BUILDING AGE

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A REINFORCED CONCRETE CHURCH IN THE BOROUGH OF THE BRONX, NEW YORK CITY

T. H. POOL & CO., ARCHITECTS

EXTERIOR VIEW SHOWING QUAINT ARCHITECTURAL TREATMENT

INTERIOR VIEW OF THE LIVING ROOM

RESIDENCE OF MR. WILLIAM ADAMS AT LAWRENCE, LONG ISLAND, N. Y.

ADAMS & WARREN ARCHITECTS, N. Y.

The Building Age

NEW YORK, JANUARY, 1910.

Pittsburg's Mammoth Office Building

(With Supplemental Plate.)

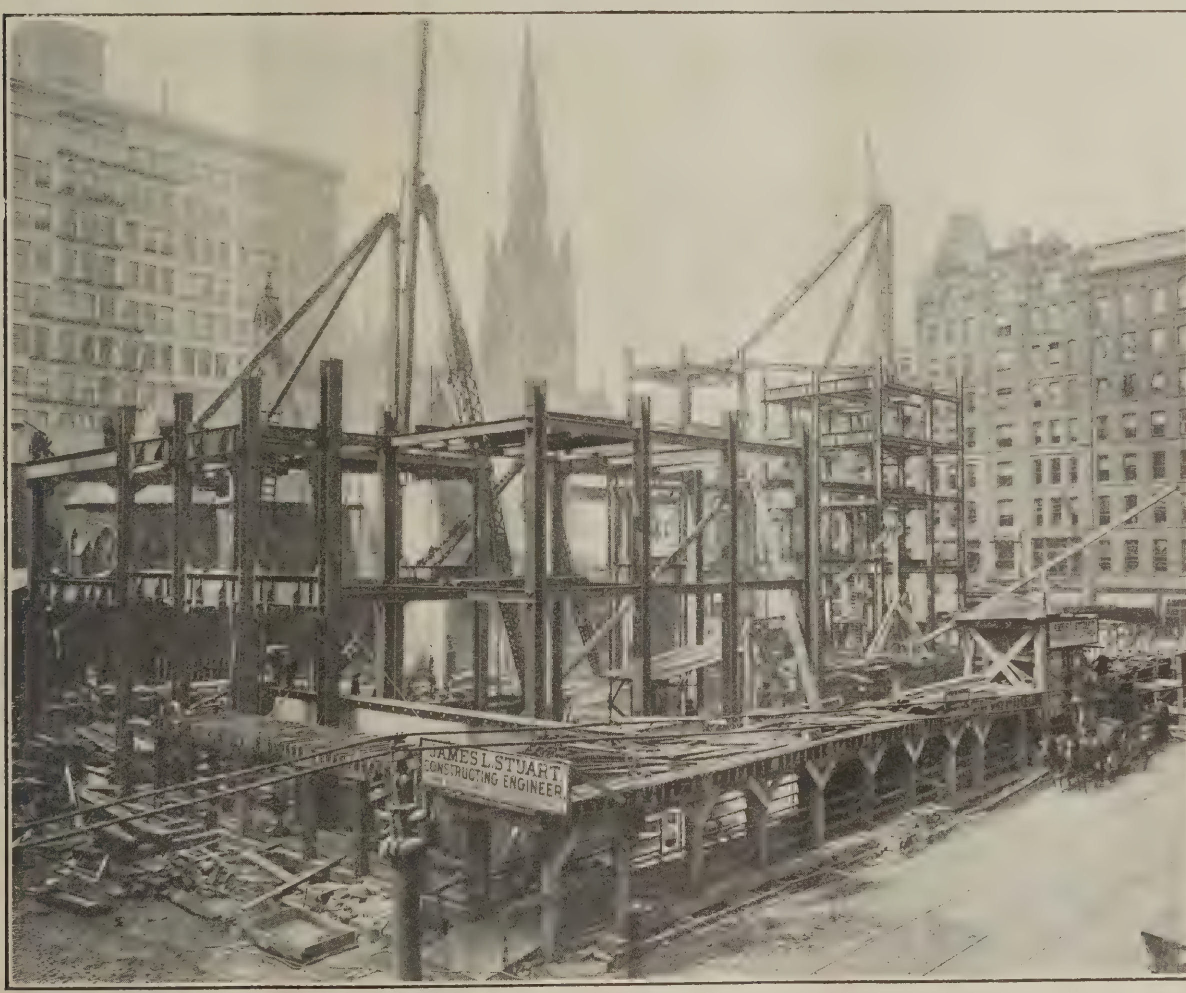
WHAT will be, when completed, the largest office structure, both as regards hight and floor area, between New York and Chicago, is the 25-story Henry W. Oliver Building, now nearly ready for occupancy in the city of Pittsburg. It has an entire block frontage on Smithfield street, with a depth of 120 ft. on Oliver avenue and 110 ft. on Sixth avenue. On the remaining side the building overlooks Trinity churchyard, so that all offices will have outside windows, giving an abundance of light and ventilation. The structure rises to a hight of 347 ft. above the curb level and extends two stories below the sidewalk.

It is of modern steel skeleton-frame construction, requiring about 12,000 tons of structural material. The first three stories of the facades are of New Hampshire pink granite, and the remaining 22 stories are covered with glazed terra cotta of a similar color.

The picture presented upon this page, showing the first few stories of the iron work in place, was made from a photograph taken April 23, 1909, and the large picture, constituting the basis of one of the half-tone supplemental plates, shows the building as it appeared September 10. It will be noticed that the steel frame work has been completed and that the encasing masonry is up to practically the 15th floor, thus indicating the rapidity with which the work of construction was pushed by those in charge.

In order to prevent injury to employees and to pedestrians passing along the streets extra precautions were taken, and in addition to the covering of heavy timbers over the sidewalks on the avenues and street, as indicated in the picture upon this page, another platform extending entirely around the building was constructed at the 19th floor. This was built of extra heavy plank, and in such a manner that it would readily catch any material that might accidentally fall. The steel used in the framework was fabricated by the American Bridge Company and erected by the Pittsburg Steel Construction Company. There are about 25,000 tons of fireproofing material used in the building, furnished by the National Fireproofing Company, of Pittsburg, while the 400 tons of enameled architectural terra cotta used for facing the upper 22 stories of the structure was supplied by the Northwestern Terra Cotta Company, through its Pittsburg representative.

The interior finish is of Honduras mahogany, with the halls and corridors finished in white Italian marble. Each floor has about 20,000 square feet of area, thus



View of First Three Stories of the Steel Framework, with Trinity Church in the Background.

Pittsburg's Mammoth Office Building.—Architects, D. H. Burnham & Co., Chicago, Ill.

giving a total of half a million square feet for the building. The locks and hardware throughout the building will be of Yale & Towne manufacture.

On each floor are toilet rooms for men and women, as indicated on the typical floor plan, presented in connection with this article. There will be a coat closet and lavatory in each office and in the corridors on each floor will be four drinking fountains, with sterilized and filtered ice water. The building will have no boiler plant of its own and therefore no smoky chimneys, the

Appearance of Site Just Before the Old Business Houses Were Demolished.

necessary heat and electric power being supplied from the Oliver power building, located about 200 ft. away in the next city square. The building will be equipped with 14 Otis passenger elevators of the plunger type and one freight elevator.

The main floor will be arranged for occupancy as banks and high-class stores, besides the city ticket offices of the Pennsylvania and Baltimore & Ohio Railroad Companies. The floors above will be devoted to offices arranged as shown on the floor plan referred to.

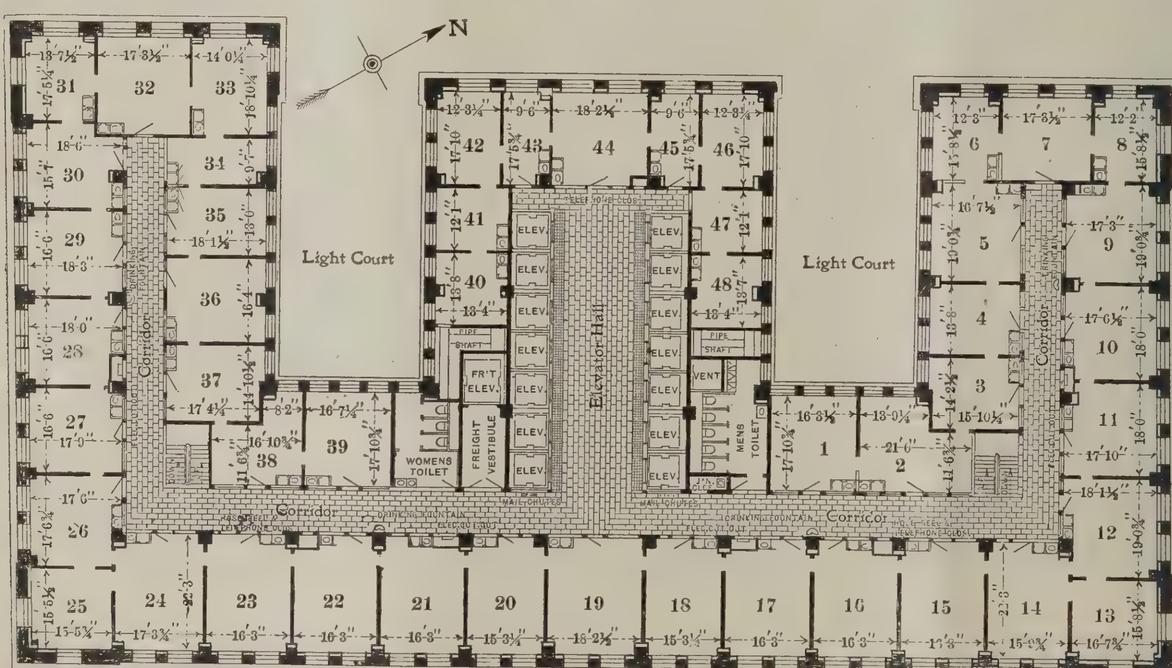
No. 433 in Col. Woods' plan of the Borough of Pittsburg. This and adjoining ground early in the eighteenth century was used by the Indians as a burial place and by the settlers during Revolutionary times. In 1812 this lot, with the one adjoining, was owned by Oliver Ormsby and by him sub-divided into a small plan of lots, with Carpenter's Alley dividing the two groups. After the Ormsby division, home building soon began on the Smithfield street lots, later giving way to the business buildings shown in the small half-tone illustration.

The construction of the new office building is being superintended by C. E. Harvey, representing the architects, D. H. Burnham & Co., of Chicago, while James L. Stuart, 341 Sixth avenue, Pittsburg, Pa., is constructing engineer. In this connection it may be interesting to note that the suspended scaffolding shown in the large picture of the building is that of the Patent Scaffolding Company, 1220 Second avenue, New York City.

Fire-Resisting Paints for Interior Woodwork

In discussing the question as to what sort of a paint is best adapted for use upon interior woodwork in order to render it as fire-resisting as possible, a recent issue of *The Painters' Magazine* presents the following: Experience has shown that paints consisting mainly of linseed oil, driers and pigment are not fire-resisting, let alone fireproof. However, repeated coatings of water glass (silicate of soda) will serve the purpose. Apply to the wood three coats of silicate of soda 33 deg. Beaumé and before the last coat has set hard, apply a thin lime wash, which unites with the silicate of soda, forming silicate of lime, which is an insoluble substance.

Another fire-resisting water paint is made as follows:



A Typical Floor Plan of the New Henry W. Oliver Building.

Pittsburg's Mammoth Office Building.

At each side of the main entrance, which will be on Smithfield street, is a granite column 7 ft. in diameter at the base and 36 ft. 5 in. in hight.

The site upon which this building is being erected is somewhat historic, and a few facts in connection with it may not be without interest at this time. The small half-tone illustration near the top of the second page shows the block of old buildings which were torn down to make way for the Henry W. Oliver Building. The ground upon which this old row stood represents Lot

Eighty pounds powdered silex, forty pounds bolted china clay and twenty pounds air-slacked lime are mixed intimately with sixty pounds liquid silicate of soda, 33 deg. Beaumé and then thinned to painting consistency. It may be colored with any earth color, such as ochre, umber, sienna or red oxide, but not with chemical colors. Two coats are necessary. If the paint is to be pure white, add in place of any color sufficient dry zinc white, using additional silicate of soda in the first mixing.

RAISING THE ROOF OF A TRADE SCHOOL BUILDING

SOME of the most interesting problems which the builder is called upon to solve relate to the alteration or remodeling of structures of various kinds. It may be that the front of a brick dwelling is to be taken out and the first floor arranged for use as a store, or perhaps the entire house is to be altered into a building for commercial purposes; possibly it is a roof that is to be raised, and another story added; maybe some portion of a structure has become unstable or unsafe from the

Raising the Roof of a Trade School Building. Fig. 1.—View of the Building as it Originally Appeared.

lapse of time in combination with hard usage, which renders it necessary to replace it with new material and, in a way, to put the building in an entirely safe condition for the purposes for which it may be intended. In fact, the multiplicity of changes in connection with the alteration and remodeling of buildings is such as to develop novel and interesting expedients, while at the same time severely taxing the ingenuity of the contractor who has undertaken the work.

A striking example of remodeling, with a view to doubling the capacity of the structure, is that of the Trades Building connected with the Hampton Normal and Agricultural Institute at Hampton, Va. In order to accommodate the increasing number of students desirous of attending classes in the various trades, it was decided to raise the roof of the present brick structure and add another story, the changes being made in accordance with plans prepared by architects Ludlow & Peabody, of New York City.

Fig. 2.—An Outside View, After the Roof Had Been Raised 70 In., and Showing It Resting on 6 x 6-In. Posts Placed 18 Ft. on Centers.

The present building is a one-story affair, as may be seen from an inspection of Fig. 1 of the illustrations. The work was done by twenty-two students and two former students of the Institute, who raised the roof 13 ft. 2 in. in four hours' actual time of hoisting, thus clearly demonstrating the practical training which students receive at this institution.

The scheme for raising the roof was something of a departure from the regular method of blocking, etc., as those executing the work made use of a hoisting trestle designed by Superintendent of Construction John Sugden, of the Hampton Institute. This trestle is shown in detail upon the following page, the drawings so clearly showing the general construction employed that comparatively little explanation would seem to be necessary.

It may be stated, however, that Fig. 4 represents a side elevation of the trestle, Fig. 5 a plan at the base, Fig. 6 a front elevation, with sections at the top, bottom and the middle of the apparatus, while Fig. 7 represents a view at the foot of one of the roof trusses, showing the arrangement at the point where the hoisting trestle was applied.

Referring to Fig. 6, the part marked "A" is a block, which, as the vertical of the trestle was raised by means of the jackscrew clearly shown, was also raised and supported at each end by a piece of 3 x 6-in. stuff resting on the base. This vertical, which is moved by means of the jackscrew in question, acts upon the roof truss in the manner already stated. New supports were required for the block for every rise of 10 in.

The section of roof raised was 35 ft. wide by 90 ft. long and the work was done in three lifts, the first consisting of 70 in.; the second of 30 in., and the third of 58 in.

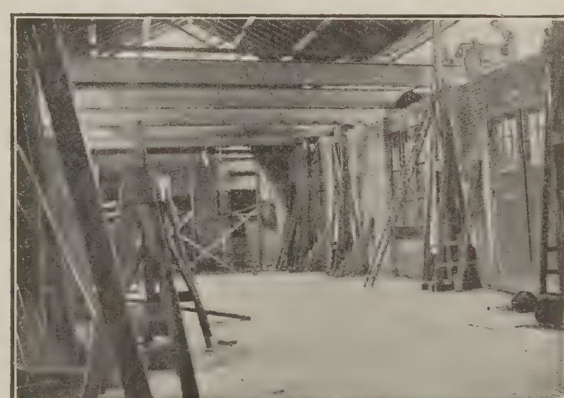


Fig. 3.—An Inside View After the First 70-In. Raise, Showing the Hoisting Trestles Supporting the Roof While the Second-Floor Iron Beams Were Being Placed in Position.

In considering the actual hoisting time, account was not taken of that required for lengthening out the hoisting posts, placing I-beams on the walls before the second lift was made, nor changing to longer posts for the last lift.

In Fig. 2 of the illustrations is presented an outside view of the building after the roof has been raised the first 70 in. and showing it resting on 6 x 6-in posts placed 18 ft. on centers. In Fig. 3 is presented an inside view after the first 70 in. raise, showing the hoisting trestles supporting the roof, while the second floor iron beams were being placed in position. In Fig. 8 an outside view of the building is shown after the roof had been raised 13 ft. 2 in. and the wall bricked up the first 70 in. The second-story window frames are also shown in position. In the last view, Fig. 9, the roof is shown raised to the desired hight and with braces fastened from the hoisting post to nailing strips on the iron beams for the purpose of guarding against wind pressure and to hold the roof in place until the walls were bricked up.

The manner in which the operation was carried out is thus described by George W. Buck, instructor in carpentry at the Hampton Institute:

We first placed 8 in. x 8 in. long-leaf heart-pine timbers under the bottom chords of the several roof trusses, fastening them with a specially-designed hook bolt, as shown in connection with the detail of the

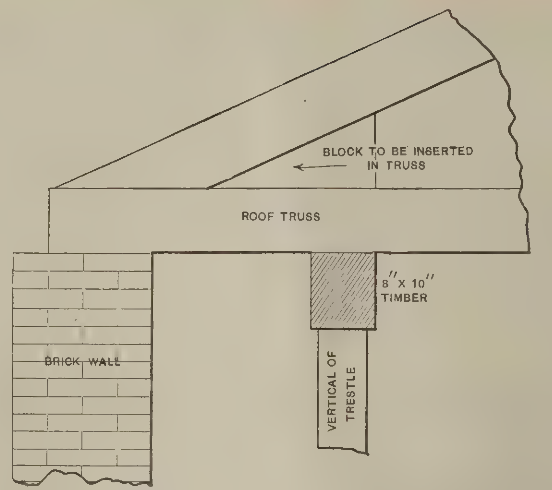


Fig. 7.—Foot of One of the Roof Trusses, Showing Arrangement at Point Where Hoisting Trestle Is Used.

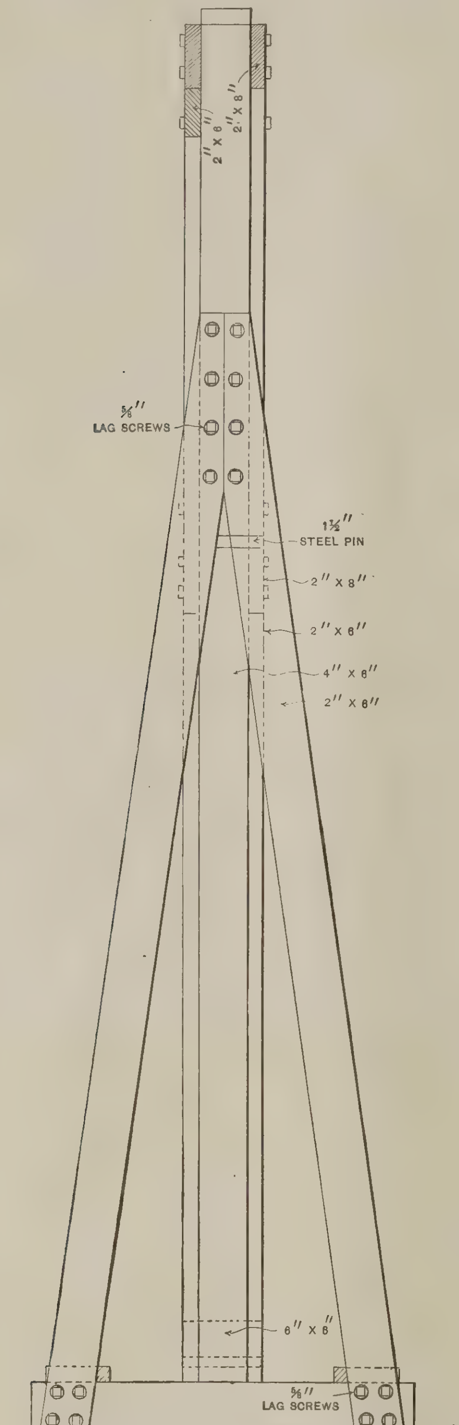


Fig. 4.—Side Elevation of Trestle.

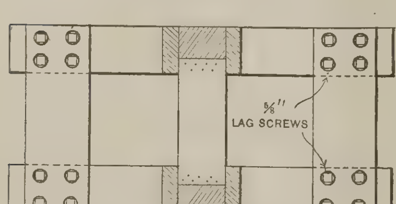


Fig. 5.—Plan at Base of Trestle.

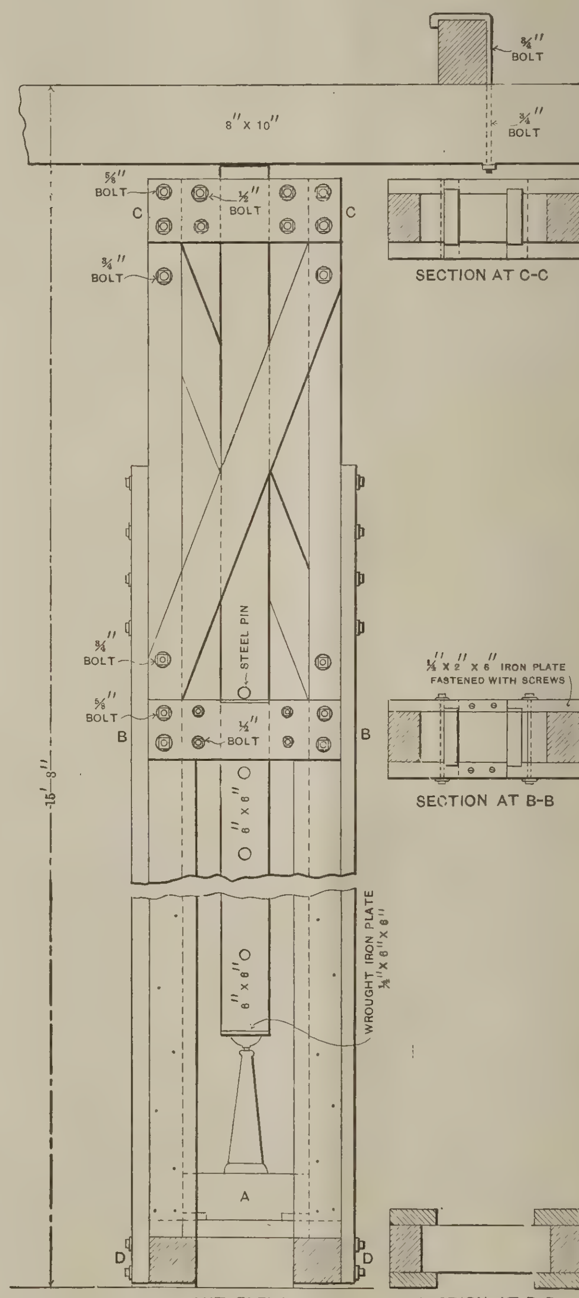


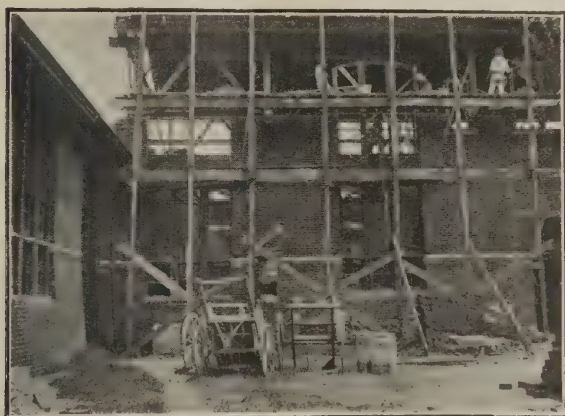
Fig. 6.—Elevations and Sections of Trestle, Showing Position of Jack-Screw and Vertical for Hoisting Purposes.

Raising the Roof of a Trade School Building.—Details of Hoisting Trestle.—Scale, ½ In. to the Foot.

hoisting trestle, Fig. 6. This permitted us to shift the timbers where needed. The 6 in. x 6 in. hoisting post or "vertical," as it is termed on the detail, was placed 12 in. to one side of the truss to leave room to put the

I-beams in the wall after the first raise was made, with all trestles in position. There were six trusses placed 18 ft. on centers, and therefore 24 trestles were needed. A plumb bob was then dropped from the center of the roof, at each end of the building, to the floor and a center mark made, so that we could at all times see how true the roof was going up.

At a given signal a half turn was taken at each jack, which was continued until the roof was raised 10 in.; then the steel pin was slipped in the hole on top of the cross support on the trestle, which held the roof while the jacks were run down and side blocks 10 in. longer



Raising the Roof of a Trade School Building. Fig. 8.—Outside View of the Building After It Had Been Raised 13 Ft. 2 In. and the Wall Bricked Up the First 70 In.

were placed in position under the jacks. This operation was continued until the first 70-in. raise was made.

The 8 in. x 8 in. timbers under the trusses were used to hoist the I-beams in place on the wall. The 80-lb. I-beams are 20 in. x 33 ft., and are placed 8 ft. on centers, framed into 15-in. I-beams over windows and doors. The nailing strip was 3 in. x 5 in., on which was laid a 3 in. x 6 in. tongued and grooved yellow-pine floor. Triplex tackle blocks, of one and one-half-ton capacity, one on each end, were used to hoist the I-beams, and by having extra long chains made we were able to pick the beams off the floor and place them on the wall. When all the beams were in place, and the wall bricked up flush with the top of the I-beams, a piece of 6 in. x 6 in. heart pine was cut to fit from the under side of the 8 in. x 8 in. to the top of I-beams to hold the roof while the hoist post was lowered, and a piece of 6 in. x 6 in. timber 30 in. long was fastened on with side pieces and bolts. Not more than two hoisting posts were changed at one time.

In the meantime, the brickwork having been built up the first 70 in., the next lift of 30-in. was made as soon as the hoist posts were pieced out, which made room to place a 6 in. x 8 in. and 20 ft. long in the trestles. This was done with the shore posts 6 in. x 6 in. on the beams to hold the roof while the change was being made. To enlarge the space in the trestles from 6 in. x 6 in. to 6 in. x 8 in., the 2-in. pieces were taken out and ⅞-in. oak put in, the change being made when the side pieces were taken off to put in the 20-ft. post.

As soon as all trestles were again ready the 2 in. x 6 in. parallel-tie braces were put on, also the 2 in. x 6 in. angle braces from hoisting post to roof truss, after which the roof was run up to the hight desired—13 ft. 2 in. When this was completed the 2 in. x 6 in. wind braces were fastened from the bottom chord of the roof truss to the nailing strip on the I-beams, making all safe and secure.

The roof was at all times under perfect control, and the hoisting post being 2 ft. from the wall left ample room for the brick mason to work on both sides of the wall when necessary. After all braces were in place the second-story window frames were set, and the brick masons had clear sailing up to the wall plate. I hope the views, etc., relating to this operation may be of interest to some of the many readers of *Carpentry and Building*, and that I have made all points clear.

In this connection permit me to say in all sincerity that the October number of *Carpentry and Building* is of especial interest. The article stating that all architects should be practical builders is very true, as we are reading every day of buildings collapsing because of poor judgment and lack of practical experience on the part of the architects. Theory is all right, but it should be combined with practical knowledge. As mentioned in your October issue, 2 x 4-in. rafters spaced 32 in. on center, with an 18-ft. stretch, would soon come to grief with a snow load, and 2 x 6 in. floor joists, even though they are bridged, are too light to be satisfactory or safe.

Insulating Concrete Buildings with Cork

A few years ago had one been told that he could take 4 in. of an up-to-date insulating material and secure equal or better results than could be obtained by the use of 12 or 14 in. of wood and air space in cold storage construction, he would have become suspicious and thought of "gold bricks," especially if it were added that this insulating material could be put up in Portland cement and finished with the same material, thus practically cutting out all woodwork. Nevertheless, such is an established fact, and by this method the cost of insurance can be vastly decreased and the building for cold storage made as nearly fireproof as is possible.

Such a material can be applied directly to concrete walls in buildings for general use, and for ceilings can be put in the concrete forms and the concrete poured directly on it. In this country, says the *Cement World*, while such materials have been used in cold storage work with great success, little or no effort has been made to adopt them for use in general building, as has been done in Europe, where great strides have been made in adopting it for insulating and isolating purposes. In all classes of buildings, such as halls, lecture rooms, gymnasiums, spinning and weaving mills and paper mills, it is being used in various ways to reduce

Fig. 9.—Inside View Showing the Roof Raised to the Desired Hight, and with Bracing to Hold Roof in Position While the Brick Walls Are Laid.

heat loss, to prevent condensation of moisture on the walls in cold weather and prevent transmission of sound, etc.

The material used in Europe is usually termed corkstone and is made of granulated cork. In this country pure granulated cork, formed into sheets, is used, as well as the German impregnated cardboard. These sheets are usually made in sheets or boards, 12 to 36 in., from 1 to 3 in. thick. They can be worked in many ways and used in many industries. They can be cut, sawed, planed, nailed to beams and built up with plaster, lime or cement mortar.

HOW THE CARPENTER-CONTRACTOR ACHIEVES SUCCESS

By J. Crow Taylor.

JUST as business men attain a certain part of their success through the faculty of being able to select good men for their associates and help, so is the carpenter-contractor's success frequently due in a measure to his faculty for surrounding himself with good men in other lines, men whom we might term his side partners. This applies, of course, to the employment of help, specifically, but the subject matter in mind is aside from that and takes into consideration all those people whose work goes along with that of the carpenter-contractor, and who have an influence for good or bad. There is the planing mill man who does the mill work, the masons who build the foundations and the walls when they are of brick or stone; the plumbers, the painters and the roofers—all of whom exercise an influence that will either help or hinder the carpenter.

If the carpenter is doing the contracting and subletting to the masons, plumbers, painters and roofers, he is of course directly responsible to the owner, and while it is to his interest in one way to sublet the work, aside from carpentry, to the lowest responsible bidder, there must be taken into consideration the difference in the work even within the specifications, because it is well known that some men can do work within specifications and yet not have it entirely satisfactory. Therefore, it doesn't matter how well a carpenter might do his work, if some of the others have not attended diligently to theirs; it reflects on the job as a whole, and to that extent injures the reputation of the carpenter-contractor. A large part of what might be termed the carpenter's capital stock in business is his reputation. This is one of the things that advertises him and helps him get other work, and sometimes to get better prices than the other fellow, provided, of course, he has looked carefully after his own work, as well as after that of the foundation builders, the plumbers, the roofers and the painters, and also has secured his mill work from a house that takes a pride in its product.

Where the carpenter can surround himself with friends in the other trades who are skilled in their calling and take a pride in their work, and who figure as closely on estimates as the less scrupulous contractor, he is particularly fortunate and should cultivate and preserve their friendship with great care. It is even worth while paying a little higher price on some of the work than it is to run the risk of damaging one's reputation.

Take, for example, the matter of buying mill work, and here the carpenter's connection is very important. There are several things to be considered. One is to find a mill of friendly disposition that can be depended on to take care of the carpenter's needs promptly, and at times to carry a part of the burden of erecting expenses until the job is completed. These things are mere conveniences. They are important ones at times, but for all that they are conveniences rather than essentials. The thing that is essential is to get mill work from an institution that takes pains with its work, carefully kiln dries its stock before working it up and does its work nicely even though it may be a simple job.

The planing mill that makes a business of sloppy or haphazard methods in getting out stock and filling orders is a poor thing for the carpenter to tie up to, even though it may offer advantages in the way of carrying the carpenter's burden and financing the work until the job is complete. It were better for the carpenter to make other provisions for financing and have mill work that he will be proud of after it is put up than to waste both time and money with poor mill work, which it takes more time to finish and put up, and of which he will be ashamed after the work is finished.

While the carpenter's mill-work connection is probably the most important one of all, the others count and a man's connections should be selected and cultivated with care. A poor roof on a good house may not only lead to damage through leaks, but gives the carpenter's reputation a black eye, even though the roofer is made responsible and repairs the defects. It means trouble for the carpenter indirectly and is no recommendation for other jobs.

It is the same thing with the painter. If he does poor work, or if he uses cheap paint that scales off in a little while and shows inefficiency or carelessness in any manner, the carpenter gets a share of the blame. He gets it directly if he is the contractor for the job and sublets the painting, but even where the contracting is let separately there is a certain indirect influence, because if the house looks bad after it is finished, either immediately or after a short period of time, it injures in the mind of the prospective builder practically every man who had a hand in the work. The same thing holds true in regard to the plumbers and masons, and even down to the excavators, who dig for the cellars and foundations. If any of them slight the work it contributes some of the dissatisfaction with the job and part of the odium therefor falls on the carpenter eventually.

So success in carpentering in a broad way depends not only on doing good work yourself and in taking a pride and live interest in your business, but also in a measure on the faculty you have and exercise in surrounding yourself with competent side partners, whose work must go along with yours. Sometimes it is easy to get this and they don't figure any higher than others, but even though they may cost more and require some difficulty to find them, it is worth while to go to some trouble about it, because they help build the carpenter-contractor's reputation just as they help build the house.

Beautifying City Homes

Some interesting comments concerning the exterior decoration of houses and apartments in Leipzig are furnished in a recent report to the State Department by S. P. Warner, consul at the German city named.

The endeavor of the people here to add to the attractiveness of their individual homes, and thus to the general beauty of the city, has been greatly stimulated by the offering of prizes for the best and most artistically decorated houses. These prizes, which consist principally of objects of art and of valuable growing plants, are offered by the Der Verkehrsverein Association, while the Leipzig City Council contributes a considerable annual sum for prizes. Persons desiring to compete send in their addresses to the association, which furnishes free illustrated pamphlets containing valuable suggestions about growing plants and flowers, and using them most advantageously for exterior decoration.

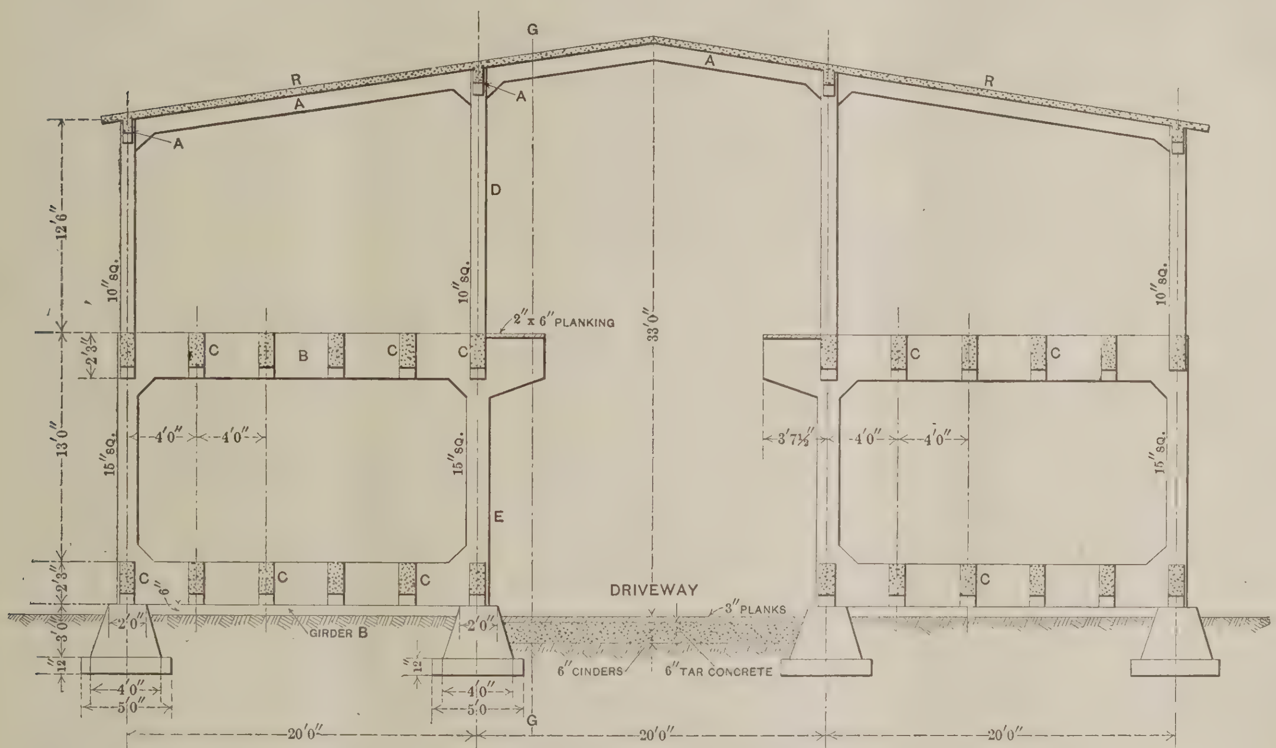
The most practicable and popular method of decorating houses is by placing artistically painted wooden boxes containing collections of variegated flowers upon the window sills. The windows are frequently entirely framed in by climbing vines. Porches and balconies are better suited for floral decoration, as large pot plants and all sorts of vines can be used. In the residential sections of Leipzig nearly every house has some floral decoration. Small, unostentatious houses thus frequently attract much attention.

A REINFORCED CONCRETE LUMBER SHED

By PAUL T. LESHER.

THE fire-resisting qualities of reinforced concrete are so thoroughly recognized at the present day that it is not surprising to find it used for every conceivable kind of building, and nowhere perhaps is it more desirable than in the construction of a building designed to house or store lumber. Not only would it be fireproof, but also wind and storm proof, and more stable in every way than would be the case if the ordinary frame construction was employed. Another advantage of the reinforced concrete is its great durability, being proof against the ravages of time and the attacks of insects and decay.

The lumber shed illustrated herewith has a row of pockets on either side of a covered driveway, the latter being an excellent feature in connection with a building of this character, as lumber can be loaded on the wagons or stored in the pockets in all sorts of weather conditions without inconvenience. The driveway is made up of 6 in. of cinders on which are 6 in. of bar concrete, this in turn supporting a flooring of 3-in. planks. In the row of second-story pockets, brackets are built out upon which 2 x 6-in. planking is laid, thus forming a platform along the front of the pockets. The beams marked "C" on the sections are spaced 4 ft. on centers, so as to facilitate the storing of the different regulation lengths of lumber.



Cross Section of Lumber Shed on Line F-F of the Longitudinal Section.—Scale, 3/32 In. to the Foot.

A Reinforced Concrete Lumber Shed.—Designed by P. T. Lesher.

The members in this shed have been calculated to take a load equal to the weight of yellow pine stored to the full capacity of the pockets.

The driveway has been made 20 ft. wide, so that 20-ft. lengths of lumber can be taken from the pockets on one side without interfering with those on the opposite side of the driveway.

The sizes of the various members of which the shed is constructed are marked on the cross sections. The roof is composed of a 4-in. slab, reinforced with ½-in. corrugated round bars 13 ft. in length and spaced 6 in. on centers. A cross section of the roof slab, also of the beam supporting it, is shown in the details presented herewith.

The shed can be built to any length desired, as the pockets are all of the same design.

Chicago in Need of Building Mechanics

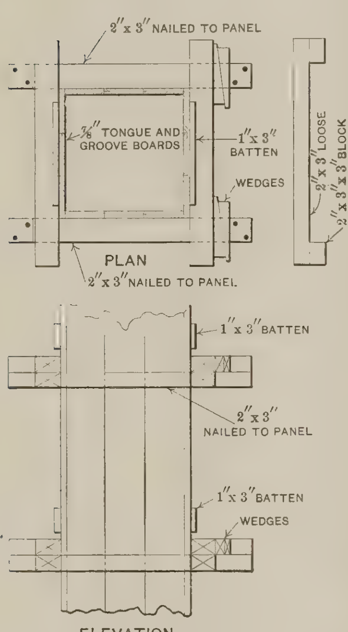
There is not a sufficient number of building mechanics in Chicago at the present time to carry forward the work as rapidly as owners and contractors wish, says the *Construction News* of a few weeks since. There is not a building mechanic out of employment at the present time, and the strong demand is likely to continue for a long time to come. It is estimated that 1,000 skilled mechanics in addition to those now employed could find steady and constant work. They could have practically anything they might ask in the way of the variety of work, and as for location, it is widely distributed throughout all sections of the city and suburbs. As to the matter of wages, nothing like the present high scale has ever prevailed, and there is not likely to be any change in the near future. Conditions in the building trades are such in Chicago that construction is going ahead continuously and without regard particularly to the season, unless it is an extremely cold winter, a thing Chicago has not experienced for many years, and then it requires extreme and long-continued cold to interrupt building operations.

In so far as labor troubles are concerned, the city is now practically free from disturbed elements with the exception of the troubles between the elevator constructors and the machinists. It is apparent, however, that the decision of Judge Grosscup, the arbitrator to whom the jurisdiction of contentions were submitted and who held that work in connection with the installation of passenger and freight elevators belongs to the elevator constructors and not to the machinists, did not settle the trouble. It is the same old question of jurisdiction. There are two organizations, one known as the new organization, the Building Trades Council of Chicago. It is a branch of the American Federation of Labor and was organized three or four months ago. It is said to be composed of the conservative elements in the building trades of Chicago and the country. Its purpose, it is said, is to avert jurisdictional contests as the constitution and by-laws provide that all disputes of this character must be settled before any other or either of any contesting organizations can become members. The other organization is known as the Associated Building Trades' Council and is not affiliated with any national organization. This organization took the place of the old building trades' council, the exactions of which brought about the great labor troubles of 1899, finally resulting in putting that order out of business in 1900.

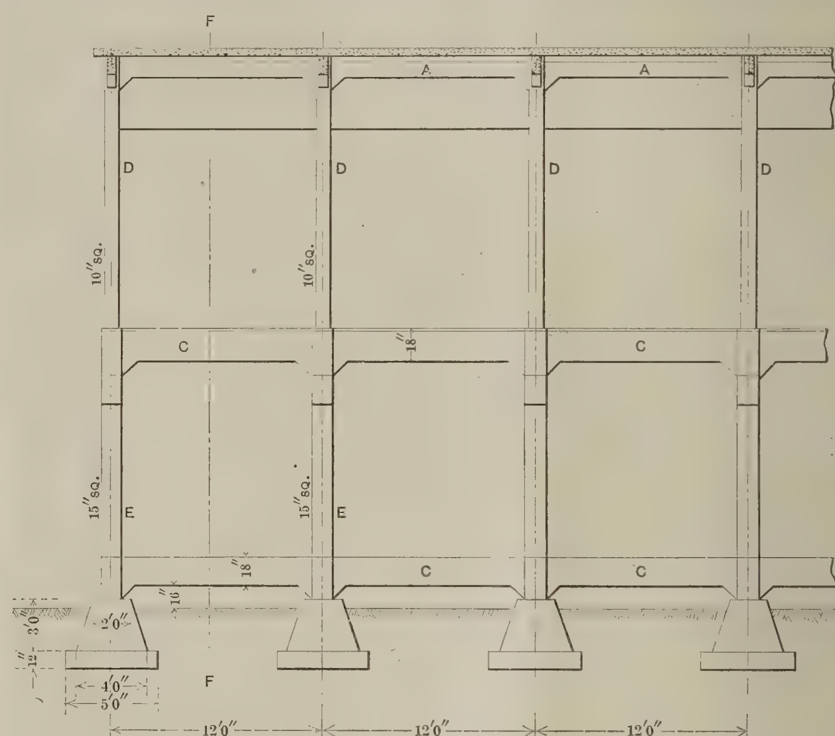
Good building mechanics are in strong demand and it is estimated by men who are in a position to know that probably a thousand more men could find employment in Chicago at the present time. It is estimated that the bridge men could give employment to 50 to 75 more men; steamfitters could use 100 more men and the same condition of affairs is true of the sheet metal workers.

It might be worth while to call attention to the wages paid in some of the lines of industry, which will be a surprise to most people for the reason that they are considered very high, and particularly so for the reason that most building mechanics have not constant employment the year round. It was generally conceded years ago that building mechanics were entitled to higher wages than other classes of workmen for the reason that their season was shorter, climatic conditions making it impossible to work longer than probably six or eight months of the year, therefore the schedule of wages would have to be higher. Notwithstanding constant employment, the scale is still high in the estimation of most people.

The prevailing rate of wages per hour in the building trades of Chicago is as follows: Bricklayers and stone masons, 67½; carpenters, 60; cement finishers, 60; drain layers, 55½; electrical workers, 68¾; elevator constructors, 65; engineers (hoisting), 70; hod carriers and building laborers, 37½; plasterers' laborers, 40; gas fitters, 68¾; gas and electric fixture hangers, 56¼; lathers, 65; marble cutters and setters, 61½; painters, 55; painters (sign), 65; paper hangers, 65; pile drivers, 50; plasterers, 68¾; plumbers, 68¾; roofers (gravel and composition), 55, 65; roofers (slate and tile), 60; sheet metal workers, 50¼; steam fitters, 68¾; stone cutters, 56¼; stone derrickmen and riggers, 46⅞; bridge and structural iron workers, 62½ cents.



Plan and Partial Elevation of Typical Column "Form."—Scale, ½ In. to the Foot.



Partial Longitudinal Section on Line G-G of the Cross Section.—Scale, 3/32 In. to the Foot.

A Reinforced Concrete Lumber Shed.

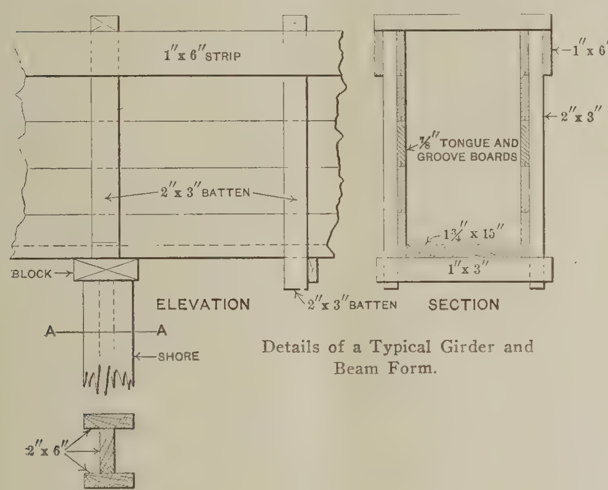
Lumber Manufacturers Take Initiative in Timber Conservation

The lumber manufacturers of the Pacific Coast have taken the initiative in an important step for the promotion of proper and conservative use of their timber supply. Practically all of the large manufacturers of lumber in the States of Oregon and Washington have entered into an agreement to manufacture odd as well as even lengths in flooring, finish and similar planing-mill products. Heretofore, it has been customary to manufacture these products in even lengths only, and a considerable portion of the lumber which came to the shaping machine was wasted. Now, it is proposed to trim the manufactured lumber to lengths of odd numbers as well as even numbers of feet.

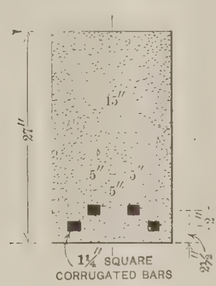
Considerable opposition to this innovation has arisen among retailers and consumers. The retailer contends that it is impossible for him to dispose of odd-length material because of the common practice in the construction of wooden buildings, claiming that the initial saving of the manufacturer is transferred to the consumer. This is denied, however, because of the proportionally small amount of odd-length material which will occur under the new system, and because of the latter-day practice of laying sub-floors of rough lumber and sheathing on the sides of the house before putting the finishing material in place.

Because of the conservation element which enters into this question, the United States Forest Service has been recommending the adoption of odd lengths for some time past. The Portland office of the Service has recently made an investigation of the actual amount of unnecessary waste incident to the manufacture of even lengths only, and these figures show that under the old system the refuse burner consumed about two per cent. of the total amount of the important forms of planing-mill products which are manufactured from Douglas fir and other important forest species, in the States of Oregon and Washington.

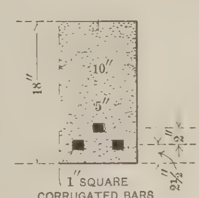
When it is considered that about 750,000,000 feet of planing-mill products are manufactured annually in the two States mentioned above, this two per cent. assumes important proportions. The Forest Service is authority for the statement that 15,000,000 board feet of high-priced lumber can be saved annually in Oregon and Washington by the manufacture of planing-mill products into lengths of odd feet as well as even. It would require the yearly growth of timber on approximately 30,000 acres of average timber land to produce the amount of lumber which this annual waste represents. The manufacturer is convinced that the waste is unnecessary. His greatest trouble now lies with a similar conviction on the part of the consumer, that odd lengths can be used as economically as even lengths.



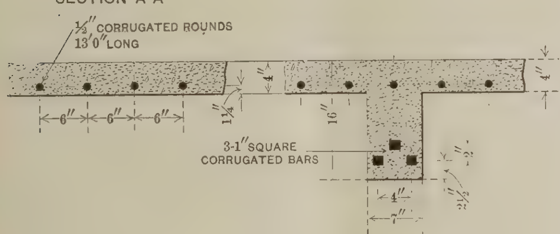
Details of a Typical Girder and Beam Form.



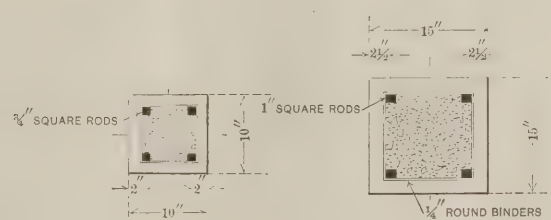
Cross Section of Girder "B."



Section of Beam "C."



Section Through Roof Slab. Section of Beam "A."



Cross Sections of Columns Marked "D" and "E."

A Reinforced Concrete Lumber Shed.—Details.—Scale, ½ In. to the Foot.

Competition for Centerpiece at Cement Show

The competition for a design for an ornamental centerpiece, to be erected at the third annual cement show, was successfully closed on December 1. A large number of most interesting and attractive designs were submitted from all portions of the country, architects of repute, engineers, contractors, sculptors and designers from New York to San Francisco participating.

The jury which passed upon the designs was composed of three members; the appointee of the Chicago Architectural Club being Thomas E. Talmadge, of Talmadge & Watson, architects, Chicago; while the Cement Products Exhibition Company, which conducted the competition, appointed Hugh M. G. Garden, of Schmidt, Garden & Martin, architects, Chicago, and Murdock Campbell, Building Commissioner of Chicago. The judges met on December 3, and after a careful study of the drawings, awarded the prizes as follows:

First prize, $200, to Wilbur Karl Howenstein, Chicago.

Second prize, $100, to Ernest V. Price, Spokane, Wash.

Third prize, $50, to George Aswumb, Chicago.

The design chosen for first prize, which will, in all probability, be erected, represents a monument of large proportions to the cement industry. It is composed of a gigantic pedestal, ornamented with figures in relief, supporting a shaft some thirty-five feet high, the whole surmounted by a figure of heroic size, typifying the strength and durability of concrete. The four sides of the base were decorated with plaques, the upper part being a briquette shield, and the lower portion a design representing the four ages of mankind, namely, the Stone, Bronze, Iron and Cement Ages.

The design which drew second prize was a very attractive fountain. An eight-sided base contained a pool, in the center of which was a large monument, surmounted by a bracket and ball. The total hight was about twenty-five feet.

The third prize design was a combination monument and fountain, with a round base.

Remodeling an Interior Door

It sometimes happens that an interior door is to be changed, say from a plain four-panel to a six-panel affair, and instead of retaining the wood in all the different parts the top panels are removed and leaded panes of glass are inserted. The leaded panes may be either diamond shaped or in small squares, or they may be rectangular and set in with the longer ends running vertically in the space available.

A veranda door may also be remodeled into an attractive entrance by making the upper section with a dozen glass panes and the original cross section of wood studded with little pegs of wood or wrought-iron nails. A rich black iron handle or knocker will set off the whole to advantage.

Work on the new 20-story office building, which will rise on the northeast corner of Broadway and Forty-second street, Borough of Manhattan, N. Y., will commence next May, and one of the features will be a subway entrance in the new arcade. At present the two subway entrance kiosks occupy practically all of the sidewalk at that point and greatly interfere with sidewalk traffic.

BOOKKEEPING METHODS FOR THE BUILDER

SUPPLEMENTING the very interesting discussion which appeared in our last issue relative to office methods of keeping track of the cost of jobs and of the date pertaining thereto, so that it will always be convenient for reference whenever speedily required, we present herewith a communication from Maxson & Co., Westerly, R. I., in which is outlined at some length the system of bookkeeping they employ in their business for the purpose named.

Relative to the best methods of bookkeeping for a building alteration and repair business, we beg to say that we have had a great deal of experience in these particular lines and therefore have been compelled to give the matter considerable serious study. We confess that while we have evolved a system that seems fairly satisfactory, yet there are at times conditions for which it is next to impossible to adequately provide. Our system is the same for all work, whether entirely new or in the nature of alterations or repairs; that is, we follow exactly the same system with every piece of work we are called upon to do no matter how small or unimportant it may be. In our own particular case the matter is somewhat complicated, from the fact that we combine three different lines of business—analogous but usually distinct; namely, the building business, the lumber business and the mill or shop business. These may well be considered as departments in our case, but we keep an account with each line of business; that is, if the mill requires stock the foreman of the mill issues a requisition or an order on the foreman of the lumber yard for whatever he wants, just the same as if he was ordering of some outside party. The stock is delivered to the mill, charged to it and entered on the general books of the firm the same as we would charge it to an individual. The same is true if the mill does any work for the yard or for the building end of the business.

Charging Profits

This is necessary in order to determine the amount of business that each branch has done during the year, and to determine whether it is doing a safe and profitable business. In making the charges from one department to another, we charge just enough profit to know that we cover the cost, say perhaps a dollar per M on material above the actual net cost. The lumber superintendent complains bitterly that he is not able to make a favorable showing, as he is compelled to sell the great bulk of his lumber to the building or mill department, at practically no profit. From his standpoint his contention is true, but we cannot reasonably charge but one profit, and the department furnishing the material to the consumer is the one that gets the benefit of the profit. This is one of the contingencies to which we allude above as not working out to just the satisfaction of everyone concerned, but the objection would be obviated if all three lines of business were combined in one and not kept separate. Nevertheless, we believe there is a considerable advantage by holding each department responsible for its own particular line. All of the above has seemed rather necessary to state, in order that it may be known just how we are situated.

Before leaving these general matters we want to mention one feature which we follow out persistently, and which we believe prevents a vast amount of trouble and misunderstanding. Whenever the lumber department delivers any material to a job or to any person, whether a regular yard sale or for our own work, a charge slip is made out in triplicate, the original copy being sent with the team for the information of the purchaser, from which he can check up the stock and know what he has received, and whether or not his order is complete. The second one is also sent along by the teamster to be signed by the foreman on receipt of the stock. If there is no one to receive and sign for the delivery, then the teamster himself has to sign it. This is brought back and turned in to the office as the charge slip. The third copy is retained in the salesman's own book. We find that this receipt at the bottom of the second copy is most valuable at times. We have had people who disputed purchases, but the display of a sales slip, with their own signature to it, usually resulted in shutting off all argument.

The Mill Work

Now, as to the more specific information asked for by the correspondent. We will first take up the mill work. Nothing is allowed to be made in the mill except that an order in duplicate is issued from the office, no matter how small the job may be. Each person in the office who issues an order has his own order book, indicated by a letter, and the orders are made in duplicate, the original going to the foreman of the shop and the duplicate retained in the book. This order is numbered and bears the letter of the one who issues it. The foreman then proceeds to have the work gotten out and a careful account is kept each day of the time expended on that particular job, and of any material furnished in connection with it. If the job is a short one and consumes, say, an hour or ten hours, but is completed within a day or so, the whole account would come in altogether; but if the job is strung along for an indefinite period, sometimes, perhaps, for weeks, the items of time and material are rendered each day, the time being taken from the workman's time sheet and assembled on the form which we have for this particular purpose, and which is added up as occasion requires, so that it becomes a stringing account, sometimes several feet in length, but is kept open until the job is reported completed, when it is figured up and properly entered on the books and filed away for future reference. From this it will seen that a careful cost is kept of every item that goes to make up that particular job.

If articles are required that are not furnished in the shop, as, for instance, the bolts or iron work necessary to the construction of a tank or any hardware not furnished by the shop, or anything of that nature, a sales slip is made out just the same and sent in from whatever source it emanates and is charged up against that job. This looks like a whole lot of bother and trouble, but once installed it does not prove so, while it does give us a careful account of everything, and we do not know of any other way that an accurate cost can be kept.

The Cost of the Work

We are satisfied that the general run of builders do not know what their work costs, and they are puzzled to know sometimes why they have not made a profit instead of a loss. After installing some of the systems which we have, we were amazed to find that we were figuring a lot of items at less than we have ever been able to produce them since—articles like window frames, for instance, or any other part of house finish that is usually figured by the piece. By knowing the average cost of the various parts of the work, like stairs, one can often estimate approximately when necessary with quite a degree of accuracy, and a general idea of cost is thus gained.

By keeping the cost of each house, we find we have gained an experience which, by taking the square feet of floor surface, enables us to give an architect a very close estimate of the value of a house. We have gotten this down so fine, in the course of a number of years' experience, that when pushed for time to estimate, we have occasionally taken jobs based on what might be termed a "square foot estimate." Of course, one's general experience enters very largely into this plan, as in some cases the entire omission of plumbing, heating, painting or any other feature of the work makes a decided difference.

On our outside building, whether in the nature of new work, alterations or repairs, we keep an account with each job, and charge directly to each job everything furnished to it, just the same as would be done if the items were simply purchased by an individual. It might be stated, however, that a particular system of arrangement facilitates the work both when entered and also for future reference. For instance, we keep what we call a "Recapitulation Book," and on the same page may be entered a dozen different items, under separate columns, such as "Batter Boards," "Framing," "Raising," "Shingling," "Laying Floors," "Excavations," etc. From this we can tell at a glance just how much each feature of the work has cost to date. The foreman of the job is required to use a time sheet with the various headings on it and to indicate thereon the amount of labor that each workman has spent on each particular branch of the work. Sometimes a workman during the week will have worked on six or eight different branches, but his time shows how much is expended on each one. At first this looked like a great bugbear and the men were reluctant to adopt it, but we had very little trouble in inducing them to fall in with it and follow it out, so that after a very short time no questions were ever raised regarding it.

The Cost Per Square

From this we are able to know just what it costs per square to lay various kinds and thicknesses of flooring, of shingles per M, or in fact of any other feature entering into the construction, alteration or repairing of a building. This enables one to have a feeling of confidence in his estimates, and time and again we have been told by architects that our figures were, in their judgment, nearer correct than almost any other bidder. Of course, in the majority of cases, we are not the lowest, nor would we want the job at the price of the lowest. We quite often land in the midst of a number of bidders, but whatever the others figure we believe our figures to be pretty nearly what the job is worth.

From this system of costs we are enabled to figure the mason work, painting, etc., ourselves, and this is certainly a great advantage. In some cases we let out the mason work and in others we do it with our own gang, being governed entirely by the condition prevailing in the town where the work is located, but it enables us to know whether we are paying too much for a job and whether to let it out, or do it ourselves. If we find some fellow who is anxious to do the work at a price not too much less than our own figures, we are quite apt to give him the job, but it also enables us to know whether he has figured too low or not. We do not find it fair or even policy to let a job to one who has figured it very much less than our figures, as it usually leads to complications and would not be just to the fellow himself. We frequently turn down bids that we consider too low. One reason for this is that our own particular line of work is of a high order, and is maintained that way as a business principle.

Following our system along a little farther, we require the foreman to send in the time of his job—weekly—up to Friday night of that week. That enables us to make up the pay-roll by Monday night following. If the job is away from home and shipments are made to that job by rail, or if local purchases are made, the foreman is required to send in twice each week stock sheets showing just what he has received and from whom. For instance, if a carload of lumber, shingles, lime, cement, or even a small shipment is made by rail, or if he has to supply his immediate necessities by local purchases, he so reports on these stock sheets. This enables us to check up his quantities and know constantly what he has on the job, and also whether the same corresponds to the invoice received from the shipper, and also if the stock has actually been received or has gone astray. By this system we can keep close tab on everything sent to the job.

The above is an outline of how we handle those matters. Pardon the length to which we have found it necessary to write in order to give a clear understanding of the matter, so far as relates to our own particular methods. We fear, however, that we are not giving your inquirer, even now, any information that will be of much value, as almost every business has to develop and install methods which it has found to meet its requirements, but where most builders fall down entirely is in not having any particular methods. Records kept in a form easily accessible at any time are of great value.

The Card System

One other thing we might mention in our rambling comments is the value of a card system of information of every possible kind. For instance, if we receive the address of some one who has a new system of waterproof concrete, or has invented some new metal corner bead, or anything that we are likely to ever want, we index it in our card system. We also keep a list of mechanics and tradesmen of every kind that we are ever likely to desire to reach. All of our catalogs are preserved in files and indexed in this same card system, both under the firm's name and under the particular articles shown in the catalog. We also keep quotations and all sorts of data, which we find of great value. We have a separate card system in which we enter all plans and specifications received, stating on the card whether by mail, express or personal delivery, what job, with date of receipt, etc., and the same information when plans are sent away. We find this of great value to us at times when architects ask for plans to be returned, when such has already been done.

In reviewing the above, we see that we have wandered far and wide over the general subject, but many times this other information is what a person wants and what is quite frequently left out. We hope, however, that from our rambling comments the correspondent may be able to extract some few hints that possibly may be of value.

A Special Estimate Blank

We might perhaps mention one other feature which we have found of value, and that is the use of a specially prepared estimate blank, on which is entered every possible item likely to be required in ordinary buildings. Each line of the estimate is numbered, and the location always being the same on the estimate, one knows just where to look for the item sought, and this is often quite a saving of time and annoyance. We are always glad to show these things, even to our closest competitors, as we believe it is of greater advantage to us to have them figure accurately and not leave out something important when competing against us, than it is to keep the benefits of our system to ourselves. It is always easy enough to figure a job *too low,* by leaving out something, but with a properly devised blank one is less likely to omit an item.

We have found the estimate blank as used by us lacking in a few points only, but probably it might not fit the business methods of another, as perhaps no two concerns or individuals figure on exactly the same basis. For instance, we usually figure every item in a building, excepting the plumbing and heating, and sometimes find it necessary to even approximate these. We know that most builders figure one branch only, applying to others for bids covering their respective lines; that is, a builder will secure a figure from a mason, a plasterer, a painter, etc., and combine these with his own figures covering the carpenter work. The carpenter will also get a figure from the millman, so that it leaves comparatively little for the contractor himself to figure. With us it may be interesting to state all of these items are figured.

Our willingness to share with others any good features that may have appealed to us is simply through a desire to uplift the trade in general and get it on to a safe and permanent basis. Bradstreet and Dun tell us that 95 per cent. of business men are unsuccessful. If that is so, and apparently it is, there must be some reason for it. They do not say that 95 per cent. *fail,* but that they are unsuccessful; meaning that they have to go out of business, either through failure or liquidation, and this necessity, of course, must be from an inability to make a profit.

In our judgment there are various reasons for this, such, for example, as a lack of education, of business training, of principle, of personality and the like, but more than all a *lack of knowledge of the cost of things.*

As we are not discussing the success or failure of man, we will confine ourselves to the one point of lack of knowledge of the cost of various items entering into the construction of a building. There is no great difficulty involved in figuring a job low enough, as ordinarily the leaving out of one important item will accomplish it, and we think inquiry will elicit the information that there are very few builders who would not have to plead guilty to this charge.

Some years ago, perhaps 10 or 12, you published what you called a "Tickler"—a list of items entering into the estimate of a building simply as a reminder to the builder in order to prevent his omitting anything that should have been included. We should be very glad to assist in any way possible in placing the business on a better basis.

Class in Estimating at Toronto Technical High School

In connection with the course in architecture and building construction at the Technical High School, in the city of Toronto, a class in estimating has just been added, under the direction of W. R. Fraser, a quantity surveyor, who has had long experience both in Scotland and Canada. The class is not confined to the members of the course in architecture and building construction, as those who have the necessary mathematical foundation are permitted to take up estimating, which it is intended to make as practical as possible, and have the course include an outline of a uniform system of taking off quantities.

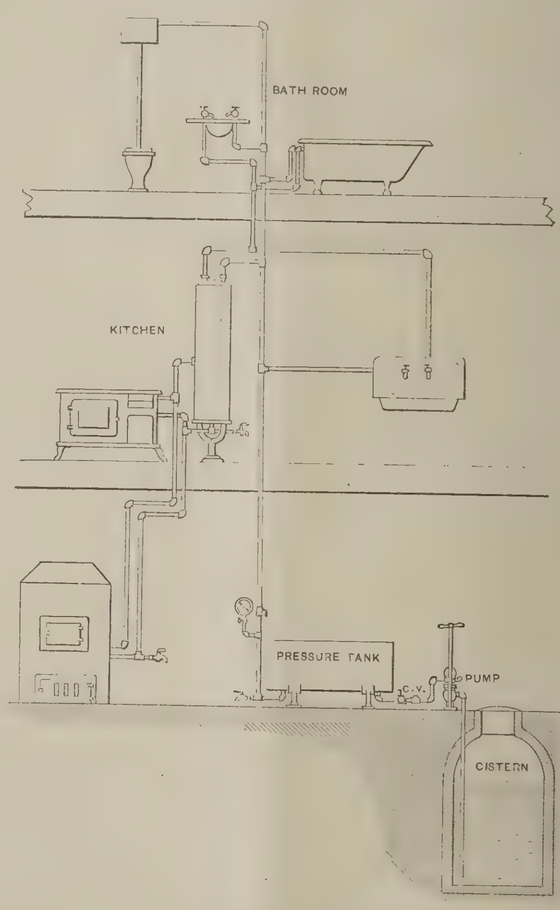
When the students are sufficiently advanced they will be required to make estimates from blue-prints of buildings which have been actually constructed. The quantities will be taken off by the students in the classrooms and they will be required also to make out bills of materials, etc. Price lists will be used for figuring costs in exactly the same manner as if the students were figuring actual contracts.

At present the class meets every Thursday night, but should necessity arise it may be increased to twice a week. The department of architecture and building construction is under the direction of W. S. Kirkland, who is director of the Industrial Arts Department.

Private Water Plant for Isolated Dwellings

It is a well-known fact that owners of vacant property are not infrequently deterred, temporarily at least, from improving the sites by the erection of modern dwellings, owing to the absence of a convenient water supply for the various plumbing fixtures. Although in some localities a policy of procrastination may be found, the most sensible course to pursue in such cases, at least until some substantial indications of public improvements are visible, says the *Record and Guide,* is to resort to the use of a pressure tank or boiler in connection with a well or cistern, as shown in the accompanying diagram.

As will be noticed, the piping to the several fixtures is run in the customary manner, in fact the arrangement is the same as if the supply of water was from the city mains. It is obvious that a pump of sufficient size will be required to lift the water from the source of supply and force it into the pressure tank. In this connection it may be said to be advisable to employ a small triplex power pump to do the work, particularly since the cost of operation is small. Between the pressure tank and house system a pressure gauge should be introduced, as well as a stop cock. In addition to this the owner should see to it that the fitter places a draw cock at the bottom of the tank or immediate connections. One of the important fittings to a system of the kind described is a check valve, which must be connected between the tank and source of supply in order to prevent



Private Water Plant for Isolated Dwellings.

the water from returning after it has been pumped into the pressure tank or receiver.

The diagram shows connections for a complete hot-water service which will give satisfaction under trying conditions, although there will be found some difference in opinion as to the best method of piping for service of this kind when two heaters are to be used, such as the coil in the furnace and the water back in the range, some preferring that all the water circulating shall pass through both heaters.

The compressed air system is not new; on the contrary, it has been in use for a decade or more, and in most instances, where properly installed, gives complete satisfaction, affording as well excellent protection from fire and in addition providing a reliable means of regulating the pressure of water at all faucets.

REINFORCING WALLS OR PIERS WHICH HAVE FAILED

VERY often the builder is called upon to straighten or reinforce the walls or piers of a building which have become bulged, twisted out of place or possibly fractured by reason of a variety of causes. Sometime it is due to settlement through the presence of soft spots in the area of the site of the building, thus permitting the footings to become more or less displaced; sometimes the trouble is due to overloading of floors and then, again, it may be traceable to bad construction. Various, therefore, are the means required for overcoming the difficulty. A simple and inexpensive remedy calculated to render the building stable and safe without going to the trouble and expense of shoring, needling, demolishing and rebuilding, is illustrated in the sketches presented herewith.

Take, for example, the case illustrated in Fig. 1. Here we find the front 12-in. wall of an old store and loft building badly bulged at the second and third stories through over-weight of the floors. The difficulty was overcome by placing against each front pier and the wall between, as well as in the center of the piers, channel beams which were drilled for one one-inch tie

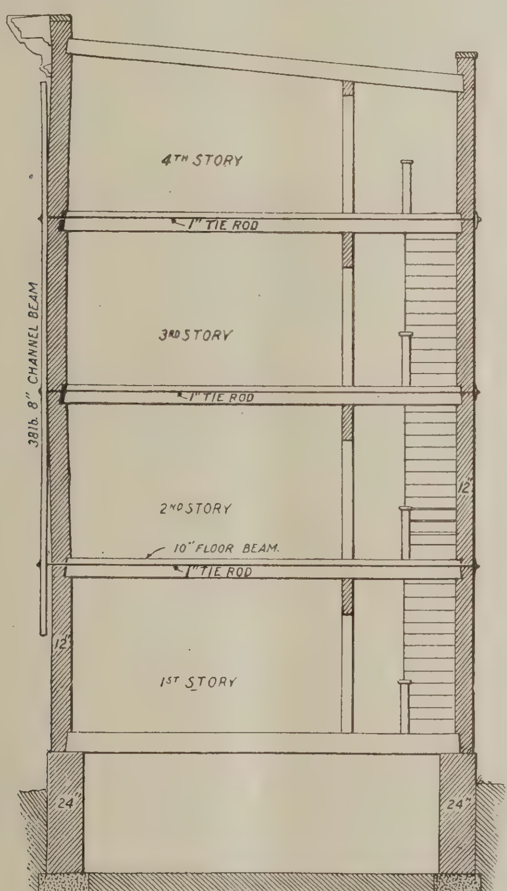


Fig. 1.—Verical Section Through Building, Showing Method of Securing Channel Beams to the Bulging Front.

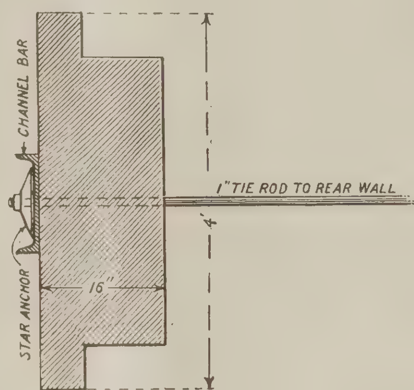


Fig. 2.—Detail of Tie-Rod Connection.

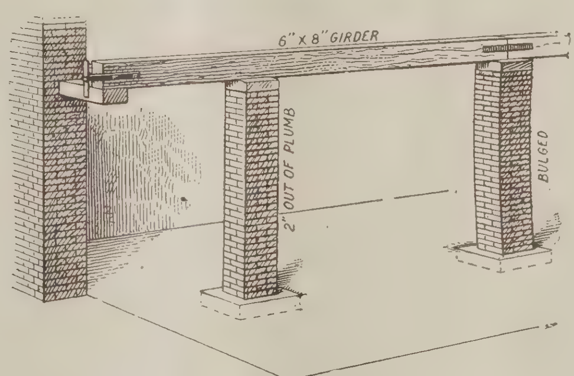


Fig. 3.—A Row of Brick Piers Out of Plumb.

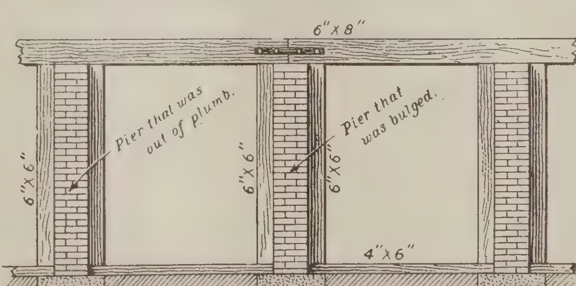


Fig. 4.—Manner in Which the Brick Piers Were Reinforced.

Reinforcing Walls or Piers Which Have Failed.

rods and Star anchors. The tie rods were placed through the front wall between, or across and notched into, the floor beams, then through the rear wall, where similar Star anchors of larger area held them in place. A general idea of the arrangement may be gathered from an inspection of Fig. 1, while Fig. 2 is a horizontal section through the front wall, showing more in detail just how the tie rods and Star anchors were used.

With a man stationed at the end of each rod and all acting in concert in carefully turning up the nuts tight against the Star anchors, the channel beams were made to exert a vertical pressure on the front wall of the building and to gradually draw it back into plumb without serious possibility of injury. When made safe and secure from a constructive standpoint, the channel beams were covered with sheet metal to form pilasters, after which they were painted to match the brick and stone details, thus producing a decorative effect.

In Fig. 3 of the sketches is represented a case where a line of brick piers in a flat-house or dwelling has settled so that they are out of plumb, thus rendering the construction unsafe. To shore up the girder and rebuild the piers was obviated by the simple expedient represented in Fig. 4 of the sketches, where a reinforcement of yellow pine timbers was introduced in the following manner:

A line of "sleepers" or 4 x 6 in. floor timbers was cut in tight between the piers and resting on the concrete floor. Reaching from these to the bottom side of the fore and aft girder 6 x 6 uprights were driven into place with mauls, each upright being ¼ of an inch longer than the neat hight. Needless to say, the power exerted by these shores or uprights was so great that the girder was lifted clear of the cap stones of the piers and then wedged up tight from the cap stones.

Earthquake-Proof Houses

In order to protect their homes from earthquakes, many of the natives in the territory around Chilpancingo and other towns in the State of Guerrero, Mexico, live in trees, says the Kansas City *Star*. Some of these tree homes are of large size and are ingeniously constructed. Reeds and grasses are interwoven with the twigs and branches of the trees, much in the manner that a bird builds its nest.

The strongest wind seldom loosens these houses from the tree. Where the trees are large and stand closely together, houses of two and three rooms are frequently built in their branches. These houses also afford protection from the "tigers" and other wild animals found in that region in large numbers. It is claimed that a "tiger" will not attack its prey unless it is upon the ground. The prime object of elevating these houses into the trees, however, is to keep them from being shaken down by the severe earthquakes which visit the Guerrero territory at frequent intervals.

The rocking of the earth gives the trees a swaying motion that does no damage to the houses. In some localities whole villages of these tree homes are to be seen. None of them suffered damage from the recent earthquakes which wrought such ruin to the buildings on the ground.

Convention Minnesota State Association of Builders' Exchanges

One of the most important meetings in the history of the organization was the eighth annual convention of the Minnesota State Association of Builders' Exchanges held at the headquarters of the Builders' Exchange, in the city of Minneapolis, on Wednesday, December 8. The meeting was called to order by President J. W. L. Corning, who then delivered an address of unusual interest. He pointed out that the present membership is 574 and efforts are being made to exceed the 600 mark before the elapse of another year. He reviewed the history of the organization for the six years it has been in existence and referred especially to the great benefit resulting to local associations and to the active co-operation existing on their part throughout the State.

The subject of trade schools and the education of young men along industrial lines was dwelt upon at some length, and favorable reference was also made to the manual training department of the Stout School at Menominee, Wis., and the Schelde School at Litchfield, Minn. He suggested that the committee on industrial education be made a permanent committee. Favorable mention was also made of the fact that the State board of control now opens bids in public and at the stated time.

Industrial Education

The committee on industrial education reported that the question of seeking a legislative appropriation for extending manual training for mechanical lines had been deferred. The statistics showing the increase in manual training in the high schools of the State were offered, indicating the tremendous impetus in this direction which the movement has received. It appears that in 1909 there were 84 schools, with 4233 students, as compared with 63 schools and 3182 students the year before, and 17 schools, with 2039 students, in 1907. The chairman of the committee in presenting the report urged the development of public opinion in behalf of trade schools, and suggested that the association should be in close touch with the national body for the promotion of industrial education.

The Noonday Banquet

Something of a radical departure in convention matters was a noon-day banquet, and after the morning session the delegates adjourned to the West Hotel, where a "spread" had been provided by the committee on entertainment consisting of H. M. Carpenter, J. A. Tyler, Harold Johnson and A. J. Archambo. After the good things provided had been duly considered, President Tuthill, of the Minneapolis Builders' Exchange, welcomed the guests and introduced the various speakers. The principal address was that of George M. Gillette, touching the progress of the commission on the employers' liability and employees' accident compensation acts.

Resuming the regular business session the committee on resolutions presented its report objecting to the burdensome conditions following the strike of switchmen in the Twin Cities and at other points in the Northwest as working a hardship on employer and employee, and protesting against the attitude attributed to the State Labor Commissioner in public interviews. The matter of receiving bids after the time for opening bids on work and permitting the late bidders to figure against the low bidders on the original competition was also objected to. Resolutions of thanks were extended to President Corning, to the Minneapolis Builders' Exchange, to Secretary Williams and others.

The election of officers resulted in the following choice:

President............J. W. L. Corning, of St. Paul.
First Vice-Pres.......S. G. Tuthill, of Minneapolis.
Second Vice-Pres.....A. Anderson, of Duluth.
Third Vice-Pres......J. B. Nelson, of Mankato.
Fourth Vice-Pres.....O. H. Olson, of Mankato.
Fifth Vice-Pres.......A. B. Blodgett, of Faribault.
Sec.-Treas........... A. V. Williams, of St. Paul.

It was decided on invitation of the Duluth delegation to hold the next convention in the city of Duluth, after which the meeting adjourned.

Concrete Piles in Pier Construction

Owing to the presence of teredo, reinforced concrete piles were used by the city of Santa Monica, Cal., in the construction of a pier extending 1,600 feet into the Pacific, the chief purpose of which is to carry to deep water the sewer outlet from the electrolytic sewage purification plant, says a recent issue of *Cement Age*. The piles, which range from 14 to 72 ft. in length, the smaller ones being 14 and the larger 22 in. in diameter, were molded in an upright position near the site of the pier and allowed to season about three weeks before use. After completion and inspection, the piles were coated with one part of neat cement and six parts of water.

Each pile was reinforced with from 6 to 8¾-in. to ⅞-in. steel rods placed 2 in. from the outside of the pile and tied together every 3 ft. longitudinally with No. 14 wire. The piles were provided with a bulb point, and the lower ends of the reinforcement were splayed into the bulbs and the upper ends carried 28 in. above the head of the pile to mesh into the reinforcement of the girder and strut.

Each pile contained a 2-in. water pipe in its center, furnished with a coupling in the head for a hose connection, water being forced through this hose in the sinking of the pile. After sinking, these pipes were filled with cement. Each pile was sunk between 16 and 20 ft. into the sand.

Each trussed bent was composed of three piles spaced 13 ft. 6 in. between centers and capped with a reinforced concrete girder 35 ft. long. The several bents were connected by a reinforced concrete strut in the line of each longitudinal row of piles. The bents were spaced 20 ft. apart.

To protect the concrete piles against floating timbers or logs, each is enclosed in a steel jacket extending 3 ft. above and 6 ft. below mean low tide; these being coated with an asphaltic preparation.

A PHILADELPHIA HOUSE OF THE TWO-FAMILY TYPE

THE plans and elevations which we present herewith relate to a dwelling designed to be occupied by two families, the arrangement being such that while all bed-rooms are conveniently accessible to the bathroom, they are isolated from the living portion of the house by means of a sliding door. A careful inspection of the plans will also render obvious other features likely to command attention. According to the specifications of the architect the cellar has a height of 7 ft. in the clear, and the cellar floor is of cement laid on broken stone.

The foundation walls are 18 in. thick, constructed of local stone laid in cement mortar, beginning 5 in. below the cellar floor and stopping 2 ft. above the first floor. There is also a terrace wall 3 ft. 6 in. below grade. The first-story wall is of brick 12½ in. thick and for the second story it is 9 in. thick, furred and plastered. The first story has a Flemish bond facing of Sayre & Fisher brick, with black headers pointed up in wide gravel joints, while the walls of the second story are of half timber, 1-in. battens and cream-colored stucco being applied directly on the bricks. The roof of the building is covered with red-shingle tile. The plastering throughout the first and second stories is three-coat work.

The joists are of 3 x 10-in. hemlock placed 16 in. on centers, while the rafters are 2 x 10 hemlock placed 2 ft. on centers and covered with 1-in. rough sheathing boards. Cypress flooring is used throughout. The exterior woodwork is of cypress and all sash is of white pine. The halls, libraries and dining-rooms are finished in chestnut, and elsewhere the interior finish is of poplar. The plumbing fixtures consist of enameled-iron lavatories, bath tubs and kitchen sinks, with galvanized-iron laundry tubs. There is return hot-water circulation from the range boilers to the bath-rooms. The heating of the house is by direct hot water, the radiators being of a flat type and placed in recesses under the windows.

The house is wired throughout for electricity, all wires being protected by steel conduit. All rooms have double-pole push-button switches, and at the foot of the stairs is a push-button switch to control the lights on the second floor and vice versa. Call bells and speaking tubes are supplied at front and rear doors, with the tenants' names attached thereto. A spring catch at the front door, controlled from the second floor, is also provided.

The exterior woodwork is stained a dark brown, while the window sash and muntins are white. The woodwork in the halls, libraries and dining-rooms is filled and stained brown, and in the remaining portions of the house it is painted three coats of linseed oil. The floors are oiled.

Front Elevation. Scale, ⅛ In. to the Foot.

A Philadelphia House of the Two-Family Type.—George S. Idell, Architect.

The two-family house here illustrated was designed by George S. Idell, Harrison Building, Philadelphia, Pa.

A COUNTRY HOUSE, three stories and basement in hight, equipped with all modern improvements and involving an outlay closely approximating one million dollars, is to be erected at Port Washington, Long Island, for Howard Gould, in accordance with plans prepared by Hunt & Hunt, of New York City. The new "Castle Gould," as it will be known, will have a frontage of 238 ft. and a depth of 110 ft. In design it will be on the plan of an English manor house, and while not as pretentious in size as the "Castle Gould" erected in 1902 at Sands Point, Long Island, and which was designed in general upon the lines of Kilkenny Castle in Ireland, it will be its equal in point of equipment and landscape effects.

Experience Necessary in Reinforced Concrete Construction

There is scarcely a field of building operations in which at first glance it seems simpler for the relatively inexperienced to do satisfactory work than in the use of concrete. Here are simple materials—sand, gravel and cement—mixed by crude labor, usually handled in a crude way, and frequently used only to obtain a relatively crude result in the form of foundations, walls, footings, and the like.

But even here experience counts for much, particularly in view of the fact that work improperly done is often excessively expensive to remove and replace. With the rapid increase in the use of reinforced concrete the absolute necessity of practical experience and thorough technical supervision is daily becoming more apparent. With few exceptions the failures of concrete are traceable to ignorance on the part of the designers and the contractor—all too frequently to the latter.

Leonard C. Wason, president of the Aberthaw Construction Company, Boston, Mass., recently pointed out with special emphasis some of the principal reasons why reinforced concrete should not be handled by unskilled labor. Briefly stated, they are as follows:

1. Because the plans may be incorrectly read. Hence knowledge and experience are absolutely necessary.

2. Because the wrong reinforcement may be used. It is an easy matter to make an error of ⅛ in. in the selection of bars. This may mean a decrease of 25 to 50 per cent. in strength. When made-up frames are used error is equally liable in their selection.

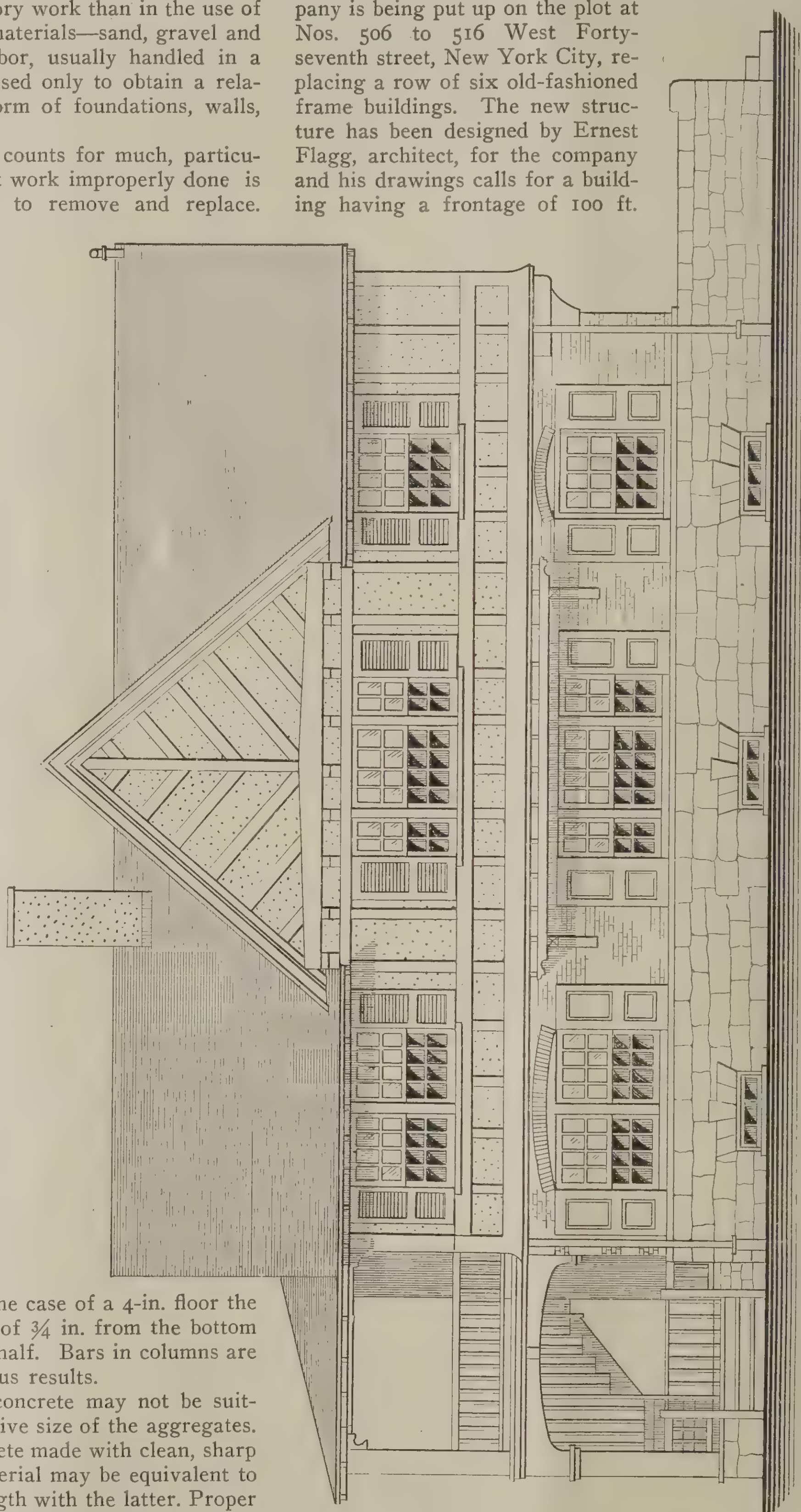
3. Because the reinforcement may be wrongly placed. To the unskilled a matter of an inch or two difference in the level of a bar in floor or beam seems but a small matter. But in the case of a 4-in. floor the placing of bars 2 in. instead of ¾ in. from the bottom may reduce the strength one-half. Bars in columns are easily miss-set, with disastrous results.

4. Because materials for concrete may not be suitable, both in quality and relative size of the aggregates. The difference between concrete made with clean, sharp sand, and that with poor material may be equivalent to a loss of 50 per cent. in strength with the latter. Proper judgment—based on experience—is necessary in the use of different kinds of cement.

5. Because the concrete is improperly mixed and used. Errors are always liable to occur in the proportions used. The mixing may not be thorough, the batch may be too dry, and may not be properly tamped, the forms may be removed too soon.

Evidently the handling of reinforced concrete is not such a simple matter after all. It is a work in which the experience of the contractor is the best evidence of the quality of the work.

THE SECOND of the fireproof type of model tenements to be erected for the Model Fireproof Tenement Company is being put up on the plot at Nos. 506 to 516 West Forty-seventh street, New York City, replacing a row of six old-fashioned frame buildings. The new structure has been designed by Ernest Flagg, architect, for the company and his drawings calls for a building having a frontage of 100 ft. and a depth of 88½ ft. It will contain stores and 18 suites of rooms on the first floor and 24 suites on the five upper floors, with several bath-rooms to each floor. It will be located one block east of the company's first model tenement and will cost in the neighborhood of $95,000. It will be of modern design, with marble-trimmed windows.



A Philadelphia House of the Two-Family Type.—Side (Left) Elevation.—Scale, ⅛ In. to the Foot.

Memorial Meeting in Honor of the Late Charles F. McKim

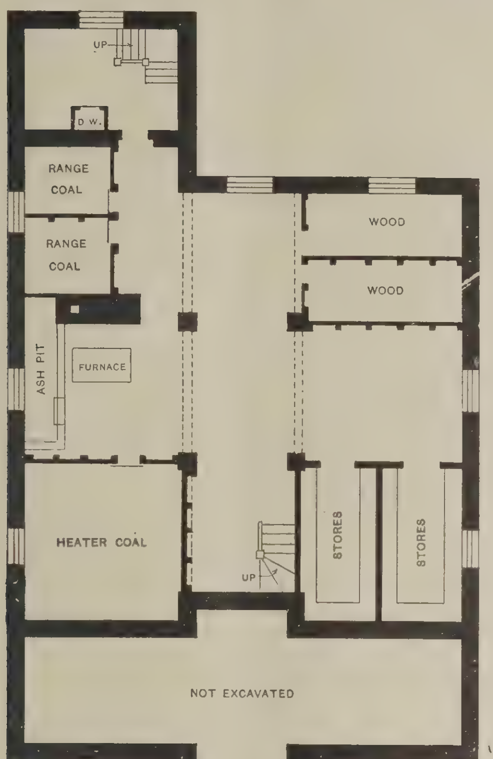
A very impressive memorial meeting in honor of the late Charles Follen McKim, who died September 14, was held on the afternoon of November 23 in the New Theatre, Sixty-second street and Central Park West, New York City, in the presence of nearly 1,000 people. Fourteen societies of architecture, art, science and education participated in the call for the meeting, which was presided over by George B. Post, one of the former presidents of the American Institute of Architects, and president of the Municipal Art Society.

After an anthem, "Great is Jehovah the Lord," by the Mendelssohn Glee Club, the various speakers were introduced, the first being the Hon. Joseph H. Choate, who referred to Mr. McKim as the leader of American architects and spoke of his marvelous sympathy with all that was beautiful. He was followed by Robert Peabody, of Boston, who recalled incidents in Mr. McKim's life as an art student in Paris, where he amazed his acquaintances with his athletic feats. Next upon the list was the Hon. Elihu Root, who referred to the fact that without ever holding public office or even binding himself by an oath Mr. McKim had a genius for public service. He was indifferent to personal credit, but was inspired by patriotic and humanitarian love of his art. The closing address was by Walter Cook, former president of the New York Chapter of the American Institute of Architects, whose tribute may perhaps be summed up in the statement that it was Mr. McKim's unwritten law never to create anything that was not beautiful.

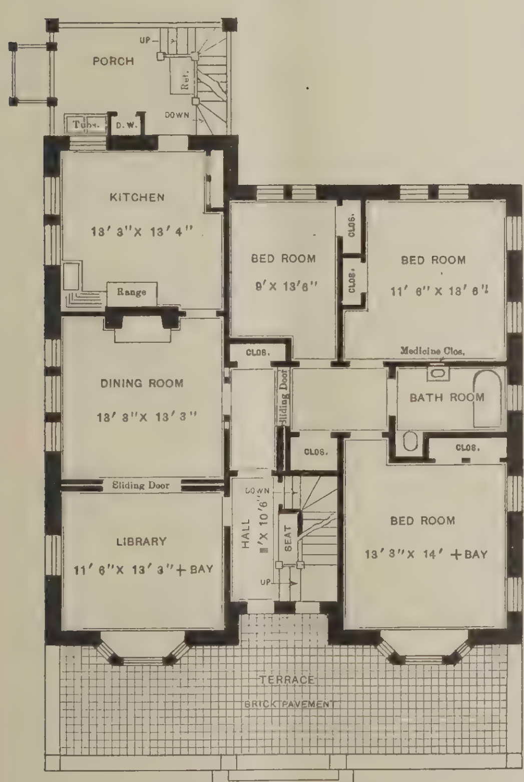
Brief appreciations were delivered by Professor H. L. Warren, of Harvard University, where Mr. McKim was a student for a short time; by Joseph H. Benton, of the Boston Public Library, one of the striking examples of Mr. McKim's work; by President Nicholas Murray Butler, of Columbia University, who referred to the founding by Mr. McKim of the American Academy at Rome and of his work in connection with the buildings of Columbia University, and by John Cadwalader, of the New York Public Library, who stated that Mr. McKim had the pride as an architect to teach at least one lesson—"that beauty was simple and that simplicity itself was beautiful."

Professor William M. Sloane, of Princeton University, presented a series of resolutions reflecting the esteem in which the late Mr. McKim was held by the societies represented at the memorial meeting.

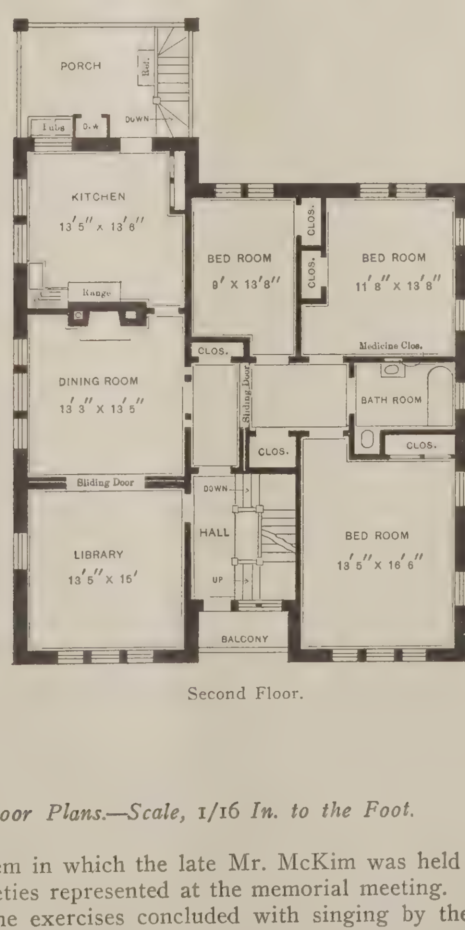
The exercises concluded with singing by the Mendelssohn Glee Club of Krenfer's "Prayer of Thanksgiving," with organ accompaniment.



Foundation.



First Floor.



Second Floor.

A Philadelphia House of the Two-Family Type.—Floor Plans.—Scale, 1/16 In. to the Foot.

A Hotel of Reinforced Concrete

Among the recently completed improvements in the building line in the city of Sacramento, Cal., is the Sacramento Hotel, which was formally opened to the public a few weeks ago. The light in which it is regarded in that city may be gathered from the following comments taken from a local paper:

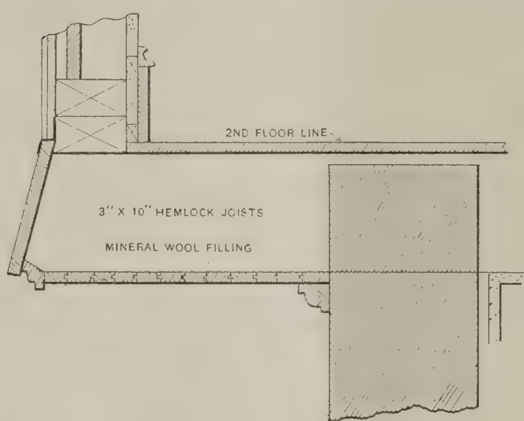
"The Sacramento Hotel is the only hotel in the State of California built entirely of reinforced concrete and the only structure of its hight and kind in the entire United States which is completed with the white cement finish with no attempt to disguise it by the use of artificial or imitation stone.

"Not only that, but the architect declares that the structure is the finest that he has ever seen constructed of concrete and, as he has had a part in the construction of 72 buildings made of this material, his opinion should be worth a great deal. The Ransome Concrete Company, which does a general contracting work and has several other important structural jobs in Sacramento, built the new Sacramento Hotel. Entirely completed ready for the opening, the hotel cost $375,000, and building experts who have inspected it carefully pronounce the structure one of the most absolutely fireproof on the Pacific Coast. Not a stick of wood, with the exception of that in the door and window casings, has been used in the building's construction.

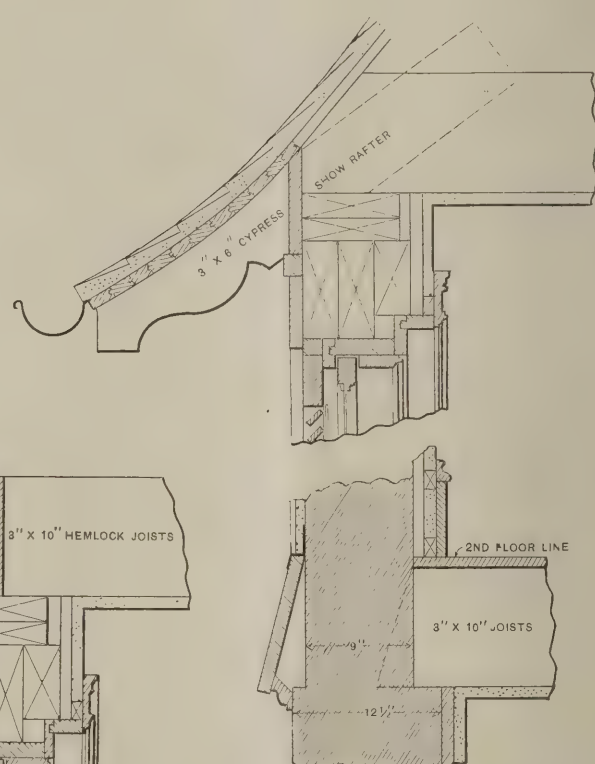
"From foundation to roof garden, the hotel has been constructed with a view to providing for additional growth and another complete story may be added as well as an auditorium capable of seating 1,500 persons without endangering in the slightest detail the strength of the beautiful building. One of the remarkable features of the building which demonstrates to a surprising degree the efficiency of concrete building material is the fact that the basement does not leak one drop. This is perhaps the only structure in the city about which such a statement can be truthfully made.

"The superiority of concrete over iron in the construction of staircases may be best understood when it is realized that with metal, the stairs, should fire break out, become so hot that it is impossible to use them at all. This is not true of the carefully tested material which has gone into the Sacramento Hotel stairways, as the concrete is almost entirely impervious to the actions of extreme heat or cold. It is one of the most completely fireproof buildings anywhere on the coast, according to expert builders. The staircases, the flooring and roofing, the solid substantial walls and other features equally commendable, all combine to make one marvel at the wonder of it all.

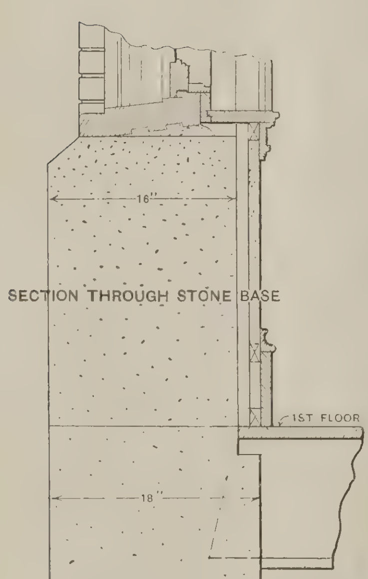
"Architecturally, the structure is fully as beautiful as any building in the State of California, and no one denies that when opened to the public the Sacramento Hotel will be the finest edifice of its kind in any city of the size in the entire nation. Architects and builders generally regard the so successful completion of the handsome structure by the Ransome Concrete Company as a triumphant demonstration to Sacramento builders of the reliability and stability of concrete construction, and it is said that the Sacramento Hotel building will stand for years through fire, flood or earthquake as a powerful and lasting monument to mark the beginning of a new epoch in structural contracting work in this city."



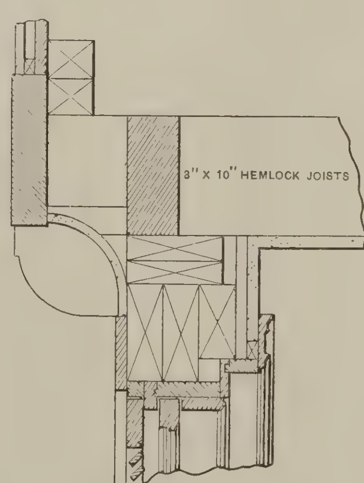
Section Through Overhanging Second Floor.



Section Through Main Cornice and Water Table.



Section Through Stone Base.



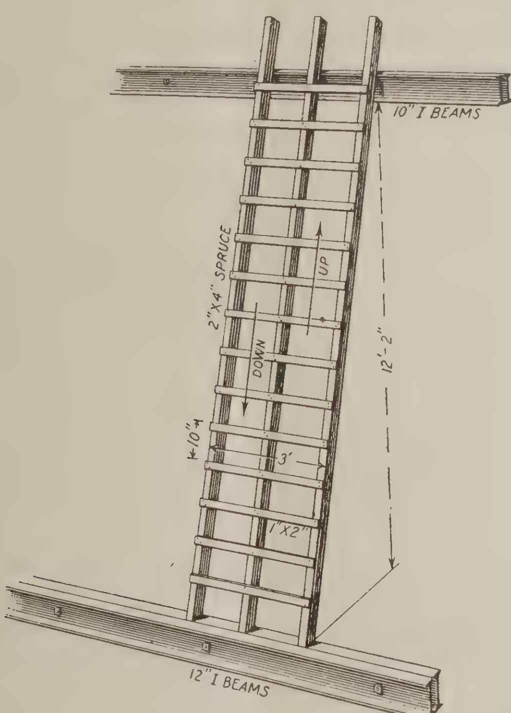
Section Through Side Gable.

A Philadelphia House of the Two-Family Type.—Miscellaneous Constructive Details.—Scale, ¾ In. to the Foot.

LADDERS USED WHILE CONSTRUCTING TALL BUILDINGS

IN modern steel and masonry construction communicating ladders between different stories of the building are just as necessary now as they were in the erection of buildings for centuries past, but on account of the great number of men employed upon the work the ladders must afford more adequate facilities for rapid passage up and down from one floor level or tier of beams to another than is usually the case. Formerly a series of single ladders at different places were used in going from the ground level to upper floors during the work of construction, but now the ladders are built in what may be termed "duplicate" form, as shown in the sketch presented herewith. Sometimes they are triplex, quadruple or sextuple, so as to form temporary means of ascent and descent. In this connection it may be interesting to remark that ladders of the sextuple form were used in connection with the erection of the iron frame work of the mammoth Pennsylvania Railroad Station, Thirty-first to Thirty-third streets and Seventh to Ninth avenues, Borough of Manhattan, N. Y.

The sketch here presented tells its own story so



Ladders Used While Constructing Tall Buildings.

clearly that any superintendent or foreman of construction can readily have ladders of this kind put together, so that the mechanics may pass up and down from one floor level to another without interference or loss of time. The style of ladder shown in the illustration was that recently used in the Gimbel Building, Thirty-second and Thirty-third streets and Sixth avenue, where the contractors established a record in the rapidity with which the steel-frame work of the 12-story building was erected, and the corner-stone of which was laid with impressive ceremonies on December 8. The right-hand side of the ladder shown is for men going up, while the left-hand side is for those going down.

The pitch of these ladders is reversed at the several stories as the building rises, so as to not only economize space, but to prevent the men from becoming dizzy. The construction is so simple as to be within the comprehension of all. The stuff of which the ladder is made is sound spruce, the parts being thoroughly nailed and the ladder placed from one girder or floor level to another, as indicated. Of course it is tacitly understood by the men that they are always to keep to the right when going up or down, thus avoiding confusion and delay.

Blistering and Peeling of Paint on Frame Houses

One of the complaints occasionally met in connection with the painting of frame houses is that the paint blisters and peels from the outside of the buildings—in some cases peeling clear to the wood. This is attributed in a measure to bad priming and painting when the wood is green or damp, and in some cases it is found that ready-mixed paints applied by inexperienced workmen cause a great deal of trouble to the man who does the repainting. A Canadian correspondent, writing to a recent issue of the *Painters' Magazine*, asks the best way to avoid this blistering and peeling when the old painted surface is done over with good material by practical and experienced hands. He says he is burning off all the blistered paint, but is afraid he may have trouble with the balance where the paint appears to be in good condition.

In reply to the above correspondent the authority in question says:

We fully agree with you that much of the blistering and peeling is due to green or damp wood and inferior material for priming. The old-fashioned notion that anything is good enough for priming is still in the minds of many, but it is like building a house on sand without piling. Boiled or fatty oil has no place in a priming paint for wood nor should a priming be stout.

There is nothing better than pure lead and well settled but not fatty raw linseed oil, mixed fairly thin and without driers for new work, and such prime should be rubbed in well into the dry wood. Over such a priming paint is not likely to blister or peel, unless there are some local defects in the surface or behind it, such as plastering in damp weather, leaky gutters on roof, etc.

In repainting old-painted exterior surfaces, as an act of precaution the painter should, before he undertakes the job, assure himself of the actual condition of the old paint, which may appear to be solid and intact all over and yet, where the new paint has been applied over it for six months or a year, loosen its hold, taking the new paint with it and coming off in large blotches. A tap here and there on the old paint will tell whether it is adhesive and solid or whether it is loose.

The new paint cannot penetrate through the old paint and fasten it to the surface; on the contrary, in contracting on drying it is liable to draw it away still more from the wood, especially when the priming has been inferior.

We would advise you to remove all of the old paint, either by burning or scraping.

A NEW BUILDING PRODUCT known as "Kellastone" is being used to a considerable extent in the construction of houses, more particularly in the State of Indiana, where it was invented by Edward F. Kellie, Terre Haute, Ind. It is a plastic material of a milk-white color, and the claim is made that it is cheap, durable, strong, sanitary and fireproof. Tests made in the laboratory for testing materials at Purdue University show that the crushing strength of the material is over 6,000 lb. to the square inch.

The Building Age

Formerly Carpentry and Building

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JANUARY, 1910

The Building Age

The tendency of the present day, more than ever before, is steadily toward progress—improvement—a bettering of things already existing and a reaching out for that which will still further benefit those engaged in the active walks of life. For the past 31 years *Carpentry and Building* has been leading its army of readers along the lines of progress in the building industry; pointing the way in a manner which has rendered its columns educational in character and enabling many an ambitious carpenter and builder to declare with pride and satisfaction in later life that much of his success as an architect or contractor has been traceable to the inspiration early derived from a perusal of its columns. This work of progress is to continue upon a broader and more comprehensive scale than has marked its course in the past, but we desire to impress upon the practical building mechanic, in whatever branch of the industry he may be engaged, the fact that his interests are in no sense to be neglected, and that the art and science of carpentry will occupy the same importance in the editorial view as it has during the 31 years the paper has been published. In carrying out the new policy more attention is to be given to cement-concrete, now so rapidly displacing the use of wood in almost every form of building construction; to terra cotta, tile, brick, stone and iron and steel work in so far as they have to do with buildings designed for business or dwelling purposes.

With a view, however, to more adequately symbolizing this broadening policy and enlarged field it has been decided to change the name of *Carpentry and Building* to that of **The Building Age,** and to make it in the highest possible sense the practical exponent of modern methods of building construction, as they appeal to those actively engaged in the various branches of this important industry.

Important Features

The many features which have proven so interesting and valuable in the past will be continued in the future. There will be special articles on various architectural and mechanical topics, including plain and reinforced concrete as applied to building construction, prepared by men of experience and ability; carpenters, builders and contractors will discuss in a practical way interesting problems arising in connection with their every-day work; novel "kinks" and "wrinkles" growing out of present-day methods of construction, as exemplified in some of the larger buildings under way in this and other cities will be illustrated and described and reference will be made to various matters as they develop, along lines calculated to be of interest and profit to our readers.

Supplemental Plates

The half-tone supplemental plates, which for the past 19 years have been regarded by our patrons as an important element in the typographical appearance of the paper, as well as affording architects, builders and contractors valuable suggestions concerning the manner in which the work illustrated was done, will be a feature of the thirty-second volume of *The Building Age.* The basis of the illustrations will be attractive examples of domestic architecture, embracing frame and cement-concrete dwelling houses, library buildings, garages, churches, schoolhouses, barns of various kinds, suburban railroad stations, carriage houses and stables, as well as structures intended for business purposes of whatever materials erected. Supplementing these half-tone plates will be presented elevations, plans and details of construction, all to convenient scale and accompanied by brief specifications, thus rendering the matter of unusual value to the reader, as well as to all interested in building construction.

Interchange of Practical Ideas

The Correspondence Department has steadily grown in importance and value during the 31 years which have passed, affording an excellent medium for the interchange of ideas between those practically engaged in the building and allied industries the country over. In connection with almost every phase of building construction, problems are constantly arising which involve in their solution many interesting points, and a discussion of which is always of benefit to those engaged in active work. This department will be one of the features of *The Building Age* for 1910, and we take this occasion to invite hearty co-operation on the part of our readers in whatever branch of the building business they may be engaged.

Miscellaneous Matters

During the ensuing year a vast amount of miscellaneous matter, covering a wide range of topics, will be presented, and in addition to the special features mentioned more or less space will be devoted to roofing, sheet-metal work, ventilation, heating, etc., as well as to improvements in apparatus, methods, tools and appliances connected with the building business. A brief review of the building situation as it exists each month in leading centers will afford architects, contractors and builders a good idea of what is going on of interest to them in different sections of the country.

The editorial management of the paper will continue in the same hands as heretofore, sparing neither time, labor nor expense in the endeavor to further the interests of its many readers. In carrying out the policy of expansion we appreciate the increased responsibilities involved, but feel confident that with a larger staff and the hearty support and co-operation of our friends and patrons *The Building Age* will be maintained upon a plane of excellence thoroughly in keeping with the importance of the interests which in the future it will be its privilege to represent.

New York's Tremendous Building Totals

Some idea of the vast amount of building which has taken place and been projected in the Borough of Manhattan during the four years, lacking one month, ending December 1, 1909, may be gathered from the figures contained in a special report just made by the statistician of the department to the Superintendent of the Bureau of Buildings in the borough named. These show a record which in extent and amount has never been exceeded in the history of the city. From the first of January, 1906, to the first of December of the year just closed, plans for 4149 buildings were filed to cost $388,788,000, while the new work in prospect for much of which the plans have already been filed will involve an additional $176,240,400 before the year 1912. It is interesting to note that the greatest expenditure has been for high-class apartment houses, multi-family flats and tenements, of which 965 were planned in 1906, to cost $57,372,000; in 1907, there were 309 planned, to cost $27,081,000; in 1908, there were 210, to cost $25,925,000, and in the eleven months of 1909, there were 428 planned, to cost $65,891,000. Office buildings rank second in the amount of capital involved, there having been filed with the Bureau plans for 181, to cost $84,940,000. Store and loft buildings were next in order, with a total of 595 buildings, calling for an outlay of $61,231,000. Other buildings planned in the period named include 98 theatres, estimated to cost $15,570,000; 54 municipal buildings, for which $5,970,000 is provided; 21 new hotels, costing $10,100,000; 32 churches, calling for an expenditure of $2,748,000; 42 schools, to cost $6,365,000; 99 factories and work shops, to cost $6,834,000, together with 179 stables and garages, to cost $8,466,000. Adding to these the cost of the 13,645 permits for alterations and repairs during the four years, amounting to $57,639,000, and we have the enormous total of $446,428,657, divided among 17,794 new and old buildings.

Convention of Brick Manufacturers

Official announcement has been made by Secretary Theodore A. Randall that the twenty-fourth annual convention of the National Brick Manufacturers' Association will be held in the city of Pittsburg, Pa., during the week of February 7 to 12, 1910. One of the principal factors leading to the selection of Pittsburg is the fact that the Clay Working Department of the Technologic Branch of the United States Geological Survey is now located there, this division being in charge of Professor A. B. Bleininger, an ex-president of the American Ceramic Society. The laboratories have been established on the grounds of the United States Arsenal and are equipped with thoroughly up-to-date apparatus for testing clays and other materials, and a visit to them will afford delegates an excellent object lesson of the modern scientific methods by which the merits of burned clay as a structural material are now fully demonstrated. The headquarters of the convention will be the Fort Pitt Hotel, and the sessions will begin Wednesday afternoon at 2 o'clock.

Meeting of the Massachusetts State Association of Master Builders

The eighth annual meeting of the Massachusetts State Association of Master Builders was held in the home of the Builders' Exchange in the Knowles Building, Worcester, Mass., on Wednesday, November 17. Most of the local bodies affiliated with the association were represented at this meeting, which was without question one of the most interesting in the history of the organization.

The reports of the various officials disclosed a very satisfactory condition of affairs, there having occurred only a few strikes among the local organizations during the year. In fact, the cities of Pittsfield and Haverhill were the only places that suffered. The delegates from these cities reported that they are now in the "Open Shop" list and that matters are running smoothly and satisfactorily. The report of the legislative committee was inspiring, as no radical labor bills were enacted during the year.

Industrial education has not been neglected and the fact that a trade school of large proportions was reported as being under construction in the city and will be completed within a short time added to the interest which has always been taken by the association in this movement.

The election of officers for the ensuing year resulted in the following choice:

President.........Albert B. Murdough, of Watertown.
First Vice-Pres... John A. Jackson, of Brockton.
Second Vice-Pres. Fred M. Osteyee, of Pittsfield.
Secretary........ Henry W. Sweetser, of Worcester.
Treasurer........ Burton C. Fiske, of Worcester.

Executive Board.—George S. Whitney, of Milford; Frank F. O'Neill, of Holyoke; Herder C. Wood, of Westfield; John A. Jackson, of Brockton; Edward J. Cross, of Worcester, and Thomas B. Gilbert, of Springfield.

Our Supplemental Plates

We have taken for the subjects of one of our halftone supplemental plates this month two rather attractive bungalows, picturesquely located at Pasadena, Cal., the heart of the "Bungalow idea." Both buildings have an interior arrangement of five rooms and bath, and represent about the same amount of invested capital. In the one case the building is noticeable for the broad chimney, which rises on a line with the front wall and projects through the roof in a way to give a rather unique effect, while in the case of the other bungalow the noticeable effects are produced by the luxuriant foliage among which it appears to nestle.

In the case of the bungalow shown in the upper picture on the supplemental plate the architect was D. W. Terwilliger, Los Angeles, and of the bungalow shown in the lower picture the architect was Alfred Smith, of Pasadena, Cal.

The large picture on the opposite page of the folded supplemental plate represents the new Henry W. Oliver Building in Pittsburg, Pa., referred to at length elsewhere in this issue, and of which D. H. Burnham & Co., Chicago, Ill., are the architects.

CORRESPONDENCE

Building on the Percentage Basis

From Maxson & Co., Westerly, R. I.—Some years ago, or to be more exact, in July, 1904, we addressed a communication to the Correspondence columns in an endeavor to secure, if possible, suggestions as to the prevailing custom so far as any existed covering the conduct of jobs taken on a percentage basis. This correspondence brought out a few expressions of opinion, but the subject was by no means discussed to the extent which we think its merits deserve. Apparently there is no regular custom in the business covering jobs of this kind, each contractor and owner making his own agreement covering the work. Nevertheless, the subject is a wide one and there ought to be some fairly definite method of conducting jobs of this nature that would be on nearly the same basis.

The questions arising are first as to what is a fair percentage above the actual cost, but more particularly as to what extent the owner or builder shall furnish equipment. We do a great many jobs on a basis of actual cost plus 10 per cent., but in our case, being not only builders but lumber dealers and millmen as well, buying everything at wholesale, cargo or carload rates, we are enabled to eliminate, by combining the three lines of business, at least two of the usual profits entering into the cost of a structure as built by the ordinary carpenter or mason builder.

Most builders are obliged to go to a dealer to purchase their materials. In our own case we buy direct from the producer, but the question of implements like derricks, wheelbarrows, shovels, tackle, blocks, falls, chains, hoisting engines, staging and the thousand-and-one things required for the economical conduct of such building operations enters into the case seriously. The question, therefore, is to what extent should the builder furnish these at his own cost, and to what extent should the owner be chargeable for them. Our own custom has been to charge up to the owner perishable implements like shovels that wear out; rope, if much damaged, and certain waste of staging, etc. In some cases it would seem fair to charge a percentage on the value of the plant used, and in other cases a charge for their use. The whole subject, however, is so open that it is difficult to know what is a fair thing. We have, however, been very successful in working in harmony with our customers, although at times we have felt as if we were not always doing full justice to ourselves.

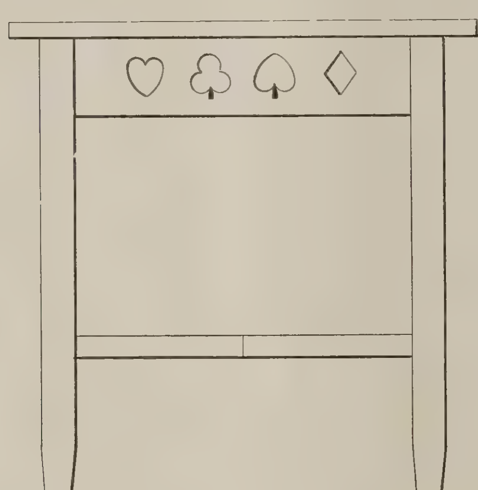
Carpenters' Wages in Atlanta, Ga.

From W. H. P., Martinsburg, W. Va.—Will you kindly inform me through the Correspondence columns of the January issue of the paper what wages are paid carpenters in the city of Atlanta, and whether or not jobs are plentiful?

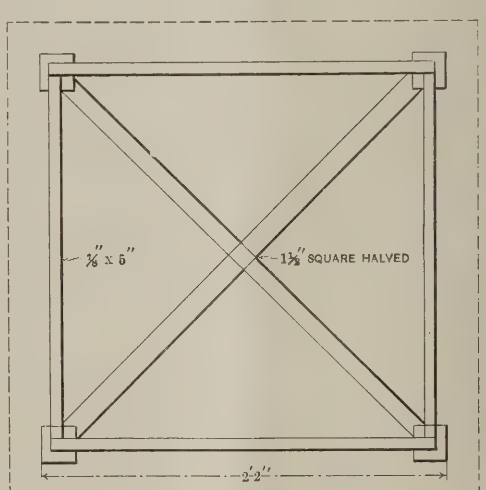
Note.—According to the figures recently issued by The Builders' Exchange of the city of Atlanta carpenters' wages range from \$2.50 to \$3.50 per day. There has been a considerable amount of building in the city, and the volume of operations as reported from month to month by the Building Inspector's office indicates an average amount of work in the immediate future. Whether or not building mechanics are in demand or whether the supply is sufficient for all immediate requirements we are unable to state at this time. As a general proposition, however, a first-class mechanic can usually obtain work without difficulty, but for the information of our correspondent above we would suggest that he address a letter to the secretary of The Builders' Exchange, Atlanta, Ga., asking in regard to the building outlook for the coming season.

Suggestion for a Den Table

From M. R., Sturgeon Bay, Wis.—I am sending herewith sketches of a table for a den which may possibly interest some of the many readers of the paper. One view represents a plan of the frame work, while the other shows an elevation of the completed work.



Elevation of Table.



Plan Showing Framing.

Suggestion for a Den Table.—Contributed by "M. R.," Sturgeon Bay, Wis.

Waterproofing a Concrete Cellar.

From W. H. S., Lima, Ind.—In the wet season when we have plenty of rain, water enters my cellar and I come to the practical readers of the paper for suggestions as to a method for remedying the difficulty. The outside wall of the cellar is concrete to the grade line, and there is also 4 in. of concrete constituting the cellar bottom. The latter is about 15 in. lower than the sewer entrance, the land being level but a little low. There is also a storm sewer basin in front of the house, but I never have had more than 12 in. of water in the cellar. Now, I wish to know how to waterproof this cellar, so as to make a guaranteed job of it when done and without too great an expense.

Note.—We are inclined to the opinion that our correspondent has before him a rather difficult problem to solve, especially as he stipulates that it must not involve any considerable expense. As a general thing it is very much easier to make a cellar waterproof before the building is constructed than it is after it has been completed. While there are a number of methods of waterproofing walls which might be cited, involving in large measure the application of some compound either liquid or plastic, yet the most satisfactory results will be obtained from applying the waterproofing compound to the outside of the cellar walls, excavating for this purpose. The fact, however, that the cellar is below the sewer entrance vastly complicates the problem, but we submit it to our readers for suggestions in the light of their experience.

An Old Method of Obtaining Bevels in Stair Construction

From W. S. Wylie, Greeley, Col.—While Morris Williams is writing on the subject of stairbuilding, and I am carefully examining his diagrams and endeavoring to find the reason for everything and where he obtains the bevels, I am inclined to the opinion that it may be interesting to some of the readers of the paper to present a method which I was taught some 20 years ago but have not had much occasion to use, since that kind of stairs appears to have gone out of fashion. I have based my drawings upon the plan presented by Mr. Williams, using a scale of 1½ in. to the foot.

Referring to Fig. 1 of the diagrams, we have the square A-B-C-D, each side of which is 5 in. and give the plan lines for the quarter turn. Placing one foot of the compass in B and extending to A, turn it around to E. Connect E and B and we have from C to E the base of the pitch board across the quarter circle. Now, from C set up 7 in. to I and connect I and E. This gives the pitch of the two tangents and their length.

Now in order to place the tangents at their proper angle, set one foot of the compass in C and extend it to A, which is the diagonal of the plan. Turn to S and connect I with S, which gives the pitch of this diagonal line on the major axis of the pattern. Place one leg of the compass at I, extend to S and swing around to H. Then draw the horizontal line from I to H and connect H and G. We thus have the tangents to the pattern at their proper angle and also their length.

Next take the distance from L to M found on the plan and place it on the minor axis, from where the axes cross to mark the center line of rail at that point. Set off the width of the rail at this point and at the end, as Mr. Williams has described. Find the center from which a curve can be drawn through the three points and we have the pattern.

The bevel is found as Mr. Williams describes it, but it was not until I used my little blocks that I saw the reason for the distances used.

In Fig. 2 of the diagrams I show a block 5 in. square in cross section cut off at the top with the pitch of the tangents, which show the major and minor axes, as well as the center line of the rail. In Fig. 3 I have tried to show this block turned partially around and the point cut off, showing where the bevel is found. The distances are the same as in Fig. 1, that of B-K in each being the same. It is so much easier to remember these things if one knows the reasons for them.

Now let the stairbuilder readers of *Carpentry and Building* criticise my sketches, and if they are not correct I shall be glad to have him tell me so, for I paid for my knowledge and I want to know if I have been cheated.

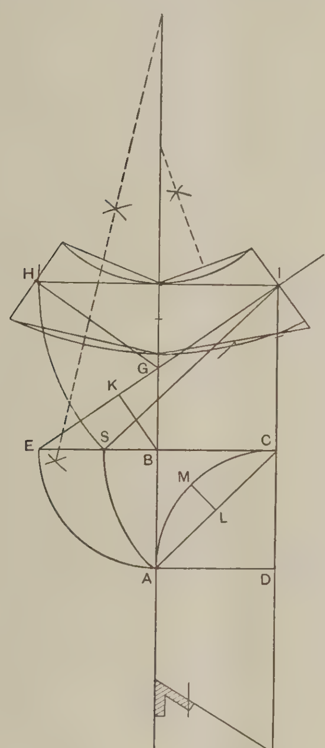


Fig. 1.

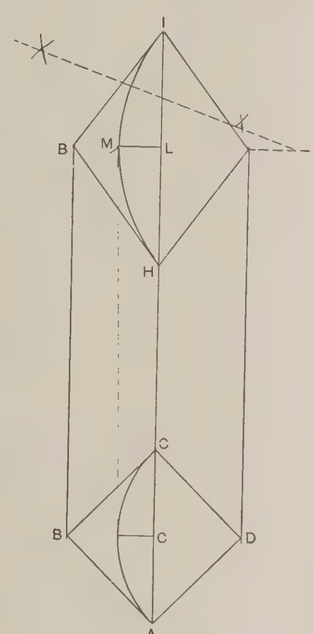


Fig. 2.

Fig. 3.

An Old Method of Obtaining Bevels in Stair Construction.—Contributed by W. S. Wylie.

Details of a Louver Ventilator

From Henry Hall.—I was indeed pleased to note in the last issue the suggestions of "M. S. M.," of Washington, in reference to my louver ventilator. As one journeys through life, one does not gather all knowledge, for the reason everything does not come to one's notice. Hence, when articles of any nature are published and a reader has in his possession similar ideas, no matter if of equal value, he enhances the worth of these articles by responding with suggestions. The trouble with most mechanics is modesty; they have little occasion to write and when they behold the efforts of another they are afraid they cannot write like that and remain silent. On the other hand, some imagine their scheme the only practical one, and are prone to criticise the endeavors of one who does not claim perfection—simply a desire to help as he is helped. "M. S. M." is a member of this class.

Now these little "talks" of mine are the results of leisure moments when I exercise my memory and recall various jobs I have worked on and embody what I believe are the attractive features of designs from men whom I have had the pleasure either to assemble or erect their creations.

Answering "M. S. M." in detail, I fail to see how one can minimize the amount of work to a greater extent and retain strength. The inherent suppleness of sheet metal necessitates the use of some reinforcing agent—wood or wrought iron. Even iron of 24 gauge, while it may resist compressive strains in the ports, would not prevent racking of ventilator by the wind, despite the use of rivets.

From observation and my conversations with mechanics, both foreign and from all over America, I glean it is the universal practice to overlap slats. The ideal slat is impractical for the hand brake and a slat, therefore, with sharp breaks is imperative, and as the outside part of the slat must be stiff a small edge bent square must be added; this really should be a wire edge. I never saw a slat with this edge omitted.

The slat in itself is an obstruction to the flow of air, no matter how designed. If we must have a free passage just a hood or cap is placed over the stack, but as this is not proof against driving rain or snow a louver ventilator was evolved by some one who fully realized slats would retard the entrance or egress of air, and who balanced, as it were, the amount of hindrance with the absolute need of a ventilator which is impenetrable to storms; consequently overlap and baffle edges.

I have studied architectural proportion, still I am not aware it applied to the design of a gutter for a hideous ventilator. Or perhaps there is some rule, involved in the computation of rainfall, etc., which governs the amount of projection the gutter should have. Why one-fourth too much projection, as "M. S. M." claims?

Again, speaking of the wood, I want to point out the fact it aids in the rapid assembling of ventilator.

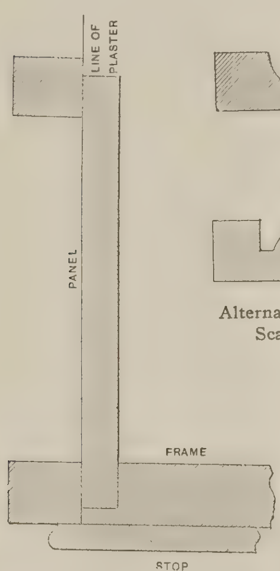
When criticising the tie rod "M. S. M." betrays ignorance of statics. A tension member is not to resist compressive stresses. As roof has considerable pitch it is self-evident an outward thrust on top rail of the louver frame exists, and to equalize the stresses on the opposite rails they are tied, realizing an equilibrium so far as this thrust is concerned. The makeshift gas pipe was long in vogue, but modern building construction demands something in harmony with the structure; naturally the manufactured rod and turnbuckle is acceptable and about the simplest and neatest manner to fasten it to rail would be with the piece of band iron I show. This rod is to care for nothing but pulling loads. If the wind pressure is such as to make imperative additional reinforcing, it must be obtained by a system of truss work designed and calculated to brace ventilator in a way to resist both this pressure and the thrust of roof, obviating the need of tie rod; truss work to be made of structural steel shapes.

The ventilator as designed is intended to be economical, so was made to the smallest or inside measurement of brick stack. Flat water table is of little moment, still a slight pitch could be made with very little trouble. I prefer this, for if ventilator was made to outside measurements the remainder of brick wall would constitute an inaccessible shelf for the accumulation of dirt, whereas the outside water table is cleaned by each storm.

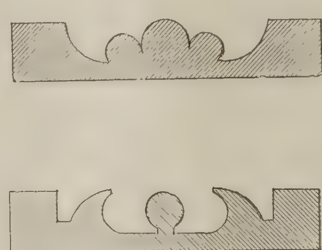
I trust "M. S. M." does not include me in the novice class. I am employed here, the greatest city of the country, shoulder to shoulder with the best building mechanics from all over the world.

Door and Window Trim in Old Colonial Days

From Charles J. Woodsend, Berkley, Va.—I send herewith sketches of details of some door and window trim copied from some of the finish in one of the first good brick houses built in the city of Portsmouth, Va. The house is an old Colonial dwelling, the steps upon the outside at the front of the house being of white marble, with iron railing and balusters. The trimming reproduced herewith is on the main floor of the house, possibly what would be called the second floor at the present time. The lower floor is taken up with kitchen, laundry and servants' offices and is level with the street. The trimming was all put on with hand-made wrought nails and brads. Possibly it may be of interest to some of the readers in other sections of the country.

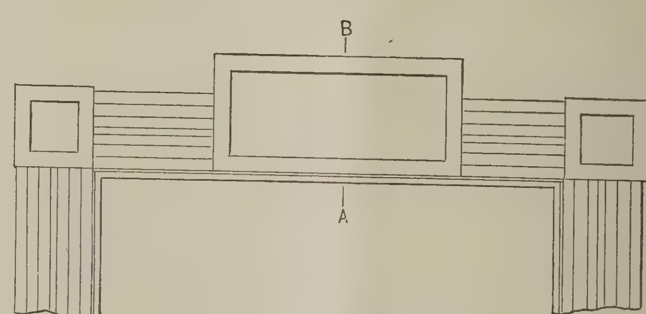


Section on Line A-B of Trim.
Scale, 3 In. to the Foot.



Alternate Profiles of Architrave.
Scale, 3 In. to the Foot.

Section Through Corner Block. Scale, 3 In. to the Foot.



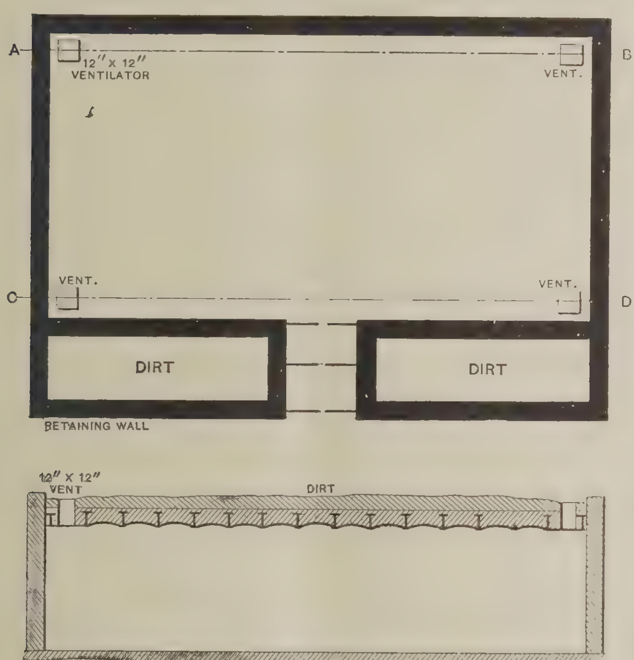
Detail of Trim. Scale, ¾ In. to the Foot.

Details of Door and Window Trim in Old Colonial Days.

A Question in Cellar Ventilation

From P. S. & S., Paul Smith's, N. Y.— We have an outdoor vegetable cellar constructed of concrete, without an air space, and built in a sand bank, a plan and section of which are given in Figs. 1 and 2 and an elevation in Fig. 3. This cellar has a ventilator in each corner, measuring 12 x 12 in. on the inside. The passageway or entrance to the cellar has three sets of doors to avoid freezing. We are unable to keep the cellar from sweating. The temperature at the time of writing is about 40 degrees. In the coldest weather, when the thermometer out of doors is from 40 to 50 degrees below zero, the temperature in the cellar is about 34 degrees. We have decided to build a roof of wood over the cellar, and would be glad of any views which may be given to us by your readers as to how the cellar should be ventilated to prevent the sweating and also to avoid freezing. Any information which we may receive will be greatly appreciated, and we thank those who favor us in advance for any assistance they may give.

Answer.—To answer intelligently the question as to "how the cellar should be ventilated to prevent the sweating and also to avoid freezing," we must first look into the cause of the sweating. The cause of freezing needs no elucidation. The drawing shows the top of the cellar to be constructed of I-beams, with the space between filled with concrete, and earth above. It is stated that in coldest weather the temperature in the cellar is about 34 degrees F. When the outside temperature falls to a low point the ceiling becomes chilled to a temperature below that of the room and chills the air in contact with it, causing moisture to be deposited on the cold surface. This action is less likely to take place



Figs. 1 and 2.—Plan and Section.

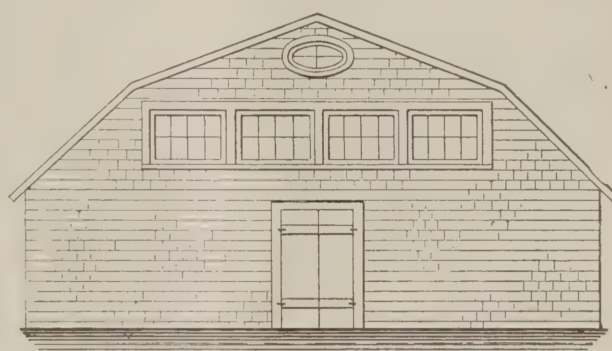


Fig. 3.—End Elevation, Showing Entrance to Cellar.

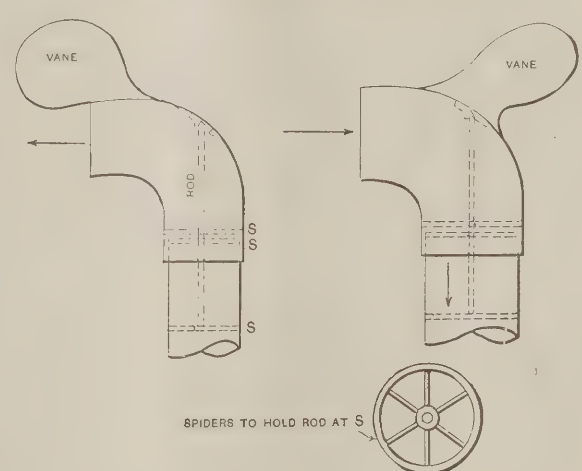


Fig. 4.—Cowl to Remove Air. Fig. 5.—Cowl to Admit Air.

A Question in Cellar Ventilation.

on the walls, which appear to be pretty thoroughly banked with earth. The capacity of air to hold moisture decreases very rapidly with a decrease in temperture. The proposed roof doubtless will reduce the sweating by diminishing the chilling effect of the cold outside air on the ceiling. This sweating would be still further diminished by sheathing the room on the inside, leaving a dead air space on all sides.

Ventilating the room in freezing weather would probably not diminish the sweating to any extent, owing to the slight capacity of cold air to absorb moisture. On the other hand, the admission of such air would, unless carefully regulated, freeze the vegetables. If air above the temperature of the room is admitted it will, unless dry, deposit moisture on the cold walls and ceiling. Hence the desirability of sheathing them, as suggested. At times a change of air is desirable and may be readily secured by the use of proper hoods. Two forms should be used, one to remove air and one to admit it. These are illustrated in Figs. 4 and 5, respectively, the swivel hoods being diverted toward or away from the wind by vanes. Dampers or slides should be placed in the flues. The supply flues should be carried down to within a foot of the floor and the exhaust flues should terminate at the ceiling in order to secure the best circulation.

Does Sheathing Aid Destruction of a Roof?

From S. R., Cynthiana, Ky.—I wish to make a few observations on the above subject based on my own experience. The trouble with the roof, of which the correspondent in the January issue speaks, is caused by laying the new tin over the old tin roof. The action of the snow, sleet and cold from the top and the warmth from beneath cause the roof to sweat. The paper and the old roofing hold the sweat or moisture and cause the new tin roof to rust on the under side, which finally fills the roof with pin holes, so that it is worthless, although it looks good from the top side. I once laid a new roof over an old one which lasted only two years, then removed the old tin roof and put a new roof on the sheathing boards, and it is in fine condition to-day after having been in service for eight years. This proves conclusively to my mind that leaving out the paper and removing old tin before laying the second roof causes it to last six years longer than the first roof.

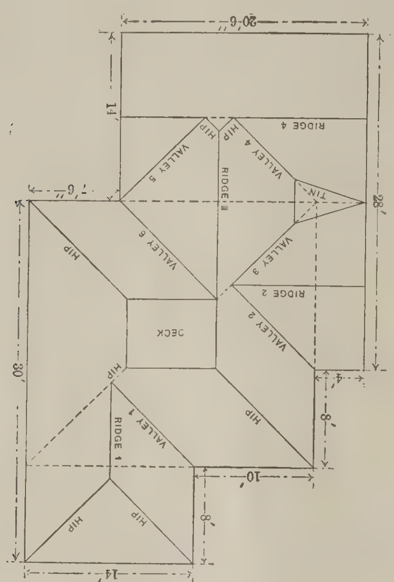
Moral:—Never lay new tin roof over an old one or over paper. Also save the paint for the top side of the roof. I know a roof laid of cheap Worcester tin 40 years ago and the under side of it is still as bright as a new one. In soldering a new tin roof nothing but rosin should be used; acid never.

Method of Waterproofing Concrete

From C. H. J., Indian Head, Md.—Will some of the practical readers kindly describe some of the methods used in rendering concrete waterproof and greatly oblige?

Roof Plan for a Dwelling

From E. H. B., Hampton Institute, Va.—Although somewhat late in the day to comment upon a question appearing in an issue some months ago, and especially after the question has been considered by quite a number of the readers, yet I make bold to submit a plan of a roof in answer to "G. W. G.," Storm Lake, Iowa. My plan is very similar to that submitted some time ago by "J. E. N.," Leland, Ill., but with the exception that I keep valleys marked 4 and 5 at a pitch of 45 degrees,



Roof Plan for a Dwelling, Submitted by "E. H. B."

and ridges marked 2 and 4 at the same hight. By this arrangement I have the same pitch all over the roof, which is not true of the plan furnished by "J. E. N.," because he has ridges 2 and 4 at different hights, while the spans of the respective gables are the same, thus causing the pitch of the gables to be different.

In submitting this roof plan, I beg to say that I find the Correspondence columns of the paper very helpful and interesting to me.

Details Wanted of a Boom Derrick for Builders' Use

From W. S. A., Pittsburg, Pa.— A few months since I noticed in the Correspondence columns a very interesting article on the "Strength of Ropes and Blocks" contributed by "C. J. M.," St. John's, Newfoundland. I would like to ask in this connection if some of the practical readers will give me detailed information as to the building of a boom derrick and the rigging therefor to be used in connection with a crab or engine for lifting of loads ranging from 500 lb. to 2000 lb. The boom should swing three-quarters of a circle at least, and more if possible. I should be glad to have the correspondent furnishing the information give the diameters of ropes, the proper manner of tying the guy lines at the head of the mast and any other suggestions regarding improvements, tying of knots, etc.

A Pioneer Subscriber of "Carpentry and Building"

From T. A. H., Ottawa, Can.—In looking over *Carpentry and Building* for September last, my attention was drawn to a paragraph in the letter of "A. M.," Washington, D. C., who stated that he was one of the early, perhaps the earliest, living subscribers to *Carpentry and Building,* as he sent in his subscription to the paper in February or March, 1879, to begin with the January number. Certainly, there are not many living to beat that record. He also stated that he had not lost a single number of the paper and looked with pride upon his thirty bound volumes.

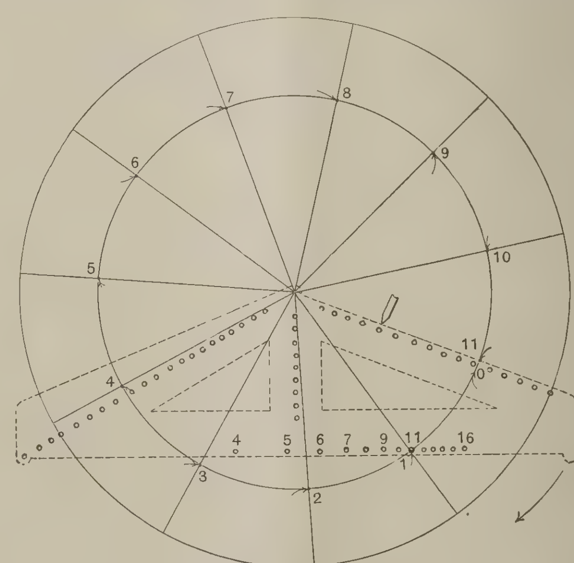
Well, Mr. Editor, I am happy to say that I have taken *Carpentry and Building* as long as my friend "A. M.," in Washington, for I commenced in January, 1879, and have all the numbers intact. I might also add that I have in my library *The American Builder,* a Journal of Industrial Art—1874—New York, American Builder Publishing Company, 229 Broadway.

I fully indorse all that "A. M." has to say in advising the younger members of the craft to read and study *Carpentry and Building,* for I consider it one of the most practical works issued at the present day, and it should be in the hands of all young mechanics as well as the older ones, for that matter. I trust that my friend "A. M." and myself may be spared many years yet to enjoy the reading of *Carpentry and Building* and be benefited thereby.

The "Angleograph" and its Uses

From Charles Gray, Ithaca, N. Y.— In response to the inquiry of "S. B.," Rome, N. Y., in the November number of the paper, I send herewith a rough sketch of an instrument very much like the one he describes called an "angleograph." It is used for the purpose of dividing a circle into equal parts and making regular polygons, as well as many other geometrical and artistic figures. It is also designed for taking the place of the compasses for describing circles.

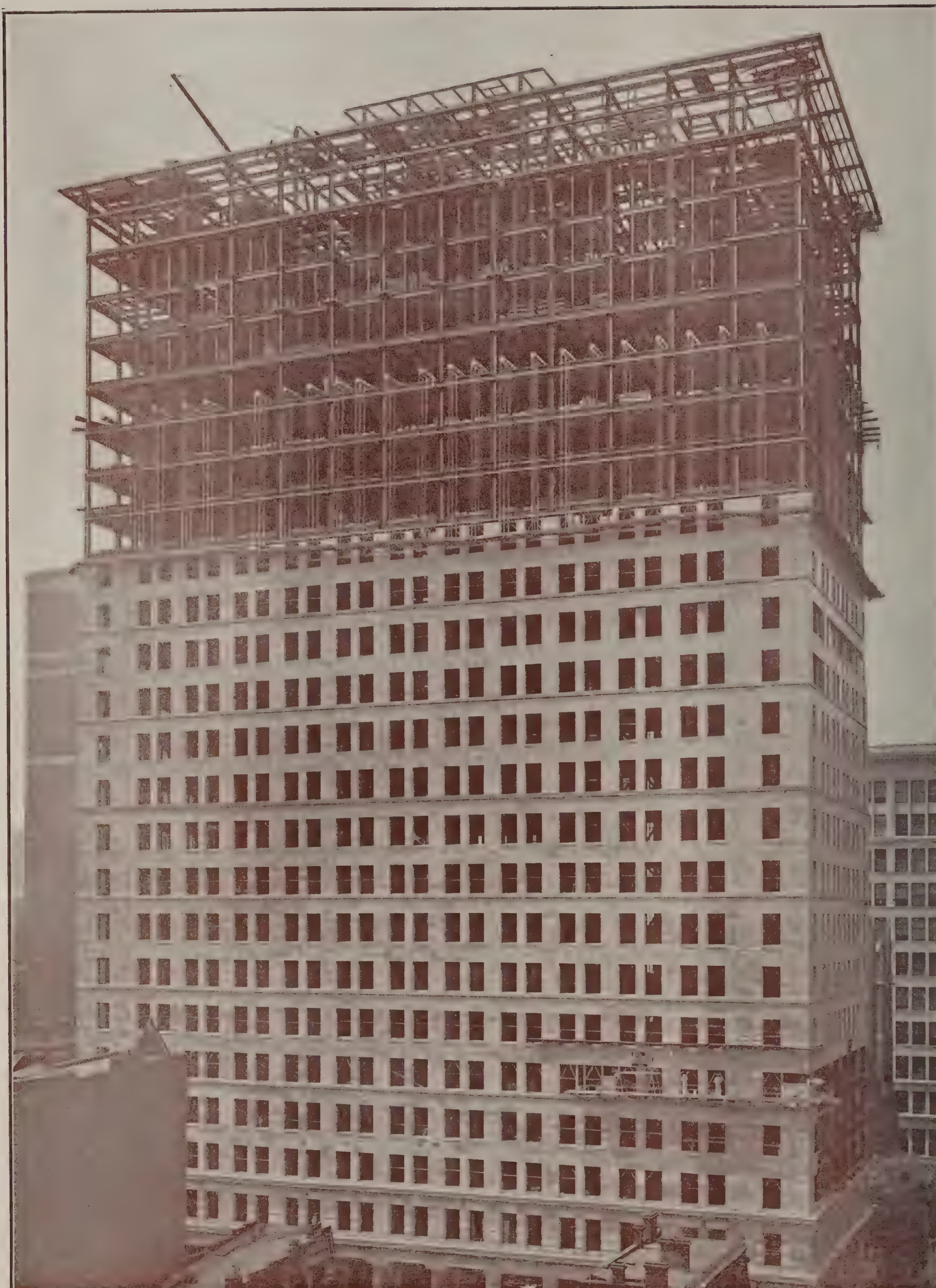
Many very difficult and beautiful figures may be drawn with the aid of this instrument. The sketch shows a circle divided into eleven equal parts, one position of the angleograph being indicated by the dotted lines. A pin should be placed through the hole at the center of the circle and the instrument revolved around in the different positions required. It will be noticed that the holes in the lower part of the instrument are numbered, these corresponding to the number of sides of regular polygons, so that to describe a given polygon it is only necessary to place a pin through the hole O and draw the initial line along the side sloping to the right. Then place the point of a pencil through one of the holes extending along the other side of the instrument, corresponding to the number of equal parts



The "Angleograph" and Its Uses.

into which it is decided the circle shall be divided, then revolve the instrument until the edge sloping to the right passes through this point. Draw another line and continue this process of revolving and drawing lines until the side sloping to the right coincides with the initial line.

The circles shown in the sketch were drawn with the angleograph. If this description is not sufficiently clear to the readers, I shall be pleased to answer any questions which they may bring to my attention.



THE NEW HENRY W. OLIVER BUILDING—PITTSBURG'S LARGEST SKYSCRAPER

D. H. BURNHAM & CO., ARCHITECTS

A FIVE-ROOM BUNGALOW WHERE THE CHIMNEY CREATES AN ODD EFFFCT

D. W. TERWILLIGER, ARCHITECT

A BUNGALOW WITH A FLORAL SETTING AND A RUGGED BACKGROUND

ALFRED SMITH, ARCHITECT

TWO BUNGALOWS IN SOUTHERN CALIFORNIA

THE JOBBING CARPENTER AND SOME OF HIS WORK*—XI

By Edward H. Crussell

OUTSIDE blinds are often in need of repairs; and though those with rolling slats present difficulties enough, the old-fashioned kind with the stationary slats are even worse. The writer used to find it such a mean job to cut the small round-end mortises, shown in Fig. 68, with a chisel that he finally secured one of the tools made for this purpose that is part of the equipment of most of the foot-power mortising machines. Fitted with a stout wooden handle it could be used with a mallet almost as well as in the machine.

Blinds with rolling slats usually give out either at the pins of the slats or at the rod which controls the slats. In making new slats the pins are cut square with saw and chisel and then may be quickly rounded with a rasp. In putting on new rods all the staples should be driven into the rod first, then, the blind being fixed so that the slats stand edgewise, with their lower edges resting on a bench or something similar, it is an easy matter to drive the staples through those in the rod into the upper edges of the slats.

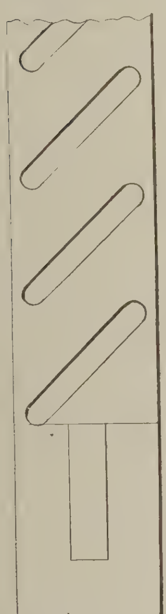


Fig. 68.—Showing Mortises for Stationary Slats.

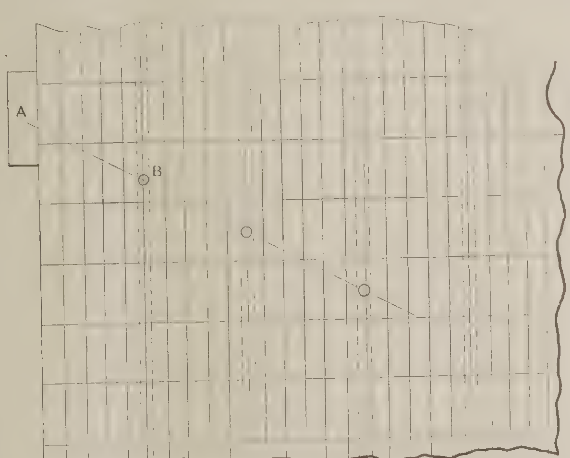


Fig. 69.—Method of Running Wires Under a Double Floor.

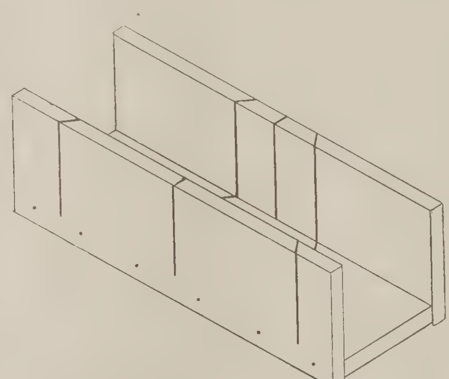


Fig. 70.—View of Wooden Miter Box.

The Jobbing Carpenter and Some of His Work.—XI.

Doors, windows and blinds provide most of the repair work that falls to the lot of the jobbing carpenter, the only other item running them close being floors. It is not the intention to say much upon this latter subject, as it is a class of work that ought not to present many difficulties. It may, however, be well to mention a mistake usually made when it becomes necessary to tear up an old floor before laying a new one. Most men when doing this start close to one of the walls. This is where they make the error, because until one gets two or three feet away from the wall he has no room in which to work and no chance to use his tools. The proper way is to tear up a part in the center and then work both ways from it.

Speaking of floors recalls a job that the writer once did and which may perhaps have some interest for the readers of this journal. A large room was being converted into a telegraph office and it was especially desired that no wires of any kind should show in the room. The legs of the desks and tables were made hollow and all wires for electric lights, telegraph and telephone were to be brought along under the floor and up through the table legs. This would not have been difficult were it not for the fact that the floor was double, the upper one running at right angles to the one below, which in its turn ran at right angles with the floor joists. The ceiling below was plastered, and besides this the lower story was 20 ft. high, which made it impossible to do anything from below. The diagram, Fig. 69, will perhaps explain pretty clearly how the work was done. All the wires entered at "A" through a cupboard under the counter. The dotted lines indicate the floor joists; the light lines the joints of the under floor, and the heavy lines the joints of the upper floor. A good size hole was cut in the floor of the cupboard at "A" and a line was marked on top of the floor showing the direction of the wires. A careful measurement was then taken from "A" to the side of the first joist, and a line representing this joist was drawn on top of the floor parallel with the side of the room until it intersected the other line at B. A 2-in. hole was then bored through both floors and into the floor joist until there was sufficient room to pass the conduits that were to contain the wires. A 2-in. hole was made first so that we might be sure of hitting the joist before making the hole too large. It was afterward made square and enlarged to the width of one of the upper floor boards, or in cases where the hole came between two of these boards it was made as wide as both of them. After the hole at B was cut, measurements were again taken to the side of the next joist and the operation continued as before. After all the holes were cut a cord was drawn through with a "fish wire," which cord easily drew the conduits in after it.

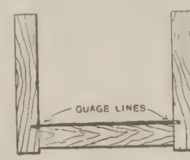


Fig. 71.—Cross Section of Miter Box, Showing Gauge Lines.

On the diagram is shown only one line of wire, but there were several more of them containing only one conduit, while others had three. The conduits were made of some insulating material and were about ¾ of an inch outside diameter. After the wires were all in the holes were filled with neatly fitting pieces of flooring, and three days after the room was in use it would have taken sharp eyes to have seen where the pieces were without close examination.

* The author of these articles will be glad to discuss any phase of work in the line of jobbing carpentry that the reader may suggest.—Editor *The Building Age*.

The Jobbing Carpenter and Some of His Work.—XI.

A knowledge of picture framing is something that may at any time prove useful to the carpenter, and an endeavor will now be made to put forth a little general information on this interesting subject. Generally, picture framing starts in the jobbing shop with the framing of a few blue prints, public notices or work of a like character, which, when well done, often leads to something better.

The tools required for the work are no more than those found in the "kit" of every good woodworking mechanic, and any special skill required is to be easily obtained with a little practice. The writer has in his time framed hundreds of pictures of almost every kind and size, but he has never used anything more elaborate than a good iron miter box, and much of his work has been mitered in the home-made wooden article pictured in Fig. 70 of the sketches.

Most of the trouble with poor mitering has its origin in the miter box, and we shall therefore first endeavor to point out some of the faults to be found in this necessary article. The usual ones are a tendency to make it much too big and to use any old scraps of material that are of no account for anything else. The result is that though the box itself has been fairly well constructed, it will, after the saw cuts are made in it, warp or twist all out of shape, so as to be practically useless for fine mitering. It is no uncommon thing to see a mechanic construct a miter box 5 or 6 in. wide when perhaps all he has to miter is a piece of ⅞ in. quarter round. His idea evidently is that it takes no longer to make a large box than a small one, and the large box may be useful later for the purpose of mitering wider molds. It generally happens, however, that when he goes to the mitering of wider moldings his miter box is either worn out or broken, and so he has bothered himself with the clumsiness of a large box for no good purpose.

In making a miter box it is very essential that the cuts be true and at an exact angle of 45 degrees with the sides, but it is just as important that the box itself be truly and squarely made with the sides of a parallel depth and parallel one with the other before these cuts are made. Considering the small amount of material required it is as well to try and pick out pieces free from all knots and of as straight grain as possible, which are not so liable to twist out of shape after the cuts are made. Take first the piece for the bottom and plane it out of wind on the top or face side; then make one edge exactly square with this side. Gauge the other edge to the proper width and make it also square with the face side; treat the two sides in like manner, except that it will only be necessary to square the top edge of them, from which a gauge line is marked the proper inside depth of the box. After this has been done the two sides can be nailed to the bottom, using the gauge lines for placing them and allowing the rough lower edges of the sides to go where they will—whether flush with the bottom of the box or a little beyond it. Fig. 71, which is a cross section of the box, should make all this clear.

After having proven to our satisfaction that the box is perfectly square and parallel inside, we next proceed to set out the saw cuts. These are often marked with the steel square, though a handier job can be done with the combination square that was pictured in these pages for January last. Fig. 72 shows the steel-square method. Other figures than 12 and 12 can of course be used, but the mechanic should be sure to make the measurements from the inside edges of the box, these being the ones that we have faced up and made parallel. The plumb marks should also be made on the inside of the box, and for accurate work all marks should be made with a knife-edge.

The cuts require careful sawing and should be made with the saw that is to be used in the box. Start the saw close to one side of the knife mark and be sure to keep on that side all the way down the cut. It is usually necessary to cut from both sides in order to keep the saw cuts plumb, and if one is not careful when turning the box around he will get on the wrong side of the line. A square cut is usually added to the box, as seen in Fig. 70, but the cutting of it can be left until it is needed, because the fewer the cuts in the box the better.

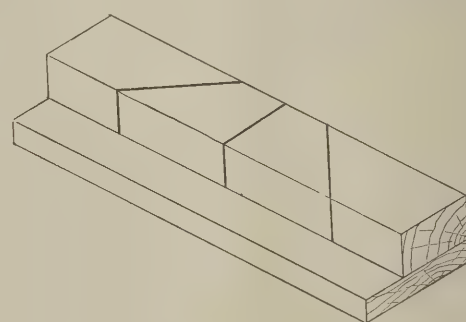


Fig. 73.—Perspective View of Miter Block.

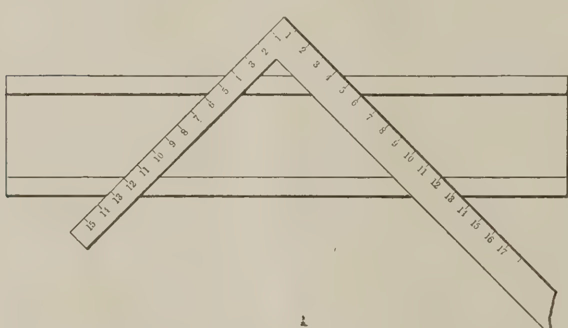


Fig. 72.—Plan View of Miter Box, Showing How the Cuts Are Marked with the Steel Square.

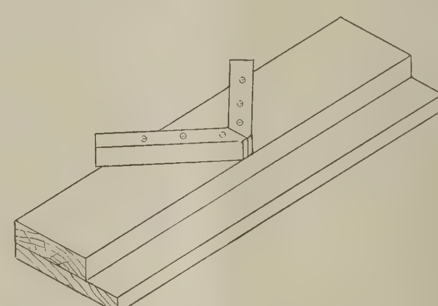


Fig. 74.—View of Miter Shoot.

The miter block, Fig. 73, deserves more consideration than it usually receives from American mechanics. It is especially useful for cutting small mouldings, say 1½ in. or less in width. For this purpose it is better even than the iron miter box, being smaller and handier and not requiring to be changed from one side to the other for each cut. In size it is about 1 ft. 4 in. long, 5 in. wide and 2¾ in. thick, with the rabbet about 2 x 1¾ in. It should be made of hardwood and can be built up as shown or rabbeted out of a solid piece.

The miter shoot in Fig. 74 is used for trimming the ends of the moldings with a plane after they have been cut with the saw, and though not indispensable, it has its uses. If the saw is in proper shape it should cut the moldings so that there will be no need for further trimming, but there is sometimes a little difficulty in getting the moldings exactly the correct length. The two opposite sides of a picture frame must be exactly similar in length if we are to have good miters, and the miter shoot is a valuable aid to this end. It should be built up as shown, being about 2 ft. 6 in. long and 9 to 12 in. wide. The rabbet should be made of a size to accommodate the plane that is to be used with it.

There are a number of different styles of picture frame cramps on the market and an almost endless variety of home-made affairs have at different times been contrived for the purpose. They are used almost entirely by the amateur, practically all of the professional framers' work being put together and nailed in an ordinary machinist's vise.

We will for the present concern ourselves with the professional's method. The molding is measured along the inside or rabbeted edge—never along the back edge —and cut to length. Sometimes the sight measure of the frame is given and sometimes the rabbet measure. The sight measure must always be marked on the molding in order to obtain the proper length for cutting, and twice the width of the rabbet deducted from the rabbet measure gives the sight measure. For instance, with the rabbet ¼ of an inch wide and the rabbet measure 16 x 20 in., the sight measure would be 15½ x 19½.

Having cut the four pieces for the frame and made sure that the opposite sides are exactly even in length, fasten one of the pieces in the vise as shown in Fig. 75, gripping it across from the back edge to the inside of the rabbet and placing a piece of cardboard or something similar in the vise to protect the back edge. Examine Fig. 75 carefully and note that the end of the rabbet at the miter comes exactly even with the side of the jaw of the vise. This is important because when we apply the second piece the rabbet in it will rest firmly against the side of the vise jaw and one may hammer on it as hard as he pleases without moving it, so long as it is held square with the piece in the vise. Different people have watched the writer nail up a frame and then have tried to do likewise and failed, just because they did not notice this little item.

With one piece firmly fixed in the vise, place the other piece against it in the position it will occupy when finished; slide it toward the back edge of the miter about ⅛ of an inch—because the nailing has a tendency to draw it forward—and bore the holes for the nails right through the first piece and a little way into the other. Now take the molding apart and brush *both* edges of the miter with a little thin hot glue, being very careful not to get any on the face of the molding. Liquid glue is worse than useless for this purpose. Place the pieces in position again and drive in the nails or brads, allowing the last few taps of the hammer to draw the molding into place until all the members intersect. Fig. 76 shows the method of holding the molding while driving the nail.

Place the other half of the frame together in this manner and then put these two halves together, using exactly the same method. It may happen that in gluing the last miter one may get some glue on the face of the molding; if so, wipe it off with a piece of cloth and a little warm water before it has time to set. Do not use the water too hot or it will be liable to take the polish off the molding.

In soft wood the holes for the nails can be made with a fine bradawl, in hardwood they should be made with the automatic drill mentioned earlier in these pages. A little soap applied to nails or screws that are to be driven into hardwood make an almost unbelievable difference in the driving of them. If the frame molding is composed of more than one piece, as, for instance, a natural wood outer frame with a gilt molding inside it, the gilt molding must be mitered and nailed up separately; then dropped into its position in the outer frame and fastened to it, care being taken that the nails or screws used do not come through to the front of the frame and spoil it.

The frame being now completed, it may be fitted with a glass and the picture inserted. The glass will first need cleaning, which is an item of no little importance. A good way is to wash both sides of the glass with clean water and while it is still damp rub it all over with a cake of chalk or whiting. In a few moments this will be dry and the glass can be thoroughly cleaned or polished by rubbing off the dry chalk with a clean dry cloth or a crumpled newspaper. Scouring soap such as Sapolio used in the same manner is also good.

If the picture is the correct size it can now be dropped into place, but quite often it is necessary to trim it a little. The best way to do this is to lay the picture face up on the bench and place the frame over it in its relative position, adjusting one with the other until the appearance of the picture suits; then after marking around the rabbet of the frame, with a pencil lift the frame and trim the picture to the pencil lines.

Blue prints having old associations for their owners are sometimes sent in to be framed. These will generally be more or less crumpled or creased, and to make a good job of them they should be mounted on a "stretcher" before being placed in the frame. The "stretcher" may be of soft wood from ½ to ¾ in. in thickness and from 2 to 3 in. wide, depending upon the size of the print. It should be mitered and nailed together the same as the picture frame, of a size to fit snugly in the rabbet of the frame molding.

To mount the print it should be laid out face down on some level surface and wetted evenly all over with a sponge and water until it lies perfectly flat and pliable. Sometimes it is necessary to wet it more than once in order to secure this result. Cover the face of the stretcher frame with hot glue and hold it in position on the print, see that it is in perfect contact all around and then turn it face up and set it aside in a horizontal position to dry, when it will be found stretched as tight as a drum head and perfectly free from creases.

It is as well to lay strips of wood or something similar on the face of the blue print around the edges to insure them keeping in contact with the stretcher while the glue is setting, also one edge at least of the print should be trimmed before it is dampened in order to insure the placing of the stretcher in the correct position.

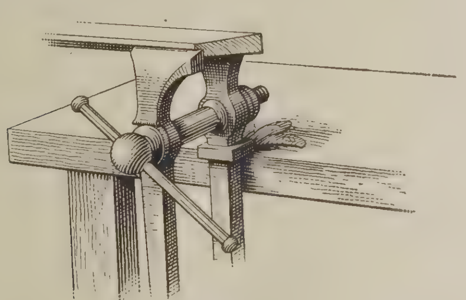


Fig. 75.—Showing How the Molding is Gripped in the Jaws of the Vise.

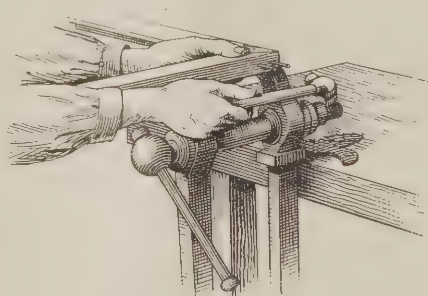


Fig. 76.—Method of Holding the Molding in the Vise While Driving the Nails.

The Jobbing Carpenter and Some of His Work.—XI.

BRACKET AND SCROLL SAWING

By C. Tobyansen

In the issue of the paper for May last we presented a fairly complete account of the several forms of bracket and scroll constructions used as roof ornamentation, such as cresting finials, etc. For the sake of completeness, however, we shall include the gutter bracket, although it is now rarely used on out buildings, as the box gutter has about superseded the standing gutter. In Fig. 18 is shown a perspective view of the common form of standing gutter for a shingle roof. The larger bracket, which closes the end of the gutter, is commonly named "gutterduck," while the supporting bracket is the gutter bracket. Somewhat more elaborate designs are shown in Figs. 19, 20 and 21.

structive rafter and nailed fast to the side of those resting on the plate and given whatever projection is desired. They may vary considerably in size, but 2 x 6 in. is the general run for the main roof and 2 x 4 in. for dormer construction.

The hip rafter extension is correspondingly longer and wider, as is the hip rafter itself. In order to develop the form in proper relative proportions to the common rafter extension we shall refer to Fig. 23, where A shows the common and B the hip mold. The width of the hip as corresponding to the common rafter

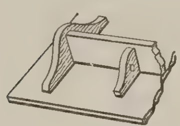


Fig. 18.—Standing Gutter for Shingle Roof.

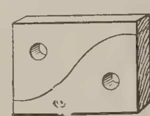
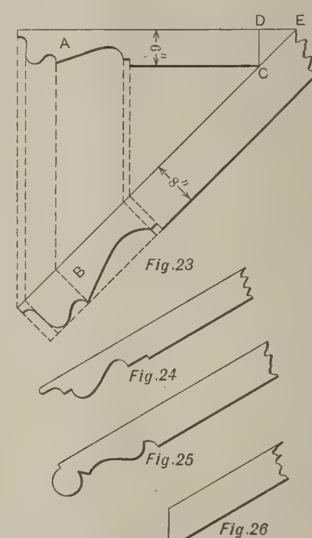
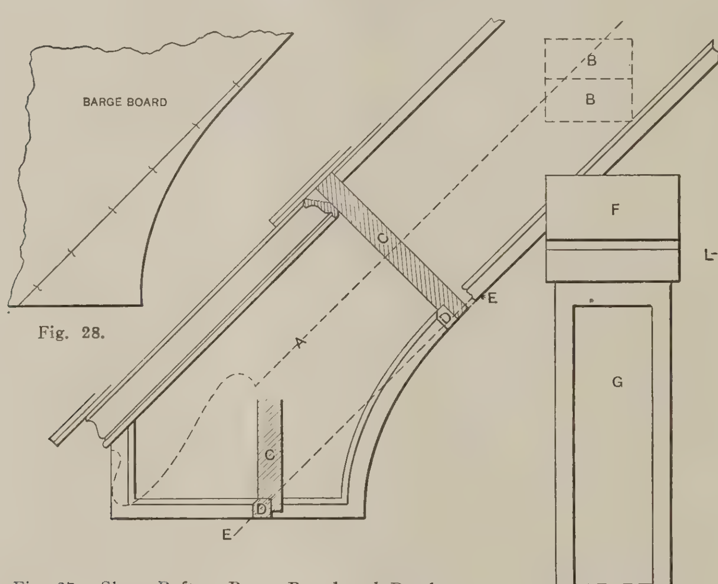


Fig. 22.—Showing How Two Brackets May Be Made by a Single Cut.

Figs. 19, 20 and 21.—More Elaborate Designs of Standing Gutter.



Figs. 23 to 26.—Rafter Ends and Their Development.



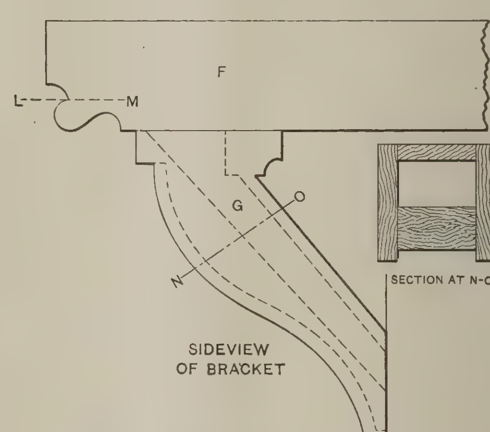


Fig. 27.—Show Rafter, Barge Board and Bracket.

Fig. 28.—Piece to be Applied at Line E-E of Fig. 27.

Fig. 29.—Details of Bracket, Showing Construction.

Bracket and Scroll Sawing.

The part of the "gutterduck" extending back from the gutter should be of easy outline, as it is flashed along the upper edge. Incidentally it may be well to mention that the ogee form of bracket shown in Fig. 18, and again in Fig. 22, is the one form wherein two brackets may be made by a single cut, with no waste material whatever excepting a straight wedge cut. This form on a larger scale is often used as cornice and porch bracket, where economy of time and material is of moment. A perforation 2 in. or thereabouts in diameter will greatly improve its appearance.

We will now proceed beneath the roof line and see what there is deserving of attention. First, we have the rafter ends—variously styled "exposed rafters," "lookouts" or "show rafters," all meaning the same member, which is simply a continuation of the con-

is as the line C-E to C-D respectively. It is the same corresponding relation as a straight cut to a miter cut of 45 degrees, so it will be understood that as the mold is lengthened it is also deepened, thus retaining whatever gracefulness the curves or outline may possess. Figs. 24, 25 and 26 show other forms of rafter ends, the last named having merely plumb and foot cuts—a style often used. These cuts are decided by the pitch of the roof, knowledge pertaining to which is altogether too common among carpenters to need further elucidation.

The pergola—so popular of late—requires a somewhat different rafter-form. These are a sort of open-air trellis structures, copied from the ancient classic forms of architecture—Greek and Roman. Generally speaking, they consist of two long rafters laid horizontally on supporting columns about 8 ft. high. Transversely on these long rafters—they are generally 12 to 16 ft. in length—are placed cross rafters 4 to 8 ft. long and spaced 17 to 20 in. on centers, thus forming a trellis for clustering vines.

These rafters, as stated, are placed horizontally—no pitch—and are the real rafters, being exposed their entire length. They are generally shaped on both ends. They vary much in length, but are quite long enough to be a nuisance to handle around the band saw, as they generally require a helper on "the other end." This means that the sawyer has to shove the unwieldy timber and the more unwieldy helper around by mere force, and at the same time shield the delicate band-saw blade from undue pressure. In addition he must follow the curved lines and make a steady, smooth cut. Very easy for the man who does the designing, but if he had to do the actual work as well, methinks he would confine himself to few and simpler curves.

Please understand, gentle reader, that when we state that this rafter work consists merely of two long timbers covered with many shorter ones, more or less closely placed, we only imply the average run. There are exceptions with side passages, circular works, corners and wings, or again they are terraced varied hights to different parts of the structure, giving more pretentious architecture, as also more work physically. But the main features—that of horizontal timbering uncovered—remains the same.

In Fig. 27 we show a verge or barge board, also a barge bracket, by which we do not intend the reader to infer that these two members always come together, because such is not the case. The dotted line "A" denotes the position of the rafter end relative to the barge board and the plate B-B. For economic reasons the piece shown in Fig. 28 is applied to the main board at

When well nailed with white lead between the joints it makes a good job.

We wish to call attention to the fact that the bottom piece H, Fig. 30, is of such thickness as to conform to the meeting of the cove and curve at the line L-M of the side elevation, Fig. 29. This construction leaves the joint at the end of the bracket scarcely detectable, even though it should open up a little in the course of time. The lower part G is also boxed as indicated by the dotted lines of the elevation and shown in the sectional view taken on the line N-O of the elevation. This part is also what we term a core or skirt bracket, meaning that the central body is set back, so as to form a sunken panel as shown in Fig. 27.

Another form of truss or brace bracket is that shown in Fig. 31, a form often used for barge brackets and also, in much larger dimensions, as roof supports on side porches. It differs from the bracket in Fig. 27, mainly in the fact that it is a complete bracket framed and put together in the shop, while the other goes to the building in two parts, there to be framed into the structure.

This bracket may also be boxed up much, as pre-

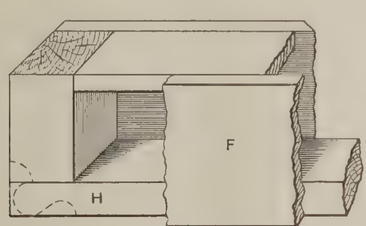


Fig. 30.—Box Construction of Bracket "F," Shown in Previous Figures.

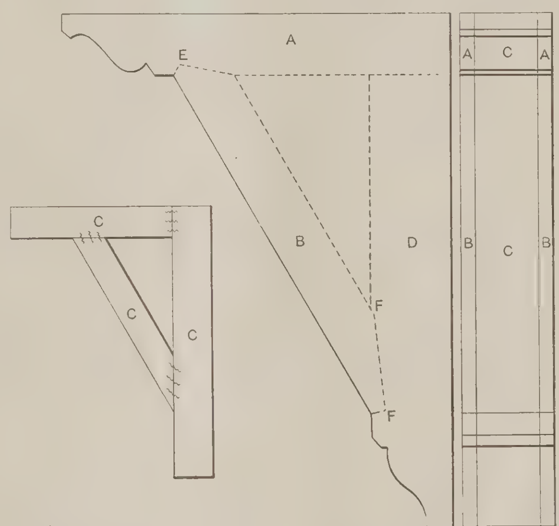


Fig. 32.—Solid Core of Brace Bracket.

Fig. 31.—Another Form of Truss or Brace Bracket.

Bracket and Scroll Sawing.

the dotted line E-E, as, of course, it would take a much wider board to make it all in one piece and also it would be quite awkward to handle, as these barge boards are about 16 ft. long, 12 to 18 in. wide in the main body, and 2 to 3 in. thick. When the heel piece is glued and fastened with corrugated irons or fasteners, as described in the May issue of *Carpentry and Building*, the two parts are inseparable, while with glue only it would not so well stand exposure.

After the board is completed, the rabbet for the molding D is run on the shaper. The curved part of the molding must be band-sawed and also worked on the shaper.

It will be noted that there is a difference in the rabbet or recess in the lower and upper sections of C-C, making the edges of the molding and the board flush along the curve, and it is continuous although broken along the plumb and foot cut—just an architectural vagary, that is all.

Now to the bracket F and G in Fig. 27, the side elevation of which is presented in Fig. 29. The part F, on which rests the barge board (supposedly), is made long enough to be let into the frame work of the building, thus securing it rigidly. The bracket is boxed, as shown in the constructive detail, Fig. 30, principally because it saves lumber, but also because it is less liable to checkage than a solid piece of such dimensions.

viously explained, but it is preferable to make the core solid, as suggested in Fig. 32, and overlay it with ⅞ in. or 1⅛ in. stuff, as occasion may require. We will suppose this bracket to be 7 in. thick or have 7-in. face, as the sawyer would say; that would require a 4¾-in. core and 1⅛-in. side pieces. Select some common 5-in. pine for the core, taking care that no bad knots show on the face, and frame it as shown in Fig. 32.

The joints can be cut well enough on the band saw, as they do not show, but care should be taken that it is nailed up square and true. Here, again, corrugated fasteners will be found very handy. This framing accomplished to our satisfaction, we proceed to put on the 1⅛-in. stuff, which should be fairly clear, as it shows. We first shape the pieces B-B, Fig. 31, very carefully on the band saw, taking extra pains at the joints E and F. Tack on to the core unshaped the pieces A and D shown on the side elevation; just tack enough to hold temporarily, but mark so you can get them back in exactly the same position. Now lay on the piece B in its proper position and scribe along the joint part with a knife point. Remove the pieces A and D and cut for the joints. Place back on the core and nail to stay.

If you have performed this delicate cutting carefully no hand fitting should be needed. Note that in the core the vertical and horizontal pieces are joined vertically. The back piece is cut long and the top short, while in the 1⅛-in. sheathing the joint is made the opposite way —top long and back short. Thus the joint is securely braced when nailed and there is no fear of it ever sagging.

We now assemble and nail all secure, there only remaining the sawing of the mold on each end and the bracket is finished, and at the same time substantially made.

Concrete Work in China

In a recent consular report to the Department of Commerce and Labor the subject of constructional machinery is discussed and reference made to the needs of China in the way of cement for building purposes. Among other things it says: Wood is very scarce and high in price, whereas limestone and sand for the manufacture of cement and bricks is abundant and handy, with unlimited cheap labor to turn it out. Not long ago a government plant was completed with a very large capacity. Also at Hongkong is an English factory that turns out a very good grade of cement. The molds which are used at home will be quickly imitated if sent here, as well as nearly any mechanical device necessary in building a concrete house. But the larger buildings, such as government houses, factories and schools, which require special systems, will need a lot of material in time to come. Already the Chinese are specifying steel construction in most of their large buildings, and I and T steel beams are being imported in noticeable quantities. The principal architects in Canton make it a point to use American material whenever possible.

New Publications.

One Hundred Country Houses—Modern American Examples. By Aymar Embury II. Size, 10½ x 11¼ in.; 265 pages. Bound in cloth. Published by The Century Company. Price, $3.00. Postage, 30 cents.

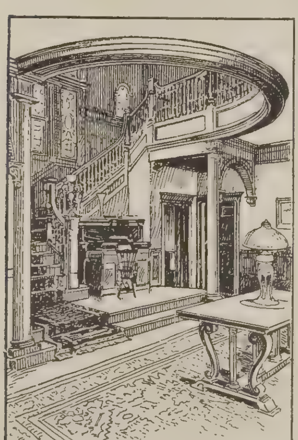
This is a work which will strongly appeal not alone to the architect, but to every country dweller and every would-be country dweller, for the designs shown represent 100 exceedingly interesting types of modern country homes in various parts of the country, illustrating the work of many different architects. The styles most usual in home building are dealt with under eleven classifications as follows: New England Colonial, Southern Colonial, Classic Revival, Dutch Colonial, Spanish or Mission, American Farm House, Elizabethan, Modern English, Italian, Art Nouveau and Japanesque. The author points out that this list divides itself naturally into two classes—"one more easily treated in a formal manner and the other suited to a less formal treatment."

In the make-up of the matter, which shows great care on the part of the author in its preparation, the half-tone illustrations representing the completed buildings with their immediate surroundings occupy the right-hand pages, facing which is the well-written description dealing with the rise and growth of architecture in America and of the different periods and styles of design as indicated by the headings referred to. The work is one of which the author may well be proud and is of a nature to constitute a valuable addition to the literature of the subject of the architecture of country homes.

SOME PROBLEMS IN STAIR BUILDING—XIII.

By Morris Williams.

WE shall now endeavor to show how to raise a level landing rail to the required hight, either at the top or bottom landing, where it will be necessary to use a small cylinder owing to lack of space. Referring to Fig. 84, we show a partial plan of a flight of stairs having a 4-in. cylinder connecting it with a landing at the top end. The pitch board shown in this figure is made up of a 9-in. tread and an 8-in. riser.



In Fig. 85 we show the elevation of the last step and the development of the cylinder tangents. The center line of the flight rail extended cuts the side tangent *a b* in *b′*. A line drawn from *b′* to *w* would indicate the hight of the center line of the landing rail above the floor line if the operation in this case was to follow the method usually employed in connection with cylinders of 8 in. and over in diameter, but in this case the level landing rail would be too low, being barely 2 in. above the floor line, whereas it should be at least the hight of half a riser.

The hight of a level landing rail when in position ought to be at least 2 ft. 10 in. from the floor line to the center of the rail; if space allow the use of a cylinder 9 in. in diameter we would obtain the prescribed hight for the landing rail at the point *b′* of Fig. 85. The same point *b′* is shown in Fig. 86 at the hight of half a riser above the floor line just where it is required to be in order to have the level landing rail when in position 2 ft. 10 in. above the floor line. In this figure, however, we have a 9-in. diameter cylinder, whereas in the previous figure the diameter of the cylinder was only 4 in. owing to lack of space.

The reader will observe from the above that whenever space allows it should be utilized to determine the size of a cylinder relatively to the pitch of the adjoining flight that will produce the sanctioned hight for the level landing rail similar to the examples shown in Fig. 86. The wreath required for this example is one to cover only the first quarter of the semi-circular cylinder, and as shown in the diagram the method to lay out the face mold and finding the bevel is the simplest of any that we are likely to meet in the construction of wreath hand rails.

The rail for the other quarter turn in this example is not a wreath, being, as shown shaded in the plan of the diagram, merely the form of the plan rail, requiring no bevel, twist or face mold.

The purpose of this article is to show how to construct a wreath rail over a small cylinder in case a larger one of sufficient size cannot be used. In Fig. 85, therefore, is shown one method, and it may be well for the reader to compare it with the one shown in Fig. 86, noting the difference between the two methods of construction. As before stated, the line *b′ w* of Fig. 85 indicates the hight above the floor line at which the pitch rail of the flight will strike the side of the cylinder. In this case the line is only 2 in. above the floor line, while in Fig. 86 the same line is 4 in. above it, this being the hight required for the level landing rail. The problem as shown in Fig. 85 is how to raise the rail from w to m so that the landing rail will be 4 in. above the floor line instead of 2 in. We proceed as shown in the diagram by drawing the center line d' m of the level rail 4 in. above the floor line and from d' draw a line to b'.

In this manner we have obtained the pitch line of the tangents for two wreath pieces that will cover the distance all around the curve of the cylinder. The two first tangents as shown at a' and b' are inclined, the tangent a' having the same pitch as the flight and the tangent b' being not quite so steep, as shown from b' to the joint c'.

The method of finding the angle between the two tangents as required upon the face mold to square the joints of the wreath is clearly shown in the diagram angle position as shown at d' c''. The center line of the wreath is shown in the diagram merely to illustrate the nature of the construction.

The face mold complete for this wreath is shown in Fig. 87, and requires no explanation except to state that the tangents c'' d and d' m are made equal to the same tangents bearing similar reference letters in Fig. 85.

In Fig. 88 is shown the face mold complete for the bottom piece of wreath, and the operation of laying it out may be readily seen by comparing it with the operation in connection with the tangents a' and b' in Fig. 85, the same reference letters being used in both cases. One bevel only will be required for the upper wreath, and it is shown at d' in Fig. 85.

Two bevels will be required for the bottom wreath owing to the two tangents being inclined, and these are shown in the diagram Fig. 89. Here the base line m is

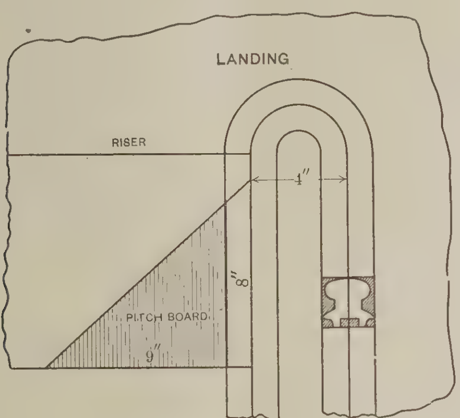


Fig. 84.—Plan of Stairs.

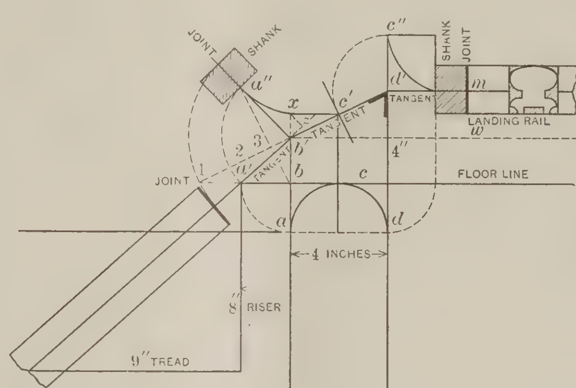


Fig. 85.—Plan of Center Line of Rail with Elevation and Pitch Line of Tangent for a 4-In. Cylinder at the Top of a Flight.

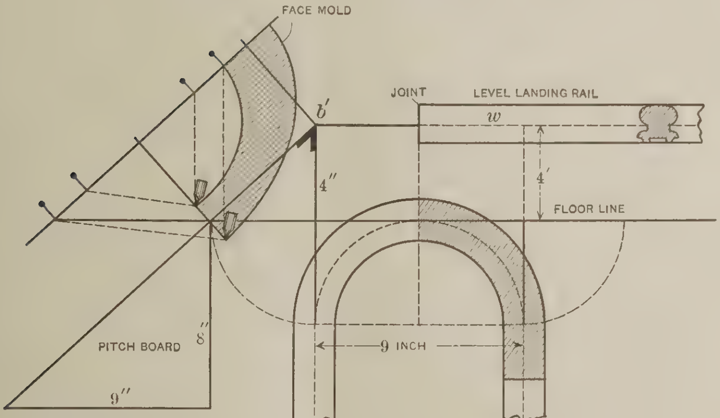


Fig. 86.—Method of Constructing a Wreath Over a 9-In. Cylinder at the Top of a Flight Upon a Landing.

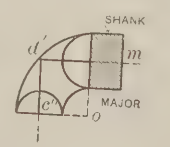


Fig. 87.—Top Facce Mold for Wreath Shown in Fig. 85.

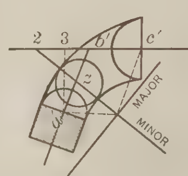


Fig. 88.—Bottom Face Mold for Wreath Shown in Fig. 85.

Some Problems in Stair Building.—XIII.

by drawing a line from b square to the tangents b' c' d'. Then revolve tangent a' to cut the line in a''. Then by connecting the point a'' and the point b' the angle at b' will indicate the angle between the two tangents as required upon the face mold.

The curve of the center line of the wreath is shown extending from a'' to the joint at c'.

From the same joint c' up to d' is shown the bottom pitched tangent of the upper piece of wreath, and as indicated it is the same pitch as tangent b' of the bottom piece of wreath, which is necessary, owing to the joint at c' being made square to both tangents. The top tangent d' is level, and this also is a necessity, owing to the joint at m being made square to the level landing rail.

The angle between these two tangents as required upon the face mold will be a right angle as shown at d'. It is found by simply revolving tangent c' to its right made equal to the radius of the plan curve of the center line of rail, while the hight c is made equal to the line b 3 of Figs. 85 and 90. By joining the point c with the base the bevel will be found at c. This bevel is to be applied to the end c' of the wreath shown in Figs. 85 and 88. The bevel at a, Fig. 89, is found by having the base length the radius of the plan curve, while the hight from m to a is made equal to the length of the line x z in Figs. 85 and 90. By joining a to the base m as shown the bevel will be found at a, which is to be applied to the end a shown in both figures referred to.

The bevel c is to be applied to the wreath toward the outside, and the bevel a toward the inside, holding the stock of the bevel square to the respective tangent in each case. The bevel shown at d' in Fig. 85 is to be applied to the end m of the upper wreath. No bevel is required for the other end owing to the fact that one tangent of the wreath is a level tangent.

Some Problems in Stair Building.—XIII.

Stairbuilders usually draw a diagram similar to the one shown in Fig. 90 preparatory to the laying out of the face mold. It will be observed that this figure represents the plan and elevation of the first quadrant of the cylinder and also contains the plan tangents with their respective pitches, all of which is a duplicate, as will be seen by comparison of the first quadrant and tangents as shown in Fig. 85 bearing the same reference letters. The numbers 2 3 b' c' shown in Figs. 85 and 90 are transferred to the line 2 3 b' c' of Fig. 88, and the face mold is completed as partially shown and explained in Fig. 85.

In Fig. 91 is shown another method practiced by stairbuilders to raise a level landing rail to its proper hight above the floor line when a small cylinder is being used, making the raising of the rail necessary. In this diagram we have the same size of cylinder (4 in. diameter between center of rail) and also the same pitchboard for the flight adjoining as in the figures preceding. Commence by locating the center of the bevel landing rail 4 in. above the floor line and continue the pitch of the stairway to cut this line in the point *c*. Drop a line from *c* to *b*. Now from *b* draw a line to *d*

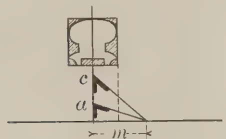


Fig. 89.—Bevels for Botom Wreath.

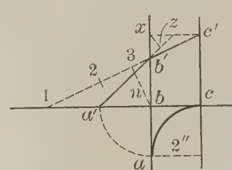


Fig. 90.—Elevation of Tangents a' b' and b' c' Preparatory to the laying out of the Face Mold.

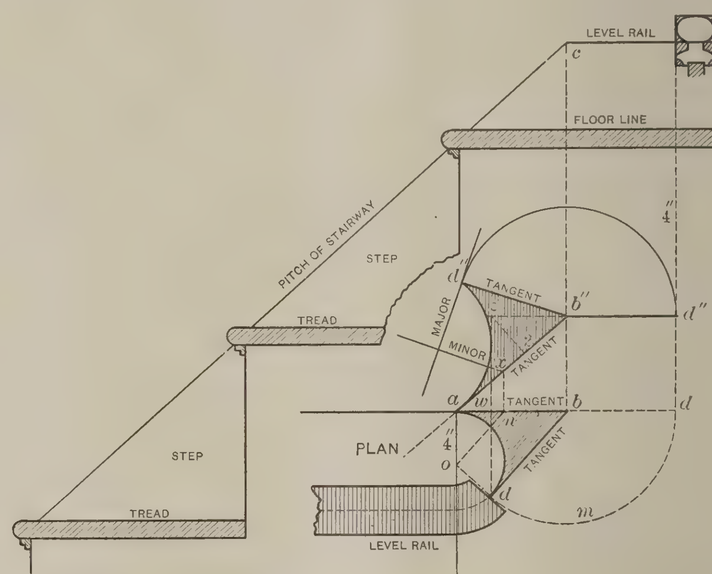


Fig. 91.—Showing Method by Which to Raise the Landing Rail Above the Floor Line to the Hight of Half a Riser, the Wreath Being Made in One Piece, Extending Over More than Half the Cylinder.

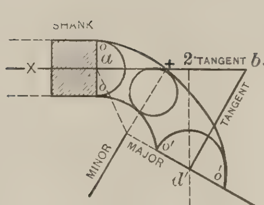


Fig. 92.—Face Mold for the Acute Plan of Wreath in One Piece Shown in Fig. 91.

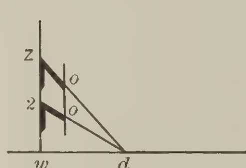


Fig. 93.—Bevels for the Obtuse Angle Plan Tangents Shown in Fig. 91.

tangent to the plan curve and make the joint at *d* square to this tangent.

We have in this manner determined the length of the plan curve as from *a* to *d*, and also the two plan tangents as shown at *a b* and *b d*, respectively. Now from *a* to b'' draw the pitch of the flight rail with the pitchboard. From *d* draw the line *d w z* as shown, and from *z* draw a line to 2 square to the pitch line tangent b'' *a*. From *o*, the center of the plan curve, draw the line *o n* parallel to the plan tangent *d b*; from *n* draw *n x* to cut the pitch tangent *a* b'' in the point *x*.

Upon the pitch line tangent *a* b'' we now have all the points required to complete the face mold for the wreath. The face mold may be drawn upon the tangent line *a* b'' in this diagram, as it is partially shown to have been done, and containing as it does the tangents, axis and center line of the mold.

In practice, however, the method shown in Fig. 92 is the one usually employed. Referring to this figure, draw a straight line as X Y and upon it place the points *a x* 2 b'' taken from the pitch line *a* b'' of the previous figure. From the point 2 draw a perpendicular line and extend it indefinitely. Measure from b'' a distance equal to the plan tangents *b d* of Fig. 91, cutting the perpendicular line dropped from 2 in the point d'. Now connect d' with b'', which will be the level tangent as it is required upon the face mold. The other tangent will be the line *a* b'' and the angle between the two as required upon the face mold to square the joint will be found at b''. Note that the same angle is shown at b'' in Fig. 91. To find the axis draw the minor from *x* parallel to the tangent b'' d' and draw the major from d'' and square to the minor axis as shown.

To find the width of the mold at each end it is necessary to ascertain the bevels required to twist the wreath. They are shown in the diagram, Fig. 93, and are found as follows:

Make the base *d w* of the diagram equal to the line *d w* in Fig. 91; make *w* 2 of Fig. 93 equal to *z* 2 of Fig. 91, and *w z* equal to *z w* in the same figure. Now connect *z* with *d* and 2 with *d*. The bevels are thus found at *z* and 2, respectively. Bevel *z* is to be applied to the end d' of the wreath and bevel 2 to the end *a*. In this diagram, Fig. 93, the line *o o* is placed at a distance from the line *z* 2 *w* equal to half the width of the straight rail as shown in Fig. 89. The distance from *z* to *o* along the long edge of the bevel *z* in Fig. 93 is to be placed on each side of d' as shown at d' o' and d' o' in Fig. 92 to determine the width of the mold at this end; so also the distance from 2 to *o* shown on the long side of bevel 2 in Fig. 93 is to be placed on each side of *a* as shown at *a o* and *a o* in Fig. 92. The width of the mold at the minor axis will be that of the straight rail.

Having thus found the width of the mold at each end and also at the minor, we may now easily draw the inside and outside curves by merely bending a lath to touch the points found on each side, or if preferred, it can be done by using the axis as a trammel and string and pins or a straightedge. The operation shown in connection with the preceding diagrams may be applied to raise or lower any distance desired a landing rail where a small cylinder is used either at the top or bottom of a flight.

The first method, as will be observed, requires two pieces of wreath, each one covering half the cylinder, while the operation exemplified in the second method requires only one piece, which is shown in the plan Fig. 91 to extend from *a* to *d* and to cover more than half of the cylinder. The remainder of the cylinder is a level part of the level landing rail as shown from *d* and shaded in the diagram.

WHAT BUILDERS ARE DOING

THE tremendous impetus given to building operations during the summer and fall months has carried construction work into the winter upon a scale which speaks well for the future employment of labor in all branches of the industry. This condition has been favored to some extent by the comparatively mild weather which has prevailed, thus permitting of a great deal of out-door work, which otherwise would have been delayed until spring. The striking feature of the situation the country over is the extent to which dwelling houses are being erected, especially in connection with the development of property in outlying districts of the larger cities. This is undoubtedly traceable to the more or less congested conditions existing in the cities and the tendency of the population to seek homes in the suburban sections. Reports available from leading cities of the country for the month of November indicate a volume of work practically the same as at this season the year before. Striking gains are to be noted in cities like Buffalo, Denver, Philadelphia, St. Paul and Rochester, while heavy shrinkages are found in Chicago, Pittsburgh, Cincinnati, Baltimore, Louisville and Salt Lake City.

Among the smaller places, where the amount of capital involved in the operations is not large, the changes fluctuate from decreases of 4 per cent. up to increases of 250 per cent. It is reasonable to suppose that from this time forward until the opening of spring, building operations will be upon a decreasing scale, more especially if the winter should prove severe. On the other hand, with what might be called an open winter a vast amount of building work is likely to be carried along, so that the total for the year 1909 will compare very favorably with many of the highly prosperous periods of the past.

Buffalo, N. Y.

The records of the Building Department show that during the past year Buffalo has spent and is preparing to spend more money in building operations than in any previous year in its history, with the exception of two years, when the figures were abnormally swelled by the erection of unusually large and expensive buildings, such as the Post Office and Federal Building, and several large office buildings like the Ellicott Square Building, costing two or three million dollars each. The total of Buffalo's building permits for the eleven months ending November 30, 1909, was $9,420,000 for 3191 buildings—a gain of 52 per cent. over the corresponding period of the preceding year.

These figures do not include many important building projects just outside of the city, such as the Wickwise Steel Company's new furnace, now in course of construction, on the Niagara River, north of the city; the $1,500,000 to be expended in buildings and improvements by the Farmers and Drovers' Stockyards Company, at East Buffalo, etc.

Among the larger and notable items in the past year's record are the Hotel Lafayette addition, $260,000; Y. M. C. A. Men's Hotel, $115,000; Statter's Hotel Annex, $350,000; the Wm. Hengerer Company department store addition, $200,000; the H. A. Meldrum department store addition, $110,000; the J. N. Adam Company department store addition, $100,000; the Sinclair Rooney Company wholesale millinery building, $140,000; the Wm. Hamlin wholesale clothing building, $125,000; the J. N. Beyer building, $50,000; George Irish Paper Corporation warehouse, $75,000; Buffalo Cold Storage Company warehouse, $80,000; wholesale grocery warehouses of the Wm. H. Granger Company and the C. M. Flickinger Company, costing respectively $85,000 and $50,000; Buffalo Glass Company warehouse, $60,000; Washburn-Crosby Company flouring mill B and elevator, $500,000; Wheeler Elevator, $275,000; Spencer-Kellogg Company elevator, $225,000; Husted Milling Company elevator, $60,000. In manufacturing plants, the Lackawanna Bridge Works, $120,000; Pierce-Arrow Motor Company, $400,000; American Radiator Company, thermal research laboratory, $115,000; American Agricultural Chemical Company addition, $50,000; Frontier Iron Works, $80,000; Buffalo Foundry & Machine Company, $75,000; Beaver Manufacturing Company, $60,000; Buffalo Brewing Company, $250,000; New York Central Railroad freight house, $60,000. In the list of churches, charitable and benevolent institutions there are included the Central Park Presbyterian Church, $100,000; Mother House of the Sisters of Mercy, $350,000; Club House of the Church of the Holy Redeemer, $75,000; Hahnemann Hospital, $180,000. In school buildings, the Buffalo Seminary, $85,000; the Nichols School for Boys, $80,000; Public School No. 56, $132,000; Front Avenue Public School, $110,000. Also numerous apartment houses and private residences, costing from $40,000 to $100,000.

For the coming year plans definitely in shape or in progress give indication that 1910 will be busier and larger in totals than the current year. Projects now matured and in readiness for early construction include a new Technical High School to cost $400,000; the Hutchinson Central High School, $500,000; South Side High School, $400,000; New County Hospital, $500,000; Tuberculosis Hospital, $200,000; Contagious Diseases Hospital, $200,000; a new Convention Hall and a new Public Market, cost not yet determined, and new Freight Car Shops, to be built by the New York Central Railroad Company, at East Buffalo, to cost $350,000.

Chicago, Ill.

Building permits in Chicago for the month of November were 891, covering a frontage of 25,624 ft., and with a total estimated cost of $6,825,700. This makes the total cost of new buildings for which permits have been issued during the eleven months of the year $83,832,480. Last year the total for the same period was $62,736,810. While new business for November was less than the monthly average for this year, the total was greater than for any month, excepting November, in 1908.

The permits for this year amount to nearly 60 miles of new buildings, representing a respectable new city within a city which has been erected within the limits of Chicago this year. All former records of activity have been broken, and contractors have been taxed to the limit of their ability to take care of the business that has been offered them. In 1905 the total for the year was $63,455,020; in 1906, $64,298,335; in 1907, $58,065,080, and 1908, $68,204,080. In nine months of this year to the end of September the city had broken all previous records for a full year. The figures for November this year are less than for 1908, but last year two especially important permits were issued in November, for the Blackstone Hotel and the office building of the Peoples Gas Light & Coke Company.

It is probable that there will be a reaction during the early months of next year on account of the increasing costs of materials and the higher cost of labor. A year ago building materials were relatively cheap, and this condition continued through the first half of the present year in many important lines, notably steel, but the enormous demand that this activity has created has raised values to a figure which may be expected to check the enthusiasm of investors for a time. Brick and other local materials have advanced in response to the unprecedented demand, and the same amount paid in wages does not go so far towards completing a building. When there was less business the men were anxious for work and would accomplish more in a day, but as the demand for men increases they become more independent and endeavor to make a job last as long as they can.

Several new buildings of considerable size are in prospect, however, and will contribute to the activity of next year. The Boston Store will erect a new fireproof building to replace the old structure now occupied at State and Madison streets, and Mandel Brothers have plans under way for a new fireproof building, which will be large enough to require some 10,000 tons of steel. The Chicago Telephone Company has already let a contract for a new steel office building to be located on Wabash avenue.

Cleveland, Ohio.

Building operations are holding up well in Cleveland and considerable large work in the way of store and office structures is being figured on, contracts for some of which will be closed soon after the first of the year. During November there were 479 permits issued by the city building inspector's office for structures to cost $889,180, as compared with permits for buildings to cost $889,000 issued during the corresponding month a year ago. Of the permits issued during November, 219 were for frame buildings to cost $341,525; 60 were for stone and brick buildings to cost $444,180, and 200 were for additions and alterations, the estimated cost of which is $103,475.

The total permits for the eleven months of the year aggregate $11,300,319, as compared with $8,991,004 during the corresponding period of 1908.

Denver, Col.

A tremendous impetus was given to building operations in November and the invested capital involved was very nearly double that of the same month in 1908. The bulk of the operations as heretofore was made up of dwellings, although business structures were by no means neglected.

The report of Building Inspector R. Willison for November shows 264 permits to have been issued by the department, calling for an estimated outlay of $988,850, while in November, 1908, there were 246 permits issued for building improvements costing $548,200, thus showing an increase of $440,650. Of the total for November were permits for 147 brick residences costing $419,300 and six frame residences costing $6200. There were also 33 barns and sheds costing $45,700. One $20,000 apartment house was projected and plans were filed for 17 business buildings to cost $231,100, and for two warehouses to cost $89,000.

The monthly average for the year to December 1 was a trifle over one million dollars, and for the eleven months 3147 permits were issued for improvements costing $11,048,763. In the same eleven months of 1908 there were 2943 permits taken out for new buildings, alterations and repairs costing $9,058,920.

The Master Builders' Association tendered the architects of the city a banquet on the evening of November 20, the affair being in recognition of the aid rendered the builders by the architects during the recent labor troubles in that city, and also as a token of appreciation of the way in which the architects have handled the "bonding" question. It appears that at a meeting held a year ago the builders asked the architects to agree to accept the bonds of the builders in lieu of surety company bonds and 100 builders deposited $1000 each to create a bonding fund. The architects agreed to the proposition and the plan, according to reports made at the banquet, has worked very successfully.

Thomas Bate, president of the Master Builders' Association, introduced Architect George Williamson as toastmaster of the evening. Short speeches were made by Robert S. Roeschlaub, W. P. McPhee, M. J. Kinney, T. J. McCue, B. Coldren and G. L. Boetcher.

Jersey City, N. J.

All previous building records were broken in Jersey City by the figures issued for the month of November by the Superintendent of Building Construction. The total estimated cost of new structures for which permits were issued in the month named was $1,305,769, while six permits, aggregating $792,560, were temporarily held up until certain slight defects are removed, thus bringing the total to $2,098,329. Taking the actual amount of permits granted and eliminating the value of the improvements represented by the six permits pending, the total for the eleven months of 1909 is $7,347,814, which is an increase of $2,428,513, as compared with the corresponding eleven months of 1908.

Los Angeles, Cal.

Los Angeles building shows rather more activity at present than was manifest at the opening of the winter season. Building is still confined largely to smaller work, though a number of larger jobs have been started and others are ready for immediate construction. The total volume of building for which permits were granted in November was $1,450,000, as compared with $1,172,078 for October, $1,375,909 for September and $1,555,199 for August. The increase for the first eleven months of the present year over the preceding year amounts to 25 per cent., the totals being respectively twelve million and nine million dollars.

An amendment of importance has just been made in the Los Angeles building law, which will permit of the erection of buildings to a hight of 180 ft., or 12 stories, as compared with 150 ft., or 10 stories, as at present. The amendment provides, however, that the cornice line shall be continued at 150 ft. and that the extra 30 ft. in hight must be built at least 25 ft. from the street walls, so that it shall cast no shadow on the street.

Following the passage of this ordinance, several contracts have been let for additions to large buildings. Contracts have been let for an addition to the Hotel Alexandria, to cost $1,000,000; for the Los Angeles Trust & Savings Bank Building, to cost $500,000, and for the Chester Office Building, to cost approximately $1,000,000. Plans are also being drawn for the addition of several stories to the Van Nuys Hotel building.

Louisville, Ky.

November closes a year that has been far below that of last in the building line, but 1910 bids fair to be the banner year for this city. Early the coming spring ground will be broken for several large buildings of the first class and marked increase is expected in residences and small store buildings. All in all the builders expect big things and are preparing to get busy.

The month of November shows that there were 149 permits issued, amounting to $172,772 in cost of buildings, compared with November, 1908, when 190 permits were taken out, amounting to $217,454. This comparison is a fair one all through the year.

The Builders' Exchange has been holding meetings regularly and a committee has been appointed, known as "The Organization Committee," for the purpose of organizing the several building lines. There are twenty-one lines represented in the city, and it is proposed that they organize individually for the purpose of making it possible to do business with a fair profit and maintain a high standard of work, and incidentally show that while they may be competitors in business they can entertain good will toward each other.

This movement was suggested by a recent effort to effect a national organization of one or two lines and is a move to assist in making this possible. It is also for the purpose of being prepared to meet the demands of labor without the usual long-drawn disputes that continually arise where building is active and labor scarce.

Memphis, Tenn.

The building business is showing considerable improvement for this season of the year, and most of the work that was projected last month involved dwelling houses of frame construction. The steady growth of the city is responsible for a constantly increasing demand for dwelling houses, and the indications point to this class of building constituting an important factor in the building situation for some time to come.

In November there were issued from the office of Building Commissioner Dan. C. Newton, 222 permits for buildings to cost $390,600, whereas in November, 1908, there were 185 permits taken out for building improvements, involving an outlay of $128,943. From January 1 to November 30, inclusive, of the year just closed, the value of the building improvements for which permits were issued was $3,910,330, while in the corresponding period of 1908 the value was $3,025,896.

Newark, N. J.

Considerable work is going forward at this season in and about the city, a conspicuous feature being large numbers of dwellings, which appear to be in demand by reason of the steady increase in population. During the month of November 235 permits were taken out for new buildings and alterations estimated to cost $842,759, which is a considerable gain over the corresponding month of 1908, when 187 permits were issued by the Bureau of Building Inspection for Improvements estimated to cost $556,632.

One of the operations recently commenced involves a number of dwellings which are being put up by Max Block on North Twelfth and North Thirteenth streets, calling for an outlay of something over $60,000.

New York City

The local building situation presents several rather interesting contrasts as compared with this season last year, in that, for example, the Borough of Manhattan shows an increase in the number of permits issued and estimated cost of building improvements, while Brooklyn shows an increase in the number of permits issued, but a decrease in their estimated cost, while the Borough of the Bronx shows a falling off in both new buildings and capital invested. It is possible that the slight decrease in the building operations in the extreme upper sections of the city may be due to the better transportation facilities afforded by the opening of the tunnels under the North and East Rivers, thus bringing outlying sections in these directions into more easy communication with the business districts of Manhattan.

The figures for November show that 64 new buildings were projected in the Borough of Manhattan, calling for an estimated outlay of $7,542,100, while in the same month in 1908 55 permits were issued for new buildings costing $6,251,180. In the Borough of Brooklyn 701 buildings were projected in November to cost $4,402,800, and in November, 1908, there were 693 new buildings, for which permits were issued, and calling for an estimated outlay of $4,890,508. In the Borough of the Bronx the estimated cost of the new buildings for which permits were issued in the two periods specified was $3,770,625 and $4,413,425 respectively. In the Borough of Queens the total amount of new building for which the 419 permits were issued in November was $2,023,066, as against 324 buildings to cost $1,282,133 in the same month of 1908.

A very large percentage of the new work under way consists in the erection of dwellings in connection with the development of suburban property, and the wholesale lumber dealers point to the fact that it is this suburban building which is practically holding up the lumber situation. There is also a considerable amount of remodeling and repairs, which, on the whole, has been in excess of last year and has been an important factor in the consumption of material.

Taking the figures for the three principal boroughs of Greater New York, it is to be noted that there were 11,242 permits issued in the eleven months just passed for building improvements estimated to cost $221,253,434, while in the corresponding eleven months of 1908 there were 8301 permits issued for new buildings to cost $122,782,762.

There are on the boards of architects tentative plans for several large projects and numerous new buildings were launched the first week in December, the bulk of which will probably be built in the Bronx. One builder in that borough has filed plans for 15 five-story flats and other builders filed plans for 14 similar structures, involving an estimated outlay of something like half a million dollars.

The feeling among builders and real estate operators is of a rather optimistic nature as regards the coming season, and it is felt that there will be plenty of work for labor in all branches of the industry.

The Appellate Division of the Supreme Court decided a few weeks ago that an apartment hotel or apartment house was a tenement house, and whether "plain or ornate, cheap or expensive," came under the provisions of the tenement house act. The case on appeal was that of the Tenement House Department from the decision of a referee vacating an injunction against the owner of an apartment hotel, the Tenement House Commission having enjoined the owner from using the premises as an apartment hotel. In rendering a decision the court was unanimous in pointing out that "a tenement house as defined by the law is any house occupied as the home or residence of three families or more living independently of each other and doing their cooking upon the premises." In their opinion the legislative definition of a tenement house includes and covers buildings that are actually so occupied.

Philadelphia, Pa.

While building work in this territory usually diminishes in the winter months, the open season so far experienced has been utilized by a number of builders to advance work, some of which would not have been started until the early spring. Two-story dwelling houses continue the leading factor in the building trade, and these are being rapidly erected, principally in the outlying sections of the city. While there is still one month left in the present calendar year, the expenditure authorized for building operations in eleven months has not only exceeded the best previous records for a like period, but has also exceeded the best record made in any full year in the history of the Bureau of Building Inspection.

The total estimated cost so far during 1909 has reached $41,012,910, which is $301,400 larger than that for the amount of work authorized during the previous record year of 1906. Compared with the volume of business undertaken during the first eleven months of 1908, the amount authorized during the past eleven months shows a gain of $14,657,185 over that of the previous year. Evidently, therefore, the trade has not only reached normal conditions, as based on the best previous record, but has even exceeded all previous records; and from the amount of work ahead it looks now as if the coming year would be quite as prosperous.

It is to be noted that during the month of November 695 permits for 1399 operations were issued, at an estimated cost of $3,254,660, exceeding all previous records for that particular month. Of this total, that for two-story buildings was $1,428,150 (permits being taken for 758 houses), this being an increase of $332,950 when compared with the previous month, and $615,925 in excess of the same class of work authorized in November, 1908. Three-story dwellings show no increased movement; the amount of work done, however, compared favorably with that undertaken in the previous month. The estimated cost of manufacturing plants, $698,500, during November shows a sharp increase over recent months, due to the fact that operations on several fair-sized buildings for general manufacturing purposes were begun. In this particular field the use of concrete for building purposes is rapidly increasing.

While business during December will probably show a recession, owing to usual unfavorable climatic conditions, as well as the approaching year end, a large amount of work is under consideration and new propositions for the future are constantly developing. Every branch of the trade is as fully occupied as possible under the circumstances. One incident developed during November, however, to interrupt the continued pleasant relations that have heretofore existed between operative builders and their mechanics in certain lines. Owing to difficulties arising from union mechanics' refusal to handle material understood to have been furnished by a maker employing non-union workmen, a strike was called, which was followed by sympathy strikes and subsequent lockout by master builders, resulting in the stoppage of work on a number of large operations, including that of the Wanamaker Store, a number of public schools and other buildings. Practically no work has been done on these operations for nearly a month, and at the present time neither side appears willing to make any concessions. With the approach of the winter season activity in suburban building shows a quieter condition, but plans are being made to open up extensive tracts in the early spring.

Henry L. Reinhold, Jr., architect, will soon invite bids for 15 two-story dwellings to be erected in Bryn Mawr, Pa.

John Wilson & Co., Sixty-second and Elmwood avenue, has begun work on the erection of 60 two-story brick dwellings in the vicinity of Woodland avenue and Hobson street, the estimated cost of which is reported to be close to $130,000.

Permits have been taken out for the erection of 56 two-story dwellings and two stores and dwellings in the northeast section of the city, in the vicinity of East Allegheny avenue and Tulip street. Ground for some of the work was to be broken early in the month.

Plans have been posted recently for the erection of a seven-story manufacturing building to be erected for the Lehigh Manufacturing Company, Twenty-second and Lehigh avenue. The structure is to be of reinforced concrete and terra cotta.

Plans prepared by Henry T. Blanveld, architect and engineer, have been estimated upon for the erection of a seven-story hotel for the Reading Hotel Company, Reading, Pa. The building is to be of fireproof construction, steel frame, brick, stone and terra cotta exterior and hollow-tile floor construction.

John W. De Long is about to begin operations on a group of housekeeping flats to be erected at Morris, Rittenhouse and Pine streets, Germantown. The plans embrace twelve separate three-story buildings, each measuring 21 x 94 ft. on the ground plan.

A contract was awarded Calvin W. Rogers about the middle of November for the erection of 168 two-story brick dwellings and three two-story stores and dwellings at Sixty-fifth and Haverford avenue, to cost about $600,000.

The Knights of Columbus at a recent meeting practically decided to erect a new club house at the corner of Broad and Poplar streets, at an estimated cost of $500,000. P. Gormley, 155 North Tenth street, is chairman of the building committee.

Bids have been taken by Sauer & Hahn, architects, for the erection of 18 houses near the Allen Lane Station on the Pennsylvania Railroad. The plans call for houses of different styles, including brick and stucco designs in Colonial and Spanish architecture. Each house will measure 20 x 61 ft. on the ground plan, the estimated cost of each being $6000.

Ballinger & Perrot, architects and engineers, have awarded contracts to William Provost, Jr., Chester, Pa., for the erection of a group of buildings to be erected at Marcus Hook, Pa., near the former city, for Samuel Courtauld & Co., Ltd., artificial silk manufacturers. The buildings to be erected comprise a one-story main building 130 x 400 ft., a five-story sorting building 76 x 131 ft., two other structures, one 64 x 100 and the other 43 x 71 ft; a boiler and engine house is also to be erected. The cost of this work is estimated as being close to $500,000.

Pittsburgh, Pa.

While there seems to be every prospect of a big revival in the building line in the early months of 1910, with indications that builders will commence operations somewhat earlier than usual, yet just now comparatively little is being done in this industry. Building Inspector S. A. Dies reports for November 292 permits issued for new building additions and alterations to cost $762,229, while in November, 1908, there were 315 permits taken out for new work to cost $1,864,066.

It must be remembered, however, that in November, 1908, permits were granted for two costly buildings for the University of Pittsburgh, which considerably swelled the total for that month, whereas in November, 1909, no permits were issued for especially costly structures. The greatest activity in the month just closed was in the new 14th ward, where 34 new buildings were projected to cost $160,150. Of the new buildings in the city, 76 are to be of brick, 40 of frame, 48 of brick veneer, 8 of stone and 3 of concrete.

For the eleven months of the year just closing, 3822 permits were issued for improvements to cost $15,879,314, as against 3656 permits for improvements costing $11,589,939 in the corresponding eleven months of 1908.

San Francisco, Cal.

Building in San Francisco is running ahead of the average season as far as the work actually begun is concerned, and, though some builders feel confident that the coming months will see a large increase, the conservative estimate is that there will be no striking change in the situation before spring. During the month of November the total amount of new work undertaken was estimated to cost $2,540,897, as compared with $1,969,008 in October and $1,785,611 in September. During November, 1908, the record for building reached a total of $2,659,326.

Of the contracts let during the month just closed, $756,728 was for frame construction and $996,996 for brick. This shows something of a return to the more permanent sort of construction and is largely due to the replacing of the temporary buildings in the fire limits by brick and concrete structures. All of these temporary buildings are due to be removed before the first of next May, and, though there is considerable talk of extending the time limit, property holders are showing a tendency to get rid of the old temporary buildings. Just at present the brick buildings under way are largely of the two and three story sort, having been planned some months ago, when the feeling was general that the city was rather overbuilt in the matter of office and loft buildings. The buildings now being erected and in prospect are very largely of five and six stories, no very tall buildings being in immediate contemplation.

Among materials, common building brick especially is about the weakest. The demand for brick has improved during the last few months, but not sufficiently to bring the consumption anywhere near the capacity of one of the plans about San Francisco Bay. The price continues to sag, and, while nominally held at $7, is being largely sold at and near $6. Many of the smaller makers of brick have gone out of business.

Lumber is held about as heretofore, with no prospect of serious changes before spring. Fir is bringing a fair price and all Coast woods are tolerably firm except redwood, which is about the weakest thing on the lumber list. Stocks of all kinds in the local yards are far from heavy and some large movements inward are expected during the winter.

Plans have been completed for the new Olympic Club building, to be erected on Post street, after plans by Paff & Bauer. The building will be five stories high and will have a frontage of 200 ft. on Post street. The first three stories will be of Sandstone, with granite facings and granite columns, and the upper stories will be of pressed brick. The rear portion of the lower floor will be occupied entirely by a gymnasium 170 x 140 ft. in area. The remainder of the lower floor will be occupied exclusively by baths, which will include a salt water tank 140 ft. in length. This floor will be finished in marble and glazed tile. On the second floor the reception room, offices and the directors' rooms are placed. The third floor will be devoted to the main dining room, a large lounging room, a red room and a billiard room. The two upper floors will be divided into living rooms for the members of the club. A running track, a solarium and a roof garden will occupy the roof.

Work has been resumed on the extensive buildings of the Southern Pacific Railroad Company at Visitacion Bay, in this city, after having been discontinued some two years ago. It is given out that all of the buildings will be completed, though no particulars as to the rate of progress or the date of completion are to be had. The work includes: A machine and erecting shop 135 x 450 ft., to be equipped with 120-ton and 15-ton traveling cranes; a round house 420 ft. in diameter, with 40 stalls and a transfer table 70 x 495 ft.; a planing mill and coach repair shop 185 x 335 ft.; a freight-car repair shed 115 x 440 ft., equipped with a 15-ton traveling crane; a carpenter and blacksmith shop 56 x 380 ft.; a paint storage building 75 x 195 ft.; a storehouse 55 x 100 ft.; a power house 60 x 90 ft.; a large administration building and several other miscellaneous buildings.

Among the other important buildings for which plans are now complete, or on which work has begun, are: The Harbor View Baths, Charles C. Frye, architect, to cost $75,000; the five-story Mainwell Realty Building, at Market and Main streets, to cost $75,000, N. W. Sexton, architect; the St. Francis Hospital, at Bush and Hyde streets, to cost $200,000, Alfred I. Coffee, architect; the new stone and brick First Baptist Church, to cost $70,000; and the Joseph Winterburn flats, to cost $50,000, A. T. Ehrenpfort, architect.

St. Louis, Mo.

There is no particular change in the building situation, the volume of operations being on a scale differing little in volume from that at this season a year ago. There has been a slight increase in the number of permits issued for new buildings, the bulk of which are dwelling houses required through the steady growth of the city. According to the figures compiled in the office of Commissioner Smith, 656 permits were issued in November for building improvements estimated to cost $1,458,610, while in the same month in 1908 there were 614 permits issued, calling for an estimated outlay of $1,366,511.

A feature of the recently organized Building Industries Association of St. Louis, whose headquarters are in the Century Building, is an exhibition of building materials and supplies, which cover practically everything entering into the construction of a building. This exhibition is meeting with very flattering success and we understand that over 150 firms, construction companies and manufacturers are represented in the display.

St. Paul, Minn.

Building operations are in full swing here in the city, and with fairly seasonable weather a vast amount of work will be carried right through the winter months. The new undertakings are of a noteworthy character, calling in the aggregate for a large investment of capital. The figures compiled in the office of the building inspector show that in November 307 permits were issued for impryovements to cost $1,565,535, while in November, 1908, there were 259 permits issued for improvements to cost $910,135.

It is, however, when the figures for the eleven months are considered, that the tremendous gain in building operations, as compared with the year before, is revealed. With only one exception, and that July, the value of the building improvements for which permits were issued in 1909 went well over the million-dollar mark, June even showing nearly one and three-quarter millions, so that for the eleven months of the year just passed the total value of the improvements for which permits were issued was $11,526,902. This was an increase of $4,788,388, as compared with the corresponding eleven months of 1908.

The recent annual meeting of the Builders' Exchange shows the work for the past year to have been the best in its history, as regards the number of plans handled and in the co-operation between the different trades in building lines. The officers elected for the ensuing year were:

President.................... A. C. Raymer.
First Vice-President.......... John A. Seeger.
Second Vice-President........ John D. Roberts.
Treasurer.................... Robert Seibert.
Secretary.................... A. V. Williams.

One of the architects of the city, Peter J. Linhoff, has just inaugurated the system adopted by doctors and some others in establishing specified office hours. Those desirous of consulting him can do so between the hours of 1.30 and 5.30 p. m. During the morning hours this office is to all intents and purposes closed, except to those having a previous appointment with the architect. By this means the architect and his assistants are enabled to concentrate their attention on the work of preparing plans and specifications and accomplish more in a given time than would otherwise be the case. Although the scheme has been in operation only a few weeks, yet it has given great satisfaction.

Seattle, Wash.

The interesting feature of the local building situation is found in the fact that while nearly 100 more permits were issued in November than was the case in the same month a year ago, the invested capital is practically the same in the two periods. This indicates a large percentage of dwellings in prospect, more than one-third of the month's total valuation covering structures of this class. Another interesting feature of the November report of Francis W. Grant, superintendent of buildings, is the reinforced concrete work projected, there having been permits issued for three buildings of this character, calling for an expenditure of $230,000. There were eight permits for brick construction, involving an estimated outlay of $206,000, but the bulk of the operations were frame construction, covering both residences and buildings for business purposes.

According to the authority mentioned, 288 permits were issued for frame business buildings to cost $214,120, while 206 permits were for frame residences costing $476,530.

The total for the month of November was 1149 permits for building improvements costing $1,254,630, as compared with 1066 permits for buildings costing $1,253,180 in November, 1908.

For the eleven months of the current year 13,935 permits were taken out for new work, alterations and repairs, calling for an outlay of $18,003,865, while in the eleven months of 1908 there were 12,492 permits issued, calling for an outlay of $12,273,909.

IT IS STATED that all new school buildings erected in the future in the city of Boston are to contain sun and fresh-air rooms. It is understood that a committee of the school house commission has under consideration a plan for utilizing the roofs of the present buildings, and it is thought that some recommendation to this effect will be made and action definitely taken.

LAW IN THE BUILDING TRADES

By A. L. H. Street

BUILDERS' DUTY TO EMPLOYEES

Since the New York statutes which require shafts over openings left in each floor of a building in the course of construction to be fenced in by a barrier, does not prescribe that a shaft for openings in unfinished or unfloored stories shall be guarded, a builder is under no duty to any employee to fence an opening where the floor has not been laid and could not be laid at the then stage of the work. The legal doctrine that an employer owes his employees the duty to provide them with a reasonably safe place in which to work does not apply where the situation in a building in course of construction is constantly changing and being necessarily made unsafe by the progress of the work. (New York Supreme Court, Appellate Division, First Department) McHugh *vs.* Grand Central Building & Construction Company, 117 New York Supplement, 714.

LIABILITY OF WIFE FOR PRICE OF BUILDING

Where the husband of a married women enters an agreement with building contractors for the erection, at an agreed price, of a building upon a lot that is the separate property of his wife, and the wife has knowledge of the erection of the building, and does not dissent thereto, but silently acquiesces in the erection thereof, such separate property of the wife may be charged in equity and sold for the collection of the agreed price of the building, if the price is not unreasonable. (Florida Supreme Court) 49 Southern Reporter 539, McGill *vs.* Art Stone Construction Company.

DISCHARGE OF CONTRACTOR'S SURETY

Defendant contracted to construct a building for plaintiffs for $18,360, "all payments to be on certificates of said architect as the work progresses, to wit: $4000 on completion of foundation, $3000 on completion of first story, $3000 on completion of second story, $3000 on completion of third story, $3000 on completion of building, and balance 60 days thereafter." Three months prior to the time of the completion of the building, plaintiffs had paid the contractor $15,100, the amount then due being only $13,000, and on a final accounting the architect certified that there was a balance of $4,239.27 due. Claims for labor and materials existed, which plaintiffs were obliged to pay, to an amount in excess of this balance. Held that the over-payment to the contractor was prejudicial to his sureties, and that they were discharged thereby, though when the building was completed the payments to the contractor were not greater than the contract allowed. (Supreme Court of Wisconsin) Kunz *vs.* Boll, 121 Northwestern Reporter 601.

PERSONAL INJURY THROUGH DEFECTIVE SCAFFOLD

That an employee on a scaffold used a beam thereof for a purpose not contemplated by the parties, and was injured by its breaking, is not evidence that the platform was unsafe, under New York Labor Laws (Laws 1897, p. 467, c. 415), Section 18, forbidding unsafe scaffolding. An employee, injured by falling from a scaffold, who only shows the happening of the accident by his using a beam thereof for a purpose not contemplated by the parties, does not show that the scaffold was improper, under the labor law. (New York Supreme Court, Appellate Term) Connoly *vs.* Peterson, 116 New York Supplement 11.

RIGHTS UNDER MECHANIC'S LIEN

A court of equity having jurisdiction of the parties in an action to foreclose a mechanic's lien can determine the validity of claims in any wise interfering with the enforcement of the lien. A promise by a building contractor to pay the claim of a third person out of the moneys which become due under the contract is not binding as against lienors for materials used in the construction of the building. (New York Supreme Court, Special Term, New York County) Concord Construction Company *vs.* Plante, 116 New York Supplement 153.

RIGHTS OF SCHOOL BUILDING CONTRACTOR'S CREDITORS

Creditors of a contractor of a school district for labor and materials furnished in the erection of a building are without remedy at law to have the funds in the hands of the directors applied to the payment of their debts against the contractor, and they are without any remedy in equity which will involve the diversion of funds from the channel to which they have been turned by public authority. Since public policy forbids liens on public buildings claimants for labor and materials furnished a contractor constructing a building for a school district cannot have liens declared under the Arkansas statutes, authorizing mechanics' and material men's liens, and they can only reach the fund which the district owes the contractor by resorting to the remedies common to creditors for the collection of debts. (Supreme Court of Arkansas) Plummer & Davis *vs.* School District No. 1 of Marianna, 118 Southwestern Reporter 1011.

RIGHTS UNDER ALTERNATIVE BIDS

A city, in erecting a city hall on foundation walls constructed by a contractor, whom it had refused to allow to proceed in the erection of the hall when it became apparent that his purpose was not to erect such a hall as had been designated by the city, did not thereby voluntarily accept the benefit of the work done by the contractor, so as to become liable for the reasonable value thereof. The acceptance of an alternative bid for the erection of a city hall, either of cement, stone or brick, without designation at the time which shall be used, does not result in a contract on which the bidder may sue, until designation by the city of the material to be used; and, after designation of cement stone, the bidder has no contract for the erection of a brick hall, under which he can recover either the compensation agreed on or damages for a breach. (Iowa Supreme Court) Ketterman *vs.* City of Ida Grove, 120 Northwestern Reporter 641.

DAMAGES RECOVERABLE FOR BREACH OF CONTRACT

Where the owner under a building contract broke the contract by preventing completion of the building and appropriated to his own benefit material and labor furnished by the contractor, or ratified such appropriation, the value of the material and labor was an element of damages recoverable by the contractor. (Alabama Supreme Court) Tutwiler *vs.* Burns, 49 Southern Reporter 455.

RIGHTS UNDER BUILDING CONTRACTS

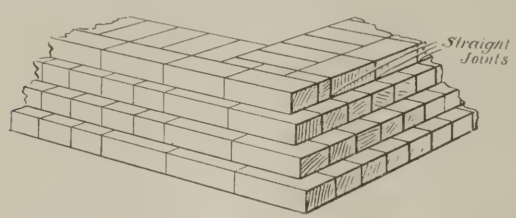
In construing a contract all its provisions must be considered. The contemporaneous construction placed on an instrument by the parties thereto is entitled to much weight in reaching the intent and purpose of the instrument. Where a building contractor transferred to a third person the balance due under the contract to secure advancements to aid in the construction of the building, and thereafter the owner paid the sums due under the contract to the assignee, the transfer was an assignment of the funds due and to become due under the contract, but not of the contract, and the assignee occupies no relation toward persons furnishing materials and labor in the construction of the building. Under the Missouri Statute, which gives to sub-contractors, laborers and material men a lien on the amount due by the owner, an assignee of the principal contractor has the prior right to the fund as against sub-contractors, material men and laborers subsequently serving notice of lien. A building contractor has the common law right to assign the balance due and to become due from the owner. That an assignee of a building contractor of the balance due and to become due from the owner consented to material men and laborers furnishing materials and labor in the construction of the building did not affect his rights under the assignment. The right of a sub-contractor, material man, or laborer, under Mississippi Code 1906, Section 3047, to a lien on the amount due from the owner to the principal contractor on giving notice to the owner is defeated by a bona fide assignment by the contractor of the balance due and to become due under the contract, made before the service of such notice of lien, though the assignee does not give the lien claimants notice of the assignment. An assignment by a building contractor of the balance due and to become due under the contract for a debt due to the assignee from the assignor, not growing out of the construction of the building, is good as against sub-contractors, material men and laborers subsequently serving notice of lien on the owner. The assent of the owner to an assignment by the contractor of the balance due and to become due under the contract is not essential to give effect to the assignment. (Mississippi Supreme Court) A. & S. Spengler & Stiles *vs.* Tull Lumber Company, 48 Southern Reporter 966.

CONTRACTORS' LIABILITY FOR INJURY TO THIRD PERSONS

A contractor, making excavations for the laying of a walk to a side door of a dwelling, entered by steps nearly 3 ft. high, removed the steps and excavated there. The dwelling was occupied by a tenant, who was away the day the work was done. It was not shown that the contractor had any reason to believe that the tenant was away that day, or that she was ignorant of the removal of the steps; and had the tenant remained at home she could not have failed to see the conditions. Held that the contractor was not negligent in failing to prevent persons from opening the side door from within and stepping out, and he was not liable for injuries to the tenant opening the door from within and falling to the ground. Where work is done by an independent contractor, who is proprietor of the business he is conducting, he alone is responsible for the care in doing it. (Massachusetts Supreme Judicial Court) Carey & Baxter, 87 Northeastern Reporter 901.

Construction of Brick Footings

A frequent source of controversy among those who are practically engaged in the trade is the best method of constructing brick work where it is used for footings. Some advocate one form of bonding while others present equally strong claims for a different method, and yet both styles may serve an excellent purpose. Much, of course, depends upon the nature of the work in connection with which the footings are to be employed, and in most instances this determines the kind of brick work to be used. In the illustrations which are presented herewith we show the footings of an angle of 14-in. wall, as contributed by a correspondent of the "Contract Record." The first picture represents the footings as usually built, while the second illustration represents what the correspondent in question considers a much better arrangement of the brick, giving a stronger bond.



Construction of Brick Footings. Fig. 1.—Brick Footings for 14-In. Wall as Usually Constructed.

He points out that the usual method, as shown in the first picture, makes a straight joint between the top course of footings and the first course of neat work, while the second method, with an arrangement of three-quarter bricks, does away with the straight joints. He states that although he has been a building superintendent ten years, he has never seen this arrangement adopted by any bricklayer without first being shown, nor has he ever seen it described in any of the text books.

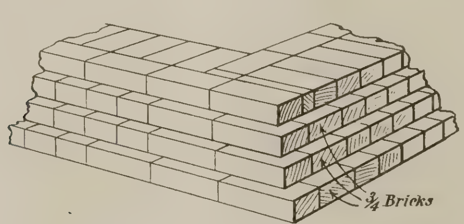


Fig. 2.—A Stronger Method of Bonding.

We shall be glad to have any of our readers who have had experience in work of this character give us their views on the subject for publication.

Banquet of Associated Building Contractors of Newark, N. J.

THE Associated Building Contractors of Newark, N. J., and vicinity held their first banquet at the Krueger Auditorium on the evening of Monday, December 13, and in spite of the heavy rain storm, something like 175 members and guests were present. It is interesting to note that the associations affiliated embrace carpenters, plumbers, masons, sheet-metal workers, steam fitters, painters, felt and slate roofers, cement workers, electricians and blue-stone workers, delegates from all of which were in attendance.

While the main body of those present occupied tables arranged crosswise of the hall, the officials and speakers of the evening were seated at a table to one side. Here was President Charles E. Van Syckle, Vice-President Thomas G. Pitts, Secretary A. J. Crowder, Treasurer Walter Lawson, Rev. J. H. Macdonald, James E. Degnan, Andrew Dickinson, president of the State Building Contractors' Association; Richard Varley, and Louis Maier, president of the Master Plumbers' Association.

After the many good things provided in the *menu* by the banquet committee had been properly considered, during which the orchestra rendered popular music, President Van Syckle welcomed those present to the first banquet of the association, stating that the organization was formed about seven years ago for the purpose of bringing the various trades together and establishing more cordial relations and a heartier co-operation on the part of all concerned.

He introduced as the first speaker the Rev. J. H. Macdonald, who, being a preacher and a Scotchman, stated that it always gave him pleasure to tell others their duty, because Scotchmen liked to dictate. He spoke of the recognition that is given "the man with the new idea" in the commercial world and the idealism of the business man. He told of the giant strides which this country has made in every line, pointing out that harmony was a requisite for a brilliant future. He was much impressed with the opportunity which this country offers the young man, for at the present time there seems to be a demand for some one who can do something in a new way. It is the young men who are doing the work of the world, and if a man would be equal to his task he must keep on being young; in idea at least. When a man's ideas are getting old and covered with moss and he is just beginning to think he is of importance, it is then, the speaker pointed out, that he is likely to find his usefulness on the wane. The ideal of the builder is to create something of beauty that will be a joy in the lives of those who live in the community, and it is, he says, a great satisfaction to be a member of the constructive force that adds to the enrichment and beauty of a city. He closed his remarks by reciting the poem in which are the lines "Let me live in a house by the side of the road and be a friend to man."

The toastmaster next introduced James E. Degnan, who declared that the builders were responsible for much of the progress of the city. If the leveling of old landmarks brings sorrow to some, yet the benefits attending the progress are more than compensating. We see in progress that financial and industrial advantage in which all participate. Our country, once a band of struggling patriots, is now a field of opportunity for many honest, ambitious men. We enjoy, he stated, the reputation for being the least oppressive and the most powerful people in the world, and we should labor to preserve that reputation. In our vocation intelligent efforts should never seek reward at the community's cost. The various trades which form each association have all given evidence at various times of a generosity of which all may be proud and your association, as a whole, participate in the enjoyment.

The last speaker was Andrew Dickinson, who dwelt upon the necessity of industrial education, which is receiving such widespread attention, and urging its support by the members. He pointed out the great need of well-trained, intelligent mechanics in all branches of industry, and that with the limited number of apprentices now in the business and the restrictions placed on their opportunities, the scarcity of skilled workmen would be more gradually felt in the years to come. He recommended the provision of more trade schools for the training of young men and urged the members to see to it that they were provided, and thus protect the future.

A LARGE FIREPROOF WAREHOUSE, to cover an area 84 x 100 ft. and to cost in the neighborhood of half a million dollars, is about being erected at the south corner of Duane and Hudson streets, New York City. The construction will be steel frame and brick and it will rise 12 stories in hight. The plans and specifications were prepared by Rouse & Goldstone, architects, 12 West Thirty-second street.

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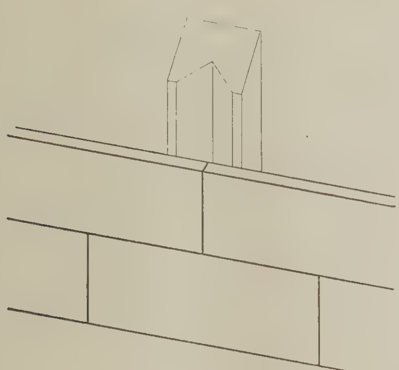
NOVELTIES.

The Shourds' Stud System of Concrete Construction

A system of erecting hollow reinforced concrete walls, in which it is claimed the advantages of the monolithic are retained and its disadvantages eliminated, has recently been brought to the attention of the building public by W. S. Shourds, 3726 North Carlisle street, Philadelphia, Pa., and leading features of which are illustrated herewith. It is known as the "Shourds' Stud System" and represents the results of several years' investigation, with a view to solving the problem of building the best house for the least money. The object was to find a universal building material, which could be used in any part of the civilized world by the capitalist for his mansion, as well as by the farmer for his dwelling and barn buildings. The principal requirements were low cost, durability, healthfulness, fire-resisting qualities, ability to follow plans and insulation of heat and cold. Briefly, the system here illustrated consists of a frame of concrete columns or studs, and beams in which the reinforcement is placed, after the member is formed on the ground. The frame is covered with thin, rough slabs of concrete and finished with stucco. The size and shape of both the studs and slabs naturally varies with the size and location of the building to be erected. A dwelling house of three stories or less, it is pointed out, can be readily constructed of studs 6 in. square, spaced 32 in. on centers, and slabs 3 in. thick, 31½ in. long and 11½ in. high. In the specimen wall here illustrated the members are of these dimensions. In casting the slabs eight can be molded at a time. The slabs are left on the sand bed to set and harden for a period of four or five days. In constructing a building the studs are set up on the foundation, properly bedded, plumbed and secured in position with temporary wooden braces. The steel reinforcement is then placed in the grooves and the first course of slabs set and temporarily held to the studs with pieces of wire. This wire is hooked into one of the wire staples in the slab, carried around the back of the stud and hooked into another staple. A good idea of the shape of the stud may be gained from an inspection of Fig. 1. In Fig. 2 is presented a detail of the construction, representing the corner of a wall. The narrow wooden strip shown on the face of the stud is used as a furring strip, so to speak, to which to nail the lath. These wooden strips are pressed into the concrete when the studs are molded and are held in place in the studs by means of galvanized nails, which are driven through them before they are pressed into the concrete. If wooden lath are not to be used it is the practice to insert pieces of wire at intervals in the studs, so that expanded metal or other types of lath can be attached. The wedges shown in the illustration are simply used to tighten the wire, so as to hold the studs firmly in position, while the concrete is run into the groove of the studs. The grooves in the studs for the reinforcing bars and cement mortar are 2 x 2½ in. deep, while the studs are 6 in. square and are placed in the work about 36 in. on centers. The slabs are 1 ft. wide, 31½ in. long and 3 in. thick, weighing about 100 lb. each. The composition of the mixture used varies according to requirements. When the mortar in the groove is set the temporary wires are removed. At each floor level beams are run around the building to carry the horizontal reinforcement and supporting the floors. They are laid on the tops of the studs, the reinforcement is laid in the groove, and the groove and space between the ends of the beams filled with the same mortar that was used to fill the studs. An idea of the construction at this stage is indicated in Fig. 3 of the illustrations. The point is made that the rough surface of the slabs make a perfect support for the stucco finish, as it cannot swell and break the key, neither does it rust away. The claim is made that only one coat is necessary, as the slabs themselves take the place of the scratch coat. With half-timbered work the boards are put on before the stucco, being nailed to wooden or metal blocks put in when the slabs are laid up. Ornamental panels of any size can be used in the wall at slight additional expense. Burnt clay products, either glazed or unglazed, in a great variety of shapes and colors can also be used most effectively, while white and colored marbles, ornamental iron work, and even pieces of colored glass can be utilized to advantage.



Novelties.—The Shourds' Stud System of Concrete Construction.
Fig. 1.—Showing the Shape of the Stud.

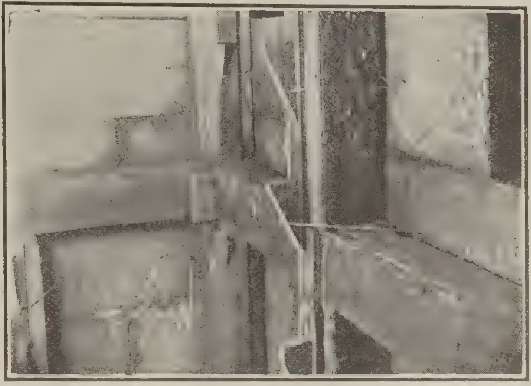


Fig. 2.—Detail Showing Construction at Corner of a Wall.

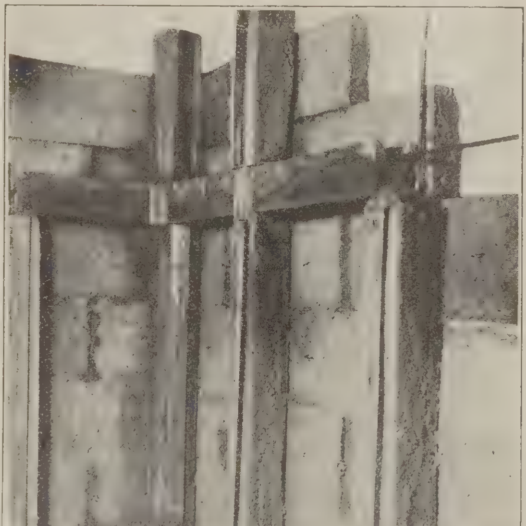


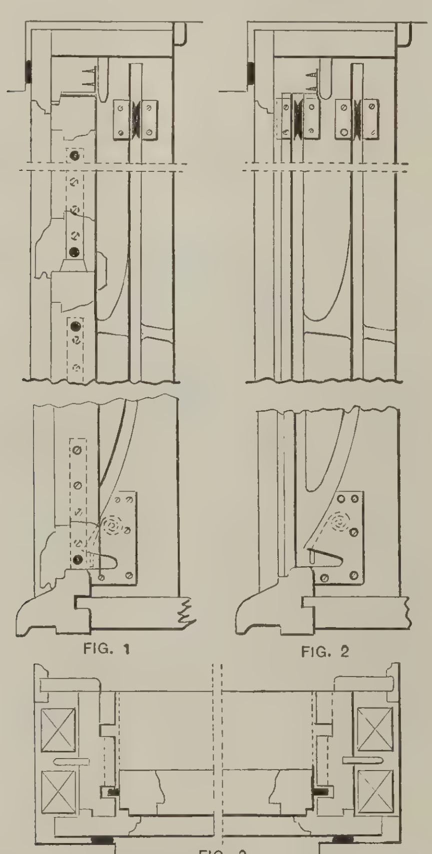
Fig. 3.—Showing Construction at a Floor Level.

Wood Mosaic Flooring

An excellent idea of the appearance of some of the many designs of parquetry floors and borders produced by the Wood-Mosaic Flooring & Lumber Company, Rochester, N. Y., and New Albany, Ind., is afforded by means of a catalog of pocket size which the company is distributing. The specimens of floors and borders are printed in colors to faithfully represent the actual appearance of the various woods used in the many combinations illustrated. The grain effect is beautifully brought out and at first glance one would conclude that thin veneers of the actual borders and "fields" had been pasted on to the pages instead of printed. The booklet in question shows the most popular and best designs of 5/16 in. thick flooring, but the company states that the patterns can all be made ½, ⅝ or ⅞ in. thick if desired. The borders are made up in 12-ft lengths and the fancy fields in convenient-sized slabs for laying. The simple oak designs are composed of 1 1/3 or 2-inch slats assembled in squares, hexagons, etc., on canvas, the canvas being merely to hold together in convenient form for handling the carefully selected slats or short strips until the flooring is nailed down. In the booklet in question reference is made to the source from which the company obtains its white oak supplies, also to finishing materials to be used in connection with the flooring. The company states that for 30 years it has been manufacturing ornamental hardwood flooring and it is prepared to execute orders for special designs to conform to any scheme of decoration.

The American "Reform" Window

Every now and then improvements are being made in window construction, with a view to permitting both sides of upper and lower sash to be cleaned from the inside without the necessity of getting out upon the window sill and running the risk of accident to the cleaner. One of the latest forms of construction looking to this end, as well as rendering the window air and water tight, burglar proof, etc., is that which has just been introduced to the attention of architects and builders by the Building Improvement Company, No. 1 Madison avenue, New York City. It is referred to as the "American Reform Window," and its construction and operation may be understood from an inspection of the sections presented herewith. Referring to Fig. 4, No. 1 is a vertical section through a win-



Novelties.—Fig. 4.—Details of the American "Reform" Window.

dow when closed, both upper and lower sashes being in line and not one behind the other, as is the case with double-hung window sash as ordinarily constructed. A close inspection of the section will readily show the air and water tight features. In No. 2 is shown a vertical section through the window frame, clearly indicating the hanging stile and especially the arrangement of the sliding grooves. The lower part of the hanging stile is provided with a turn-plate, on which the sashes turn when adjusting them for ventilating and cleaning purposes. No. 3 represents a horizontal section through the window sash and frame. In the construction of this window the pulleys, weights and chains are arranged in the usual manner, the only new

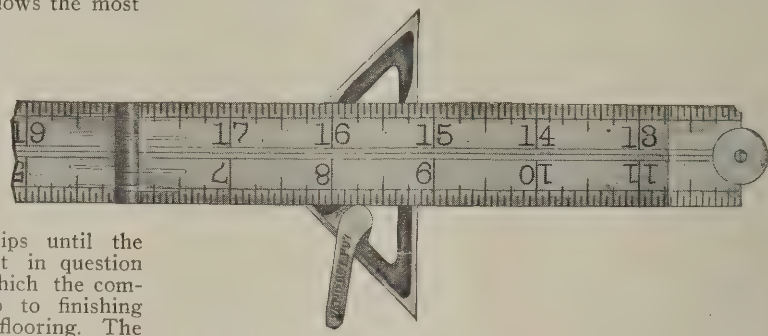


Fig. 5.—Attachment for Carpenters' Rules.

mechanism being the turn-plate, by means of which the sash are turned inward for cleaning purposes. After the lower sash has been cleaned it is pushed up to the top of the frame and the upper sash is drawn down and manipulated in a similar manner. In order to ventilate and yet at the same time prevent any draft, the handles are operated to open and allow the lower sash to fall back against the catch. This permits the cool air to enter directly into the room, and is referred to as especially desirable for use in hospital buildings, schools, institutions, etc.

Attachment for Carpenters' Rules

An attachment which every carpenter and builder is likely to find a useful adjunct to his "kit" of tools is the device which is being manufactured by the R. T. Sales Company, Elizabeth, N. J., and the application of which is illustrated in Fig. 5 of the accompanying engravings. It is of such a nature that when attached to an ordinary 2-ft. rule will give a mitre, a depth gauge and a line gauge, while at the same time it may be readily used in place of a try square. It is of a size to be readily carried in the vest pocket and by various attachments the different angles required are obtained. Another point is that the tool is of such a nature that it may be made to grip two rules, thus giving a greater measuring distance. It is made in solid bronze or aluminum and is referred to as a labor and time saver.

"Econo-Bar Cramps" for Reinforced Concrete Construction

What are known as the "Econo-Bar Cramps" for fireproof concrete-steel construction are described in a little pamphlet of a size convenient to carry in the pocket sent out by the Topliff & Ely Company, Elyria, Ohio. The cramps consist of pressed steel stirrups or saddles adapted to support the reinforcing rods and staples which are driven into the form work to hold them in place. The point is made that by this means column, wall, beam and floor reinforcement bars are fixed in position before a particle of concrete is placed. The upright legs of the saddles are grooved and the feet are perforated to form guides for the staples. After the staple is driven this groove prevents the saddle from working out from under the staple and losing its grip. There is a wedge action set up in driving the staple which makes the saddle grip the bar in a horizontal as well as vertical direction. It is claimed that the workman can walk around freely on the bars without danger of disarranging them. The distance from the center of the bar to the center of the form work is constant for all sizes of bar, hence the exact amount of concrete for fireproofing is assured. The claim is made that the "Econo-Bar Cramp" will take any size of bar from ⅜ in. to 1 in., and that they will grip and hold any shape of bar on the market, as they are universal. The cramp is made in three sizes to provide 1 in., 1½ in. and 2 in. of concrete for fireproofing.

Model Coal Chute

Majestic Foundry Company, Huntington, Ind., is directing attention to a new style of window chute, known as the "model" and furnished with rubber glass—a non-breakable, translucent substitute for glass, which is said to give entire satisfaction in use. A catalogue which the company has issued shows a full line of coal chutes, and a copy can be had on application.

Pitcher's Adjustable Door Hangers and Frames

What is pointed out as a great labor and space saving system of sliding or disappearing doors is that which involves the use of the Pitcher Adjustable Hangers and Frames, manufactured by the Pacific Tank Company, 231 Berry street, San Francisco, Cal. Among the advantages claimed for this system of sliding or disappearing doors are that they can be placed anywhere throughout a building without increasing the thickness of the wall. The track is constructed of a steel rail imbedded in wood, which renders the hanger practically noiseless, and by the construction of the company's patent frame the hangers and doors can be removed after the finish is on. The entire section of the frame or pocket is set up at the factory, thus resulting in a great saving of time, trouble and labor in making measurements and framing on the part of the carpenter. The hangers cannot settle or come off and the claim is made that they will carry the heaviest doors. They are of steel construction, with roller bearings, and are easily and quickly adjusted. The total thickness of wall is 5½ in. Referring to the accompanying illustrations, Fig. 6 represents a side view of the hanger with that portion of the door to which it is attached. Fig. 7 represents a vertical cross section through the framing, while Fig. 8 is a horizontal section through the door and framing. These so clearly indicate the general arrangement and construction as to render extended comment unnecessary. With each set of hangers the company furnishes a wrench for the purpose of adjustment.

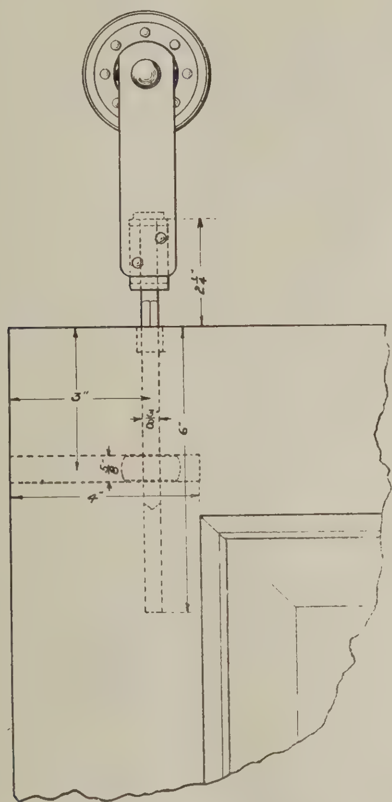


Fig. 6.—Side View of Hanger.

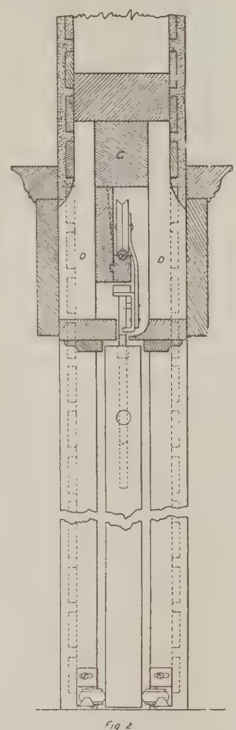


Fig. 7.—Vertical Section Through the Framing.

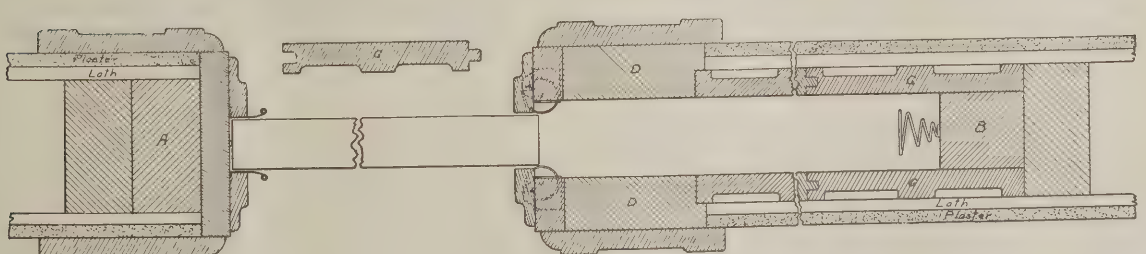


Fig. 8.—Horizontal Section Through the Door and Framing.

Novelties.—Pitcher's Adjustable Door Hangers and Frames.

Richards No-Break Sliding Door Lock

A late addition to the expanding line of hardware specialties made by the Richards Manufacturing Company, Aurora, Ill., is a sliding-door lock, having its working parts described as few and simple and with positive action. Extra strong jaws are provided to guard against breakage and the locking mechanism is so designed that only one tumbler is required. Each lock is supplied with a different key and the lock is reversible—that is, it can be used on either side of the door and can be locked or latched from either side. An important feature of the lock is that in bringing sliding doors together the lock receives and grips the holding lug through an opening in its side, so that the door and not the lock sustains the impact when the door strikes the jam. The lock presents an entirely smooth surface, with no projections to catch or tear the clothes. The hand-hold covers, which operate from both inside and outside, serve as flush pulls as well as to operate the lock. The point is emphasized that the act of pressing back the flush pulls to open the door unlatches the lock. While exceedingly simple, the lock is referred to as one which cannot be easily tampered with or picked. They are suitable for doors 1⅜ to 2¼ in. thick and are made in one size, 4½ x 6¾ in., with a regular dead black finish, although special finishes are made upon order. The locks are packed one each in a pasteboard box, complete with all screws and two keys, with directions for applying.

American Combined Level and Grade Finder

An instrument which will be found of special interest to architects, carpenters, masons, bricklayers, civil engineers and others is what is known as the American Combined Level and Grade Finder, which is made by Edward Helb, Railroad, Pa. The instrument measures 24 in. in length, is 1⅝ in. thick and 3½ in. wide. The chief distinguishing feature of the instrument and which is of paramount value is the graduated dial with the pointer on the side of the level. This dial renders the instrument of special service in connection with all forms of carpenters' and mechanical work, as well as for grading, landscape gardening, excavating, obtaining the hight of any object, laying off and leveling buildings, etc. The dial in connection with the spirit level renders the instrument a double proof of accuracy, both for horizontal and vertical positions. The claim is made that in all forms of grading the instrument enables the ordinary laborer to do work which otherwise requires the extra expense of a civil engineer or surveyor. The point is made that it is adjustable and cannot easily get out of order, while in case of breakage any part can be readily replaced at small expense. With each instrument the manufacturer sends a booklet fully describing the tool and showing in detail some of its many applications. Many of the diagrams are drawn to a scale of 1 ft. to the inch, thus greatly enhancing the value of the instructions presented.

The American Electric Luminous Radiator

What may be described as a portable fireplace without flame and which is clean, safe and economical in opera-

Novelties.—Fig. 9.—American Electric Luminous Radiator.

tion, is the line of luminous radiators illustrated in Fig. 9 of the engravings and manufactured by the American Electrical Heater Company, Detroit, Mich. This is known as the round type of heater, is handsomely finished in "brushed brass," although on special order the company furnishes them in polished brass, polished nickel or oxidized copper finish, according to requirements. A snap of the switch turns on the heat, which is furnished by the three large frosted electric bulbs clearly indicated in the illustration. The round type of heater is designed more especially for placing in the center of a room, as when in use it throws out heat in all directions, at the same time giving off a cheerful glow, which renders it an attractive object. The point is made by the company that a device of this kind is not intended for heating an entire building, but is exceedingly useful and economical where an intermittent, auxiliary, moderate heat is required, such as is ordinarily furnished by an oil or gas stove. The device stands 20 in. in hight and has a diameter over all of 13 in.

Starrett's New Bevel Protractor

Among the many new tools which the L. S. Starrett Company, Athol, Mass., has added to its already extensive assortment, is the new bevel protractor No. 490, illustrated in Fig. 10 of the engravings. The tool is of the same general design as the company's well known No. 12 protractor, but with the additional feature of having the head extend both sides of the blade. This, it is pointed out,

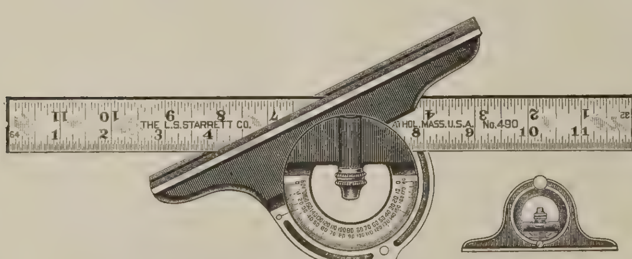


Fig. 10.—Starrett's New Bevel Protractor.

greatly improves the usefulness of the tool, as the same angles may be transferred from either side of the frame without the necessity of resetting. The head of this protractor is 7 in. long, supplied with an accurate level attached to one side, as clearly indicated in the illustration presented herewith. The blades are hardened and graduated with heavy figures reading both ways. The heads are made with fine smooth finish to match the finish of the company's No. 33 combination squares. The heads will, however, also fit the blades of the company's No. 11 and No. 23 combination squares and combination sets. Another improvement which cannot fail to be appreciated by mechanics is that the turret is graduated to read both ways, from 0 to 180 degrees. By this arrangement direct readings may be had from the turret, indicating the supplement of the angle as well as the angle required. The fact that there is only one zero line on the frame eliminates all possible chance of confusion as to whether acute or obtuse angles are obtained.

New Floor-Finishing Machine

In order to meet the growing demands of contractors and builders for a machine for surfacing and polishing new floors, as well as for smoothing old ones, John M. Crook, 950 North Fifty-third avenue, Chicago, Ill., is introducing the device shown in Fig. 11 of the illustrations. It is the invention of Rudolph T. Schuttler, Oshkosh, Wis., and embodies features which cannot fail to command the attention of those for whose use it is intended. The machine consists of a horizontal frame in the forward end of which is journaled a vertical shaft or spindle having secured to its lower end a hollow disk or buffing wheel carrying the abrasive or polishing material, which can readily be removed as occasion may require. The disk or buffing wheel comes in contact with the floor, and being rapidly revolved through the agency of an electric motor mounted upon the frame work of the machine, accomplishes the object sought. This motor, it is pointed out, can be arranged in either a vertical or horizontal position and the power can be transmitted to the buffing wheel shaft in any convenient manner. The rear end of the platform of the machine is supported by two wheels, one upon either side, and near the front end is a smaller wheel, which allows the machine to be easily moved in any direction. The general arrangement of the parts is clearly indicated in the illustration. The buffing wheel can be readily raised and lowered by means of a lever within convenient reach of the operator.

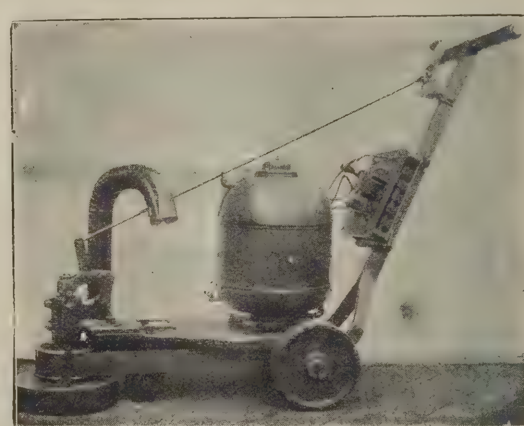


Fig. 11.—New Floor-Finishing Machine.

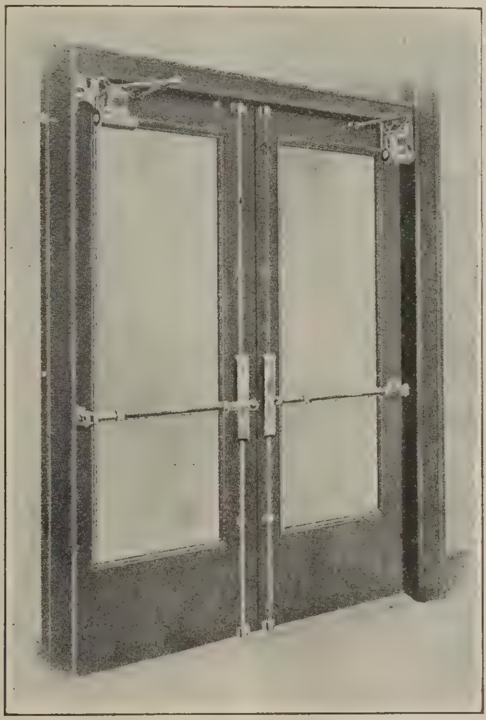
In operating the machine it is moved from side to side, covering about 5 ft. of space in its progress across the floor. It is only necessary to connect the motor to any source of electrical supply and move the machine backward and forward over the floor. By utilizing the revolving disk the floor can be polished close to the edges and in the corners. In working upon new and unfinished floors, abrasive material is first used upon the buffing wheel, then sandpaper is put on, and finally felt for the polishing.

The Reynolds Automatic Screwdriver

An important factor in assembling small work in large quantities is the putting in of the screws and a method for doing this rapidly and economically is something greatly to be desired, owing to the fact that the constant use of even an improved ratchet screwdriver becomes something of an onerous task on the part of the operator after a comparatively short time. With a view to rendering the operation of putting in screws much easier and much more rapid than would otherwise be the case, a line of machines has been brought out by the Reynolds Machine Company, Rock Island, Ill., which are referred to as simple, efficient and durable, and at the same time do not require skilled hands to operate them. The construction of the machine is such that the screws are dumped into a hopper or magazine in bulk, where they are automatically taken one at a time. The work is placed on the table and the pressure of a foot lever drives the screw. The spindle is driven by an adjustable friction which makes it possible, it is claimed, to set screws as tight as desired, and which allows the spindle to stop when a screw has been driven home, thus avoiding marring the work or the heads of fine brass screws. After being taken automatically from the magazine the screw is held by a pair of jaws until the driver descends and engages the slot in the head of the screw and forces it down into the work. The table is slightly raised by a cam on the foot lever as each screw is driven, thus clamping the work between the table and the screw guide. The driver in the larger sizes is made with an inserted blade, which can be easily removed when worn and a new one inserted.

Clark's Emergency Exit Door Lock

In these progressive days when more and more attention is being given to facilities looking to the comfort and safety of audiences, whether it be in churches, school houses, theatres, hotels, assembly halls or public buildings, interest naturally attaches to devices tending to the accomplishment of this end. In providing means for the rapid clearing of an audience room special attention has been given to the doors of exit, with a view to rendering their operation easily effective. Looking to this end are the emergency exit door locks made by Hugh Elmer Clark & Brothers, Rochester, N. Y., and one style of which is illustrated in Fig. 12 of the engravings. The picture represents an inside view showing a lock designed for double-entrance doors swinging out with no astragal or rabbet and where entrance by key is not necessary. The arrangement is such that pressure from the inside against the horizontal push bars draws the dead bolts at the top and bottom and automatically locks them in that position, thus leaving the doors perfectly free to swing. The point is made that the emergency exit lock has in its cross-bar a patented feature which will always be of vital importance in an emergency exit device. In the designing and making of it care has been taken to secure a good proportion of parts to withstand strain, also to use a high grade of material. Nuts and small screws which might easily become loosened are eliminated by the use of steel pins located in place by spring cotters. While simplicity of construction, combined with strength and durability, are first considerations, the manufacturers have not neglected to give thought to general appearance when mounted on entrance and exit doors, and the locking device is supplied in standard finishes in brass and iron, according to requirements.



Novelties.—Fig. 12.—Clark's Emergency Exit Door Lock.

A Book on Water Closets

An example of helpful trade literature is presented in the new catalogue issued by the Sanitary Manufacturing Company, Hamilton, Ohio, as every page contains useful information relative to the Hamilton Gem line of low-down water closets and their equipment. The introduction states that the company has added 18 handsome new combinations in iron enamel and vitreous china tanks of distinct and original design and a positive automatic seat action closet for schools and public buildings. Economy of floor space is claimed for the Hamilton Gem closets and satisfactory service, noiseless and reliable. The first illustration is in color, and is a fine half-tone engraving conveying a good idea of the Hamilton Gem closet. It is followed by three pages of information which will aid architects, builders and plumbers in selecting the proper type of closet for office, hotel and club buildings and apartment houses and all kinds of general buildings. A notable feature of the catalogue is a full page devoted to describing in detail the features of merit in every part of the closet and its equipment. This page also contains reliable roughing-in measurements, text for specifications and prices. The ventilated siphon jet closet has a 4-in. top back outlet for connection with the ventilating system, while the closet still preserves a graceful appearance. The Giant-Flume is a siphon jet closet with a vitreous china flushing tank and designed in all parts to meet the specification of the United States Government. The Positive Type K is a washdown closet, and full particulars are presented in connection with it. After devoting some 80 odd pages to the detailed description of different types of closets, the equipment of which the company can furnish and which is further illustrated by small sectional views showing the internal arrangements of the waterways, the construction of the reliable mechanism is dilated upon, showing how the tanks are made, the character of the ball cocks and valves that are used in connection with it, with half-tone engravings of all the separate parts numbered to facilitate ordering repairs. The numbered parts include valves used in the closet tanks and the ball cocks used in supplying them. These are followed by engravings of the hinges and various other metal parts used in the closet equipment. Two pages are devoted to the roughing-in dimensions for the various types of closet. Three pages are used to show the general contour of the bowl and sectional views show the construction of the waterway. It is pointed out that these bowls are all made of vitreous china, fired at a temperature approximating 2900 degrees, which is said not only to make them absolutely non-absorbent, but to give them a hard, smooth, glossy white surface. Another feature to which attention is called is the unusual depth of the water seal. One page gives information in reference to the company's method of shipping to avoid errors and prevent breakage, every closet being shipped in a crate. The different styles of wood finish are also shown in color, and the closing pages are devoted to the metal parts of the seat equipment, including reinforcement to prevent spreading by warping, and different styles of hinges which can be furnished.

Lane's Tubular Track and Hanger

In accordance with its usual custom of bringing out something new each year for its patrons, Lane Brothers Company, Poughkeepsie, N. Y., has just placed on the market a new pattern of barn-door hanger with which is used a steel tubular track, as shown in Fig. 13 of the accompanying illustrations. It is claimed to be a very simple and inexpensive hanger, which cannot jump the track and which allows the door to swing outward a considerable distance without cramping either track or hanger. The latter has a steel frame of the company's distinctive U-shape design, strongly braced and covered, while the wheels are fitted with roller bearings. The rail has double-braced steel brackets rigidly attached.

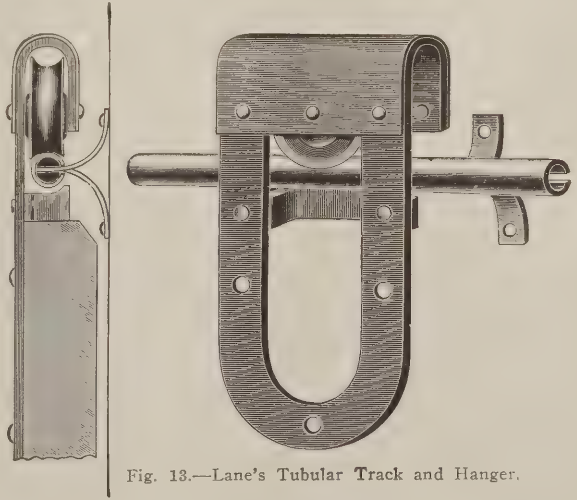


Fig. 13.—Lane's Tubular Track and Hanger.

TRADE NOTES.

ROBERTS TOOL COMPANY, Edward A. Hollis, manager, 610 Bullitt Building, Philadelphia, Pa., is sending out a four-page folder illustrating and briefly describing what is known as Roberts' Patent Improved Combination Saw Filing Guide and Clamp, for which many claims are made. The device is of such a nature that the entire length of a cross-cut or rip saw can be filed without changing or altering the adjustment of the tool, owing to the fact that the clamp is 30 in. long. It is made entirely of iron or steel, is nickel mounted and can be set in an instant to file any angle. Attention is called to the fact that it is so graduated that the operator cannot fail to file the teeth any desired hook or bevel, thus making every tooth alike. It is claimed that by extracting the guide rod and reversing the guide bar a man who is left-handed can file just as well as one who is right-handed.

BOMMER BROTHERS, Brooklyn, N. Y., have just commenced a five-story extension to their plant on the south side of Willoughby avenue, between Classon avenue and Taaffe place, in the city named, which will cost in the neighborhood of $50,000. The extension will cover an area 80 x 144 ft. and will be constructed of brick, with blue-stone trimmings.

THE L. S. STARRETT COMPANY, Athol, Mass., has just issued from the press a 32-page supplement to General Catalog No. 18, calling attention to a number of new tools which the company has added to its already extensive assortment. In connection with the numerous illustrations is brief descriptive matter, sufficient, however, to enable the reader to grasp the salient features, together with the prices at which the tools can be had. The general make up is in keeping with the literature sent out by this enterprising concern, and those of our readers who are interested can readily obtain a copy of the supplementary catalog upon application.

THE BRADLEY MANUFACTURING COMPANY, Cincinnati, Ohio, in emphasizing the merits of Cemeline points out that it is an impervious coating, especially adapted for waterproofing concrete or cement blocks, brick, metal work, roofing and all woodwork, and can also be used for fireproofing shingles or inner doors or wherever a fireproofing may be necessary. It is made in four permanent colors and is put up in paste or liquid form according to requirements. The claim is made that one gallon of Cemeline liquid covers 200 square feet of concrete, brick or stone surface, while on metal it will cover 300 square feet of surface. For coating on woodwork it will cover 240 square feet of surface.

THE RAYMOND CONCRETE PILE COMPANY, 90 West street, New York City, and Chicago, Ill., has just issued a very interesting pamphlet describing the methods employed in connection with some municipal dock improvements in Baltimore. The company is constructing certain piers, which are of steel and concrete, after the designs of Oscar F. Lackey, harbor engineer of Baltimore. One of the noteworthy features of the construction is the concrete sheet piling designed by the engineering department of the Raymond Company, the statement being made that in the work some 220,000 surface feet of the piling is used. The numerous photographs illustrating the pamphlet afford an excellent idea of the methods employed. In addition to the municipal docks the concrete bulkheads now under construction by the Raymond Concrete Pile Company for subsidiaries of the Standard Oil and International Harvester Companies are described and illustrated. The Raymond Company also has the contract for placing 1200 concrete piles in the foundations of a reinforced concrete shop to be erected at the Schenectady works of the General Electric Company by the Stone & Webster Engineering Corporation.

CHARLES BENJAMIN TUTTLE, architect and engineer, has recently removed his office from Topeka to 204 North Main street, Wichita, Kan., and would be glad to receive catalogs, samples, etc., from manufacturers of materials and equipment used in building construction.

THE STEEL-MONOLITHIC COMPANY, of New York, has just been incorporated, with a capital stock of $2,000,000, to deal in fireproofing materials. The directors are William G. Kennedy, George Clark, Jr., and M. McGrath, all of New York City.

THE KINNEAR MANUFACTURING COMPANY, Columbus, Ohio, has been experimenting with a scheme for setting skylights in lead instead of the usual iron or steel frames. The results are announced as extremely gratifying, and it is reported that the company will now manufacture a patent lead frame for skylights. As lead will not expand with heat nor contract with cold, the new idea is expected to prove very popular with builders who have experienced trouble because of these characteristics of iron and steel.

"COMFORTABLE HOMES" is the title of an attractive booklet referring at length to the merits of Neponset Sheathing Papers, Proslate Roofing and Florian Sound-Deadening Felt, which is being distributed by F. W. Bird & Son, East Walpole, Mass. A goodly number of the pages are devoted to half-tone reproductions from photographs of buildings in connection with which the manufacturers' products have been used. The statement is made "that some kind of sheathing paper is used in nine out of ten buildings under clapboards, shingles, weatherboarding, tin and slate, and its sole purpose is to keep out cold and dampness in winter and heat in summer. In other words, sheathing paper insulates against the undesirable elements. Therefore it is evident that sheathing paper plays an important part in the making of a comfortable home." The claim is made that the Neponset papers absolutely do the work for which sheathing paper is intended, and those who are interested can obtain a copy of the booklet with samples of the materials by sending to the address above.

THE STANDARD DAMP-PROOFING & ROOFING COMPANY, 2652 Park avenue, New York City, has just purchased a plot of ground 62 x 110 ft., on the east side of Washington avenue, south of Tremont avenue, in the Borough of the Bronx, and will erect thereon a two-story and basement fireproof plant, which has been found necessary in order to meet the growing demands of its business.

THE CANADA CEMENT COMPANY, LTD., has opened its general offices in the Imperial Bank Building, Montreal, Canada, and will be glad to receive, from manufacturers, copies of catalogs of interest to the cement industry.

CONTENTS.

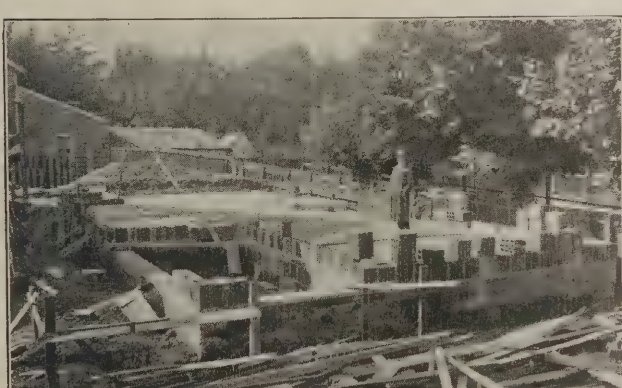
The Building Age

NEW YORK, FEBRUARY, 1910.

Terra Cotta Tile in Dwelling Construction

ONE of the noticeable features of the present era of building activity, especially in this vicinity, is the growing tendency toward what may be termed the "fireproof idea" in connection with dwelling houses of comparatively moderate cost. In the development of this idea hollow terra cotta tile is extensively employed and its use is well illustrated in a building operation now in progress in one of the many beautiful suburbs of which New York City can boast. The operation involves the ultimate erection of a rather remarkable group of 24 houses of semi-fireproof construction, of which six have already been completed, while others are under way and will be finished as soon as the weather will permit. The prime movers in the enterprise have gone into the construction of these houses with the distinct idea of counteracting, so far as possible, the cheap speculative houses so widely built throughout the suburbs of New York, and aim not only at houses that are of a semi-fireproof nature and built in the most durable manner, but they have sought to combine in them the latest ideas in design and adapted to the modern methods of living. There has also been sought and accomplished a departure from the repetition over and over again of the same style of treatment, with the result that each of the houses in question varies in plan and exterior details, yet all are in the same period of architectural design. Special attention has been directed to the color scheme with a view to avoiding harsh contrasts, yet so treating the group as to produce what may be termed an interesting example of attractive street architecture.

Terra Cotta Tile in Dwelling Construction.—Placing the "Forms" and Preparing the Foundation Walls.



View Showing the Foundation Walls Completed and Main Floor Laid.

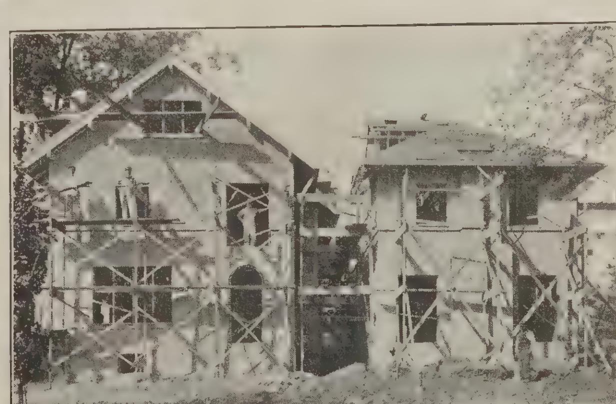
The sites upon which the houses are located vary from 33 ft. up to a trifle over 50 ft., although for the most part the frontage is 40 ft. In placing the houses on the lots they have been so arranged that the principal rooms of each dwelling have a comparatively unobstructed view; that is, the kitchen sides of two houses, for example, are placed adjoining each other and comparatively close to the building line, thus bringing the opposite sides of the house on which are located the principal living rooms sufficiently far from its neighbor as to give a much better view than would otherwise be the case.

The rooms in the houses vary from 10 to 11 in number, exclusive of baths, and many features have been incorporated which heretofore were usually found only in connection with expensive residences.

We have selected a typical house for illustration, with a view to showing the general style of construction, which is practically identical with all, and for the particulars concerning which we are indebted to the architects, Mann & MacNeille, 12 East Forty-fifth street, New York City, who are also supervising the work.

House with Tile Walls Laid to the Second Story, and Showing Arrangement of "Run-way."

The several small half-tone illustrations presented herewith afford an excellent idea of several stages of the work in connection with the construction of these houses. The first one shows the "forms" for the foundation walls being placed in position and the concrete poured into them. The second picture represents the foundation walls of a house completed and the tile of the main floor laid. The third picture shows one of the houses with the tile walls laid to the second story and the arrangement of the "runway" for wheeling materials to an elevated position. The last half-tone represents two of the houses under roof and the exterior



Two Houses Under Roof, and Showing First Coat of Exterior Plaster Applied.

hollow-tile walls covered with the first coat of plaster, although there is a space around the door opening of the left-hand house where the plaster has not yet been applied. The details appearing upon pages 49 and 50 afford a good idea of the method of construction, as well as some of the features of finish of a typical house.

The foundation walls are built of concrete mixed in the proportions of one of cement, two and one-half of sand and five parts crushed trap rock sufficiently small to pass through a ring 1½ in. in diameter. The outside of the foundation walls is covered with cement mortar, mixed in the proportion of one of cement to two and one-half of sand, with an admixture of the waterproofing composition for the purpose, keeping the cellars perfectly dry.

The walls of the houses above the foundations are built of the National Fireproofing Company's tile, with a key on the outside and burned hard. The tile are laid up with Portland cement and the exterior surface covered with stucco, the latter being applied directly to the tiles. Some of it is two-coat work, with a "float finish," and some of it three-coat work, with a "spatter" finish. The walls at the grade line are 8 in. thick and above they are 6 in. thick.

The use of hollow tile in the outside walls gives a series of air spaces which not only tend to keep the houses thoroughly dry, but to render them cooler in summer and warmer in winter, while at the same time rendering them sound and vermin-proof.

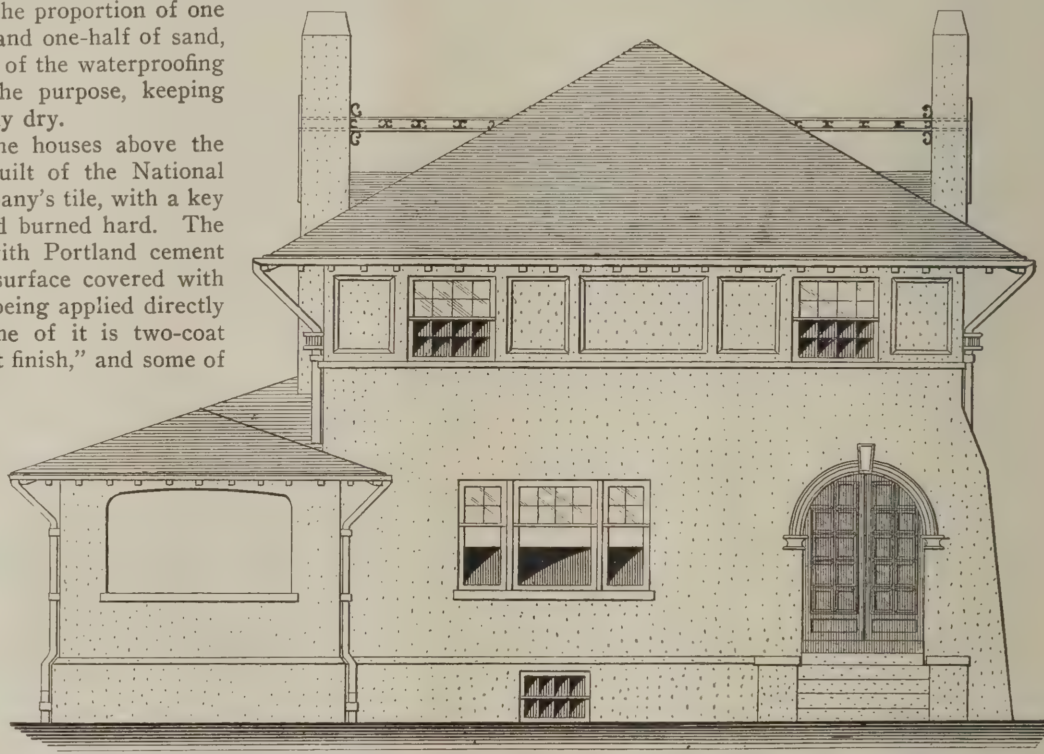
The plaster was applied directly to the tile on the inside, no furring being necessary. The plaster used was patent cement mortar. The floors are of the well-known Kahn system of construction, the reinforcing material being a trussed bar. The roofs are frame construction covered with slate or tile, varying in color with the different houses, some being red or green, some purple and others mixed green and purple, giving effects somewhat out of the ordinary.

In the construction of the houses the lintels over the openings were formed with tile filled with concrete and reinforcing bars proportionate to the span.

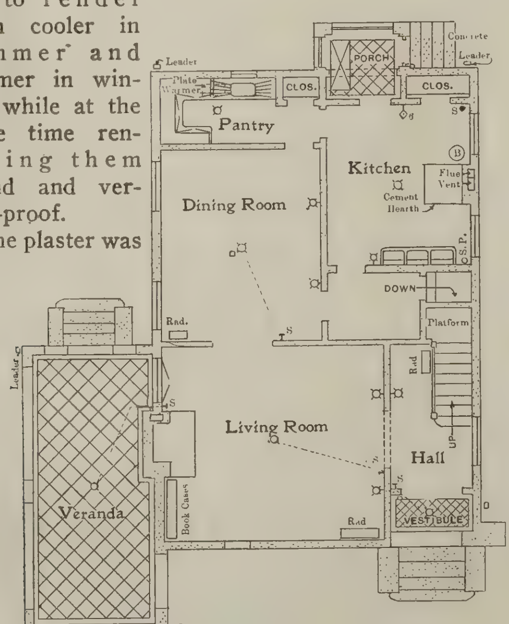
The vestibules with some of the halls and some of the dining rooms are floored with tile in 6-in. and 9-in. squares and of dark tones. The bath rooms have tile floors and walls with sanitary tile base, a detail of the latter being shown on page 50.

The interior trim is of chestnut, stained a dark tone, with wax finish on the main portions of the first floor and yellow pine elsewhere. The cased openings between hall and living room and living and dining rooms are each 5 ft. wide. The ceiling beams are 2 x 8 in., placed 16 in. on centers.

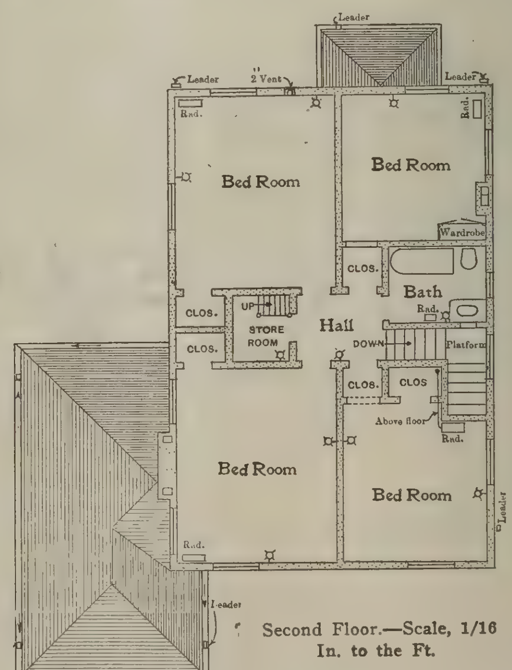
The houses are piped for gas and wired for electricity, the wiring being in conduits run in chases cut after



Front Elevation.—Scale, ⅛ In. to the Ft.



First Floor.—Scale, 1/16 In. to the Ft.



Second Floor.—Scale, 1/16 In. to the Ft.

Terra Cotta Tile in Dwelling Construction.—Mann & MacNeille, Architects, New York City.

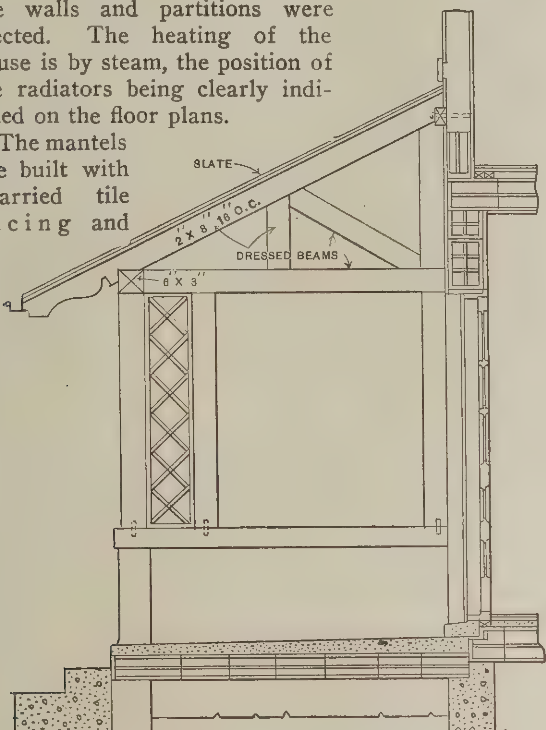
the walls were erected. In connection with the plumbing work the pipes were erected first and the partitions were built afterwards. The soil pipes are 4 in. in diameter and run in chases. The scheme of water pipes is so laid out that they run exposed on the ceilings of the kitchen and butler's pantry. In the case of the gas pipes the chases were cut after the walls and partitions were erected. The heating of the house is by steam, the position of the radiators being clearly indicated on the floor plans.

The mantels are built with quarried tile facing and hearths and the wood mantels are ornamented with panels of pottery. The gas and electric light fixtures are of a most ornate nature and are made of a composition known as "Dureatta."

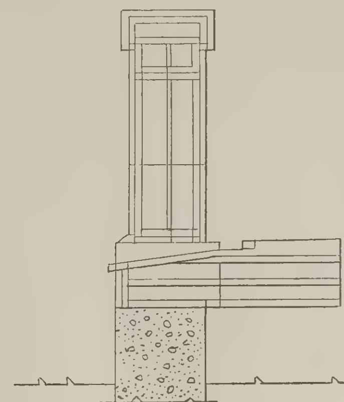
In connection with the work it is interesting to note that all the concrete and mortar was mixed by means of a machine located in the middle of the plot of ground and was wheeled to the different houses in barrels, "runways" being constructed to reach the second floors, as indicated in one of the small half-tone pictures on the first page of this article.

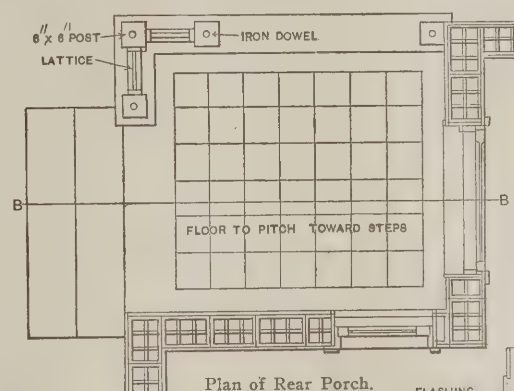
In the kitchen of each house is a French combination coal-and-gas range, with elevated gas broiler and oven; also a water boiler which has an inside gas heater, and special provision is made for the disposal of garbage.

The range is located between two windows, thus giving plenty of light on both sides—a feature not always considered in the planning of a kitchen. The chimney is built with an 8 x 8-in. smoke flue and an

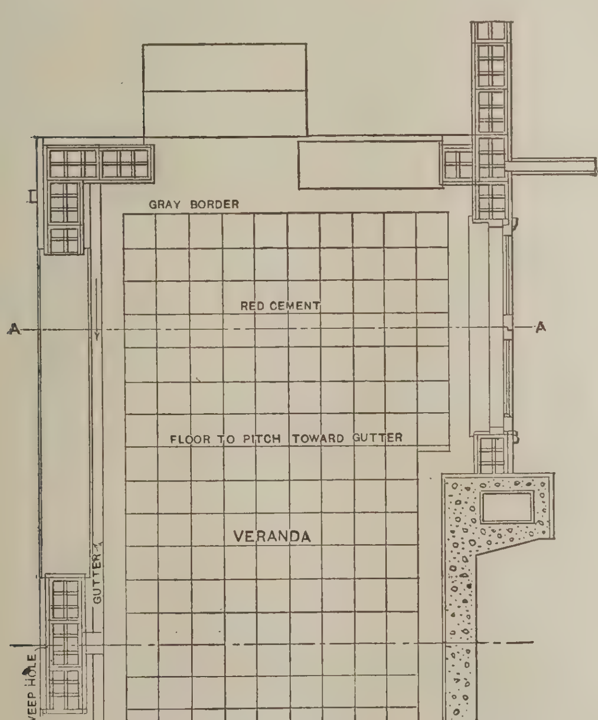


Vertical Section Through Veranda on Line A-A of the Plan.—Scale, ¼ In. to the Ft.

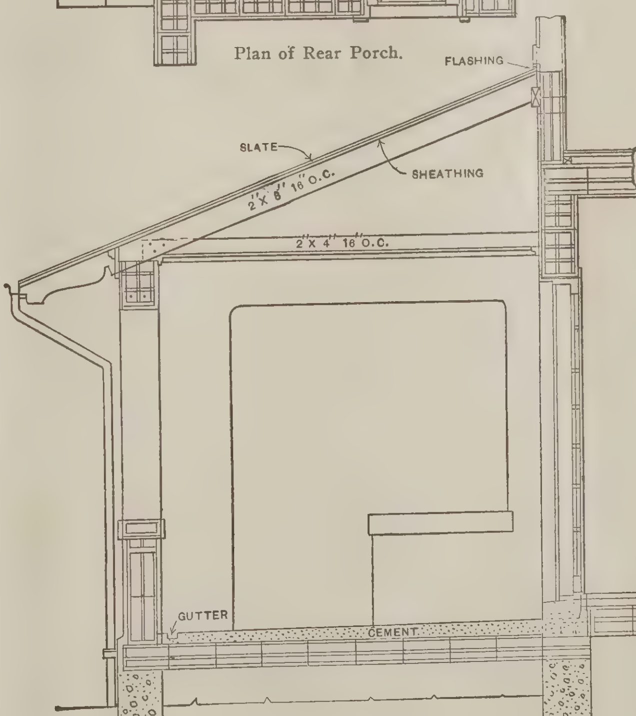

Section Through "Weep Hole" of Veranda.—Scale, ½ In. to the Ft.



Plan of Rear Porch.



Plan of Veranda.—Scale, ¼ In. to the Ft.



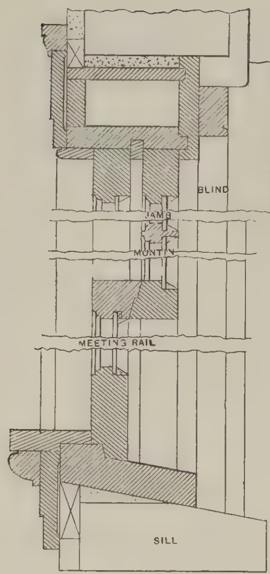
Vertical Section of Rear Porch on Line B-B of the Plan.—Scale, ¼ In. to the Ft.

Terra Cotta Tile in Dwelling Construction.—Miscellaneous Details.

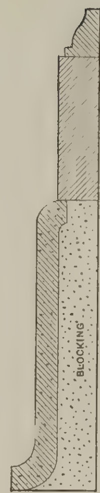
8 x 12-in. vent flue.

The kitchen pantry is equipped with a series of dressers, a sink with drain boards; also a plate-warmer conveniently located.

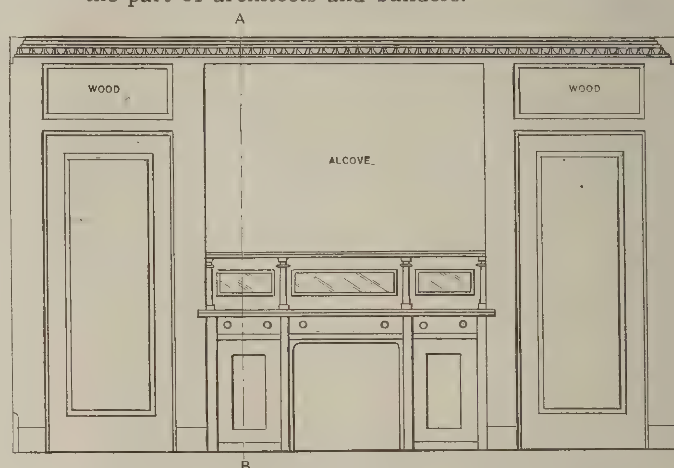
The owners of these houses, which are being built in Orange, N. J., are the Kellogg-Green Company, and the contractors for the work are Bliss & Griffith, 225 Fifth avenue, New York City. It is interesting to note the fact that a little more than a year ago this firm built at University Heights the first private dwelling of hollow tile within the limits of New York City, the owner being Professor James E. Lough, of New York University. It is needless to state that at the time, this use of hollow tile attracted a great deal of attention on the part of architects and builders.



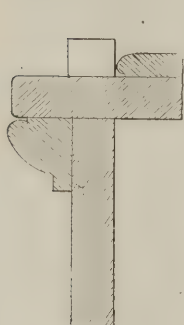
Details of Double Sliding Windows.—Scale, 1½ In. to the Ft.



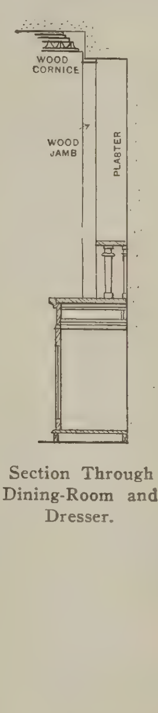
Detail of Tile Base.—Scale, 3 In. to the Ft.



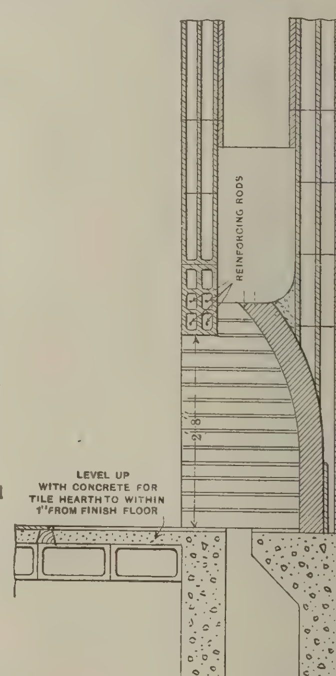
Elevation in Dining Room, Showing Built-in Dresser.


Detail of Window Stools.—Scale, 3 In. to the Ft.

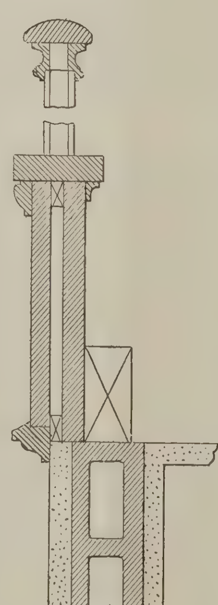

Detail of Newel Post.

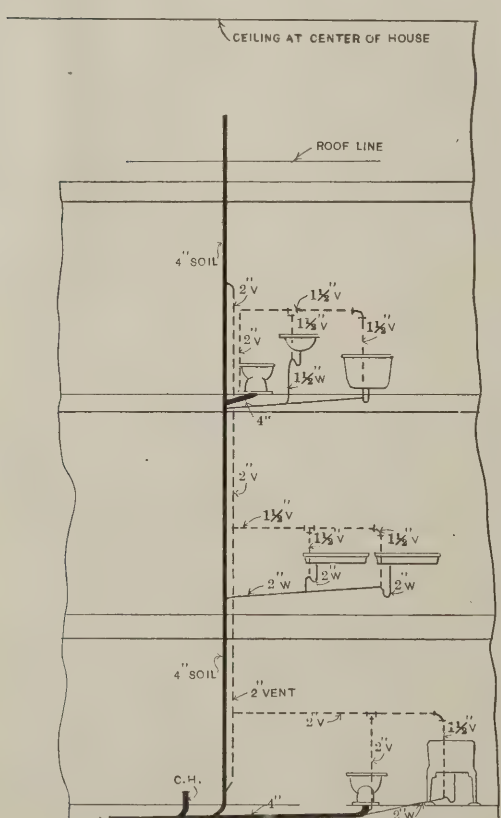


Section Through Dining-Room and Dresser.

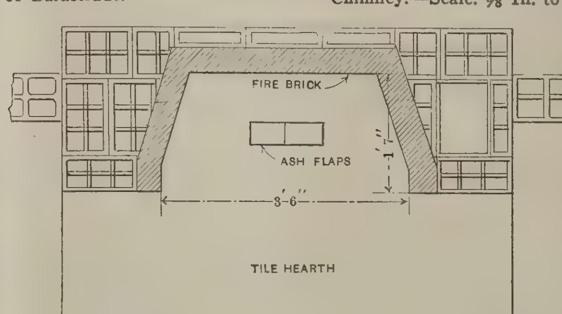


Section Through Fireplace and Chimney.—Scale. ⅜ In. to the Ft.


Detail of Balustrade.



Plumbing Section.



Plan of Fireplace and Hearth.—Scale, ⅜ In. to the Ft.

Terra Cotta Tile in Dwelling Construction.—Miscellaneous Details.

SUGGESTIONS FOR THE PROGRESSIVE CARPENTER

BY J. CROW TAYLOR.

THE carpenter or cabinet maker ought to know that any woodwork is subject to more or less influence from moisture. What is meant is not simply the moisture incident to being exposed to the rain, but moisture absorbed in the open air, and particularly the moisture incident to putting up mill work in a green building, where the plastering is fresh. There have been some excellent jobs of mill work spoiled from this cause alone. Sometimes it seems unavoidable because of the time limit given to putting up and finishing the structure. Probably the masons are delayed until the time has so nearly expired that the carpenter must put up in his mill work while the walls are still green. Then it doesn't matter what kind of wood is used nor how well seasoned, for there will be some swelling for a while, and afterward when the building dries out some shrinking, resulting sometimes in warped panels and bad joints and cracks, and a general rundown appearance that seriously impairs the beauty and value of the job. If the mill work includes veneer panels the effect of the moisture may differ a little. If there is moisture in sufficient quantities it may cause a loosening up of the glue that holds the veneer panels together, and then the veneer work is entirely destroyed so far as its practical value is concerned.

Moisture-Proof Lumber.

There have been some decisive steps taken the last year or two in the way of making practically moisture-proof built-up lumber, using instead of the regulation glue cementing material that is practically impervious to water, and this material penetrating the wood renders it also practically free from the influence of moisture. This waterproof veneering work, however, has not yet attained a wide distribution, and it is not entering generally into mill and cabinet work. There are some prominent industries in the country developing various kinds of waterproof veneer work, and, while they retain as a business secret the exact nature of the cementing material, they may in a few years develop it to such a point it will come into more general use, and then we can have veneer panels which may stand even the trying service of being put against green walls.

The veneer panel generally has more strength and less tendency to swell and shrink and warp under changing conditions of the atmosphere than solid wood. It is not, however, absolutely proof against the influence of variations in the moisture of the air surrounding it. An old veneer manufacturer has a trite saying on this point that built-up lumber from veneer is subject to the same influence of moisture as solid wood, but not so much so. In other words, it will warp and twist a little under changing conditions, but not so much as solid wood, and will if exposed to extreme moist conditions that will loosen the glue be ruined. If given reasonable protection against this it will stand up better ordinarily than solid wood, and the thin panel has more strength.

Built-Up Panels.

One important thing for the carpenter and cabinet maker to study in connection with the use of veneer is the core or body on which face veneer is put, and the influence it has on the face wood. There is to be found among veneering products of the planing mills, furniture factories and panel plants quite a wide range of difference in the making of cores or bodies on which the face veneer is put. The regulation panel plant makes its veneer panels ordinarily in three or five ply, using thin sheets and crossing every other one, and striving to maintain a pretty even balance on each side of the center. If it is a panel, say, of poplar or some of the cheaper native woods, the back and center are made up about the same thickness, or there may be 1-16 center face and back, or 1/8 center and 1-16 face and back. If, however, it is a panel calling for mahogany, which is usually cut very thin, and is to be an extra good job, three or five ply of the body will be made independent of the facing and then the thin face of mahogany 20 or 28 to the inch is glued on, and after it is finished off it does not amount to any more in the body of the panel in point of quantity than a heavy sheet of paper.

Veneer in Door Making.

In the making of table tops the common practice is to build up the body out of strips and boards of varying widths, whichever is most convenient, finish it off smoothly and then glue veneer on the face, the veneer sheet running the same way as the body. Some of the finer tops have a sheet of poplar or some other veneer on top to form a cushion or cross banding on which the fine face veneer is glued, but many of the oak table tops are made of common oak lumber and then have the oak face veneer glued right on top of the lumber. Also in door making, the frames are sometimes made of solid lumber and the veneer facing glued on it, varying in thickness from 1-20 up to 1/4 in. in some instances. More commonly door frames are made up of strips either glued or dovetailed together. The framing is then straightened on the jointer and run through a planer or sticker to get it of uniform thickness, after which it is covered with veneer, the thickness in this case varying considerably, as is the case where solid framing is used. Of course, in making up the frame of strips the outside strip is made of the same wood as is used for the outside face, so it will harmonize.

Errors in Core Making.

The practice of gluing face veneer right on to a solid body or body made up of strips has led to some misunderstanding and occasionally expensive errors in cabinet work and door making. There comes to the writer's mind now an instance where a contractor made some big single panel crotch mahogany doors, and after the doors were in the house the big panels buckled until the architect refused to receive them. Investigation as to the methods of manufacture brought out the fact that these big single panels for the doors had been made up of poplar strips running crosswise of the door, matched together to form a body, which was about 1/2 or 5/8 in. thick and then faced on each side with the crotch mahogany. Another door maker who looked at them said immediately that the man's error was in not making his core or center three-ply and then facing with mahogany, making what would in reality be a five-ply job. In other words, he should have had his matched strips in the center running lengthwise of the door, then crossed this on each side with a sheet of veneer, say, 1-16 in. thick or 1/8 in., depending on the total thickness, and then applying his mahogany on this. The point to it is that the mahogany veneer being very thin had no strength or supporting qualities whatever, consequently there was nothing in the way of a body to hold the strips of which the panel core or body was made. His logic would have held good in building up the center out of strips in this way, and facing it each side with veneer had he been able to use heavy veneer.

Heavy veneer for face work is seldom used, however, for a number of reasons. One is the scarcity and value of fine woods and another is that veneer can be cut better in thin sheets than in thick sheets, and there is less rupture and disturbance of the grain. Consequently, for fine jobs the practice is to use thin-face veneer and make up the body so that it is self-supporting and will balance up without consideration of the face veneer itself. This is an important point to keep in mind, and it will save errors frequently in putting up veneer jobs to remember that fine-face veneer should not be depended upon for supporting strength in a veneer job and to make the core or body on which this veneer is put self-sustaining.

Another point to keep in mind is that swelling and shrinking of a solid body of any kind may spoil the face veneer. In mantel factories they have quite a lot of this class of work where a solid board may be faced front and back with veneer, the grain of all the wood running the same way. If the board is not thoroughly dry it will afterward shrink, and in so doing will cause the veneer face to buckle and blister off. If the board is too thoroughly dried out—that it, has been heated until it is unnaturally dry—it will, after the work is finished, absorb enough moisture from the air to cause a little swelling, and this will produce either a series of small checks or a large crack in the veneer. It takes quite a lot of study to understand thoroughly how to work solid bodies of wood in this way and apply the face veneer on them so as to get perfectly good results. One excellent safeguard is to cross band the end of the core or body either with a strip of veneer or with a strip of lumber, so as to prevent exposure of the end pores to moisture. This will tend to prevent swelling and shrinking with changes in the moisture of the air.

Rough-Face Bricks for Architectural Effects

At one time the wave of dry-pressed products swept over the country, and with the variety of color there was given the architect a mechanically perfect block of burned clay, and we regret to say that many architects made use of it, to the architectural elimination of the mortar joint, which is an important feature of any brick wall, says a brickmaker writing in a recent issue of the *Architect and Engineer*. Bricks are bricks and must be laid in mortar; therefore, if a truthful brick wall is to be built, the mortar joint should be a part of it. We fear that there is a present tendency to go to the other extreme and consider mortar as the building material, in which bricks are to be laid. There are extremists in everything and perhaps they add something to the betterment and beauty of the world. We do not know. But somehow we cannot help saying "amen" to the wish that some of the architectural freaks had died in infancy.

We not only gave the architect a great variety of colors, but we gave him variation in size. To the Standards we added "Romans" and "Normans." The colors, the several sizes, together with the possibility of different bonds, gave the architect opportunities he had never known before. Our cities, architecturally, took on a new light and life and color of which we had never dreamed.

We did our part toward a more beautiful city and the architect his, but the brickmaker and the architect alike failed to consider the most essential element in building architecture, the effect of time, the problem of "growing old beautifully."

Is this a lost art in architecture? Did the ancients understand how to build for all time? They lived longer than we do and had better opportunity to study the effect of time. Or was it because their materials were nearer nature than ours—everything handmade? We can not say, but we know that our beautiful buildings became streaked with dirt and hideous in a decade. It was no longer a question of "undertones of pink," but of the original surface color.

The manufacturers of light colors began to mottle the bricks—"mottled," "speckled," "iron-spot," etc., to break up the color and in an effort to make the bricks dirtproof. It was about this time that the influence of stiff-mud bricks began to be felt in the market. Also enameled bricks were under serious consideration by many manufacturers, but architects would not have enameled bricks as a general facing material.

The demand for a material which would not show dirt became insistent. There was a notable adoption of darker colors and rougher shades, and paving brick became a feature in the market. The latter certainly does not show dirt, and aside from that, surely deserves a place in our building scheme, but it could not fill the place of the brighter colors.

There was an attempt by the dry press brick manufacturers to introduce rock-faced bricks, but it failed because the architects would have nothing of it. It was a noble building material debased into an imitation of another noble building material. Possibly a more extended use of rock-faced bricks would have led us sooner to recognize the merits of rough-faced products.

Texture is wherein we have failed to meet the requirements of the architects, and texture is a very important element. Why put burlap on our walls? As well use a smooth paper printed to imitate burlap.

A printed or painted cloth on the floor would soon hide its color and design in dirt, while a rough-coated tapestry will hold the design and color to the last rag, and if it be a Persian rag it will still command a high price in America. It is the tapestry idea that we need in brick—not the color effect, but the texture.

We have heard the cry of "fad" against the rough effects that are now coming out, but they are not fads. They have come to stay and multiply.

What we are after are effects of light and shadow, and not visible roughness—at least not visible at the distance from which the wall is viewed. We wish to break up the smooth, brilliant colored surface and give softness, and in doing this we bring out the depth of the color and its true life by the contrast of light on the high points and shadows in the depressions. Quoting from a German article: "Smoothness in brick surfaces eliminates the play of the light and shadows which is essential to the enlivenment of the surface and prevents softening of the too strong colors on the one hand and the animation of the gloomy on the other hand." If manufacturers will keep this in mind there will be produced fewer of those freak products, whose only excuse for existence is that of roughness. Such rough effects, whose only merit is roughness, may please us for to-day, and we bear with them to-morrow, but on the third day we would relegate them to the ash heap if we could.

The wire-cut face brick—we mean a stiff-mud brick with a wire-cut face—has developed wonderfully in this country, and a number of factories are making it almost exclusively. The same brick is being experimented upon in Germany, but with no marked success up to the present time.

The wire-cut face is especially pleasing. There is nothing mechanical about it. The wire dragging through the clay roughens up the surface in a series of ragged corrugations, and no two bricks have the same light and shadow effects. At first a great deal was said about the dirt that such a surface would accumulate. The product has been on the market about six years, and the first buildings constructed show no evidence of getting dirty, and it is believed the bricks will hold their color-effect longer than a smooth-face brick. The softening and blending effect of time which should enhance the beauty of the wall will deal kindly with this product.

A CHURCH OF FIREPROOF CONCRETE CONSTRUCTION

By Albert Moyer, C. E.

THE essential features of a building which is designed to contain at one time a large number of people must be safety from fire, wind, earthquake and dampness. All these characteristics are contained in a church recently erected in the Borough of the Bronx, New York City, and illustrated somewhat in detail herewith. The church is entirely of concrete, with the exception of the roof, which is of structural steel. The half-tone picture upon this page affords an excellent view of the auditorium looking toward the main entrance doors. Of the two views constituting one of the half-tone supplemental plates, the upper picture represents the finished structure, while the lower picture is a view in the basement looking toward the altar.

are marked into squares, there are no horizontal or perpendicular markings, and the buttresses are not marked so as to imitate blocks of stone. The whole design is Gothic simplified, so as to be in accord with the material employed.

No brick was used and no wood, with the exception of the doors, pews and some of the trim. A particular advantage of reinforced concrete for the purpose of an auditorium is that concrete is positively proof against vermin and rodents, which are one of the principal agencies for spreading disease.

The roof is constructed of steel frames of four light trusses over the nave with purlins of steel channels. The roof over the aisles is also of steel trusses. This

View in Church Auditorium Looking Toward the Main Entrance Doors, and Showing Choir and Organ.

A Church of Fireproof Concrete Construction.—Architects, T. H. Pool & Co., New York City.

It was the original intention of the congregation of this church—Our Lady of Mercy—to construct the building of stone with brick backing, but after obtaining a large number of estimates it was found that the cost would be more than the available appropriation. The design was therefore modified to accord with the requirements of concrete, as the building material and the cost of construction by the use of reinforced concrete, with a very pleasing exterior surface, were found to be much cheaper than stone and within the appropriation.

Reference to the picture showing the exterior of the building will readily show that while the architect has used a design for which stone was a precedent, he has to a certain extent translated stone into concrete and has avoided an imitation of stone. None of the walls

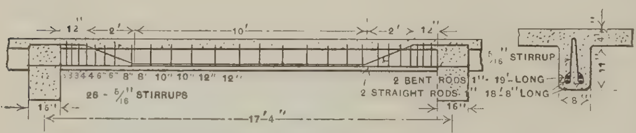
form of construction for such special cases is used on account of its lower cost.

Furthermore, the roof is sufficiently high, so that should a fire occur from ignition of the pews and the small amount of woodwork used, the heat would not be sufficient to buckle the steel trusses or channels.

The ceiling of the basement, shown in the lower picture on the supplemental plate, is of reinforced concrete. This ceiling is much lower than that of the main auditorium, the ceiling of which is the roof, and a fire in the basement might easily buckle steel construction and let the fire into the upper portion of the church, whereas with concrete no damage could occur, the fire being entirely confined to the basement.

Very little reinforcing was used in the walls. Perpendicular reinforcing was not necessary owing to the thickness of the walls. Horizontal reinforcing was placed over the window openings and door openings. The principal reinforcing was in the floor of the church, which was placed in the box forms in the usual manner, by being assembled in the forms and the concrete poured in afterward.

The thickness of the walls in the basement is 20 in. and that of the first floor 16 in. The reinforcement of the walls consists of 5/16-in. rods running in both directions and placed 10 in. center to center. The only purpose served by these rods is to take up such of the temperature stresses as might occur and thus avoid the appearance of cracks. The latter necessarily will occur, but owing to reinforcement they will be distributed so that no one crack is large enough to be visible to the eye.



Details of Reinforced Concrete Beams Used in Central Spans of Main Floor.

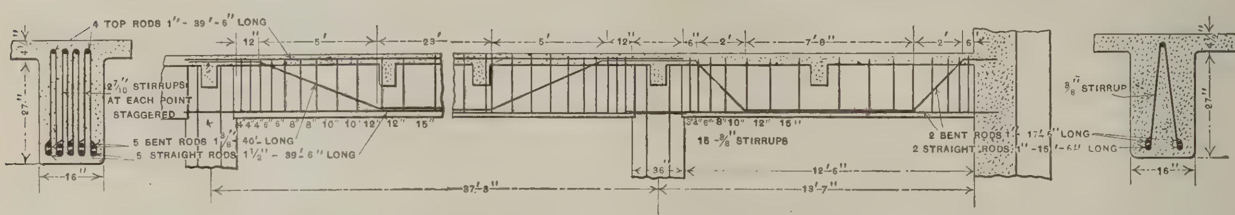
dice is due to ignorance as to the various simple methods for treating a concrete surface which will produce an artistic effect.

The surface finish for this church was accomplished by first washing the outside walls with a solution of muriatic acid. This to a certain extent exposed and cleaned the sand and stone aggregates, furnishing a surface to which a plaster coat of cement mortar would permanently adhere.

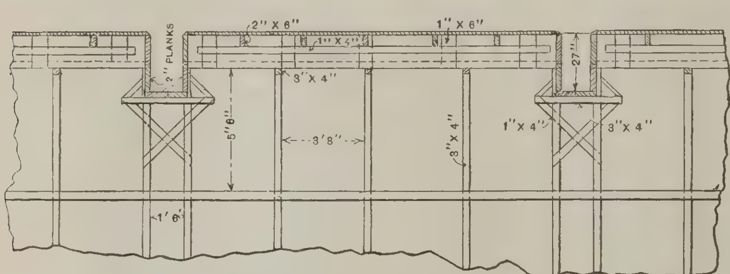
A plaster coat was applied of Portland cement, hydrated lime and white sand from Long Island. The sand cost $1.40 per cubic yard delivered on the job. The proportions for the mortar for the finish coat was one part "Vulcanite" Portland cement, one-fifth part hydrated lime and two and one-half parts white sand. The effect is almost white.

The mortar surface finish was damp-proofed by the use of hydrated lime, which was mixed with the mortar. The proportions used were 20 lb. of hydrated lime to one bag of cement. This has the effect of damp-proofing and will prevent the frost from disintegrating the mortar coat.

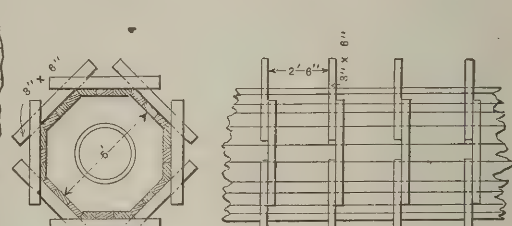
The interior of the church, a view of which is shown



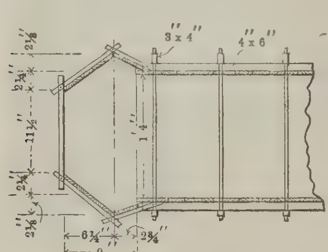
Details of Principal Concrete Girders Supporting the Main Floor of the Church.



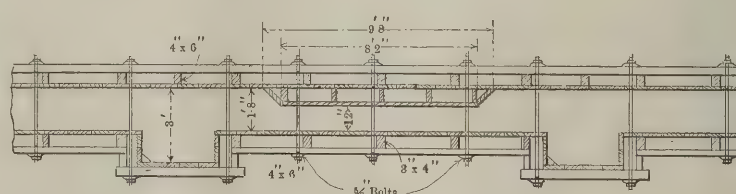
Section of Wooden "Form" Used for the Floors.—Scale, 1/8 In. to the Ft.



Details of "Form" for Chimney.—Scale, 1/8 In. to the Ft.



"Form" for Wall Coping.—Scale, 1/2 In. to the Ft.



Section of Wooden "Form" Used for Walls and Water-Table.—Scale, 1/8 In. to the Ft.

A Church of Fireproof Concrete Construction.—Details of Wooden "Forms" and of Reinforced Concrete Girders.

The size of the girders is 16 x 27 in., the spans being 38 ft. They are reinforced as indicated by the details on this page. It will be seen that in each girder there are five straight rods 1½ in. in diameter and five bent rods 1⅜ in. in diameter and four rods 1 in. in diameter to resist the shear. There are 68 stirrups 7/16 in. in diameter distributed in these spans, as indicated by the details of the principal girders. The details of one of the concrete beams used in the central spans is also shown herewith. The reinforcing rods were bent and assembled by hand before being placed in the "forms." They were held in position by cement blocks while the concrete was poured around them.

Architects in the past have been afraid of concrete from the standpoint of surface treatment. This prejudice is due to ignorance as to the various simple methods for treating a concrete surface which will produce an artistic effect.

on the first page of this article, was plastered with hard plaster. The ornamental caps and ornamental designs under the windows and purlins of the roof were worked out in plaster, which has adhered admirably to the concrete surface. There is no danger of these plastered interior walls becoming stained from dampness, as the concrete walls were properly waterproofed by means of two coats of bitumen painted on the concrete surface with a brush. This bitumen paint not only adheres firmly to the concrete and acts as a film for waterproofing, but also furnishes an excellent surface on to which lime or patent plaster will permanently adhere. It will, therefore, prevent the discoloration of the plaster by moisture, which might otherwise by capillary attraction pass through the walls.

The area walls were waterproofed by the integral method: 2 per cent. of hydratite, a compound, was added to a one and three-fifths concrete. This method has proved entirely effective and will remain so provided the walls do not crack from either settlement or temperature stresses.

The finished floors of the main body of the church were colored with red oxide of iron. The floors were laid very similar to cement sidewalk paving, the surface being well troweled to a very smooth surface. The color is a rich, dull red.

The ornamental crosses in the gable front of the church were made of white Portland cement and white sand cast in plaster moulds. These proved to be too white to blend with the church and were afterwards painted a dull gray.

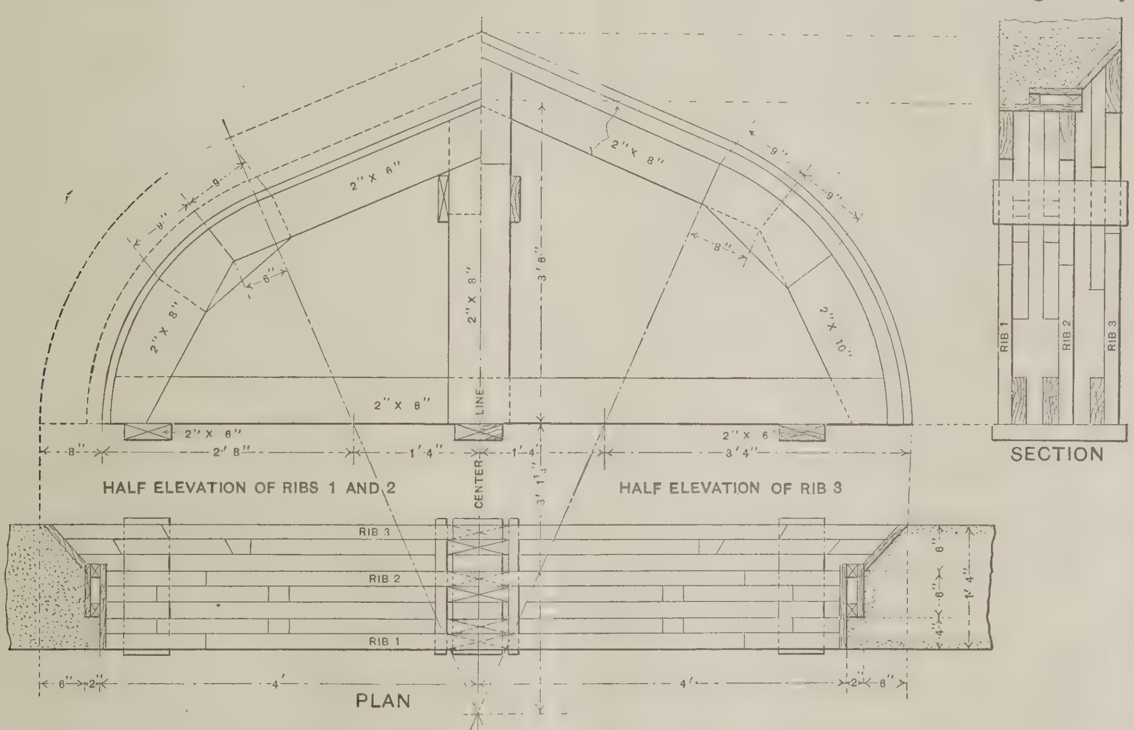
The prominent architectural feature of the church is the two ornamental chimney stacks, the unique method of constructing the forms being shown among the details herewith.

That which will probably interest the reader most is the method of constructing these forms or moulds into forms, effective waterproofing and pleasing surface finish, so that the whole building embodies the requirements of effective building construction in that the building is fireproof, vermin-proof, water and damp resisting. It is also economical and permanent, no insurance necessary and no repairs or painting.

The reinforced concrete was designed by the Turnbull Construction Company, New York City, Mr. Y. Reygondeau de Gratesse being vice-president and chief engineer, the general contract for the building as well as all the concrete work being executed by them. The architects were T. H. Pool & Co., 13 West Thirtieth street, New York City.

Concrete and Steel as Substitutes for Lumber

In a recent discussion of the conditions existing in the lumber trade and the extent to which structural industries have succeeded in finding substitutes for lumber, thereby greatly reducing the consumption of the latter material to a degree that is being felt by the



Plan, Elevations and Section of Wooden Centers Used for Aisle and Clerestory Windows.—Scale, ½ In. to the Ft.

A Church of Fireproof Concrete Construction.—Details of Wooden Centers.

which the concrete was poured. Rabbetted windows and doors are always difficult, and a convenient method for providing forms for them is very well illustrated herewith.

The wall forms were tied together by bolts, no spreaders were used, the concrete acting so as to tighten the forms against the nuts.

The floor forms contain a unique feature in the braces used to support the boxes for the girders, all as shown in the details.

Quantities of material used were 2680 cubic yards of concrete, 47 tons of reinforcing steel, 40 tons of structural steel and 150,000 ft. b. m. of lumber for forms.

The roof covering is of blue slate and is the only portion of the building which might have been improved. It does not give the necessary color and tone which a concrete building seems to require, and which could have been well produced by the use of dull red or green tile, similar to the old Spanish tile.

In this church the advantages of concrete as a building material has been very successfully displayed by convenient and economical method of constructing manufacturers of lumber throughout the South and Southwest, C. D. Johnson, of the Frost-Johnson Lumber Company, St. Louis, Mo., said: "Concrete and steel are coming more and more into use every year, taking the place wholly or in part that hitherto called for lumber.

"Nearly all modern freight cars are being built with steel underframes, gondolas and coal cars being made entirely of steel. The new passenger equipment now being built for many of our largest railroads is entirely of steel construction.

"Bridges heretofore entirely of timbers are now being made of concrete, and depot platforms are being constructed of gravel or concrete.

"The largest street-car plant in the country, located in St. Louis, has recently begun building street cars of steel construction throughout, except the floors, which are concrete.

"A large box manufacturer recently made the statement that boxes made of wood pulp are eliminating the use of 6,000,000 ft. of lumber every year in the city of Chicago alone."

Death of Charles A. Cowen

In the death of Charles A. Cowen, president and treasurer of Charles A. Cowen & Co., which occurred at his home on December 26, 1909, New York City lost one of its most honored and prominent building contractors. He was born on January 5, 1854, in New York, his early education being acquired in private and public schools of the city. As a boy Mr. Cowen served a full apprenticeship with his father at the bricklaying and mason trade, and he was taken into partnership by his father in the year 1878; and upon the latter's death, in 1885, the son continued the business, which was styled in recent years as Charles A. Cowen & Co., Wm. N. Croxton being the partner. It was in 1884 that he became a charter member of the Mason Builders' Association, served on the nominating committee in 1887, was a member of the Joint Arbitration Board between the Mason Builders' Association and the Bricklayers' Unions in 1891 and 1892, and was secretary of the organization from 1893 until 1901. He was treasurer in 1905 and 1906 and became president in 1907, being re-elected in 1908 and 1909.

He became a member of the General Society of Mechanics and Tradesmen in 1889, serving on various committees and filling the offices of vice-president and president, the latter in 1899, and from that time until the year of his death he was a member of the finance committee.

He was vice-president of the New York State Association of Builders in 1903, and filled the office of president during the years 1904 and 1905.

When the Building Trades Club was organized he became a member of the board of managers during the years 1899, 1890 and 1891. He served as second vice-president of the club in 1892, 1893 and 1894, was elected president in 1895 and re-elected in 1896, and served on the board of managers in 1897.

He was vice-president of the National Association of Builders from 1903 to 1909. He was also a member of the Building Trades Employers' Association, and of the Carpenters' Association.

Mr. Cowen was a builder for 30 years and his firm was actively engaged in the erection of buildings both large and small throughout the city and adjacent country.

The funeral services were held at the residence of the family, No. 302 West 104th street, on the afternoon of Tuesday, December 28, and was largely attended by his friends and colleagues in the various spheres where he was active. The pallbearers were Messrs. John J. Roberts, Augustus Meyers, Lovell H. Carr, Warren Conover, Ronald Taylor, Fred B. Tuthill, A. E. Pelham and Frederick R. Usher.

Waterproofing of Concrete

Except for mass concrete foundations, all work should be made as waterproof as possible. Experiment has shown that rich concrete is practically impervious to water, according to the hand-book of the Lawrence Portland Cement Company. Mixtures poorer than one to four are apt to be very pervious. Concrete made with large aggregate is much more impervious than that containing only smaller sizes; 2½-in. stone, for instance, is far superior to ¾-in. Gravel is superior to broken stone in producing imperviousness.

Again, the thicker the wall the less water will flow through it in proportion, and the older the concrete the less pervious it is. Usually, after the flow of water has continued for a few hours, it is found to diminish rapidly in quantity, apparently due to the filling of the pores with the very fine particles carried in suspension by the water. If this action takes place at all, it is produced very rapidly.

On the other hand, if it is not thus rapidly produced, the effect of the water is apt to be injurious, because it and the chemicals it contains will dissolve certain parts of the concrete, which will then be carried away and the whole mass become honeycombed, even to the point of failure. The denser the concrete, the less pervious it is; so that the usual line along which experimenters work, is to find means and materials for filling the minute pores which form in the concrete as it hardens. As has been said, extra cement will do this. Hydrate of lime is an exceedingly impalpable material and is often employed. Pure silica or alumina in the form of silt or clay is also effective to a certain extent, and when such clay happens to have the property of slightly swelling when damp, the imperviousness is supposed to be increased.

Certain chemicals are also sometimes added to the cement or the mortar. Some of them are entirely inert and simply act as resisters of flow, because they produce in connection with water a capillary phenomena of a negative variety, similar to that which exists between mercury and glass or between oil and water. Others are supposed to form insoluble precipitates as soon as extra water is encountered, these precipitates filling the voids as does the silt or extra cement above described.

Moisture is prevented from getting below the surface of a concrete structure in many cases by special treatment of that surface. Long continued trowelling will produce a dense condition such as is found in a sidewalk, which is practically impervious to water.

All methods of surface treatment have the disadvantage that they prevent further hardening of the concrete as soon as they are installed, because no more moisture can penetrate to the interior, and it is moisture which is essential to further hardening.

Lectures on Diversified Uses of Concrete

One of the important features of the Third Annual Cement Show, which will be held in the Colisseum, Chicago, February 18 to 26, will be a series of lectures dealing with the diversified uses of concrete. The subjects are as follows:

Mixing and Placing, Silos, Floors, Tanks, Stucco, Surface Finish, Sidewalks, Fireplaces, Concrete Piles, Small Farm Uses, Concrete Poles, Concrete Bridges and Culverts, Jamestown Sea Wall, Concrete Steps, Determination of Voids, Selection of Aggregates, Manufacture of Cement, House Building, Odd Uses, Factories, Artistic Uses, Decoration with Colored Tile.

The series has been arranged by Percy H. Wilson, secretary of the Association of American Portland Cement Manufacturers, and there will be given three each day at 4:30 p. m., 8 p. m. and 9 p. m., in the west end of the balcony annex. Each lecture will be accompanied by a continuous lantern slide exhibition.

Death of T. Buckler Ghequier

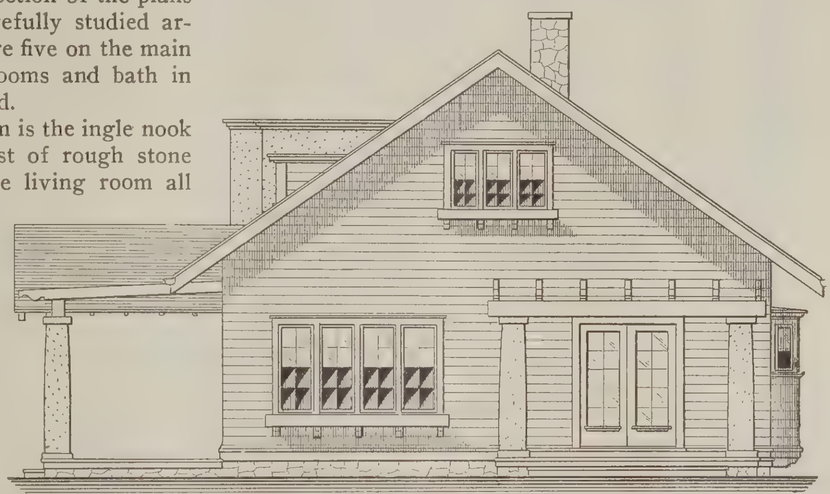
The members of the Eastern architectural profession will learn with regret of the death on January 7 of T. Buckler Ghequier, at the University Hospital, Baltimore, Md. He was a well known church architect and was for many years a member of the architectural firm of Ghequier & May, examples of whose work appeared some years ago in the columns of this journal. He was an extensive traveler and during recent years he had been to England and the Continent where he studied European architecture, giving especial attention to the cathedrals and other church edifices.

The funeral services occurred at old St. Paul's Church on Monday morning, January 10, the Rev. Dr. Arthur B. Kinsolving officiating.

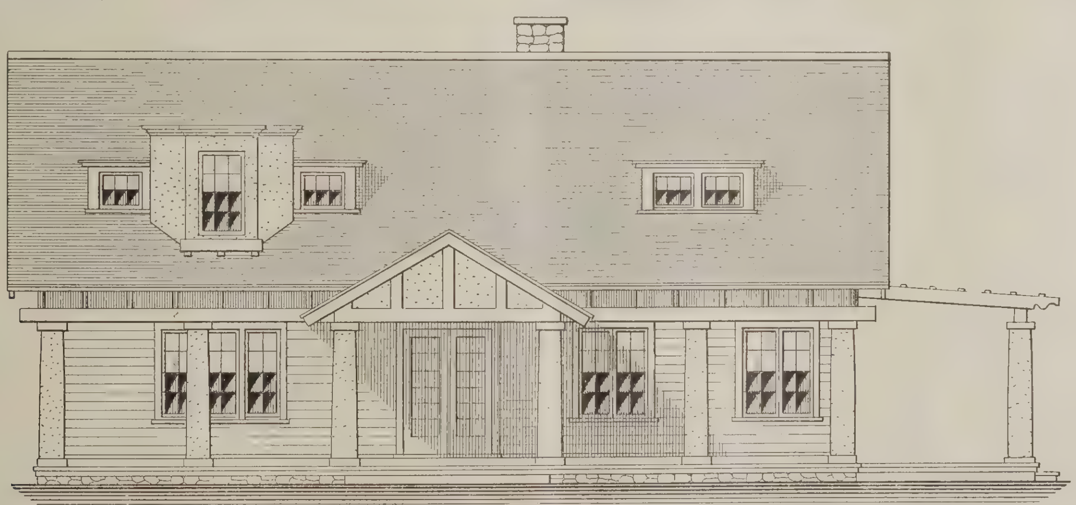
A BUNGALOW FOR THE LAKESIDE

WE present upon this and the pages which immediately follow the plans, elevations and details of a bungalow designed to be erected at an inland lake or summer resort and is intended only for occupancy during the warm months of the year. It could, however, be used as a permanent home in a mild climate although no heating system has been provided, the only means of warmth being the commodious fireplace in the living room. An inspection of the plans will show a carefully studied arrangement of rooms of which there are five on the main floor, with two additional sleeping rooms and bath in the attic, a portion of which is finished.

A striking feature of the living room is the ingle nook with the fireplace and chimney breast of rough stone with seats on either side. From the living room all parts of the main floor are readily accessible without the necessity of passing through any other room. Another feature of the arrangement is the terrace or out-door breakfast room shown at the extreme right. A small central hall gives access to the two sleeping rooms on the main floor, as well as to the bath room and from it rise the stairs to the attic. The cellar stairs from the kitchen are directly under this flight. Between the kitchen and dining room is a commodious china closet and in what may be termed the rear hall is an ice box. A screened porch may be used as a laundry if desired.



Side (Right) Elevation.—Scale, 3/32 In. to the Ft.



Front Elevation.—Scale, 3/32 In. to the Ft.

A Bungalow for the Lakeside.—Arthur Loos, Architect, Milwaukee, Wis.

According to the specifications of the architect, the mason work is of field stone, such as may be found in the vicinity of the building site, laid up in cement mortar composed of one part Portland cement and two parts clean, sharp sand. The living room fireplace mantel and hearth are of split field stone of selected colors and neatly struck joints.

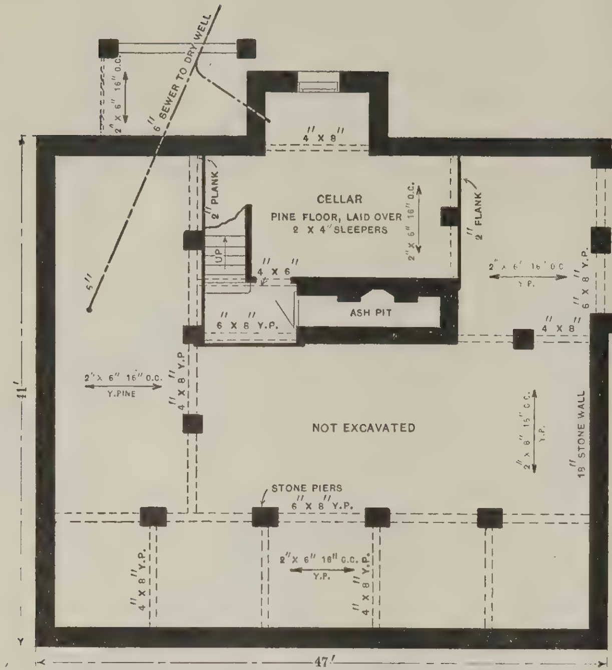
The framing timber is of No. 1 hemlock, with the exception of the ceiling joists in the living and dining rooms, which are of cypress. The outside studs and rafters are covered with 6-in. hemlock matched and dressed boarding, over which is a layer of heavy building paper, this in turn being covered with cypress siding with 1½-in. lap. The roof is covered with cedar shingles exposed 4½ in. to the weather. The porch floors are of 1⅜-in. pine tongued and grooved and laid in white lead joints.

All outside finishing lumber is No. 1 cypress, while all inside finishing lumber, such as door and window casings, baseboard, dining room, wainscot, etc., is also of cypress, but hand finished and sandpapered.

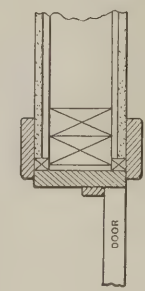
The floor joists are lined with 6-in common dressed hemlock boards laid diagonally and covered with heavy building paper, on which in the living and dining rooms is placed ⅞ x 2½-in. Perfection No. 1 maple flooring, and in the balance of the house No. 2 maple flooring. The floors in the living and dining rooms are treated to two coats of Chicago Varnish Company's best floor varnish, the last coat being well rubbed down. The balance of the floors have two coats of oil. The porch floors have two coats linseed oil paint. All glass except the sideboard, which is plate, is of double strength sheet glass. All tin used is Taylor's I. X. Old Style. All finishing hardware is of dull brass finish. The casement windows have hold-fast casement window locks and adjusters.

The entire first and second stories are plastered throughout with two good coats, the finish coat being a white float or sand finish. The kitchen and bath room have Adamant wainscot 4 ft. 6 in. high.

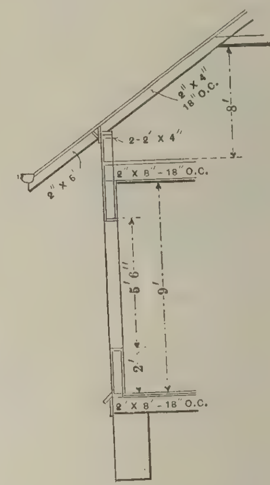
The outside plaster work, where shown on the elevations, is of cement mortar three-coat work, the last coat applied rough cast with a broom. The dormer, porch and gable plastering is done on ⅜ x ⅝ in. wood lath nailed on 1 x 2-in. furring strips over sheathing.



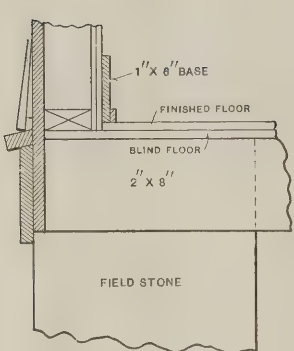
Foundation.—Scale, 1/16 In. to the Ft.



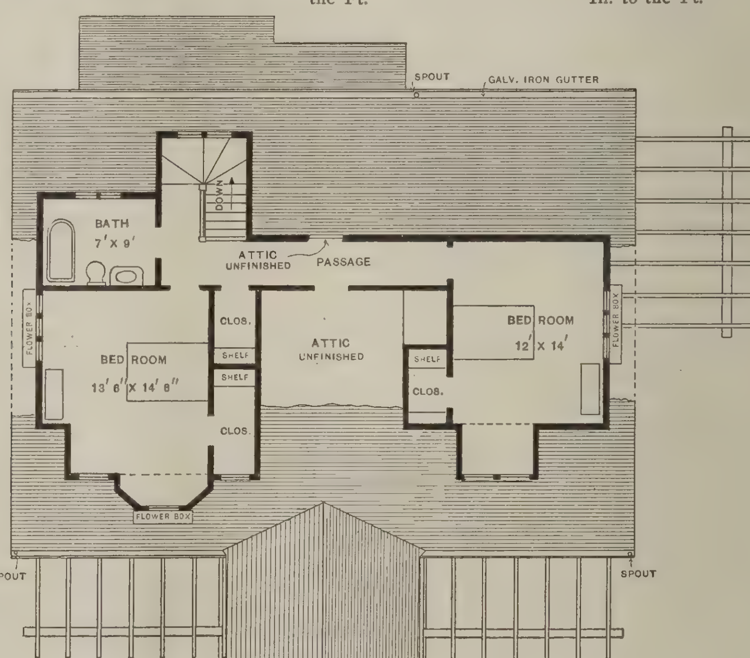
Detail of Inside Door Frame.—Scale, 1 In. to the Ft.



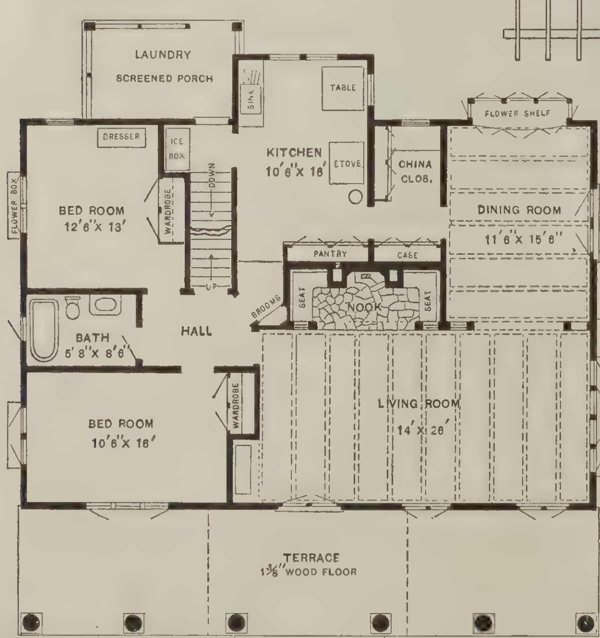
Section of Building.—Scale, ⅛ In. to the Ft.



Details of Water Table.—Scale, ¾ In. to the Ft.



Attic.—Scale, 1/16 In. to the Ft.



Main Floor.—Scale, 1/16 In. to the Ft.

A Bungalow for the Lakeside.—Floor Plans and Details.

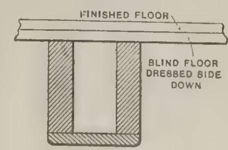
The porch columns are applied on wooden staves, around which metal lath is securely wound and the cement plaster applied.

As the bungalow is to be built in the country, it is not arranged for city water supply or gas. The kitchen has a 30-gal. gasoline heated hot-water boiler, with galvanized iron supply to kitchen sink and bath-room tub and lavatory. The fixtures consist of a 20 x 30-in. cast iron enameled sink in the kitchen, a 5 ft. 3 in. roll-rim porcelain enameled cast iron bath tub supplied with Fuller combination cocks and porcelain enameled lavatory and wash-down closet in each bath room. All fixtures have cut-off on both hot and cold water supply pipes. All pipes and open plumbing are nickel-plated, and all connections between lead and iron pipes are made with brass ferrules and wiped joints. The soil pipes from bath rooms are of extra heavy cast iron, with lead and caulked joints.

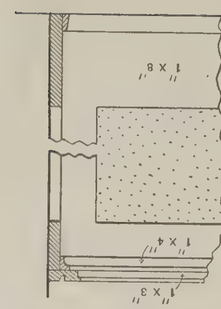
The water supply is from an outside tank and windmill through 1¼-in. extra strong lead pipes provided with stop cock in the basement. The supply is continued as far as the hot-water boiler full size, with ⅝-in. branches to the wash basin.

Electric bells are provided in kitchen, with push buttons at front and rear doors, also in dining room floor.

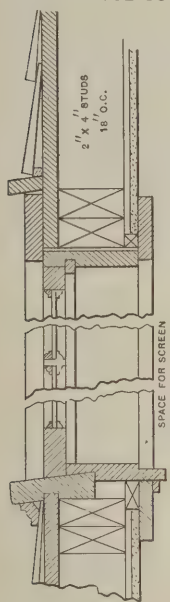
All outside finishing lumber and tin work has three coats of linseed oil paint of light cream color, the siding being stained twice dark brown color. The roof shingles have two coats of Cabot's shingle stain of a green color. The finishing lumber of dining and living rooms have two coats of asphalt stain, made by dissolving asphalt in turpentine to a dark walnut color. The woodwork in bed rooms and bath rooms has three coats of



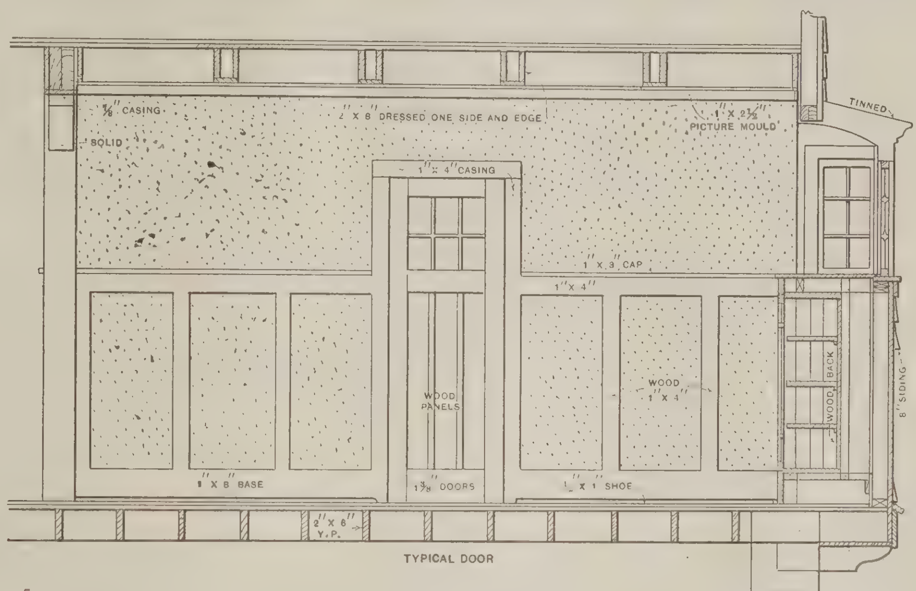
Beam Ceiling of Dining and Living Rooms.



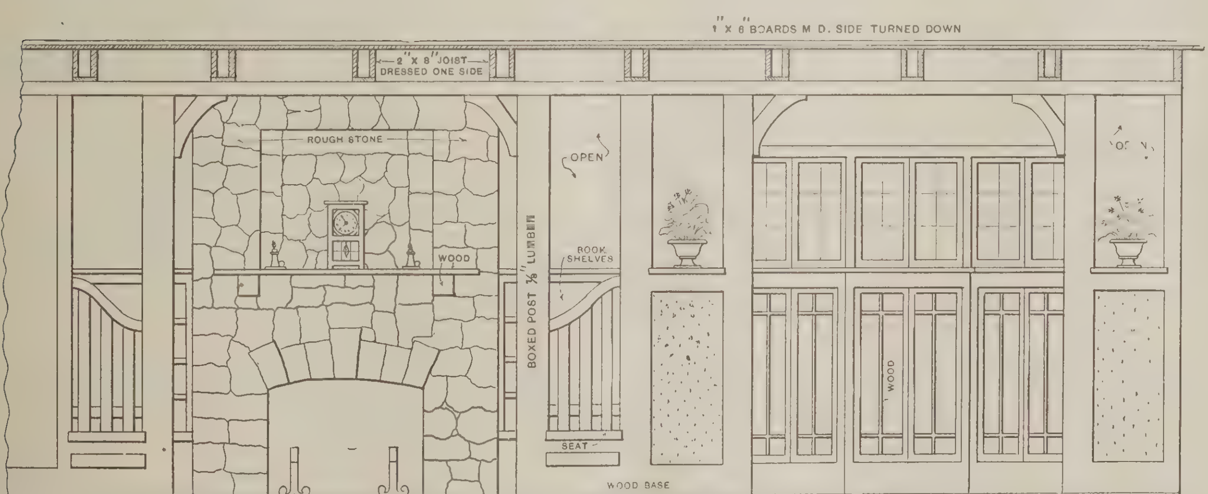
Details of Wainscotting in Dining-Room.—Scale, ¾ In. to the Ft.



Details of Swing Windows.—Scale, 1 In. to the Ft.



Elevation Showing Side Wall of Dining-Room.



Side Wall of Living Room, Showing Ingle Nook and Opening to Dining-Room at the Right.

Miscellaneous Constructive Details of a Bungalow for the Lakeside.

white paint, while the kitchen woodwork has two coats of brown stain.

The bungalow here shown is estimated to cost in the neighborhood of $3,000, erected in the northwest section of the country, the principal items being as follows:

Excavation 150 yds. at 30 cents.....		$45.00
MASON WORK.		
1448 cu. ft. stone at 10 cents........	$144.80	
15 piers 18 x 24 x 4′ 0″ at $1.80......	27.00	
7 piers 18 x 18 x 4′ 0″ at 1.40......	9.80	
Mantel and hearth.................	75.00	
Total mason work................		256.60
Lathing and plastering.............		205.00
Outside plaster at 75 cents per yard..		
Inside plaster at 27 cents per yard..		
Lumber and building hardware......	550.00	
Millwork	465.00	
Carpenter labor	530.00	
Total		1545.00
Painting and glazing..............		268.00
Plumbing and sewerage...........		420.00
Finishing hardware................		55.00
Tinning		40.00
Electric bells.....................		10.00
Total cost of building..............		$2844.60
Allowing for gas machine..........		100.00
Complete		$2944.60

The above is based upon the following rates of wages: Mason and plasterers, 45 cents per hour; carpenters, 35 to 37 cents per hour; painters, 35 to 38 cents per hour; plumbers, 50 to 60 cents per hour, and laborers, 25 to 27 cents per hour.

The bungalow here shown was designed by Arthur Loos, 426 Camp Building, Milwaukee, Wis.

How to Estimate Millwork

Apropos of the subject of taking off quantities from plans for the purpose of reaching an estimate of cost, a correspondent of *The Contract Record,* whose specialty is millwork, submits to that journal the following suggestions:

"The first thing to do, after getting possession of a set of plans and specifications, is to read over the entire specifications carefully.

"Now, some reader will no doubt wonder why it should be necessary to read the entire specifications when you want only the millwork items. My reason is, some architects (or, rather, would-be architects), although they may have certain pages or paragraphs of the specifications devoted exclusively to millwork, will invariably get some things mixed in with the carpenters' or plumbers' specifications that should come under millwork, such as scuttle doors, sink boards, etc., and when the job is about finished the architect generally calls on the mill to furnish them.

"After becoming familiar with the specifications, we proceed with the outside door and window frames, commencing with the basement and finishing with the gable and dormer frames, always stating kind of sash or doors, whether glazed, open or paneled, kind of glass if glazed, and kind of finish to be used for each frame. If for brick or stone building, state if jamb linings, arch bars or sills are required.

"As outside millwork comes next, take off carefully outside base, water table, corner boards, number of lineal feet of main, gable, dormer and porch cornice, giving number of members and width and thickness of each; then porch columns, newels, balustrade, steps, etc.

"Next we will take all inside frames, treating them similarly to outside frames, stating which are closet frames, as it is customary to figure one set of finish to match general finish, of course, and one set plain finish.

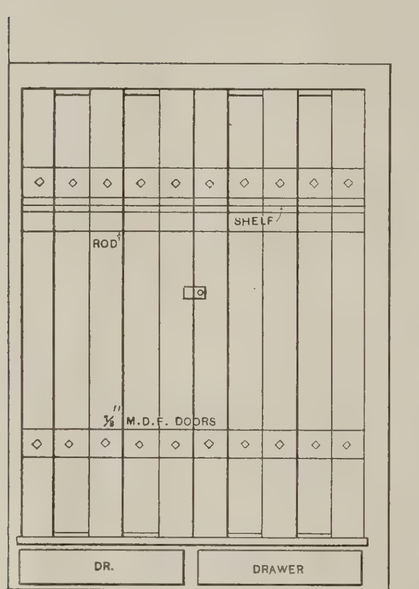
"Now we are ready for other interior finish, such as base, chair rail, picture mould, etc. I have found nothing more expedient and accurate for taking off these items than a small rota-meter, which may be purchased from any reliable dealer in architects' supplies for a small amount, and will pay for itself in a very short time.

"All stairs are generally figured and gotten out by a regular stair shop or factory; I will not mention them further at present, but may at some future time.

"Care must be taken to get all that both plans and specifications call for, such as outside steps, lattice panels, plate rail for dining room, corner beads for exposed plaster corners, sink trim, medicine cabinets, etc. These small items are the ones mostly overlooked or forgotten, and if you happen to be making up an estimate on the work, and leave out a few small items, and finally land the job, you will find that your profit will suffer.

"One of the most aggravating and trying experiences for the man that prices the items, and also for the mill superintendent, is to find that whoever took off the items failed to specify the kind of wood to be used, sometimes even omitting the thickness of doors, sash, etc., all due to carelessness.

"To make a success of this work a man must needs be an architectural draughtsman, or at least be familiar with the scale rule and have some idea of what the building will look like when completed, for if you can't read plans you may get lost."



Elevation of Wardrobe.—Scale, ⅜ In. to the Ft.

Elevation and Section of Kitchen Cabinet.—Scale, ⅜ In. to the Ft.

Miscellaneous Constructive Details of a Bungalow for the Lakeside.

A rather novel feature in connection with a handsome residence which has just been completed for a physician in the city of St. Louis, and which also contains his offices, is a fireproof and noiseproof garage in the basement. The garage is approached by a slight incline from an alley in the rear of the dwelling. This arrangement obviates the expense of a separate building for the physician's automobile and enables him to enter and leave his house without being subjected to the inclemency of the weather. The garage is isolated by a brick wall and a fireproof ceiling, the gasoline being stored in an underground tank in the rear of the house.

ECONOMICAL CONCRETE FIREPROOFING

BY OWEN B. MAGINNIS.

THE patent forms of concrete fireproofing construction have become so numerous at the present day that it seems scarcely possible to mention anything about the subject without great danger of repeating what has already gone before, yet there are many details which can be put to practical use if only they are properly understood and applied. The usual ingredients used in connection with reinforced concrete might be contained in the following schedule of proportions of mixture, depending upon the nature of the reinforcing materials—whether twisted bar steel, flat bar, expanded metal or wire mesh arch, and any builder can use them advantageously in connection with the sketches presented herewith, although it will prove the part of wisdom to first inquire into the tested and approved systems:

THE PROPORTIONS OF MIXTURES.

Portland Cement.	Sand.	Cinders.
1	2	5
1	2	7
1	4	6
1	2½	5 slag.
1	0	4½
1	2	5 small stone.

FOR BRICK OR TILE ARCHES.

Portland Cement.	Sand.	Cinders.
1	2	10 ashes
1	2	5 stone.
Top dressing 1	3	..

All of the above is for a working load of from 75 to 150 lb. to the square foot. It will be noticed that the average proportion of 1, 2 and 5 is usually adopted in connection with small spans like that shown in Fig. 1 of the sketches.

Reinforcing may be done by spacing and inserting the bars at right angles to each other or diagonal to the perpendicular surface of the webs of the beams after the centers have been set and a layer of about 3 in. of concrete laid and rammed. These centers may be of inch spruce boards and constructed after the manner illustrated in Fig. 2, although any intelligent carpenter by means of ⅞-in. cleats and 2 x 2 in. or 2 x 4 in. strips can put together from a scale, plan or sectional detail of a fireproof floor a good, reliable system of centering, so that we can safely leave this part of the work to him to carry out according to his best judgment. We would, however, suggest that he bear in mind the fact that these centers must be strongly put together, thoroughly nailed and fully capable of carrying the men and materials which will be placed upon them, also to withstand the tamping strain which will be applied when ramming down the concrete. This with the movement of the men and the weights will demand absolutely certain centering.

These remarks apply to all centers without exception, and in architectural and engineering construction.

As to the mixing of the materials, it is to be said that they should be of the best quality, the cement tested, the sand good, sharp and clean, and the cinders, coarse, free from clinkers, angular and gritty. The mixture should be measured in stated proportions or quantities by means of pails or barrels in a mass on a platform, wetted, shoveled, turned and mixed until it is of a

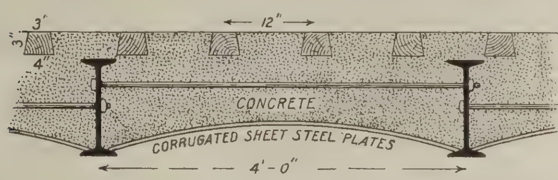


Fig. 1.—Floor Construction of Short Span.

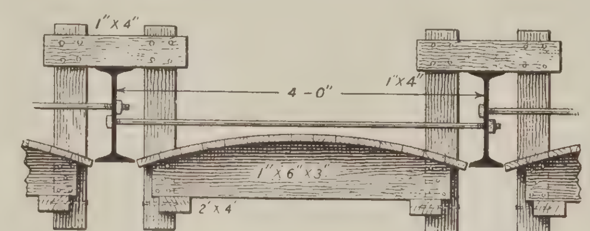


Fig. 2.—"Center" for Floor Span, Shown in Previous Figure.

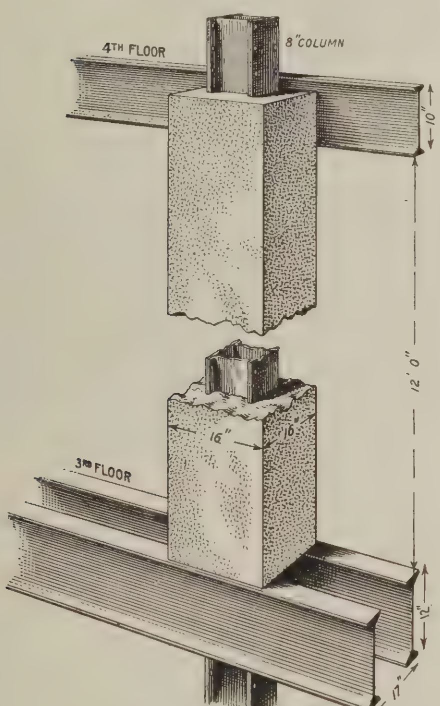


Fig. 4.—A Steel Column Protected by a 4-In. Coating of Concrete.

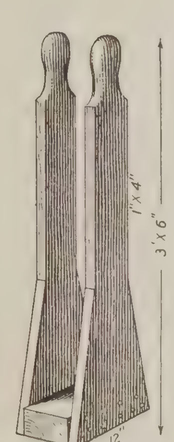


Fig. 3.—Style of "Tamper" Used.

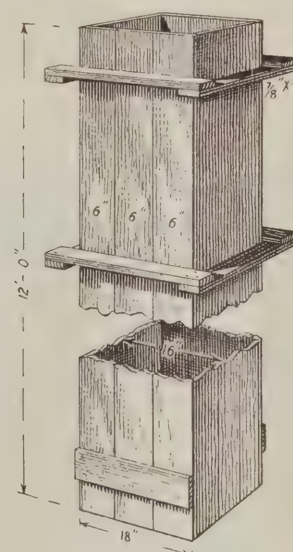


Fig. 5.—View of Wooden "Form" Used in Concreting a Steel Column.

Economical Concrete Fireproofing.—By Owen B. Maginnis.

spongy consistency. It should then be dumped into place from hods or pails, properly spread in layers and tamped with a broad tamper, such as that illustrated in Fig. 3, which in its simplicity practically explains itself. The block is better of oak or ash, but cinder concrete does not need much pounding, so that the tamper shown will give sufficient impact to bring the mass to settle and distribute solidity.

A very excellent concrete can be made of gravel, both for footings and arch centers, as well as for floor fillings, and is a source of great economy when sand and gravel are found on the building site during the process of excavating; but clay must be debarred, as it is lacking in cohesive quality.

The mention of gravel leads up to a consideration of the fireproofing of vertical members, and here we take up the use of what might be called, to coin a new technical term, "Fluent concrete" in contradistinction to the old-established stiff mass of broken stone or ashes. We class Fluent concrete as a liquid—opposed to a solid and similar to grout in mortar.

Its ingredients are cement, sand and small gravel or pebbles, ranging from ⅛ to ½ in. average diameter. The mixing proportions are on an average 1:2:5, being liquid before setting and hardening. It can only be built up with the use of molds or boxes to retain it in place until solid.

These boxes or forms must follow in their sectional area the shape of the members to be built, such as walls, piers, etc., and show the construction now prevalent and in accordance with the practice when the steel framing is the core and bearing part of either a brick or concrete wall. To illustrate this refer to Fig. 4, where will be seen one of the columns protected with its casing of concrete. The problem for the builder is to fireproof a number of interior columns with concrete in a square casing so as to form a protection against fire. This is done by means of 4 in. of concrete placed about the column as shown.

It has been said that wooden molds are necessary, so in Fig. 5 we present a sketch illustrating the usual practice. The molds are of course built by carpenters and in order to be detachable and readily portable, so that they may be easily carried from one part of the work to another, the parts are light and easily handled. The form shown in Fig. 5 is built of 1-in. stuff bolted together in four sections. It is usual to pour the concrete into the molds from the floor above, in order that the mass may be properly united. It is puddled by workmen with long ⅝-in. iron rods, so as to guard against the possibility of the formation of air holes, yet in spite of this these often occur.

It is usual to attach all anchors for marble and stone to the columns, girders, etc., and allow the concrete to form itself around these. Fluent concrete is adaptable to all shapes, but on account of its fragibility is unfit for moldings. To offset this defect plastering or stucco must be used instead.

In connection with these remarks on a detail now a part of one of our national forms of building construction, it may be said that the subject is so varied and so extensively treated as to warrant one interested in a practical way to be constantly on the *qui vive* for any work new or worthy of repetition.

It may not be without interest also to mention that the general scheme outlined in these remarks is that used in fireproofing the interior columns of the new 12-story and basement Belvedere Building now nearing completion at the corner of Eighteenth street and Fourth avenue, New York City.

Now a word as to the behavior of concrete in upper walls, which are always subjected to variations of climatic conditions, the remarks being based upon the results of practical observation and experience. It cannot be gainsaid that concrete is porous; that by reason of its voids, its interstices and its absorbent nature it draws into its composition whatever is predominant in the atmosphere, such as heat, cold, frost, dampness, and even electricity. It therefore becomes necessary on the part of the constructor to safeguard the mass against any possible deterrent effects or injuries which may possibly occur through the course of time.

Let us quote a probable example. In a large institution building recently constructed the architect found after the structure had been closed in and roofed over that after a spell of wet weather it became very damp when the steam heat was turned on. He reasoned, and rightly too, that it was caused by the radiant action of the heat drawing the moisture through between the porous composite particles of the wall. To offset this the interior surfaces were coated with layers of tar and antihydrine, but even this was found to be so insufficient for the purpose that the walls were finally furred on the inside with 2 x 4-in. strips and then sheathed with metal lath before plastering. This arrangement afforded a chance for the walls to sweat and the condensed moisture to trickle without marring the plaster.

As a general proposition, therefore, it may be stated that concrete walls are best formed with a space or spaces between the inside and outside, or rather of two or more vertical thicknesses anchored together by reinforcement or by tying with strips of steel or iron rods. This gives air spaces which are of undoubted advantage in construction of this kind.

Finally, it is to be said that cement, clay and lime building materials are possessed of the quality of porosity or having absorbative powers to a greater or lesser degree, as in the case of bricks, sand, limestone, etc., and therefore some antidote as a liquid or some preventive in method of construction must be adopted and applied to insure and maintain the permanent integrity and safety of all walls. Though the health of the people residing or working in buildings is scarcely within the province of the actual builder and mechanic —being more that of the architect or doctor—still, as the former looks after the execution of the work, it can scarcely be said to be entirely outside his care and responsibility. He should therefore take all such things into consideration and execute the work in a way to give satisfactory results to all concerned.

Novel Method of Deadening Sound

A rather novel method of deadening to the occupants of an eight-story apartment hotel in West Fifty-ninth street, Manhattan, N. Y., the noises made by printing presses in an establishment adjoining the building has been devised by the architects who were called in to solve the problem. The architects proposed to smother the noises by erecting two masonry fences in front of the printing-house windows extending to the third and fourth stories, the fence to be built of a double wall of porous terra-cotta blocks, filled in with mineral wool and faced with Portland cement. It is well known that mineral wool is an admirable non-conductor of sound and it is thought that this expedient will result in accomplishing what is desired in the way of lessening, if not altogether preventing, the sounds penetrating to the apartment house.

THE SPREAD of the fireproof idea in connection with dwellings of moderate cost is further exemplified by the recent award of a contract for the erection of ten houses at Manhasset, on the north shore of Long Island, N. Y. Hollow terra-cotta tile is to be used as the structural material for the outside walls, and in many cases of the floor and partitions as well. The idea is to have the houses completed next spring, and if this type of construction proves satisfactory in that section to erect about 100 more houses.

SCAFFOLDING OF THE CAMPANILE AT VENICE

BY A. G. H. THATCHER.

THE collapse of the Campanile in 1902 was due to the disintegration of the structure and not to the failure of the foundations, as at first thought. After its destruction the footings were examined and the outer piles were renewed, otherwise there has proved to be no necessity to interfere with the work of the original builders.

Scaffolding of the Campanile at Venice. Fig. 1.—General View of the Structure as It Appears at Present.

It is now being built to its original design and therefore in that respect needs no comment. The building has had an eventful history, but apart from any antiquarian point of view it may perhaps be worth noticing that on two occasions it has been the subject of the ingenuity of the Italian engineers, in that on both occasions a new type of scaffolding has been evolved. Reference is made to some considerable repairs rendered necessary by impairment by lightning in 1745 and the present re-erection. On the first of these occasions some records of the time state that the repairs were undertaken by means of a hanging scaffold cunningly raised and lowered by a windlass. A pen-and-wash drawing by Canaletto, now to be seen in Windsor Castle, shows the arrangement with a considerable amount of detail.

The records before mentioned refer to this scaffolding as being invented for the purpose, and it is probably the first example of what is now known as a painter's boat or cradle. The Italian engineers must have a special aptitude for designing scaffolding, in that they have in the present re-erection devised a system to carry out the work, which, so far as the writer was aware, has no parallel. Fig. 1 is a general view of the structure as it exists at present and deserves being described in detail.

When a hight of about 40 ft. was reached a framework to carry a platform was built entirely round the tower. Figs. 3 and 4 represent a section and portion of front elevation of this framework. A reference to the half-tone view, Fig. 1, will show that a series of small window openings is built in the walls for lighting purposes. They are arranged to show a light on each landing, so that they exist on each facade. This afforded the engineers an opportunity of which they readily availed themselves. When it became necessary to raise the platform, lengths of channel iron in duplicate to form an H stanchion were bolted to the lower beams of each side of the frame, so that they would hang vertically over each series of window openings, and by these the framework was raised. Additional lengths of channel iron were added as the scaffold was worked up and to keep these stiff, collars were fixed in each window to clip the irons. This is shown in Figs. 5 and 6.

The lifting arrangement is shown on Fig. 7. Beams carried through the walls as cantilevers formed the required support and carried iron bases from which the purchasing power could be gained. Each iron base or bed was perforated in its center, so that a steel screw rod of about 20 ft. in length could be passed through it. The perforation was not at right angles to the bed, but slightly inclined, so that the lowest end of the rod approached the iron-supporting stanchion, and to this it was strapped and bolted. On the iron bed a hollow steel barrel with a female thread was placed and received the steel screw rod. As shown in the diagram the stanchion could then be forced upwards by means of capstan bars turning the steel barrel. The rate of progress was slow, about 10 ft. in two hours. Two men were required to each handle during the operation, the platform and its supports on which they worked being shown in Fig. 2. The slow movement had its advantages, in that there was a less likelihood of an uneven rise in the framework above.

Fig. 2.—Platform and Its Supports from which Men Operating the Capstans Worked.

For the purpose of erecting square towers this system of scaffolding has many advantages. Ordinary pole scaffolding will not stand above a certain hight with safety, it then requiring a new base, and the same may be said even if square timbers are used, with the exception that the possible hight is greater. This difficulty was met with in erecting the tower for the new cathedral in London. The scaffolding there was erected internally and showed a tendency to buckle when about half the ultimate hight was reached, necessitating a fresh base of timbers laid from wall to wall.

With the Campanile erection, the pointing and cleaning down can be carried out by bringing the framework in Fig. 1. The materials, bricks, etc., were hauled up the interior of the structure.

For the safeguarding of the workmen a guard rail was fixed as shown in Fig. 4, and this was increased in value by the use of netting, which completely enveloped the whole of the scaffolding on the outside.

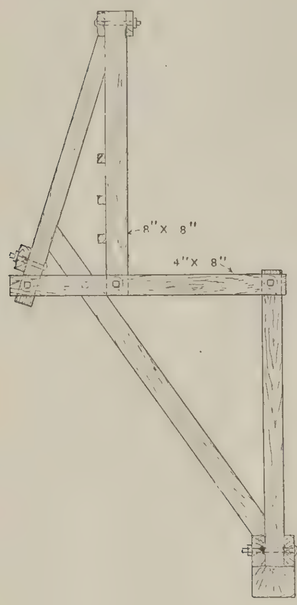


Fig. 3.—Side View of Framework Carrying the Platform.

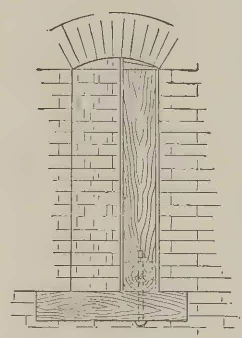


Fig. 5.—Elevation of the Clip as Viewed from the Interior.

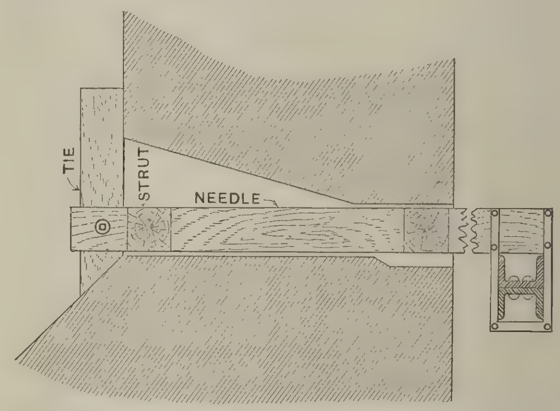


Fig. 6.—Horizontal Section, Showing Plan of Clip Through Window.

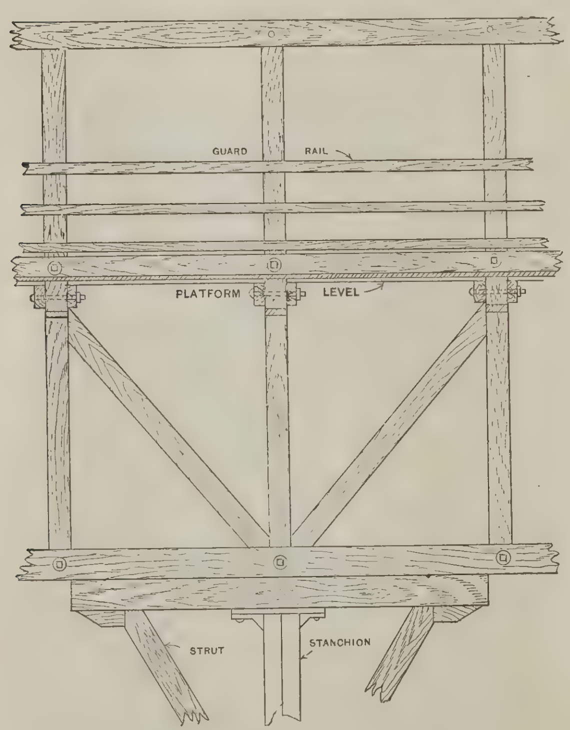


Fig. 4.—Front Elevation of Platform Frame Work.

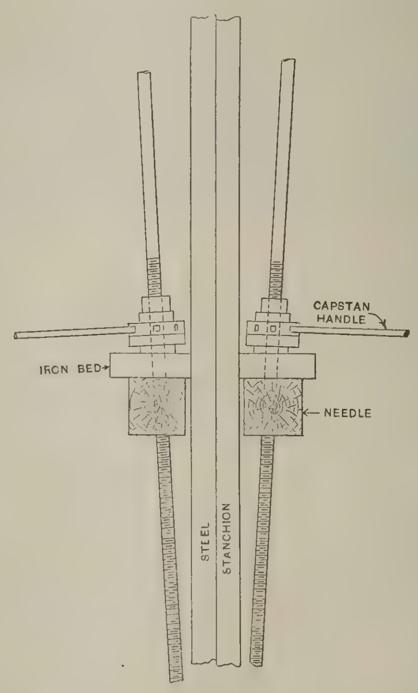


Fig. 7.—Details of Capstans for Lifting the Scaffold.

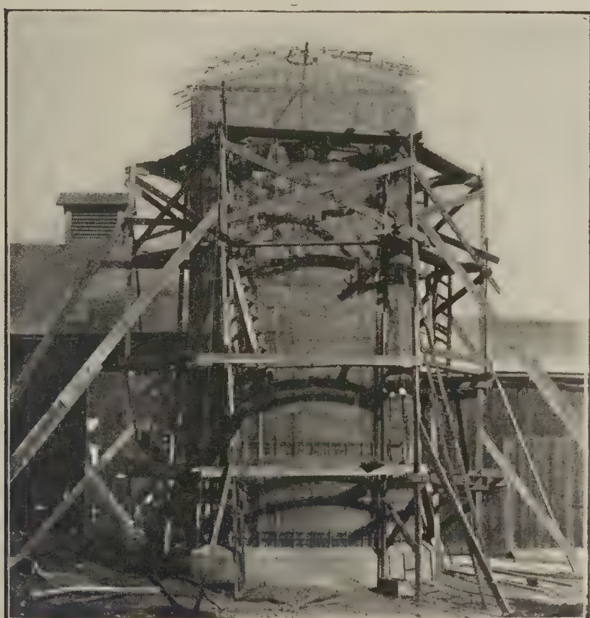
Rebuilding of the Campanile at Venice.

down in the opposite manner from which it was raised, so that it is difficult to see any real disadvantage to its use. Being of a more scientific nature than ordinary scaffolding, the knowledge of an engineer would be required to ascertain the proper strength needed in the materials used, also that the structure would maintain its rigidity. In this particular instance, the margin of strength is such that the higher portions of the building are to be erected by means of more ordinary scaffolding, which will stand upon the framework as it now exists, supplemented by booms laid across the building as seen

A most interesting piece of work has recently been completed in connection with the construction of the Cathedral of St. John the Divine, which has been under way on Cathedral Heights, New York City, for the last 15 years. The openings under the four great arches have been enclosed by temporary concrete walls and the latter have been crowned by a dome constructed of thin tiles. The latter in turn have been covered with layers of black waterproof roofing felt and plastic cement. The dome is constructed entirely of 6-in. brick tiles 1 in. thick and 15 to 18 in. long, according to the Guastavino system. The space beneath this dome called the "Crossing" and measuring 122 x 122 ft. is now available for use as a temporary place of worship. The "Crossing," however, is but the central space from which the cathedral will develop, one arm after another being provided until the entire structure is complete.

A STEEL FRAME CONCRETE SILO

A MOST interesting example of the application of reinforced concrete work to silo construction is found on the farm of A. O. Fox, at Oregon, Wis., where a building of this nature was recently erected. In this case the silo consists of a framework of galvanized steel studs or channels 2½ in. wide, which are made from soft steel hoop-basic stock and spaced 12 in. apart. The studs have an interlocking tongue cut out of the center of each upright piece, the tongue being thrown out at right angles and attached to the next



A Steel Frame Concrete Silo. Fig. 1.—Steel Frame Work of Silo with Scaffolding in Place for Applying the Cement Mortar.

stud, thus forming a horizontal line of reinforcement around the entire circumference of the silo wall every 17 in. of its hight. Upon this framework of steel is securely wired on each side galvanized expanded metal lath, which also furnishes an additional reinforcement.

An idea of the appearance of the steel framework when in place and after a portion of it has been covered with plaster is shown in Fig. 1 of the accompanying illustrations. In building the silo the metal lath was plastered inside and out with Universal Portland cement mortar, thus producing hollow walls of concrete, with a continuous air space from top to bottom. The steel framework was put up complete in three days, an additional day being required to put on the roof. The plastering was done in four days, and the silo was filled on the fifth day after its completion. It is stated that only 12 days elapsed from the time work on the silo was started until it was filled with silage.

Precaution was taken against the action of the acid juices of the silage upon the steel by using only galvanized metal and also by waterproofing the cement. The walls of the silo being hollow tend to maintain an even temperature in hot or cold weather, while the air space being continuous and the ventilators in the walls opened or closed at will, the ventilation is under control at all times.

It is a well-known fact that steel and concrete will expand and contract at approximately the same rate, so that the walls of the silo as constructed will not be affected by the heat caused by the fermentation of the silage.

The steel is firmly anchored at the base of the walls in the following manner: A shoe is turned on each stud, which is embedded in the concrete; in addition the steel studs themselves are embedded in solid concrete above the base line of the interlocking tongues, thus giving a firm anchorage, so that the danger of the silo being blown over by the wind is entirely eliminated.

The roof is of the same type of construction as the silo walls, and the air space is continued between the walls of the lath in the same manner as in the silo proper. Fig. 2 of the illustrations shows the silo with its exterior coating of plaster nearly finished.

The doors of the silo are of wood lined with felt, and the door openings are framed of neat cement.

The silo was erected without the use of wooden "forms" and is so constructed on account of the steel reinforcement as to require a minimum amount of concrete.

The new silo here illustrated and described was recently erected by the Sharon Steel Hoop Company, Commercial National Bank Building, Chicago, Ill., and with plant at Sharon, Pa.

A New Building Record

The attempt on the part of the contractors erecting the steel framework of the 12-story Gimbel department-store building at Sixth avenue and Thirty-second and Thirty-third streets, New York City, has been successful. The last piece of steel was set on December 10 and the Thompson-Starrett Company established the record of having erected 11,000 tons of structural material in a trifle over 400 hours.

The remainder of the work of construction is being rushed with equal speed, and the largest task ever undertaken in setting tile arches was accomplished on the date named, when 170 loads of fireproof tile were delivered and set before the close of the day. Heretofore the handling of 115 loads of tile arch in one day has been considered a record, but this has now been considerably exceeded, and it is thought that it will not be long before the company will have its capacity tested to the extent of 200 loads daily.

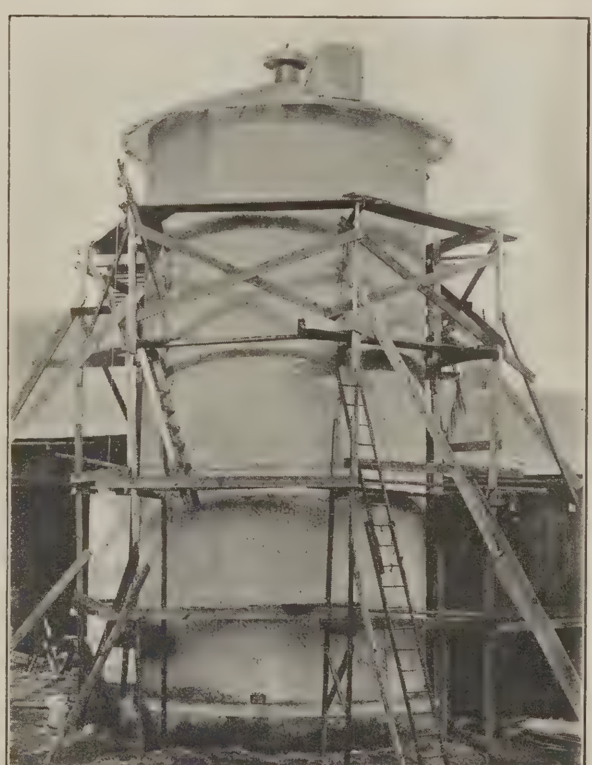


Fig. 2.—Showing the Silo with Exterior Coating Nearly Finished.

The Building Age

formerly Carpentry and Building

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FEBRUARY, 1910

The Year's Building Operations

There are so many branches of trade dependent for their activity upon the state of affairs existing in the building industry that a fair idea of the general prosperity of the country may often be gained from a consideration of the volume of building operations in a given period. Figures available from leading centers show that the value of the building improvements for which permits were issued last year in the United States was a trifle more than 40 per cent. in excess of that for the year before and that in only a very few cities was a decrease recorded. It is significant to note that among the cities showing an increase only three report less than 10 per cent. gain, while some run over 200 per cent. ahead of 1908. The total figures for fifty cities last year were $719,189,175 and for 1908 the total was $506,386,000, thus showing a degree of activity in the twelve months which have just passed closely approximating any similar previous period. Locally the Boroughs of Manhattan, the Bronx and Queens report for last year the largest number of plans filed in their history, but Brooklyn is about 20 million dollars behind its banner year of 1905. In Manhattan alone plans were filed for 995 new buildings representing a capital investment of $131,246,483, and there were 3578 permits for alterations, additions and repairs calling for an estimated outlay of $13,085,729, or a grand total for the year of $144,332,212 as against 3489 permits for improvements costing $95,516,127 in the twelve months of 1908. In the boom year of 1905 there were 2572 new buildings projected representing a capital investment of $124,746,552, to which may be added 4469 permits for alterations costing $14,105,720, giving a grand total of $138,852,272. In the Borough of the Bronx the total estimated value of the building improvements for which permits were issued last year was $41,715,265, as compared with $39,828,866 the year before. In Brooklyn there were 17,268 permits issued for building improvements estimated to cost $64,779,564, of which 10,305 permits were for new structures costing $60,130,476. In the twelve months of 1908 there were 14,289 permits issued for new buildings and alterations costing $46,348,695. In the Borough of Queens the rapid growth of activity is seen in the 4657 permits issued by the Bureau of Buildings, calling for an estimated outlay of $21,348,713, the bulk of the operations having been in Newtown and Jamaica.

Classification of Buildings

In classifying the improvements for which permits were filed, it is found that the majority of the important new buildings on the island of Manhattan during the past year were apartment houses from seven to twelve stories in hight, while in the Bronx the greatest proportionate investment was in tenement buildings, or flat houses as they are more commonly called, representing an estimated outlay of something over 25 million dollars, and in Brooklyn small private dwellings and two-family houses were the prevailing types of construction. Of new apartment and flat houses, plans for 459 were filed in Manhattan to cost $70,041,000, against 210 buildings to cost $25,925,500 in the twelve months of 1908. The most costly apartment house was the $1,500,000 structure planned for erection in the Morningside district, and the most notable from the standpoint of public benefit was the group of four "model tenements" to be erected on Seventy-seventh and Seventy-eighth streets, adjoining the new John Jay Park. Plans were filed for 220 store and loft buildings costing $30,086,450; that of chief importance in point of capital investment being the $4,000,000 department store in Greeley square and in connection with which a record was made in the erection of structural iron work. A slight falling off last year in office building construction is to be noted, plans having been filed for 34 to cost $12,656,750, while in 1908 plans were filed for 46 to cost $34,980,050. Of workshops 25 were planned to cost $1,557,000, as against 21 to cost $1,022,150 in 1908, while of churches there were 10 planned last year to cost $1,110,000, against nine the year before to cost $710,000. The projected theatre construction of last year was somewhat exceptional by reason of the growing tendency to make new play houses annexes to big office buildings, thus increasing their utility and revenue-earning capacity. There were 27 theatres planned to cost $4,306,671, while in 1908 there were 19 for which permits were issued estimated to cost $1,933,000. A larger amount was invested in private dwellings than has lately been the case in any one year, the figures for 1909 being 55 permits calling for an outlay of $3,249,382, as against 36 permits for dwellings to cost $1,368,900 in the twelve months of 1908.

Demolition of Old Buildings in New York

Probably in no other city of the country has the demolition of old buildings to make way for larger and more modern structures been carried to a greater extent than in the Metropolis of the East during the past few years. The steady growth of population combined with the increasing necessities of business have called for more and more commodious and up-to-date buildings designed to meet the exacting conditions of the present day. One potent factor in this equation of demolition has been the increasing value of the land occupied by the older buildings, thus compelling their replacement by modern structures, which would produce more adequate returns on the property. While many of the thousands of new buildings erected in recent years in New York City have been put up on vacant lots, probably more than half the new structures have replaced buildings that were serving a good purpose, yet were too small to be profitable on the sites which they occupied. According to the statistician of the Bureau of Buildings for the Borough of Manhattan there were 1127 buildings demolished last year to make room for new construction, while 704 buildings were commenced and 665 were completed. It must be borne in mind, however, that in many cases a single operation covered several buildings, especially if they were dwelling houses or flats, so that the buildings "commenced" and "completed" would be represented by somewhat larger figures than those given above. For example, in one case 27 buildings were torn down to make way for two mammoth commercial structures. During the last seven years there were something like 11,176 buildings demolished and 9267 completed. The buildings torn down are not always very old, as some are of comparatively recent erection, and it is now rumored that a 19-story steel skeleton-frame office building in the financial district is soon to be demolished to make room for a still larger building, which will cover a more extended site.

Convention of Northwestern Cement Products Association

By reason of a combination of circumstances, including the serious illness of President Martin T. Roche and the resignation of Secretary A. E. Pfiffner, arrangements for holding the sixth annual convention and cement show of the Northwestern Cement Products Association in the Auditorium in the city of St. Paul on March 1 to 5 inclusive, have been abandoned and the offer made by the Cement Products Exhibition Company to hold the convention in conjunction with the big Cement Show at the Colisseum in Chicago has been accepted.

The sessions of the convention will be held on February 18, 19, 20 and 21, at the Great Northern Hotel in Chicago. A committee consisting of L. V. Thayer and E. S. Macgown, of Minneapolis, has been appointed to arrange for the program; another consisting of O. U. Miracle, Minneapolis, and D. L. Bell, of St. Paul, has been appointed to notify the Mayor of the city and the commercial bodies of St. Paul of the action of the committee in transferring the convention to Chicago; while a committee made up of E. H. Cobb, W. C. Berry and E. H. Bassett, of Minneapolis, has been appointed to notify the members of the association of the change of its place of meeting.

Our Supplemental Plates

We have taken for the basis of our half-tone supplemental plates this month exterior and interior views of the country house of a New York architect, and of the reinforced concrete church recently erected in the upper section of the Metropolis, a somewhat extended description appearing in another part of this issue.

The residence located at Lawrence, L. I., is that of William Adams, of the architectural firm of Adams & Warren, 20 West Thirty-fourth street, New York City, and was designed by him. The upper picture represents a view of the completed structure with its attractive surroundings, while the lower picture represents an interior of the living room, a careful study of which cannot fail to be of suggestive value to the architect, the builder and the interior decorator.

The architects of the reinforced concrete church are Thomas H. Pool & Co., 13 West Thirtieth street, New York City.

Newark's New Technical High School

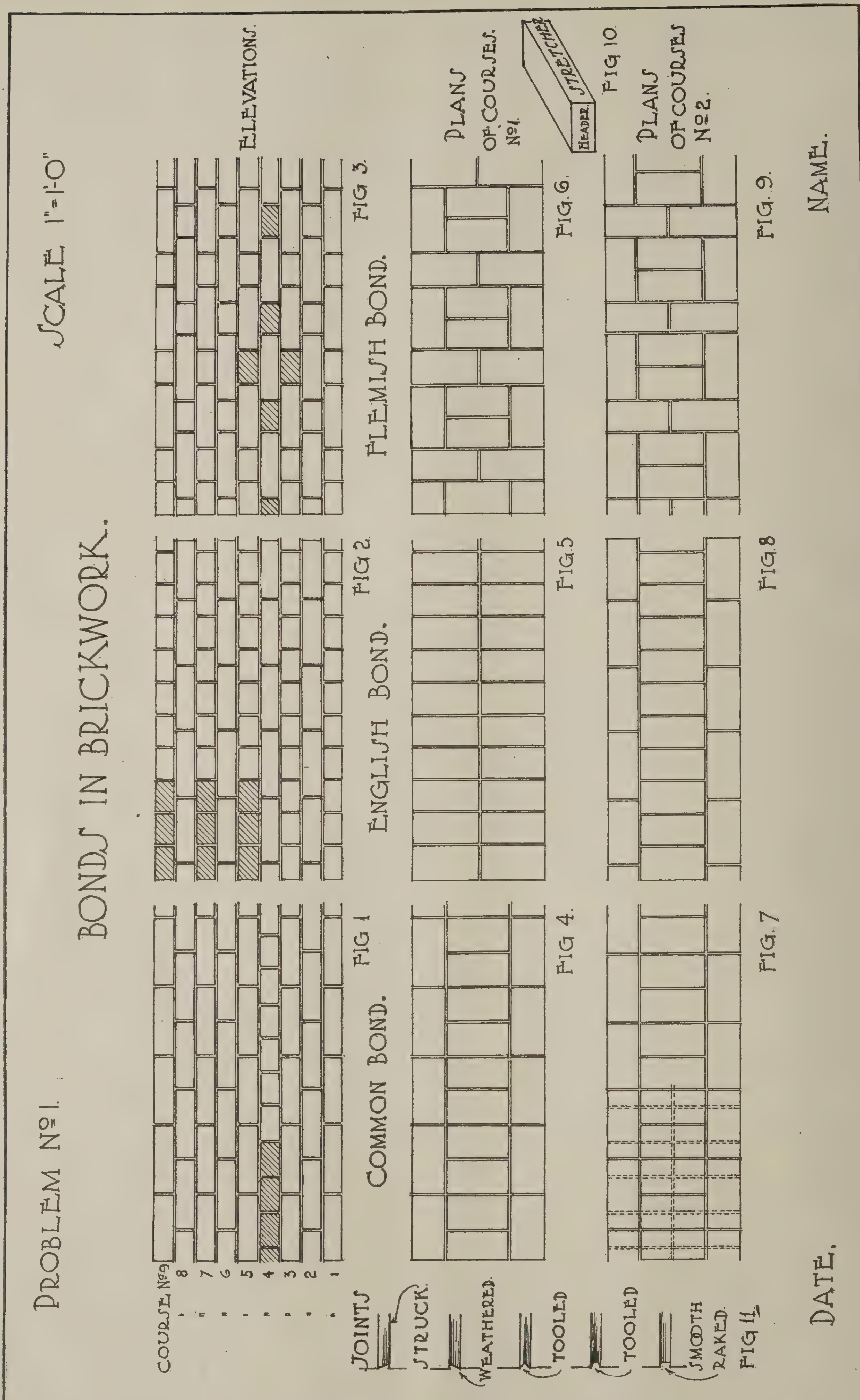
The new Central Manual Training and Commercial High School building, which it is proposed to erect on High street, Newark, N. J., will probably be, when completed, the finest building of its kind in the State, viewed from the standpoint of architectural beauty and completeness of adaptation and equipment. It will be constructed of red brick, with trimmings of terra cotta and granite; will be in the English Gothic style of architecture and will be four stories in hight, fireproof throughout. According to the plans of School Architect F. Guilbert, one of the most attractive features will be the main auditorium, which will occupy a hight of two stories and will have a capacity for seating 1000 people. The stage of the auditorium will be 37 ft. wide and 17 ft. deep, with a proscenium arch 24 ft. high. The auditorium, as well as the two upper stories, will be lighted by means of a huge skylight in the roof, 70 x 63 ft. in size.

There will be class rooms on the first, second and third floors, while a large portion of the fourth floor will be devoted to the uses of the Board of Education. On the first floor will be the wood turning and finishing shops, the pattern shop, the masonry, carpentry and sheet metal departments, in connection with which there will be a spacious library. On the second floor will be additional class rooms, together with departments of business training, typewriting, chemical laboratory, lecture room, etc. On the third floor will be laboratories, machine drawing room, kitchens, laundry department and model rooms for the department of domestic economy.

It is stated that the cost of the building will be in the neighborhood of $600,000, and that the capacity of the school will be 1000 under normal conditions, either for day or night school, with a maximum of 1200.

The building will set back 100 ft. from the street, the first 50 ft. being taken up by a walk and steps leading to a terrace, the latter occupying the other 50 ft. of approach. The space on either side of the steps will be used as lawns. By this arrangement the cellar and basement will be brought close to the surface line. Part of the space under the terrace will be used for the gymnasium and the remaining space for the power plant, heating, ventilating, etc. The heating and ventilating system as designed by School Engineer George W. Knight provides for both direct and indirect systems, the idea being to have direct radiation with indirect ventilation.

The mammoth auditorium at Denver, Col., in which the Democratic Convention of 1908 was held, has been converted into a municipal playhouse.



Lessons in Architectural Drawing for Beginners.—Sheet three-quarter full size.

LESSONS IN ARCHITECTURAL DRAWING FOR BEGINNERS

By ALFRED AUSLANDER.

EVERY mechanic in the building trades ought in his own interest to be reasonably proficient as a draftsman, for his success as a mechanic, in a very considerable degree, depends upon his ability in drawing. With this knowledge he is certain to attain greater proficiency and to make more rapid advancement than another with equal talent, but who cannot draw or read drawings.

SOME GENERAL NOTES.

We assume that the student knows already the use of drawing instruments and scale. The following definitions of the term used in masonry, relating to Lesson No. 1, will be found useful:

Elevation.—By this word "Elevation" is meant the front view of the object where all lines appear as straight lines, in their true relation to each other—in other words, a *vertical* plan, as shown in Figs. 1, 2 and 3 of the sheet on the opposite page.

Plan.—The representation of a horizontal section of anything. By the elevation we are able to tell the hight and length of a wall, but we cannot tell the thickness of it. By the plan we can tell the thickness, but not the hight and *vice versa.*

Course.—A horizontal layer of brick or stone is called a course.

Joint.—The seam between two bricks or stones is called a joint; in a vertical direction it is called vertical or heading joint; between two courses a coursing joint.

Breaking Joints.—The vertical joints in any course should (meet) butt against the solid brick of the next course above and below.

Bond.—The particular arrangement of the stones or bricks in a wall is its bond.

Stretchers.—Bricks or stones, whose lengths (longest horizontal dimension) are in the direction of the length of a wall, are named stretchers. See drawing Fig. 1. All courses are stretchers, excepting No. 4. See also Fig. 10.

Headers.—Bricks or stones whose lengths are in the direction of the thickness of a wall are called "Headers" or "Bond." See drawing Fig. 1, course No. 4, Bond Course. Also Fig. No. 10.

Brickwork.—Bricks used in building have usually a size of 8″ x 4″ x 2″ (″ indicates inches). Brick walls can be built only of certain thicknesses. Every wall should be of the thickness of the length of a brick, the width and the length, two lengths, etc.—that is, 8″, 12″, 16″, 20″, 24″, etc. Figs. 4 to 9 show a wall 16″ thick.

Common Bond.—The common bond, also called ordinary bond, consists of a continuous row of stretchers. Every fifth, sixth or seventh course to be a header course, or between two rows of headers to be 5 to 7 courses of stretchers, Figs. 1, 4 and 7.

English Bond.—Every second course in the English bond is composed wholly of stretchers, the intermediate courses being composed entirely of headers (same as bond course in common bond), Figs. 2, 5 and 8.

Flemish Bond.—Flemish bond consists of alternate headers and stretchers in each (same) course.

The center of a header in any course is over the center of a stretcher of the courses above and below, as shown in Figs. 3, 6 and 9.

Joints.—Fig. 11 shows some of the joints used in brickwork.

1st.—Struck joint is made by drawing the end of the trowel along the joint, giving a smooth surface, which is slightly back of the upper edge of the lower brick, but flush with the lower edge of the brick above.

2d.—Weathered joint is made the same way as the struck joint, but leaving the mortar flush with the upper edge of the brick below and slightly back of the lower edge of the brick above.

3d.—Tooled joints are made by using a jointer (a tool called jointer) with an end either "V"-shaped or half rounded.

4th.—Smooth racked joint is made by drawing a piece of wood (the width of the joint) along the joint, leaving a space between the face of the mortar and the face of the brick. The joint of the trowel or a nail is sometimes used instead of a piece of wood to make this joint.

Before proceeding with the drawing the students should read the descriptive text very carefully and should be familiar with all definitions of the terms used before commencing to draw. Fig. 10 shows an isometric view of a brick, and it seems advisable that the students should draw on another sheet of paper a brick one-half of the actual size and then one-quarter, which is 3″ to one foot, and finally 1″ to the foot. By doing so he will be familiar with the terms stretcher and header. The top view of the brick is also called *"Bed."*

LAYING OUT DRAWING No. 1.

To lay out Drawing No. 1 proceed as follows: First draw a very light horizontal line on the center of the sheet (this line we will call "H" for convenience), then a very light line perpendicular (vertical) to the line already drawn also on the center of the sheet (this line we will call "V" for convenience).

Use a T-square for all horizontal lines and triangles for all vertical lines.

First.—Measure off 5″ above and below line "H" and draw lines through these fronts parallel to "H." Measure off 7″ right and left of the center line "V" and draw lines parallel to this line. We will have now a rectangle 10″ x 14″. This rectangle will be called margin or border line. Cut off paper ½″ from margin line all around, so that size of finished sheet will be 11″ x 15″. All drawings must be laid out in pencil first, very accurate and clean, and afterwards gone over with ink.

Second.—Measure off 1½″ from right, left and upper border line and 1¾ from lower margin line, draw light lines through these points. This rectangle will represent the outer lines of the drawing, as shown in Fig. 1 to 9. All figures are to be drawn to a scale 1″ to the foot. All spaces are actual dimensions.

Draw a horizontal line 16″ (1″ = 1′ 0″) from the bottom line of the inside rectangle. This will give the thickness of walls for Figs. 7, 8 and 9. Leave one inch (actual size) space above this line and a wall 16″ (1″ = 1′ 0″) thick for Figs. 4, 5 and 6. Lay off nine courses of brick beginning at left corner from upper line of inside rectangle down. Each course of brick to be 2½″ thick, including thickness of joints. Draw lines through these points reaching from left to right vertical line of inside rectangle for Figs. 1, 2 and 3. Lay off 1⅝″ right and left from vertical central line, then 1⅞″ from the same line right and left and draw vertical lines through these points. This will divide inside rectangle in nine spaces for Figs. 1 to 9. Having done this the student should start Fig. 4 (common bond), laying off headers 8″ apart, etc. Then start with Fig. 7, also laying off headers 8″ apart, but so that joints of Fig. 7 come exactly on center of brick of Fig. 4. Having done this, project these lines from the plan to the elevation. This will indicate the joints of the brick.

It will be noted that all joints in the accompanying drawing are made by double lines. The student, however, may indicate the joints by single lines.

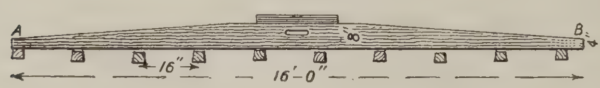
The student should proceed the same way in laying out Figs. 2, 5 and 8 for the English, and 3, 6 and 9 for the Flemish Bond.

The drawing will not be considered finished unless all titles, headings and dimensions are lettered in a neat type. He should always draw two light pencil lines and see that all letters occupy the full space between the two lines.

CORRESPONDENCE

Leveling up Beams or Sleepers

From O. B. M., New York City.—A quick method of leveling up a series of beams or sleepers is to take a straight-edge and set it on the two farthest apart within the length of the straight-edge. On top of this place a level as shown and true up the two end sleepers as at A and B. Then work from end to end at spaces, say, about 6 ft. apart, raising or lowering those between



Leveling Up Beams or Sleepers.

until their top sides touch the bottom edge of the straight-edge, thus bringing them all level and saving the necessity of applying the level to each particular one.

Questions Regarding Details of Stair Construction

From P. F. E., Pennsylvania.—I have been a reader of and subscriber to *Carpentry and Building* for something like nine or ten years, and I now come to the practical readers of the Correspendence columns for an expression of opinion regarding certain details of stair construction. Possibly Morris Williams, whose articles on the subject have been running through recent issues of the paper, would be willing to comment upon the questions which I shall raise.

Would it be poor taste to use a plain square baluster 1⅜ x 1⅜ in. in cross section by 20 in. in length set on a foot rail with a starting newel consisting of a plain square shaft and the string board paneled under the foot rail? The stairs are of red oak, with a landing platform on the fifth riser. I would say that the main or starting newel will have a square top 2½ x 6 x 6 in.

Usually a turned baluster is used, but why should we always stick to one style?

Changing the Name of "Carpentry and Building"

From Morris Williams, Pennsylvania.—I have been a constant reader of *Carpentry and Building* for 25 years and may say that no one issue ever came to my notice that did not contain some valuable information adding constantly to my knowledge, not only of carpentry and its complements, but also of all the other branches of building construction. Based on the benefits I have personally derived from a perusal of its pages, I am fully convinced that no other distributing medium can in any way be considered as approaching it in merit and helpful value to all mechanics engaged in the building trades.

Its superiority is notably observed in the appropriate selection of subjects for each issue and especially in the masterly manner in which the various matters are handled by the editorial staff, which guarantees the presentation of each subject treated by the numerous correspondents in the best possible manner.

We have all experienced the annoyances caused by unintelligible diagrams and misplaced, if not altogether omitted, reference letters in other trade papers as well as in many books. We must, however, all admit that in this respect *Carpentry and Building* has been as blameless as it is possible for a trade paper to be. In all the issues of the volume for 1909 I fail to find one misplacement of a reference letter, which fact enabled me to follow the explanations of the various writers with ease and pleasure, while in perusing other papers I have had occasion to throw them aside after hopelessly failing to follow the writers, owing to such defects, and losing thereby valuable information that might have been mine if it had been properly presented.

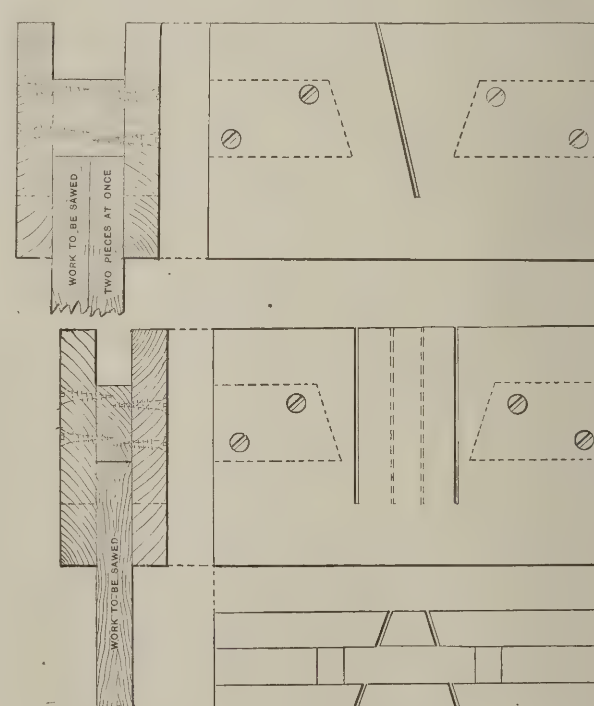
I am well pleased to learn that the change of name from *Carpentry and Building* to *The Building Age* will not materially change the nature of the paper's contents. We are not going to lose *Carpentry and Building,* but rather to have it included in *The Building Age,* thus adding to the variety of the subject matter, or, as Mr. Spencer would say, "A change from the homogeneity to the heterogeneity" along the lines of the universal law of evolution. This age and this country are specifically conspicuous in such a change, as is evident in the present extensive manipulation of steel and concrete in building construction.

In view of what will be supplied to us as readers of *The Building Age,* our duty and pleasure should be to make an intelligent study of its columns, for by so doing advancement of each one of us will be assured.

Mitre Boxes for Dovetailing

From W. R. V., Lakeport, N. H.—I am sending herewith sketches of mitre boxes for dovetailing, which may possibly prove interesting to some of the many readers of this department of the paper. I find that with the aid of these boxes when properly constructed dovetailing is greatly simplified and requires only about half the time to do better work than would otherwise be the case.

The boxes shown must be made to suit a small sized



Mitre Boxes for Dovetailing.

back saw, the back of the saw acting as a depth gauge, so as to render it impossible to cut too deep. The dovetails need not be marked out on the sides of the work, but simply spaced on the end and the box will do the rest.

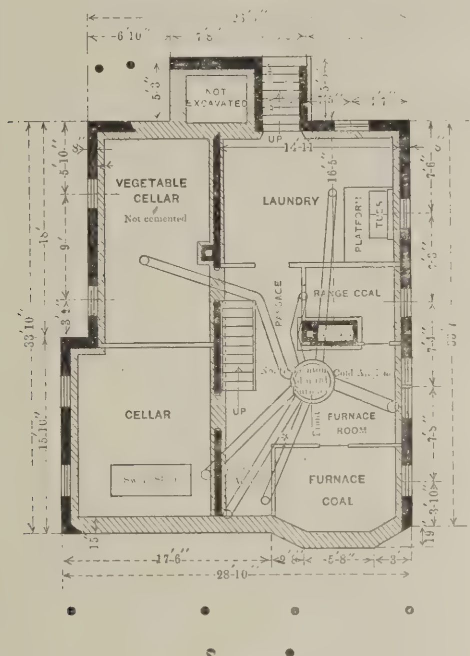
I have been a reader of *Carpentry and Building* for several years and like it very much. This is my first time to contribute to the Correspondence Department, and if the idea presented herewith is of any value to my brother carpenters I shall feel glad to have been of service to them. I have never seen nor heard of any device like this before and so far as I know it is original with me.

I should like to see the subject of "Tool Chest Construction" more fully discussed in the Correspondence columns.

Design for a Colonial Dwelling

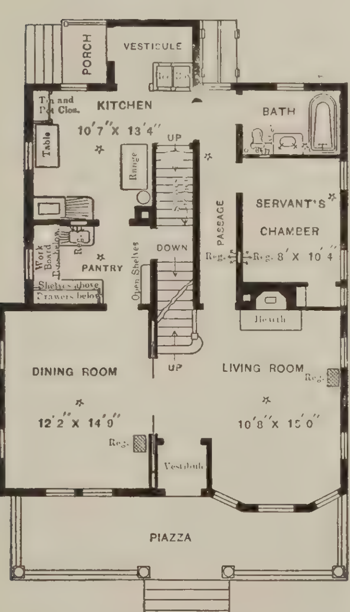
From C. A. Wagner, Port Jervis, N. Y.—I am sending herewith plans and perspective of a Colonial design, which, although simple as to exterior treatment, as the gables and the side of the dormer are shingled. The area under the entire house is excavated, and there is an 18-in. wall of field stone laid to the line of grade, above which is a brick wall set in red mortar. Through the length of the cellar runs a brick wall separating the laundry and furnace room from the vegetable and provision rooms, while board partitions divide the cellar transversely. The cellar is ventilated and lighted by windows hung at the top for opening and provided with hooks and fasteners. With the exception of the vegetable cellar the entire floor is cemented. The laundry is provided with a set of soapstone tubs and the furnace room with a Boynton hot-air heater.

The floors of the house are of No. 1 white pine tongued and grooved flooring, with the exception of the pantry, kitchen and bath rooms, where the floors are of ⅞-in. white maple, well finished and oiled. The attic floor is of ⅞-in. square-edge hemlock, surfaced. The finished rooms are plastered with three coats of lime and sand cement, with the hard finish for a last coat.

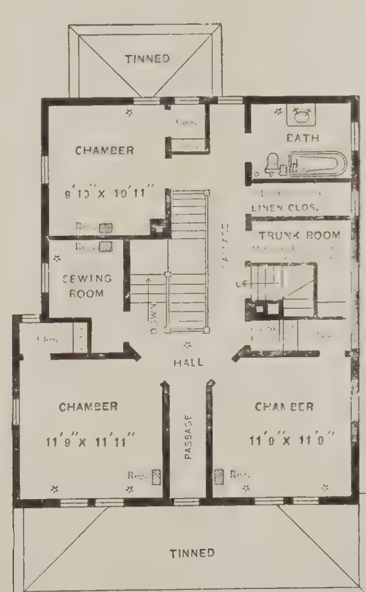


Basement.

Perspective.



First Floor.



Second Floor.

Design for a Colonial Dwelling.—C. A. Wagner, Architect, Port Jervis, N. Y.

has that homelike charm which appeals to the prospective builder as being well adapted to a small family of moderate means, and for erection on a lot 50 x 125 ft. or less. The house is of balloon frame construction and its exterior is covered with hemlock sheathing, over which is laid a good quality of building paper, this in turn being covered with clapboards. The roof as well

The doors are of stock design, the front door being of beveled plate glass and the vestibule door of double-thick glass. All doors have mortise locks, except the two front ones, which are fitted with cylinder locks. The sliding doors are provided with McCabe ball-bearing hangers and the pantry door and the dining room is hung on double-acting hinges. All interior finish is of neat design of white pine or white wood painted with two coats of white lead and oil, except the bath rooms, kitchen and pantry, which are of North Carolina pine and have one coat of filler and two coats of Spar varnish. The treads, rails and newels of the stairs are of red birch finish.

It will be noted from an inspection of the plans that the servant's room is on the first floor and is placed there for convenience in having such help where most needed. The kitchen and pantry have all modern fixtures, with a pot and kettle closet in the kitchen, with ample shelf room and easy access to the refrigerator, which is iced from the rear vestibule, this doing away with the necessity of the iceman entering the house. The bath rooms are fitted with marble lavatories, roll-rim bath tubs and low-down tank syphon jet closets. All exposed fittings are nickel-plated, all others being lead pipe, with cast iron soil pipes. The water is taken from the city mains and the waste is connected with the city sewer. The eave troughs and leaders are of galvanized iron, while the porch and step supports are of wrought iron pipe provided with sleeves.

The piazza and porch floors are 1⅛-in. North Carolina pipe tongued and grooved laid in white lead. The ceilings are of ½-in. North Carolina pine beaded ceiling. The outside finish of the house is No. 1 white pine lumber treated with two coats of lead and oil in colors to suit. The piazza and porch roofs are covered with I. X. "Old Method" tin painted on both sides before it was put on, all outside metal work being treated in the same way. The chimneys are of hard brick laid in red mortar above the roof and finished with bluestone caps.

It may be interesting to briefly state the cost of leading parts of the work which aggregates practically $3,000. Excavating, $30; foundations and mason work, $234.44; lumber, rough, exterior finish, etc., $623.61; millwork, mantel and ice box, $428.71; carpentering work, $627.65; plastering, $245.10; plumbing, gas piping, $329.75; painting, $147.50; roof, shingles, slag and tin work, $77.34; hardware, etc., $79.25; cement floors, cellar, $26.75; heating, $148.75.

What Constitutes "Acceptance of a Building"?

From H. P. W., Lowell, Mass.—Hearing a dispute as to what constitutes an acceptance of a building and knowing no better authority, I write for information through the Correspondence columns of *The Building Age*. If a person moves into and occupies a building, does he thereby accept it? Does a request for the keys and receiving them or their acceptance on presentation make an acceptance? If a contract allowed thirty days after the contract is finished and the building was occupied by the owner previous to the final completion of some minor matters, when should the thirty days begin? Is there any compilation of such legal information?

Answer.—In commenting upon the questions raised by our correspondent above, A. L. H. Street, who furnishes the legal decisions published in our columns, presents the following:

Occupation of a building or receipt of keys thereto by the person for whom it is built, while strong evidence tending to show an acceptance of the work as done in compliance with the contract, does not show that fact conclusively. To constitute such an acceptance the possession or use must be coupled with some act or language from which acceptance may be reasonably inferred. This principle has been decided by the highest courts of nearly all the important States, including Massachusetts. It has been judicially decided that use of a building when the builder stops working upon it is not an acceptance where the contract expressly provides that only an order for final payment shall be considered as acceptance; and that occupation only waives unintentional omissions unsubstantial in their nature, for which due allowance can be made to the owner.

On the other hand, the following propositions have been held: Where defective performance is not the fault of the builder, acceptance may be implied from possession and occupation, notwithstanding a protest by the owner. Use and occupation may show that the owner has derived some benefit from the work, thereby rendering him liable to the builder to the extent of that benefit. Notice from the owner to the builder that he will complete the work and deduct the cost from the contract price is an election to accept it subject to the necessary cost of completion. Where the owner of a building in the course of erection takes possession of and occupies a portion of it, and afterwards takes possession of and occupies the whole building, there is an acceptance.

The thirty-day period referred to in the third question begins on "substantial" completion of the building, though some minor details of the work are not completed. In law there is a substantial performance of a building contract where a variation from the specifications is unintentional and unimportant, and one by which the building is not injured, where the building is actually used after it is erected for its intended purpose, and where the defects can be remedied by the owner without any great expense.

Who are the Oldest Subscribers to "Carpentry and Building"?

From J. H. K., Dundee, Mich.—In the Correspondence Department of the January issue of *The Building Age*, under the heading "A Pioneer Subscriber of *Carpentry and Building*," "T. A. H.," Ottawa, Canada, expresses the opinion that he is the oldest subscriber to the paper. Perhaps he is, but I do not think he beats me very much, as I can prove by sending one of the copies dated December, 1883, and I have not missed a year since. I was a subscriber even before that date.

I think it would be a good plan for those who have taken *Carpentry and Building* a long time to give the facts through the Correspondence columns, so that we may determine who are the oldest subscribers and who have taken it continuously ever since the time they received their first issue. They could prove their claim by sending to the editor a copy of the oldest number which they have. I think we have all paid in enough to find out who is the oldest subscriber and I would suggest that a prize be offered to the one establishing his claim.

Note.—From letters which the editor has received in the recent past, there are a large number of present readers of the paper who have complete files of *Carpentry and Building* from the very beginning; that is, January, 1879, up to the present time. We are inclined to the opinion that our correspondent above would be surprised at the number of such readers, many of whom have the volumes bound in convenient form for ready reference.

Finding the Length of Jack Rafters

From Constant Reader, East Portchester, Conn.—I have recently been looking over some of the earlier numbers of *Carpentry and Building* and I came across a rather interesting letter in the issue for February, 1898, from "W. W. B.," Kansas City, Mo., in which he describes his method of obtaining the lengths of jack rafters. I would like very much to know why he uses the figures he does and what figures he would use on a 6-in. pitch roof and a 10-in. pitch roof, the rafters being placed 20 in. on centers.

I would like to have the practical readers help me out on this method, as I think it is a good one and can be used on different pitches.

Brick Required for Walls of Varying Thickness

From Engineer, Steelton, Pa.—I am sending herewith a table giving the number of bricks required for walls ranging in thickness from 4½ in. to 27 in. for areas up to 1000 sq. ft. which may possibly be found convenient for builders and contractors in estimating brick work.

Square Feet of Wall.	Number of Bricks for Thickness of Wall. 4½-Inch.	9-Inch.	13½-Inch.	18-inch.	22½-Inch.	27-Inch.
1	7	15	23	30	38	45
2	15	30	45	60	75	90
3	23	45	68	90	113	135
4	30	60	90	120	150	180
5	38	75	113	150	188	225
6	45	90	135	180	225	270
7	53	105	158	210	263	315
8	60	120	180	240	300	360
9	68	135	203	270	338	405
10	75	150	225	300	375	450
20	150	300	450	600	750	900
30	225	450	675	900	1,125	1,350
40	300	600	900	1,200	1,500	1,800
50	375	750	1,125	1,500	1,875	2,250
60	450	900	1,350	1,800	2,250	2,700
70	525	1,050	1,575	2,100	2,625	3,150
80	600	1,200	1,800	2,400	3,000	3,600
90	675	1,350	2,025	2,700	3,375	4,050
100	750	1,500	2,250	3,000	3,750	4,500
200	1,500	3,000	4,500	6,000	7,500	9,000
500	3,750	7,500	11,250	15,000	18,750	22,500
600	4,500	9,000	13,500	18,000	22,500	27,000
900	6,750	13,500	20,250	27,000	33,750	40,500
1000	7,500	15,000	22,500	30,000	37,500	45,000

Referring to the table, suppose, for example, it is desired to find the number of bricks required for a 9-in. wall, 6375 sq. ft. in area. The first thing to do is to find the number of brick required for an area of 1000 sq. ft., which, according to the table, is 15,000 bricks. For 6000 sq. ft., therefore, it would be six times 15,000, or 90,000 bricks. The next step is to find the number of bricks required for the remaining 375 sq. ft. From the table we discover that 1500 bricks are required for 100 sq. ft. of area, and for 300 sq. ft. we should require three times 1500, or 4500 bricks. For the remaining 75 sq. ft. the table shows we shall need 1050 + 75 = 1125 bricks. Adding these amounts together, we ascertain that 95,625 bricks are required for a 9-in. wall of the area mentioned above.

A Problem in Ropes and Pulleys

From W. S., Paterson, N. J.—I wish to thank "C. J. M.," St. Johns, Newfoundland, for the splendid answer to my question on ropes and blocks appearing in the October issue. If it will not be imposing too much on good nature, I would like to ask another question along the same lines. One horsepower is supposed to lift 33,000 lb. 1 ft. in 1 min., but practically it does not do this. Now if this power could be changed to pounds weight it could be determined what each horsepower could lift. Suppose, for example, I have a weight 14,000 lb. to hoist with a double and single block, how much horsepower will be required to do the work? I am inclined to the opinion that the answer to this question will interest many other readers besides myself.

Waterproofing a Concrete Cellar

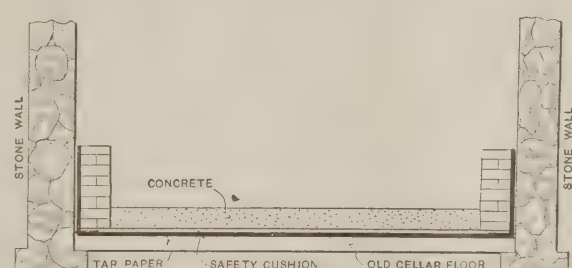
From C. M. C., New York City.—I beg to submit the following scheme to "W. H. S.," Lima, Ind., who in the January issue asks how to waterproof his concrete cellar. The enclosed sketch, which practically explains itself, may be of aid. It represents the cheapest way, I believe, to waterproof a cellar already built. The work should be done in the following manner: Thoroughly clean and smooth—using cement if necessary—the cellar floor and for a distance of 2 ft. up the side walls, for the tar paper. Water must be removed if in the cellar by digging a hole in one corner and making a pit, which must be the lowest part of the cellar, so that the water will drain to it. Pump this out and close only when the job is finished up to it. Put on three ply of tar paper with hot pitch, as in roofing-on the side walls for a distance of 2 ft. up from the cellar bottom and allow a lap on the floor of 6 in. Then lay three-ply paper on the floor connecting with the lap from the walls. Do not be afraid to use plenty of tar.

Now on the tar paper on the floor lay 1 in. of cement—composed of one part cement and two parts sand—called a "safety cushion." This is to protect the tar paper from concrete stone to put on. Then build up brick walls against the tar paper on the side walls, making the brick work 8 in. thick, although 4 in. might answer the purpose, as I do not know how much water pressure there is. In building the brick walls make sure and get shoved work, so that the cement will fill all the holes.

Now on top of the "safety cushion" place 6 in. of good concrete on the floor and the job is complete. If the correspondent has to provide against any considerable degree of pressure the concrete should be reinforced with iron rods. The sketch which represents a cross section through the cellar clearly shows the construction suggested.

Now as to cost. In the locality in which the correspondent resides a roofer will give him a square foot price for tar paper laid as above. Brick can be figured in the usual manner at so much per M laid. Concrete and "safety cushion" should be put in for $7 per cubic yard or whatever the local price may be.

I would offer one word of warning to the correspondent. Strictly speaking, the brick walls should go to the ground level. I am taking into account, however, the sewer which he has to take away the water, so make the walls only 2 ft. high. If the correspondent has a large amount of pressure the walls should be made 12 in. thick and, as before intimated, reinforce the concrete with strong iron rods placed 6 in. apart and running both ways. If the tar paper is not held in place against all pressure the labor expended will be in vain,



Waterproofing a Concrete Cellar. Submitted by "C. M. C."

so be on the safe side, for to be of any value whatever the work must be absolutely waterproof. If it is not, why do it?

The above system is the same as that used on a job of which I was in charge in the lower part of New York City. On this job, however, we held pressure out with steel channels and I-beams filled with reinforced concrete held down on the sides with brick work.

What is the Reinforcement Required for Concrete Beams?

From Student.—Will some of the experienced readers of the paper kindly tell me how to work out the amount of reinforcement required in a concrete beam with fixed ends—concentrated and distributed loads? What I do not understand is that in designing steel joists with fixed ends the greatest B. M. is at the ends; with a distributed load it is nearly twice that in the center of the beam. If this is so there must be a large amount of metal wasted in concrete beams when, say, only three rods out of five are bent up over the abutments. There is therefore more metal at the center of the beam than at the ends, where really still more is needed.

Answer.—The above inquiry was submitted to Paul T. Lesher, who furnishes the following comments in reply:

It is the general practice in engineering work when figuring a concrete beam to assume that the beam is merely supported at the ends, like a steel beam or a timber girder resting upon columns, and to have about ½ to ⅔ of the steel reinforcement turned up at the ends, and to determine the bending moment when the beam is uniformly loaded by the following formula:

$$m = \tfrac{1}{8}\, w\, l,$$

in which

m = bending moment in inch pounds.

w = total load in pounds supported by the beam or girder (including the dead load).

l = length of span of beam or girder in inches.

In reality, however, beams in concrete construction, where the entire floor system is laid as one unit, are more or less fixed at the ends, though they cannot be assumed to be more than ½ to ⅔ fixed. In a case of this kind the stress in the center of the beam is less, and there is also a reverse action, termed the negative bending moment, at the supports.

The negative bending moment at the ends of the beam must be provided for by steel rods carried over the top of the support for tension, and by a sufficient quantity of concrete at the bottom of the beam near the supports to take the compression.

Using the first formula for the design at the center for a uniform load, gives a very stiff beam, so that for the negative moment at the ends it is safe to use

$$m = 1/12\, w\, l.$$

Since the pull in the bottom of the beam decreases toward the supports, a part of the tension rods may be bent up on an incline from about one-quarter points in the beam, if the load is uniformly distributed, and part horizontally through the top of the beam at the supports. The rods must extend over the supports for a sufficient distance to receive the compressive stress there, or must be firmly connected with corresponding rods in the adjacent bay. The total steel in the top at the supports must be sufficient to resist the tension due to the negative moment.

The correspondent states that there must be a large amount of metal wasted in concrete beams when, say, three rods out of five are bent up over the abutments, but it will be evident from the above data that if enough steel is put in the bottom of the beam at the center to take care of the bending moment determined by the first formula given above, that if we use 3/5 of this metal at the top of the beam over the supports, we will take care of the negative bending moment for a beam uniformly loaded.

The main point is that a concrete beam cannot be considered as being completely fixed at the ends in usual concrete construction.

After the bending moment at the center and ends of the beam are determined, the number of square inches of steel reinforcement required can be found by dividing the bending moment in inch depth of the beam by 16,000 lb. (the fibre stress per square inch of steel).

For a concrete beam loaded with a fixed load in the center of the span, about as much steel reinforcement will be required in the ends as at the center of the beam.

Setting Out Splayed Crown Molding for Circular Cornice

From B. Mc., Mount Forest, Ont.—In the November issue of the paper, "W. I. H.," Monroe, N. Y., asked for a method of springing a crown molding around a circular cornice. We have done quite a little of this work lately, using molding similar to the crown molding illustrated and up to an 8-in. cove mold. In this part of the country the mills make the moldings all ready to put on, so that all the carpenter has to do is put it in place. For a circular-sprung molding he takes thin strips and rips them a little larger than the size of the molding, as shown in Fig. 1 of the accompanying sketches, where each strip is clearly indicated. The dotted line represents the contour of the finished molding. These strips are then tacked together and a form made similar to that shown by A A A of Fig. 2. The strips are then laid in the form as indicated by B of the same figure, with the molding edge up, all as clearly indicated. They are then run through the machine, using the same molding knife as was used for the straight crown mold. When finished they are as shown in Fig. 3.

When placed on the cornice one strip is bent on at a time in the proper order, beginning at the back and working out. This makes a good, solid job and a neat one, too. They also run the circular hand rails, etc., on the molder.

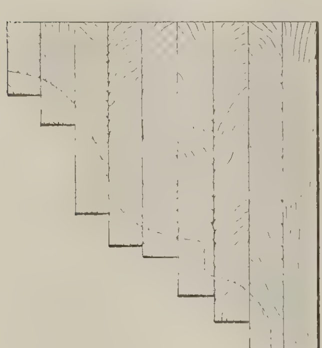


Fig. 1.—Showing How the Thin Strips Are Ripped.

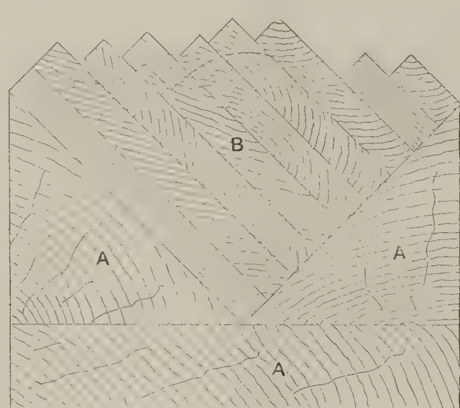


Fig. 2.—Showing How the Strips Are Tacked Together.

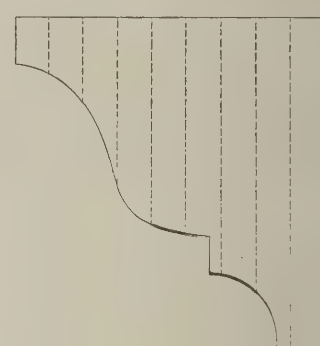


Fig. 3.—Appearance of Molding When Finished.

Setting Out Splayed Crown Molding for Circular Cornice.—Contributed by "B. Mc," Mount Forest, Ontario.

In looking over the replies to "W. I. H.," which appeared in the December number, I do not quite understand the idea of "A Student." Does he mean that a piece of 1-in. thick, cut to the curve he shows, will fit around a circle the same as his plan without bending? I would like the correspondent to explain this more clearly if he will kindly do so, as the point may have been perplexing to others as well as myself.

Proper Construction of Fireplaces and Mantels

From B. Mc., Mount Forest, Ont.—I am very much interested in the articles now running in the paper entitled "The Jobbing Carpenter and Some of His Work," as they bring out many suggestive points which are not touched upon, so far as I know, in any of the books treating on carpentry. In this connection I would suggest that some practical reader contribute an article or articles on fireplaces and mantels, telling also how to lay the tile for the face and hearth. We sometimes have to do this kind of work in this section of the country and I am sure that information on the subject would be useful to others besides myself.

WHAT BUILDERS ARE DOING

NOTWITHSTANDING the fact that building operations were seriously curtailed in many sections of the country by reason of the very severe winter weather experienced in December, the year closes with a volume of operations which will compare favorably with some of the best records of the past. The showing made by the majority of the important cities is indeed gratifying, bespeaking, as it does, an amount of work in prospect which will render the opening of spring a season of unusual activity in this important branch of trade. Reports from leading centers indicate an appreciable increase in the value of the building projects for which permits were issued, while for the entire twelve months of the year just closed the increase in vested capital in building operations over that of 1908 aggregates more than 40 per cent. Building operations have developed such a momentum that it seems reasonable to suppose that there will be plenty of work for labor in all branches of the building industry, and that the year 1910 will open with bright promises for the future.

Atlanta, Ga.

A feature of note in connection with the local building situation is that the high prices of building materials appear to have a tendency to increase instead of decrease operations. This is probably due to the impression which is gaining ground that lumber is not likely to be any cheaper in the future and that it is better to go ahead with contemplated improvements than take chances by further delay.

Concrete construction is being used to some extent, especially in the shape of concrete beams and slabs in business buildings where the walls are of brick.

The character of the new work projected is indicated by the fact that in December there was issued from the office of Inspector of Buildings Ed. R. Hays, 287 permits for buildings estimated to cost $591,776, while in December, 1908, there were 228 permits issued, but calling for an estimated outlay of only $170,822. For the twelve months of the year just closed 4399 permits were issued, calling for an estimated outlay of $5,551,951. For the same period in 1908 there were 4153 permits issued for work estimated to cost $4,833,941.

Mr. Hays is of the opinion that the city will show in 1910 fully a million dollars more of building than was the case in the year just past.

Birmingham, Ala.

The building business has a very bright future in this vicinity, and with the horizon clear of labor disturbances there seems to exist no reason why hopes of a good volume of operations in 1910 should not be realized. While there was a slight falling off in the amount of work projected in December, yet it is about the average and the total for the year is of a gratifying character.

In December there was issued from the office of Building Inspector W. O. Matthews 91 permits for building improvements costing $137,676, while in December, 1908, there were 112 permits taken out for new buildings costing $165,240.

For the year just closed the number of permits issued by the department was 1500, and the estimated cost of the buildings was $2,341,705. During the twelve months of 1908 there were 1326 permits issued, calling for an estimated outlay of $2,575,119.

Boston, Mass.

Owing to the method of keeping records of building operations in the city, it is only possible at this time to give the number of permits issued during 1909, which show a total of 1764, thus indicating materially increased activity as compared with previous years, when 1283 were issued in 1908 and 1010 in 1907. Of the permits issued last year 1302 were for wood construction, this being the largest number for any year in more than a decade, the previous high yearly total being 1414 in 1898. Permits for brick structure numbered 462, and this was the largest since 1899, when 670 permits were issued.

In December 169 permits were issued, of which 123 were for wood construction and 46 for brick, the largest number issued for any month since June, excepting November.

Buffalo, N. Y.

The full building statistics for the year 1909 show that the operations for the year were the largest in the history of the city; the total as reported by the Bureau of Building being $9,895,000, which is an excess of $3,048,000 over 1908, and a gain of 47 per cent. for the year.

The number of building permits issued for 1909 was 3361, an increase of 753 over 1908, a fact which shows that the increased investment is not represented by a small number of expensive structures; but by a large number of medium and moderate sized structures erected in all sections of the city—manufactories, commercial buildings and dwellings. The increase is largely due, according to the bureau statistics, to the industrial expansion which has taken place during the year, resulting in the erection of many new factories and additions to existing industrial plants.

The month of December was the lightest of any during the past year, owing to unfavorable weather conditions; but the indications are that the opening months of the new year will show a marked increase in the number of new building projects and a very busy spring is expected by builders.

Among the new projects already under way are the following: Foundry building 120 x 275 ft. for the Aluminum Casting Company at Hertel avenue and the Erie Railroad, to cost $50,000. Additional machine shop, 180 x 200 ft., for the Snow Steam Pump Works, to cost $70,000; machine shop, 300 x 300 ft., at the Otis Elevator Company's plant; factory for the King Sewing Machine Company, at Rano street, and the Delaware, Lackawanna & Western Railroad, to cost $150,000; machine shop, 200 x 200 ft., for the Niagara Machine & Tool Works; addition, 147 x 225 ft., to malleable iron foundry for the Acme Steel & Malleable Iron Works, Chandler street, and the New York Central Belt Line, to cost $30,000; warehouse, 150 x 1000 ft., for the Keystone Warehouse Company, on the Blackwell Canal; four-story and basement bakery for Faxon, Williams & Faxon, to cost $40,000; Emanuel Baptist Church, to cost $40,000; Temple Bethel, on Richmond avenue, to cost $75,000, and an addition to Delaware Park "Zoo" buildings—stone and iron—to cost $75,000.

Contracts just signed by officers of the Builders' Exchange and the heads of the Carpenters' and Bricklayers' Unions assure peace in the building trades for the next two years. Wages of bricklayers have been increased from 55 to 60 cents per hour, and carpenters will receive 40 cents an hour until May 1, when their wages will be increased to 45 cents.

Chicago, Ill.

The year 1909 broke all previous records of building activity in this city, the cost of the structures for which permits were taken out during the year having been $90,509,580. The previous high records were $68,204,080 in 1908, and $64,298,335 in 1906. During the past 17 years the only year in which the total exceeded $50,000,000 was 1907, when the figures were $59,065,080. The amount of building in 1909 was more than double the average of the preceding 20 years.

There were 11,241 permits issued during 1909 covering 310,351 ft. of frontage, making about 60 miles of buildings added to the city of Chicago during the past year. In 1908 there were 10,771 permits, covering 291,655 ft. of frontage. Chicago has to build a city within a city each year to provide for the growth of population.

Only a few buildings of notable size are included in the list for 1909. The city hall figures at $4,500,000, a 20-story office building replacing the old Victoria Hotel at $1,400,000 and a 12-story manufacturing building at Franklin and Monroe streets, $1,000,000. The Sherman Hotel contributes $2,000,000 to the total and the Chicago & Northwestern Railroad depot, $4,000,000. These are the only structures costing a $1,000,000 and over, the total for structures of this character being much less than in 1908, when the record for the year was swelled by a large number of office buildings. A group of new shop buildings for the Pullman Company makes an aggregate a little short of a million, and there was a notable number of manufacturing buildings, running from $100,000 to $500,000 each. The principal development of the year was in manufacturing buildings and apartment houses.

Preliminary work has just begun on a new building for the Boston Store, to replace the old structure on State street. Mandel Brothers have let the contract for a new steel and fireproof department store building, which will require about 10,000 tons of steel. The Hillman store contemplates erecting a new fireproof building, and several office buildings are contemplated for the coming year.

A notable feature of building development in Chicago and throughout the West is the use of structural steel in buildings of moderate size. The mills are unable to keep up with the demand for steel for this purpose, notwithstanding the fact that many important buildings and a legion of smaller structures are now built of ferro-concrete. One firm of Chicago architects has plans in hand for steel construction amounting to 90,000 tons, and another Chicago firm has similar work, amounting to about 50,000 tons. The amount of work of this character which is in prospect but has not yet reached the stage of contracts or building permits gives substantial evidence that the year 1910 will be a very active one in all forms of building.

Cincinnati, Ohio

Conservative Cincinnati has made a fine showing in building operations during the three years of great business fluctuation, as indicated by the figures taken from Commissioner Kuhlman's books. These figures show an increase of nearly $1,500,000 over the year 1908 in value of improvements and an increase of about $60,000 in values over the year 1907, which, with the sole exception of the year 1905, was the most prosperous in Cincinnati's building operation history.

The totals for the three years are as follows:

	No.	Value.
1909	8244	$7,794,529
1908	6031	6,428,988
1907	6766	7,737,062

With the exception of June and November the value of improvements authorized for 1909 exceeded those for the corresponding months of 1908, month by month; and the outlook so far of 1910 is good for a continuance.

During 1909 a greater number of new buildings were started than in 1908 and a larger amount of remodeling was done. Commissioner Kuhlman's figures show that in 1909 there were 700 new brick, stone and concrete-steel buildings erected as against 537 in 1908, and 737 frame buildings were constructed as against 667 in 1908. There were 1160 houses remodeled by the building of additions, etc., as against 892 in 1908.

Architects and contractors both agree that the price of material has been rather in favor of improvements than against them; as such commodities as have raised in price have been advanced so gradually as to be scarcely noticeable, and always in keeping with existing conditions of trade and commerce. No large improvements contemplated for 1910 have been abandoned so far as can be ascertained, and a number of factory, store and handsome dwelling structures are in preparation on drawing boards.

The largest new structure of the new year for which permits have been issued in January is the Fourth street seven-story office building to be built by capitalist J. G. Schmidlapp, of the Union Savings Bank and Trust Company. This is to be of steel and reinforced concrete and will cost about $75,000. The next most important structure for which permits have been issued is the new Christian Church in Evanston, a Cincinnati suburb. This is to be of brick and stone, and the architect is George W. Kramer, of No. 1 Madison avenue, New York City. The architect of the new Schmidlapp office building is Harry Hake, whose latest and best achievement was the handsome home of the Provident Savings Bank & Trust Company at Seventh and Walnut streets.

Cleveland. Ohio

Building permits issued during 1909 amounted to a total estimated value of $13,028,294, as compared with $9,761,869 during the previous year. This breaks all previous records with the exception of 1907, when the total was increased by the issuance of the permit for the new $3,000,000 Cuyahoga County Court House.

The permits show a large increase in the erection of steel, stone and brick buildings as compared with the previous year, the increase in value of structures of this character being 65 per cent. There were 750 permits issued for brick, stone and steel buildings to the total value of $7,263,-005. Permits were issued for 2612 frame buildings to the total value of $4,130, 036. The remainder of the permits were for additions and alterations. In December 292 permits were taken out for buildings to cost $727,975, showing considerable gain over December, 1908, when 387 permits were issued for buildings to cost $589,857.

Building operations which kept up well in the early part of December were greatly interfered with during the latter part of that month and early in January by the severe winter weather. A large amount of new work is already being figured on for the coming season and everything indicates that building work will start up briskly early in the spring.

The feature of the annual Christmas party of the Builders' Exchange held on the evening of December 22 in the headquarters of the organization was a three act "mellow dramar" as it was termed, vividly portraying the trials and tribulations of the average contractor. Its title was "Make Millions' Christmas Gift." The scenes dealt with the home life of the contractor, his experience in an architect's office and the Builders' Exchange as it really is. Throughout the play there was a continuous run of "hits" at the expense of members of the organization, and in the Exchange scene a 'change hour session was held in which Secretary Roberts, properly disguised, read notices of an amusing character, mostly announcements of contracts to be let which had been completed years ago.

The feature of the final act was the mock marriage of W. B. McAllister and Miss Blue Print. Mr. McAllister, former president of the Exchange, complying with the demand of the recent referendum election of the Exchange, in which it was voted that he should marry. Vice-Mayor Walker, Exchange member, decked out in clergyman's attire, performed the ceremony, using a doughnut for a ring.

The play was written by Secretary E. A. Roberts and A. C. Klumph, chairman of the entertainment committee.

The cast of characters included W. A. Fay as Make Millions, Mrs. Fay as Tiny Make Millions, his wife, and Miss Irene Walsh as Fluffy Blue Print, a saucy stenographer. There was something over 400 people in attendance and after the performance luncheon was served, consisting of cider, apples and doughnuts.

At the recent annual meeting of the Mason Contractors' Association the old officers were re-elected for the ensuing year as follows:

President.....................W. J. Hunkin.
Vice-President................Charles Miles.
Secretary.........................J. J. King.

The Carpenter Contractors' Association of the city held its annual meeting and election of officers about the middle of December, a feature being the banquet which was served at 6.30 o'clock at the Chamber of Commerce Club. President Farmer acted as toastmaster and interesting addresses were made by a number of well-known men identified with the building business. These included E. E. Teare, president of The Builders' Exchange; George Thesmacher, chairman of the executive board of Building Trades Employers; James Young and George B. McMillan, of the Carpenters' Association, and Edward A. Roberts, secretary of The Builders' Exchange. The following officers were elected for the ensuing year:

President...................F. D. Stevenson.
Vice-President................Louis A. Skeel.
Secretary-Treasurer............J. H. Caunter.
Assistant Secretary........Chester M. Harris.
Sergeant-at-Arms..............Carl Anders.

The Sheet Metal Contractors' Association held its annual meeting in December, about 40 members being present. The choice resulted in the selection of the following:

President...................H. B. McGrath.
Vice-President..............F. C. Thornton.
Treasurer....................A. H. Rudolph.
Secretary.......................E. F. Bohm.

It is interesting to note that the secretary was re-elected for the sixth time.

The new officers elected at the annual meeting of the Master Painters' Association of the city held in December were:

President......................J. E. Aylard.
Vice-President............Charles Burnham.

Columbus, Ohio

In common with other cities of the Central West, building operations have been much restricted during the past month or six weeks by reason of the heavy and severe winter weather, which has prevented out-door operations to any extent. There were only 59 permits taken out for new work in December, calling for an outlay of $76,375, while in the same month of 1908 there were 99 permits issued, calling for an outlay of $171,275.

First Assistant Building Inspector John W. Beaird states that for the twelve months of the year just closed 1787 permits were issued by the department for new buildings, alterations, additions, etc., calling for an outlay of $3,598,-601, and that in the twelve months of 1908 there were 1698 permits issued, involving an estimated outlay of $3,400,273.

Denver, Col.

Something of a reaction in the volume of building operations was manifested in the month of December, when the total cost of the improvements for which permits were issued was less than half what it was in the same month of 1908. The total for last year, however, is about one and one-half millions better than for the preceding year.

According to the report of Building Inspector Robert A. Willison, there were 124 permits issued in December for buildings calling for an estimated outlay of $504,820, while in December of the year before 174 permits were taken out for new buildings, alterations, additions, etc., estimated to cost $1,029,100. Of the total in December last 53 permits were for brick residences costing $154,700 and four were for apartment houses costing $90,000. There were also 10 business buildings, involving an outlay of $110,500.

For the year 1909 the department issued 3270 permits for buildings costing $11,554,983, of which total $4,757,150 represented the cost of 1722 brick residences and $109,200 the cost of 121 frame residences. The 49 apartment houses for which permits were issued cost $1,081,000 and the 173 business buildings accounted for $3,043,350 of the grand total.

Detroit, Mich.

The amount of building which has taken place in Detroit during the twelve months of the year just closed was the largest for any similar period in the history of the city, but notwithstanding this fact the feeling exists that 1910 will eclipse any previous year in the amount of building operations. Chief Inspector Dalton R. Wells, of the Department of Buildings, reports for December 296 permits for building improvements estimated to cost $1,083,670, which figures compare with 334 permits for improvements costing $1,024,800 in December, 1908.

For the twelve months of the year just closed there were 4399 permits taken out for buildings valued at $14,301,450, whereas in the twelve months of 1908 there were 3657 permits issued for building improvements to cost $10,682,170.

Fargo, N. D.

The Fargo Builders and Traders' Exchange held its annual election in December and the officers chosen for the ensuing year are as follows:

President........................Tom Powers.
First Vice-President............Oscar Euren.
Second Vice-President......P. L. E. Godwin.
Treasurer........................H. T. Alsop.
Sergeant-at-Arms.......George A. Anderson.

When B. C. Hicks resigned his office as secretary in September, Victor Leeby was appointed to the office for his unexpired term.

Hackensack, N. J.

The members of the Master Builders' Exchange of Hackensack and vicinity held their annual banquet in the Mansion House on the evening of December 29, the affair proving most enjoyable in every way. Before beginning the pleasant duty of satisfying the "inner man" they elected officers for the ensuing year, or, rather, again expressed their confidence in the old ones, for they were all re-elected as follows:

President.....................George Collins.
Vice-President..............Frank Ackerman
Secretary..............Frederick V. Ferber.
Treasurer.....................R. H. Yereance.

The organization now has a membership of 80 of the principal contracting builders in Hackensack and vicinity and the banquet was the occasion for a discussion of various problems connected with the building business. President Collins made a most pleasing address and called upon others to speak, including J. T. Hutchinson, F. V. Ferber, J. A. Voorhis, John H. Doremus, I. S. Brower, William Lind, W. C. Demarest and R. W. Yereance. During the banquet an orchestra rendered a number of selections. The entertainment committee consisted of F. B. Ferber, chairman; J. T. Hutchinson, George Collins, Frank Ackerman and M. M. Schwer.

Hartford, Conn.

A seasonable lull has occurred in building activities in the city, but the total for the year will run considerably ahead of the twelve months of 1908. There seems to be every indication of a good volume of business for the building trades the ensuing year, with prices holding about their present level.

From the office of Fred J. Bliss, building inspector, there were issued in December 35 permits for building operations involving an estimated outlay of $102,895, while in December, 1908, there were 46 permits taken out, involving an outlay of $183,995.

The year 1909 showed 863 permits to have been granted for new building alterations, additions, etc., estimated to cost $3,440,925. In the twelve months of the year previous 672 permits were issued, calling for an estimated outlay of $3,107,348.

Indianapolis, Ind.

Prospects continue bright for the building business in this city and a very creditable amount of work is being projected each month. In December, however, there was a very material shrinkage in the number of permits issued as compared with a year ago, but a decided increase in the amount of vested capital involved. According to the figures compiled in the office of Thomas A. Winterrowd, inspector of buildings, there were 109 permits issued last month for improvements valued at $470,360, while in December, 1908, there were 196 permits issued for improvements costing $287,940.

The volume of operations for the year is something like one million dollars ahead of the year before, the expansion being due to the steady growth of the city both in a business way and as regards population. For the twelve months of the year just closed there were 3931 permits issued for buildings valued at $7,156,560, and in the corresponding period of 1908 there were 4013 permits issued for buildings valued at $5,905,928.

Kansas City.

The past year has been marked by an appreciable increase in the amount of both brick and frame construction in the city, in connection with which dwelling houses have constituted an important factor. A considerable amount of new work was projected in December, especially frame construction. The figures available show that while only 132 permits were issued by the building department, they called for $704,550 for frame construction and $155,300 for brick construction, while in December, 1908, the 276 permits involved $385,050 for frame buildings and $235,000 for brick buildings.

For the year just closed 4174 permits were taken out involving an estimated outlay of $13,368,738, these figures comparing with 3830 permits in the twelve months of 1908 calling for an outlay of $10,562,041.

Los Angeles, Cal.

While December weather in this city was not all that could be desired, building operations were on the whole greatly interfered with and the record for the month is much better than it might have been. There was something of a drop as compared with November, which was the best building month of the year, but December ran considerably ahead of the average for the year. During December a total of 696 permits, with a valuation of $1,238,244, were issued as compared with a valuation of $1,336,830 for November, and with $667,629 for December, 1909.

The year 1909, taken as a whole, shows an increase of nearly 50 per cent. over the year preceding, and is, with the exception of the years 1906 and 1907, the largest building year in the history of the city. During the year just closed the building record shows 8571 permits with a valuation of $13,260,703 as compared with 7637 permits valued at $9,934,198 for 1908, and 7599 permits valued at $13,304,696 for 1907 and 9072 permits valued at $18,158,520 for 1906.

Of the total value of the buildings erected in the year just closed, about three-fourths was for frame residences and the remainder was chiefly for brick and concrete business buildings of the smaller sort. Only three steel-frame Class A buildings were authorized and the value of these was only $165,000.

Louisville, Ky.

The report of the building inspector's office of this city disclosed the fact that during the year 1909 there were 2835 permits issued for work amounting to $3,172,311, against $2,914,141 for 2909 permits issued during 1908, thus showing a decrease of 74 in number of permits and a gain of $260,000 in cost of work done. Buildings of larger class are responsible for the increase.

December was a decided "Frost," permits numbering only 94 against 127 for December, 1908; the 94 amounting to $79,437 against $129,443 for 1908. This was due to the entire month of extreme cold weather—the coldest in 33 years and all outdoor work was paralyzed.

The contract has been let for the new office building of the Louisville Water Company to Bailey & Koerner; the Water Company are their own architects and is for their use entirely, the cost will be about $80,000. Bailey & Koerner also secured the contract for the modern school building to be completed by November, 1910, Captain Brinton B. Davis, architect, and will cost $125,000.

Lincoln Savings Bank proposes to duplicate its present building—an up-to-date office structure of 15 stories—by extending it west on Market street. The site is now occupied by old buildings, the lease on which expires this year, and as soon as possession is possible ground will be broken. The original structure cost $250,000.

The outlook for January is not very bright, unusual weather prevails and a heavy snow covers the city, while the thermometer hovers near zero mark. Under these conditions building and all outdoor work is at a standstill, but when the spring opens up great things are expected and Louisville will get her share.

Memphis, Tenn.

With the turn of the year builders are naturally directing their thoughts toward the opening of the spring season and are shaping their movements for a period of activity, as the outlook for 1910 is of the most promising nature. Among the work in prospect, mention may be made of three new school buildings planned by W. C. Jones, architect, to cost $150,000 and for which Olsen & Lesh have the contract; a Baptist Memorial Hospital, to cost $500,000, and for which John Gainsford is the architect; the Central Bank and Trust Company Building, for which J. G. Rogers is the architect and N. M. Woods, associate architect, the contractors being Murch Brothers; and a new high school building, to cost $350,000, for which B. C. Alsup is the architect and Heinzmann Brothers the contractors.

During the past year there has been a great number of frame dwellings erected and more will follow in order to meet the steady growth of the city. During December, permits were issued by Dan. C. Newton, building commissioner, for building improvements costing $414,047, while in the same month of 1908 the building improvements for which permits were issued was estimated to cost $274,612.

For the twelve months of the year just closed the total cost of new buildings, alterations and repairs was placed at $4,324,377, these figures comparing with $3,300,508 in the corresponding period of 1908.

Minneapolis, Minn.

Nearly one-quarter of the cost of the building improvements in this city during the past year went into structures of a fireproof character, the interior construction of nearly all being reinforced concrete. There is a steady growth manifest in all sections of the city, although of course dwelling houses are receiving a very considerable amount of attention on the part of architects and builders. The outlook for 1910 is very promising.

An idea of the volume of current operations may be gathered from the figures furnished by James G. Houghton, inspector of buildings, for December, when 233 permits were issued for improvements costing $855,170, while in December, 1908, there were 244 permits issued for improvements costing $723,170.

For the twelve months of the year just closed there were 6056 building permits issued, calling for an estimated outlay of $13,092,410, these figures contrasting with 5638 building permits for improvements costing $10,093,915 in the twelve months of 1908.

The members of the Builders' Exchange held the election of officers for the ensuing year at the regular monthly meeting in December. The usual noonday luncheon was served, after which routine business was transacted. The headquarters of the Exchange at 17 South Sixth street presented a very animated appearance and the election developed quite a spirited contest. The result of the balloting showed the following choice:

President......................S. G. Tuthill.
Vice-President................N. W. Nelson.
Second Vice-President........Walter Thorpe.
Treasurer.....................H. B. Cramer.
Sergeant-at-Arms...........R. B. Dickinson.

Montreal, Can.

The twelfth annual meeting of The Builders' Exchange was held January 12 and was well attended. The report of the board of directors and financial statement was presented by Secretary-Treasurer J. H. Lauer and unanimously adopted.

The most important local work in connection with the Exchange was the establishment of a Department of Permanent Exhibits, open daily to the public free of charge, and which is the first of its kind to be instituted in Canada. A cordial invitation was extended to all interested in building to pay a visit to the exhibits and make themselves familiar with the latest devices in connection with building construction.

In presenting the building figures for the past year, the fraternity was to be congratulated on the record total established in 1909, of about twenty millions in round figures for Greater Montreal.

One danger that beset the contractor was the anxiety to get work at any price, and this was the cause of a larger number of failures than usual during the past year. There is no reason to repeat this blunder as there was ample work enough to go all round.

Mr. Lauer also drew attention to the technical schools now being erected by the Quebec Government, and the urgent importance not to emphasize the theoretical side of the exclusion of the practical work of training future craftsmen and mechanics. The new buildings offer ample room for the inclusion of the trade school, in which full scope can be given to the practical training of craftsmen, as the old order of apprenticeship has passed away.

The Builders' Exchange has also exercised its customary supervision in matters appertaining to Federal legislation, in which area (2) two important measures merit the attention of the employers throughout Canada, namely the endeavor to extend the operation of the Lemeuix "Investigation and Industrial Disputes Act" to all current branches of trade, and the annual appearance of Mr. Verville's "Eight Hour Day Bill" on all government public works.

The most important fruit of Provincial legislation was "Compensation for Workmen for Accidents Bill" which, however, had not produced so favorable an affect upon insurance rates as employers were entitled to anticipate.

The election of officers for the current year resulted as follows: President, J. N. Arcand; vice-president, Jas. Ballantyne.

Board of directors—A. Bremner, Jos. Brunet, E. G. M. Cape, K. D. Church, W. T. Castle, Thos. Gilday, J. W. Hughes, Wm. Rutherford, T. A. Morrison, Frank Pauze, E. W. Sayer.

A cordial vote of thanks was unanimously voted to the retiring officers, the secretary and working staff, whose labors during the past year were greatly appreciated.

Newark, N. J.

The amount of building in the city during the year which has just been brought to a close was very nearly double in the estimated cost of the improvements what it was during 1908. According to the figures given out by Superintendent of Buildings William P. O'Rourke, there were 2700 permits issued last year calling for an estimated outlay of $14,177,159, while in the twelve months of 1908 there were 2285 permits granted for building improvements costing $7,161,668.

It is pointed out that one reason for the great revival of activity in the building line was the renewal of confidence and the pushing forward of many important undertakings which had been held in abeyance by reason of financial conditions.

In December of the year just closed 180 permits were issued for building improvements to cost $1,040,425, while in the same month of 1908 there were 183 permits taken out for improvements costing $641,034. From this it will be seen that recent projects involved some rather important undertakings. While high prices of building materials still prevail they appear to have no appreciable check upon the building business, as the figures above indicate and there seems to be no reason why 1910 should not be a notable one in the building line in this city.

New Orleans, La.

The report from the department of the city engineer covering the past year shows that the number of building permits issued was 2795, and that the value of the buildings for which they were issued was $5,165,212. This record is a most excellent showing for the city and will compare very favorably with boom years. Several large and handsome structures are included in the permits issued, among them being the Whitney Central Bank, the new Post Office and the new home of the Metropolitan Bank. A noticeable feature of the year was the large number of attractive cottages and small dwellings erected, these being necessary to meet the natural growth of the city.

New York City

At a recent meeting of the New York Chapter of the American Institute of Architects it was decided to increase the minimum charge of architects from 5 per cent. to 6 per cent., this action being based upon "the constantly increasing expense attending the preparation of drawings and specifications due in part to the greatly increased salaries which the higher cost of living compels, and partly to the greater scope which the work of the architect has assumed and the much more exacting demands that are made upon him." The chairman of the committee on schedule of charges is John M. Carrere, and the other members are Walter Cook, Grosvenor Atterbury, H. Van Buren Magonigle and Donn Barber.

The amount of new building projected in December in the Boroughs of Manhattan, the Bronx and Brooklyn was of a value considerably in excess of that for December, 1908, although the number of permits issued was considerably less. The figures of the Bureaus of Buildings in these boroughs show 849 permits to have been issued last month for new work estimated to cost $19,800,776, while in December, 1908, there were 1006 permits issued for new buildings estimated to cost $13,176,600. Important figures covering the twelve months of the two years mentioned will be found this month on our editorial page.

The Builders' Alliance is the name of an organization which has just been incorporated for the purpose of uniting all persons engaged in the building business and to protect them against inefficient contractors, sub-contractors and workmen and to promote fair dealing.

The Iron League Erectors' Association of New York City announce that on February 1 the wages for competent all-around bridgemen and structural iron workers employed by members of the association will be advanced to 60 cents an hour, and on July 1 of the current year the rate will be advanced to $5 a day. The association has issued a card stating that although no demand has been made upon it, yet conditions and future prospects are such as to justify the increase mentioned. The "open shop," which the association has determined to maintain, has, it is pointed out, brought about healthier and better conditions in its industry and in the relations between employer and employee, and it is these which have enabled the association to take the action stated at this time.

The annual entertainment and reception of the Associated Employees of the Bureau of Buildings took place in the Lexington Opera House on Tuesday evening, January 18. The first part of the evening was given up to the entertainment feature, followed at 10:30 by a reception. The chairman of the committee of arrangements, to which great credit is due for the pleasures of the evening, was James H. Flynn.

Omaha, Neb.

Present indications are for the greatest volume of building in 1910 in the history of the department. Prices of materials are regarded as about normal and do not appear to be looked upon as high to the extent of restricting operations. Reinforced concrete construction is being quite extensively used, particularly in connection with floors and the erection of fireproof warehouses.

There was a decided let up in operations in December, but this may be readily attributed to the very severe winter weather which has prevailed throughout the West. Heavy snows have materially interfered with building operations, so that it is not at all surprising to learn from the figures compiled in the office of Building Inspector C. H. Withnell that in December only 43 permits were issued for improvements costing $119,470, as against 92 permits for building improvements costing $378,625 in December, 1908.

For the twelve months of 1909 the department issued 1606 permits, calling for an estimated outlay of $7,204,140, while in the same period of 1908 there were 1526 permits issued for new buildings, alterations, repairs, etc., calling for an outlay of $4,590,650.

Philadelphia, Pa.

The betterment in general business conditions, following the depression of two years ago, is strongly reflected in the volume and cost of building operations which were undertaken in this city during 1909. As was generally anticipated, all former records were broken, that of the previous record year 1906 being exceeded by $2,169,860, while the increase, as compared to 1908, during which conditions were generally unfavorable, was $14,472,790. Statistics compiled by the Bureau of Building Inspection show that permits were issued during the year for 17,294 operations at a total estimated cost amounting to $42,881,370, as compared to 13,950 operations costing $28,408,508 during 1908, and 17,872 operations at an estimated value of $40,711,510 in 1906.

The extent of dwelling house construction in 1909 exceeded all previous records. Total expenditures for two, three and four story dwellings aggregated $22,070,930; that for two-story dwellings alone equaling $16,711,230 for 8734 operations, closely approximating the total for 1906, when 8940 operations at a cost of $17,017,375 were recorded, and exceeding that for 1908 by about $7,500,000. The total number of three and four story building operations during 1909 was 1062, at an estimated cost of$5,359,-700. In addition to the usual type of dwelling houses the increased growth of flat house construction is to be noted. In 1906 five apartment houses, at a cost of $220,000, were erected; in 1908 this class of work had increased to fifteen operations, as a cost of $629,850, while in 1909 statistics show that work was started on thirty operations, the estimated cost of which was $1,044,500.

Quite a noticeable change in the character of building construction is to be noted. The usual dwelling house operations continue principally of brick; while in manufacturing buildings and those identified with that class of work, as well as many of the apartment houses, the various forms of concrete construction are being more extensively used.

Cost of building increased as the year advanced. Early in the year low prices prevailed for many classes of materials, but as the demand became greater and makers of builders' supplies became less able to meet the demand, prices advanced in many lines.

Labor conditions were generally satisfactory during the greater portion of the year. In November, however, difficulties arose in one line, which resulted in strikes and lock-outs which seriously handicapped operations on several large buildings, and which have not yet been satisfactorily adjusted.

The outlook for 1910 is considered exceptionally bright. There is an exceedingly good volume of business in sight, prospective dwelling house operations are large as well as numerous, and the quality of this class of work is improving. The increase in apartment house work promises to be large, and there is considerable building in sight in various other lines. The erection of a hotel to cost $2,500,000, to be located in the central part of the city, is being considered, while light manufacturing buildings, schools and other municipal buildings are being estimated upon.

The Lehigh Construction Company has been taking estimates from sub-contractors for the erection of 90 two-story houses in the vicinity of Twenty-sixth and Somerset streets.

F. C. Michaelson is taking estimates from sub-contractors for 100 two-story houses and three stores and dwellings, which he purposes to erect on Sullivan, Matthews and Blakemore streets, Germantown.

Estimates are being taken by B. C. Haney & Co. for 40 houses and a store and dwelling to be erected at Eighteenth and Hunting Park avenue.

Watson & Huckel, architects, have completed plans for a ten-story fireproof light manufacturing building to be erected for the estate of Henry C. Lea, at the southwest corner of Broad and Spring Garden streets. The building is to be of steel and concrete, and measures 50 x 100 ft. on the ground plan.

Plans have been completed for a new hotel to be known as the "Hotel Fairmount," which it is proposed to erect at Thirteenth and Chestnut streets. It is to be a 20-story structure, measuring 84 x 145 ft., the total cost being estimated at $2,500,000.

We understand that plans are being drawn by Guy King, architect, for 14 three-story houses to be built at Broad and Cortland streets for Frank D. Williams, also for 17 houses to be erected at Noble, Pa., for the same party.

Prospective work in apartment houses is good; plans are being drawn for four three-story apartments at Forty-fifth and Walnut streets by E. Allen Wilson for Clarence Siegel. The buildings are to be of the Colonial style of architecture. Further reports of proposed building operations are numerous, but have not yet definitely developed.

W. E. Dotts & Co. have a contract for a four-story brick and terra cotta apartment house to be built at Broad and Venango streets for Samuel C. Silberman. The cost is estimated at $85,000.

The following nominations for directors of the Philadelphia Master Builders' Exchange, to serve during the coming year, have been announced: D. O. Boorse, George J. Watson, John R. Wiggins, Percival Sot, J. Turley Allen, C. I. Leiper, Jacob L. Tyson, W. T. Reynolds, John G. Fleck and Wm. C. Lilly. Seven vacancies will be filled.

The election will be held at the annual meeting on January 25th. The officers of the Exchange will be elected at the regular monthly meeting on February 8th.

Pittsburg, Pa.

Concrete appears to be growing in popularity in connection with building operations in this city, and quite a little work of this kind is to be found within the borders of Greater Pittsburg. The high prices of building materials appear to have no tendency to check operations, as the feeling exists that lumber is not likely to be much, if any, cheaper in the future, and that therefore there is nothing to be gained by deferring important work. The outlook for the new year is good.

There was more new work projected in December, according to the figures of Superintendent of Buildings S. A. Dies, than was the case a year ago at this season, there having been 223 permits issued for improvements costing $670,212, as against 192 permits for improvements involving an estimated outlay of $578,557 in December, 1908.

For the twelve months of 1909 the increase in building operations over the year before is marked. According to the authority in question there were 4,045 permits issued last year for new buildings, alterations and repairs, costing $16,549,526, while in the twelve months of 1908 there were 3,848 permits issued for building improvements costing $12,168,496.

The Master Builders' Association recently elected the following officers for the ensuing year:

President.................S. N. Murphy, of Murphy Bros.
Vice-President..Wilbur Shenk, of Henry Shenk Company.
Treasurer.......F. C. Jones, of Nicola Building Company.
Secretary.........T. J. Hamilton, of Murphy & Hamilton.

The directors elected included H. L. Kreusler, of the H. L. Kreusler Company; C. M. Miller, of William Miller Sons Company; R. K. Cochrane, of George A. Cochrane Company; S. P. Trimble, of W. F. Trimble & Sons Company, and A. J. Schutz, of the A. & S. Wilson Company.

The association has decided to advance wages of carpenters from $3.50 per day to $4.00, the change to go into effect on April 15. This action was taken early so that contractors might take into account the increase in wages when submitting bids on work to be executed the coming spring.

Portland, Ore.

So far as building operations are concerned the year just closed was a banner one in the history of this city, and all indications are that 1910 will far exceed its predecessors. In the last two years reinforced concrete construction has become very popular for business buildings, but has not as yet made much headway in the construction of residences, owing to the fact that this is a timber country, and timber construction here is unusually cheap.

The report of Building Inspector G. E. Dobson shows 291 permits to have been issued by the department in December for building improvements valued at $1,436,825, as compared with 278 permits in December, 1908, calling for an estimated outlay of $960,075.

The record figures for 1909 consist of 4739 permits for new buildings, alterations, additions, etc., valued at $13,481,380. In the twelve months of 1908 there were 4839 permits issued for buildings having a total valuation of $10,405,151.

Richmond, Va.

The amount of building which has been done in the city during the past year was the largest on record, and 1910 bids fair to show as much if not more building than was the case in 1909. The construction of plain and reinforced concrete buildings seems to be on the increase, non-fireproof buildings over 65 ft. in hight being prohibited, and no frame building over two stories in hight is allowed. The present prices of building materials appear to exert no restraining influence on building operations within the confines of the city.

From the figures compiled in the office of Building Inspector H. P. Beck it is seen that there were 63 permits issued in December for new work, alterations and repairs, estimated to cost $232,404, while in December, 1908, there were 44 permits issued for new work, alterations, additions, etc., calling for an estimated outlay of $174,470.

For the twelve months of the year just closed there were 846 permits issued for new buildings estimated to cost $2,997,894, and 532 permits for alterations and repairs, calling for an outlay of $576,918, making a total of 1378 permits for building improvements involving an outlay of $3,574,812. Of the new work 296 were brick dwellings, costing $1,113,888, and 296 were frame dwellings, costing $365,732. Only two apartment houses were erected, one costing $140,000 and the other $22,000. In the twelve months of 1908 the total expenditures authorized by permits issued amounted to $3,169,431, thus giving to the year just closed a gain of $404,381.

Rochester, N. Y.

The year just past has been the greatest, so far as the volume of building operations is concerned, in the history of the city. The prospects for the coming year are very bright, although no remarkable increase over 1909 is expected. No important change in the prices of building materials is anticipated, and although the figures are regarded as somewhat high, yet they do not seem to have had any appreciable effect upon the volume of operations.

In December last there was an unusual amount of new work projected, the figures compiled in the office of Fire Marshall Herbert W. Pierce showing 210 permits to have been issued, costing $638,809, while in December, 1908, there were 131 permits taken out for new work to cost $357,635.

This ratio of increase was practically maintained throughout the year, there having been 3122 permits issued for new work, alterations, additions, etc., estimated to cost $9,272,132. In the twelve months of 1908 there were 1822 permits issued by the fire marshall's office for building improvements to cost $4,973,317, thus showing an increase in 1909 of $4,298,825.

San Francisco, Cal.

Building operations during month of December were interfered with to a considerable extent by rainy weather, and there has been a general postponement until better weather is assured. Except for a few stormy days the work in the larger buildings has made fair progress during the month. The report of the building inspector shows that the permits issued during the month called for a total outlay of $1,938,561, a falling off of more than half a million from the preceding month. Contractors are expecting a good volume of business in the immediate future, notwithstanding the season and the uncertain weather. The orders of the municipal authorities for the early removal of the temporary buildings put up immediately after the fire, and the consequent vacating of these structures, have led to an active demand for good business buildings in the retail section of the business district, and a lot of plans are now on the boards of the architects.

Figures for 1909 show a considerable falling off in building as compared with the years immediately preceding it, the total value being $28,540,000, as compared with $33,758,890 for 1908, and $50,490,490 for 1907. In 1905, the year before the big fire, the building permits reached a total of $20,111,861.

Building materials are rather firmer than in the earlier part of the winter. Fir lumber is comparatively high, being considerably higher than at the same season a year ago. Even at the present prices, fir is very firm, and dealers predict a further advance of either $1 or $1.50 per thousand before the month is out. Rough redwood is in good demand for local use and for Coast points, and dry, clear redwood is being freely shipped to Eastern points. Prices for redwood are unchanged and the market steady. Shingles are dull. Bricks show no change from the prices that have prevailed for some time. Common brick are bringing $7 or less. There is quite a large surplus at the various plants, and a number are shut down indefinitely. The consumption of brick is, however, larger than it has been. Cement is rather weak, though quoted as heretofore. There has recently been something of an accumulation owing to the check in building resulting from the rainy weather. It now looks as though the demand for cement would show a considerable increase in the early months of the present year.

Some San Francisco architects have become favorable to a more extensive use of reinforced concrete, and within the last few months a number of buildings have been planned with reinforced concrete in the specifications where steel frames had been generally expected. The higher prices asked for structural steel, and the higher prices demanded for their work by the structural steel contractors, are believed to have led some owners and architects to favor reinforced concrete for buildings of moderate hight. Stone has been meeting with greater favor here, and this tendency will, it is believed, continue into the new year. During the last few months contracts for structural stone have reached a larger figure than in any other similar period in the history of the city. The stones chiefly specified are California granite and standstone. Just at present there is a considerable demand for California slate for roofing.

Among the larger buildings now in plan and announced for early construction are the ten-story Class A office building, to be erected on Sutter street, near Grant avenue, for A. Sutter, to cost $55,000, and for which Fred. H. Meyer is architect; the Schmiedel Estate building, a six-story apartment house, to be erected on the corner of Jones and Post streets, at a cost of approximately $140,000, F. H. Meyer, architect; a six-story and basement brick apartment house, to be erected by S. L. Leszynsky. at a cost of $80,000, C. A. Muessdorfer, architect; a four-story apartment house, to be erected for L. B. Feigenbaum, at the corner of Sacramento and Polk streets, at a cost of $50,000; the California Hospital and Training School for Nurses, on California street, near Maple, to cost $200,000; the Samuel Dusenbury building, a four-story and basement brick apartment house, to be erected on Eddy street, near Van Ness avenue, at a cost of $45,000, O'Brien Bros. the architects; the William Ede Company building, on Market street, near Seventh, to cost $60,000, William Knowles, architect; the Spreckles building, at California and Davis streets, a three-story granite, steel and concrete building, MacDonald & Applegarth, architects; the Pacific Union Club improvements on California street, to cost $150,000, and the Ignatz Steinhart apartments, on Sutter street, near Leavenworth, to cost $130,000.

Seattle, Wash.

The advent of winter weather is strikingly reflected in the letting down of activity in the building line, especially in the new projects for which permits are being filed with the department of buildings. The report of Superintendent Francis W. Grant for the month of December shows that 950 permits were taken out for improvements estimated to cost $1,040,470, while in the same month of 1908 there were 1059 permits issued calling for an estimated outlay of $1,503,420. Of the new work projected in December last 170 permits were for frame residences costing $320,270, and 236 were for frame business buildings calling for an outlay of $194,980. Brick work was represented by six permits for buildings to cost $216,000, and there were five permits for reinforced concrete construction, to cost $207,400.

The entire year just closed shows 14,885 permits to have been issued by the department for improvements calling for an outlay of $19,044,335, while in the twelve months of 1908 there were 13,551 permits issued by the department of buildings for improvements calling for an outlay of $13,777,329. It is interesting to note in this connection that 6516 permits of those issued last year were for alterations estimated to cost $1,803,415.

Spokane, Wash.

The outlook for the building business in this city is good, and although the volume of new work projected in December showed a heavy falling off from the same month of the year before, yet the total for 1909 is millions ahead of the twelve months preceding. Prices of building materials remain about stationary, but wood construction is being superseded by concrete to the extent of about 20 per cent in the larger buildings.

The figures of Building Inspector E. Finney show 104 permits to have been issued in December for new work valued at $213,635, while in the same month of 1908 there were 178 permits issued for improvements valued at $515,495.

For the twelve months of the year just closed 2963 permits were taken out for new buildings, alterations, repairs, etc., at $8,766,226, as against 2927 permits for improvements having an estimated valuation of $5,927,548 in the corresponding period of 1908.

SOME PROBLEMS IN STAIR BUILDING—XIV.

BY MORRIS WILLIAMS.

IN what follows we shall attempt to show how to find the spring bevels to "twist" all kinds of wreath rails. We shall first illustrate a very simple method for doing the work, its simplicity consisting in the fact that only two lines need to be understood and manipulated in the operation. It is applicable to all cases of wreath rail that may possibly occur in the practice of the stairbuilder, either for wreaths winding around a quarter turn curve or a curve more or less than a quarter turn. These two lines in all cases constitute the base and altitude, respectively, of the triangle containing the bevel. The base line of the bevel triangle will be found in the plan and in all cases where the plan tangents are at a right angle to one another, which will always be the case where the plan curve is a quarter turn, the line will be the radius of the plan curve, or in other words, the length of either one or the other of the plan tangents.

The altitude line of the bevel triangle in all cases invariably will be a line indicating a distance from a certain fixed point in the plan to the tangents or lines parallel to them in the elevation.

The fixed point just mentioned is shown at b in Figs. 94 to 98, inclusive, where the side plan tangent a b intersects the crown plan tangent c b. In all other cases the "fixed point" in the plan from which to measure the distances to the elevation tangents will be found by drawing a perpendicular line to the crown tangent b c from the point a in the plan to z as shown in Figs. 99 to 107, inclusive. It may be interesting to remark at this point that the operation of finding bevels in wreath construction is justly regarded as the most difficult of any to accomplish. It is due to the varied conditions of the oblique planes upon which the wreaths are assumed to rest while winding above and around their plan curves from one end of the cylinder to the other. The planes are so varied and numerous as to make it an impossibility for any one not thoroughly proficient in the science of solid geometry to find the correct bevels unless they are made acquainted with a method that is applicable to any and all conditions the planes may assume. The nature of the planes mentioned has been already explained in preceding issues, so that for those readers who have grasped the principles involved in connection with them and their application in the construction of wreath rails, the method presented herewith to find the bevels will be readily understood.

In Figs. 94 and 95 we show the most simple examples of wreath construction. The plan of the center line of rail in both diagrams as indicated from a to c is a quarter turn. In Fig. 94 the tangent a b is shown to be level and the tangent b c to be inclined, as represented over and above it from b to c''.

To find the bevel place one leg of the dividers in the point b and the other to touch the line c'' m, as indicated by the arc m. The bevel is shown at w to be composed of an altitude b w equal to the distance from b to m and of a base a b equal to the plan tangent a b.

Note that at c'' is shown exactly the same bevel. It has the same altitude b m and the same length of base b a or b c. Note also that it equals the top angle of the pitch board, and that this invariably is the case where one tangent is level and the other inclined of a wreath over and above a quarter turn plan curve, such as we encounter when dealing with a cylinder placed at the junction of a level landing and a flight.

We show in Fig. 95 an example of a wreath with the tangents reversed. In this case the bottom tangent a b is inclined and the top tangent c'' m is level. To find the bevel proceed as shown in connection with Fig. 94 by

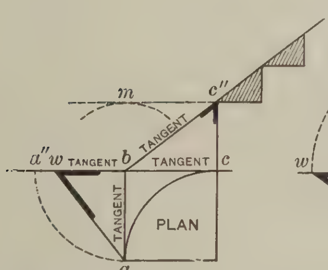


Fig. 94.—Finding Bevels for a Bottom Level Tangent and an Inclined Top Tangent.

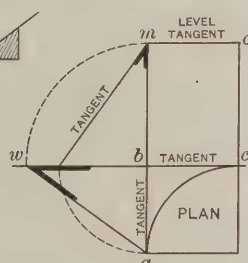


Fig. 95.—Finding Bevels for a Top Level Tangent and a Bottom Inclined Tangent.

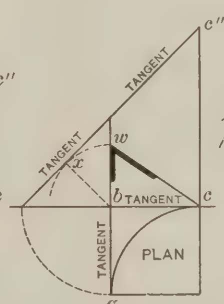


Fig. 96.—Tangent Having Equal Pitch.

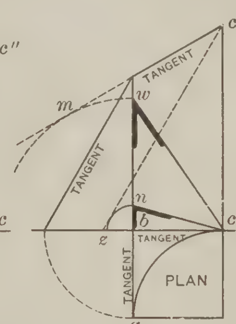


Fig. 97.—Two Unequal Tangents, the Bottom One Inclined More Than the Top One.

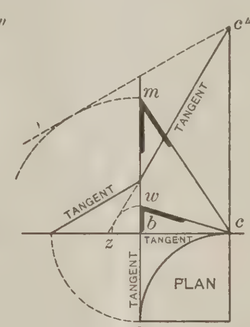


Fig. 98.—Two Unequal Tangents Inclined the Reverse of Fig. 97.

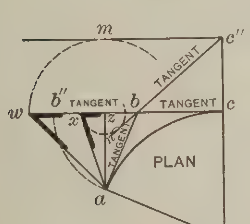


Fig. 99.—Finding Bevels for a Bottom Level Tangent and an Inclined Top Tangent Over an Obtuse Angle Plan.

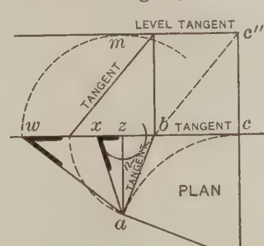


Fig. 100.—Finding Bevels for a Top Level Tangent and an Inclined Top Tangent Over an Obtuse Angle Plan.

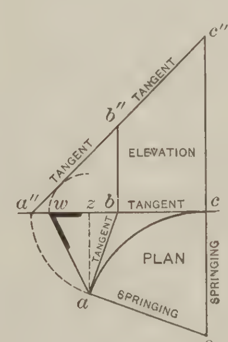


Fig. 101.—Equal Inclined Tangents Over an Obtuse Angle Plan.

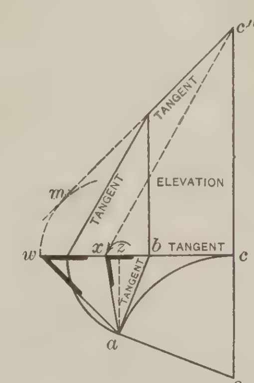


Fig. 102.—Obtaining Bevels for Unequal Tangents Over an Obtuse Angle Plan.

Some Problems in Stair Building.—XIV.

placing the compass in b; extend it to touch the line $c'' m$; turn over to w and connect w with a.

Note here also that the bevel shown at m is the same as the one shown at w, both altitude and base being the same.

These two examples represent wreaths over a cylinder placed at the junction of a flight and a level landing—Fig. 94 at a bottom landing and Fig. 95 at a top landing.

From the explanation just given it will be observed that for wreaths having tangents in the position represented in the diagrams the bevels are found in the angle formed between the inclined tangent and a vertical line as shown at c'' in Fig. 94 and at m in Fig. 95; also that they are to be applied in each case to the level tangent. One bevel only is required, owing to the plane being inclined in one direction only. The method demonstrated in these two figures to find the bevels is applicable in determining the bevels in all cases of wreath construction, as will be shown in the examples following.

In Fig. 96 we have a case where the two tangents have the same inclination. Place the compass in b; extend it to touch the tangent at x; turn over to w and connect w with c. The bevel will be found at w, and is composed of an altitude equal to the distance from b to the tangent at x and a base equal as in the two preceding figures to the plan tangents a b and b c.

Now, let it be understood that because the two tangents for the wreath represented in this figure are inclined, it calls for two bevels to square it—one to be applied at each end—and further, because the two tangents are inclined equally the two bevels also will be equal, so that in reality it will be necessary to find only one bevel, as, for example, the one shown at w in Fig. 96. This same bevel is to be applied to each end of the wreath, and in all cases where the plan tangents, as in this example, stand at right angles to one another, the bevels are to be applied reversely.

In Fig. 97 is represented a case of tangents inclining unequally. Here the bottom tangent is much steeper than the top one. By reason of the fact that the two tangents incline unequally, it will be necessary to find two unequal bevels—one for each end. Apply the same method to find them as in the preceding examples by placing the compass in b, opening it out to touch the upper tangent extended and strike the arc w m. As indicated by connecting w with c, the bevel which is to be applied to the top tangent is found at w. The reason why this bevel is to be applied to the top tangent is because its altitude represents the distance from the point b to the top tangent continued as shown by the arc at m.

To find the bevel to apply to the bottom tangent place the compass again in b, open it out to touch the dotted line drawn parallel to the bottom tangent from c'' to z as shown by the arc n z, and connect n with c. The bevel is found at n. It is to be applied to the bottom tangent because its altitude represents the distance from b to the line drawn from c'' parallel to the bottom tangent, as indicated by the arc described.

Many stairbuilders and some of considerable experience are often puzzled to know to which tangent the bevels belong. In this connection it should be remembered that the bevel in all cases belongs to the tangent from which its altitude is taken. Why it is so will be explained further on.

A position of tangents just the reverse of those in Fig. 97 is presented in Fig. 98, where the top tangent inclines much more than the bottom one. The same method of finding the bevels will apply in this case as in all preceding examples.

It may be well to here remark that the preceding examples represent all the variety of position tangents may possibly assume in actual practice. Inasmuch, however, as they all represent tangents over a quarter turn plan curve, and that other kinds of plan curves are often met with in practice, even if the tangents over the latter kind do assume the same relative position to one another as do the tangents in the preceding examples, the problem of finding bevels will be incomplete unless due notice be taken of the method for finding them over either a plan curve less or more than a quarter turn.

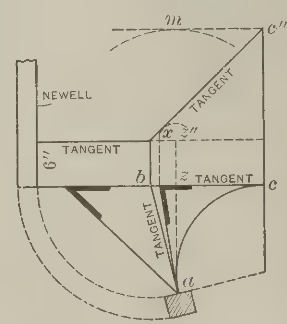


Fig. 107.—Showing How to Find Bevels for Tangents Over an Acute Angle Plan and a Curve Greater Than a Quarter Turn the Top Tangent Being Inclined and the Bottom Tangent Level.

In the diagrams which follow it will be shown that the same method of operation as heretofore explained is applicable to all conditions of plan and elevation of tangents. When a plan curve of a wreath is less than a quarter turn the plan tangents will form an obtuse angle with one another; that is, an angle greater than a right angle, as for example, that formed between the tangent a b and b c in Fig. 99. The plan curve in this example as from a to c is shown to be less than a quarter turn.

To find the bevels for a wreath over a curve less than a quarter turn where the plan tangents will form an obtuse angle, as in Fig. 99, the method heretofore explained will apply. The elevation of the bottom tangent a b is shown at b b'' to be a level line, and the elevation of the tangent b c is shown from b to c'' to be inclined.

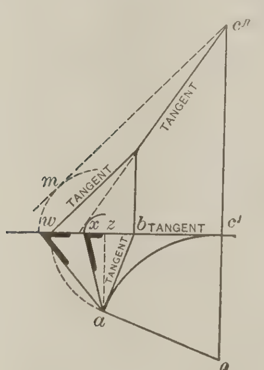


Fig. 103.—Finding Bevels for Tangents the Reverse of Those Shown in Fig. 102.

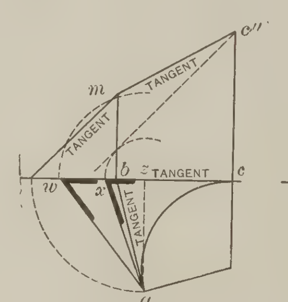


Fig. 104.—Finding Bevels for Unequal Tangents Over an Acute Angle Plan Tangent and a Plan Curve Greater Than a Quarter Turn.

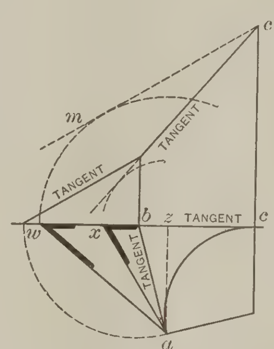


Fig. 105.—Finding Bevels Reversely Inclined to Those in the Previous Figure.

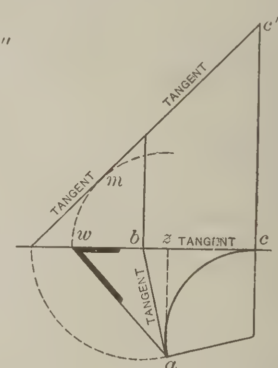


Fig. 106.—Finding the One Bevel Required for Two Equally Inclined Tangents Over an Acute Angle Plan Tangent.

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Place one leg of the compasses in z, open out the other to touch m and turn over to w, making the dotted arc shown, and connect w with a. The bevel will be found at w, and it is to be applied to the bottom level tangent $b\ b''$. Again place one leg of the compasses in the same point z, open out the other to touch the top tangent $c''\ b$, continued in n; turn over as shown by the dotted arc to x and connect x with a. The bevel will be found at a and is to be applied to the top tangent $c''\ b$.

We have the same plan for the curve and tangents in Fig. 100, but the elevation of the tangents is reversed. The top tangent in this diagram is level and the bottom one inclined.

We find the bevels in this case as in all the other examples. Place one leg of the dividers in the point z, open out the other to touch the top tangent continued in m and turn over to w. Connect w with a, and the bevel found at w is to be applied to the top level tangent at the end c''.

To find the bevel for the bottom inclined tangent draw a line from c'' through b continued as shown to n parallel with the inclined tangent. Now place one leg of the compasses in z, open out the other to touch the line $b\ n$ and turn over as indicated by the arc to x and connect x with a and the bevel is found at x. It will be observed that the method of finding the bevels as shown in this diagram is similar to the one in Fig. 99, and that the similarity is due to having the same condition of tangents in the two diagrams—namely, one level and one inclined. It matters not that the condition is reversed in the two figures, as it does not alter the nature of the plane upon which the wreaths in each case are assumed to be resting. The principle is that if we have the same plane we will also have the same bevels, because the bevels in wreath construction merely indicate the angle of inclination of such planes. It is something similar to a top bevel of a common rafter intersecting a ridge pole.

In Fig. 101 we again show the same condition of plan curve and plan tangents, but the two tangents as shown from c'' through b'' to a'' in the elevation are equally inclined, and therefore require only one bevel which will have to be applied to both ends of the wreath.

To find the bevel place one leg of the compasses in the point z, as in all the preceding diagrams, open out the other to touch the bottom tangent, as indicated by the dotted arc, turn over to w and connect w with a. The bevel is found at w.

The elevation of the tangents in Fig. 102 shows them to be unequally inclined over the same plan as that shown in Fig. 101. To find the bevels place one leg of the compasses in z, extend the other to reach the top tangent continued in m, turn over to w and connect w with a. The bevel shown at w is to be applied to the top tangent at c'' owing to its altitude, $z\ w$ having been measured from z to the top tangent continued to m, as shown by the dotted arc $m\ w$.

To find the bevel for the bottom tangent it is necessary to draw to it from c'' a parallel line as shown by the dotted line $c''\ x$. Measure its altitude from z to this line by placing one leg of the compasses in z, extending the other to touch the line as shown by the arc and turning over to x. The bevel is found at x by connecting x with a, and it is to be applied to the bottom tangent: that is, to the end a of the wreath.

As any further explanation of the method to find the bevels would simply cause unnecessary repetition, we present the diagrams, Figs. 103 to 107, inclusive, merely as illustrations of the varied relative conditions, the plan, and elevation tangents of a wreath are liable to assume in actual practice. The reader should be able to understand these figures and find the bevels for each example if he has paid due attention to the explanatory particulars accompanying the preceding figures.

Concrete Blocks Made without Sand or Gravel

Anothing striking demonstration of the merits of concrete for building purposes is found in the transformation which is taking place in connection with the industrial village of Mineville, near Port Henry, N. Y. The village is located near some rather extensive mines and is in the heart of what was once a great forest, but the collection of wooden shacks of which it was originally composed is gradually being replaced by buildings of concrete. One of the factors which was influential in leading to this rather extensive use of concrete was the possession by the mining company of a rather superior aggregate in the shape of the "tailings" or residue left after the separation of the ore. An immense heap of these tailings gives a seemingly inexhaustible supply of the aggregate, and tests have demonstrated that cement mixed with the run of tailings in the proportion of one to five produces a superior concrete block without the addition of sand or gravel.

Competition for Concrete House and Garage

The one branch of concrete construction which seems to have lagged behind the other in rapidity of development is in residence construction. While considerable progress has been made in this field recently, it is nevertheless to be observed that architects and builders have rather neglected the possibilities of concrete in the building of homes, notwithstanding the fact that a concrete house offers several advantages of fireproofness, permanency and low insurance. In this connection it is interesting to note that the Pittsburg Architectural Club has taken steps to encourage and stimulate the interest of the architectural profession in cement house construction. The club is at present sponsor for a competition for designs for a suburban concrete residence, which must not contain more than 50,000 cu. ft.

The competition is open to practically all the architects in the country, and six prizes, amounting to $500, are offered by the Universal Portland Cement Company.

The designs will be exhibited at the fifth annual art exhibition of the club, at the Carnegie Institute Galleries at Pittsburg in March, and the jury will consist of Edward Stotz, President Pittsburg Chapter American Institute of Architects; Henry Hornbostel, Dean Department of Architecture, Carnegie Technical Schools; Henry McGoodwin, Assistant Dean, Carnegie Technical Schools; J. Beatty Orth and D. E. Allison.

In making the reward the jury will consider the artistic quality of the designs, in regard to the materials used, the excellence of the plan and the practicability of the constructive details, and will endeavor to obtain a design in which the imagination and ideas of the designer, in regard to good architecture, are practically and successfully worked out. Drawings must be delivered to the Pittsburg Architectural Club not later than February 16, 1910.

New Publications.

Modern Lettering—Artistic and Practical. By William Heyny. Size, 10¼ x 7½; 136 pages. Profusely illustrated. Bound in heavy board covers. Published by William T. Comstock. Price, $2.00, postpaid.

This work consists of a course of lettering for architects, sign writers, artists and decorators, and at the same time shows the construction of pen-and-ink designs for commercial uses, letter heads, memorials, resolutions, business cards, etc. There are a number of full-page plates, all of which are accompanied by explanatory text divided into four main parts.

The first part relates to drawing materials and how to use the instruments; the second part has to do with practice work—the mechanical construction of letters and numerals, general rules for construction of letters, architects' single-stroke alphabets and lower case letters. In Part three the author discusses the alphabets, both practical and artistic, touching upon their history and proper use. In the concluding portion of the work the proper and artistic employment of lettering is discussed, together with the arrangement of letters, composition, spacing, harmony, etc., the grouping of words and sentences, designing of borders, business cards and other special matter.

Washington's New Building Code

The new code of building regulations which went into effect in the city of Washington on November 15, 1909, covers a number of rather interesting features. There is a provision for 9-in. party walls, without joist hangers, in new two-story buildings of brick or similar material not over 50 ft. long and 25 ft. in hight. Under the old building manual 13-in. walls were required inside the fire limits.

The new regulations prohibit the building of frame houses in rows outside the fire limits. The danger of the spread of a fire through a row of frame houses is explained as the reason for this requirement. It is also provided that double-frame houses can be built with frame party wall, but each double house must not extend closer than 5 ft. of the line of the adjoining lots. This will provide for a yard 10 ft. wide between each double house.

In the construction of apartment houses the new code provides that around each 1600 square feet of floor area either brick walls or walls of fireproof material must be constructed. An appeal was made to the commissioners by builders to enlarge this area, but, in the opinion of the district heads, this area was regarded as the maximum that could be allowed for safe construction and the proper regard for protection against the spread of fire.

Under the new light and ventilation regulations a dwelling covering the entire lot can be constructed on a corner lot which has no frontage on an alley and which is not more than 75 ft. long and 50 ft. wide.

There are also some additional requirements for five-cent and ten-cent theatres. A recent application at the office for the inspector of buildings for a permit for a ten-cent theatre that will seat 900 persons emphasized the needs for additional safeguards in the cheap theatres. For the theatres that will seat less than 300 persons the requirements of the new and old codes are the same. But for theatres that will accommodate over 300 persons side exits will be required, as in the larger theatres, and there must be passageways from these side exits to the street six feet wide, as against eight-foot passageways from the side exits of the big playhouses.

American vs. European Fire Losses

Any effort made to reduce the annual fire losses of the country deserves hearty commendation and support, says a recent issue of the Chicago *Tribune*. The drain upon the resources of the nation due to this cause is a tremendous one. It is an example of American wastefulness, which stands out in marked contrast with the results of European prudence.

Berlin has a population of about 3,000,000. Its average annual fire loss is about $150,000. Chicago has about 2,000,000 people. Its fire loss yearly now runs close to $5,000,000. The fire loss per capita for Germany, France, Switzerland, Austria ,Denmark and Italy combined in a stated period was 33 cents. In the United States for the same time the per capita loss was more than $2.25.

It is no wonder that European insurance rates are found to be much lower than those in this country. The illustration given in comparison are typical of many that might be mentioned. Much is said in the United States about the enormous cost of standing armies. The total fire loss of this country each year averages now about $200,000,000. That is $20,000,000 more than the entire German army costs. Estimating American losses on the basis of European safeguards, it has been declared that $175,000,000 of the amount is needless waste.

A good many people never stop to think of the bearing of a fire loss upon their own pocketbooks. They read of a destructive fire. They note the amount of the insurance and possibly the companies affected. They say "Too bad!" as they think of the unfortunate individual or firm. But they do not realize that the conditions making the fire possible are the factors in determining the rate they themselves have to pay upon their own homes. They seldom think that they are the real losers to a certain degree rather than the impersonal existence known as an insurance company.

The fire losses at Chelsea or San Francisco are not measured by the amount of insurance carried. The aggregate of investments in buildings in those places was great. But the disarrangement of business, and in cases its complete paralysis, brought far greater loss to the community than that covered by insurance or property figures. Hundreds of homes and thousands of workers felt the effect of the fire.

If agitation will bring better building laws and courage in enforcing them to the letter, much may be accomplished. The local community has much of the responsibility to bear. But it is quite likely that any actual advances in State or local legislation must be preceded by an earnest campaign of education.

Convention of Iowa Cement Users

The spring meeting of the Iowa Association of Cement Users is to be held at Cedar Rapids, Iowa, March 9, 10 and 11, with headquarters at the Montrose Hotel. In connection with the meeting will be an exhibition of cement machinery and products to be held in the auditorium.

CONTENTS.

Novelties.

Diamond Concrete Hollow Block Machine

Among the many candidates for popular favor in the way of concrete block machines much interest is being manifested on the part of architects and builders in an automatic machine for turning out self-lining, interlocking hollow concrete blocks, and manufactured by the Diamond Concrete Machinery Company, 311 Chamber of Commerce Building, Chicago, Ill. The claim is made that with these interlocking blocks an ordinary laborer can lay many more in a day than a high-priced could with ordinary blocks, for it is only necessary to make sure the first course is laid straight and level, after which all the other courses in the wall must be the same, and this can be accomplished, it is said, without using either line, level or trowel. The mortar is poured on the blocks in liquid form, and is retained in the hollow space, and cannot run down over the face of the block, as is ordinarily the case, thus saving time and trouble of cleaning off the blocks after the wall is laid. There is an opening left at the outside joints for tuck-pointing, so that it is unnecessary to scrape out the joints and fill in as with ordinary blocks. All joints on the inside of the wall are tight, and are said to give just the right kind of nailing places for attaching furring strips. If a solid concrete wall is desired the blocks can be laid up very quickly without mortar, the blocks being held in place by their interlocking device, then reinforcing rods can be placed in the holes, which come over each other, and the latter filled in with concrete. This, it is claimed, saves the expense of building "forms" and tearing them down again

Novelties. Fig. 1.—Diamond Concrete Hollow Block Machine.

after the structure is completed, also avoids the necessity of having to wait for the concrete to set. With the machine, a general view of which is presented in Fig. 1 of the engravings, the blocks are made face down, using ½ in. of fine, rich facing, and then the balance of the mold filled with wet concrete mixture. The block is then turned one-quarter over, the cores being drawn downward automatically, and the mold released from the block with one action of the levers without removing the hands from them. There are handles on the pallets for carrying away the blocks, thus saving the time of picking up and attaching a carrier. The molding box is closed and locked, ready for another block, with one action of the levers, while the cores are thrown into place by a foot lever without the necessity of laying down the tamper or using the hands. The face plates and end gates are interchangeable, thus permitting of the manufacture of a great variety of blocks. Attachments for making blocks 8, 10 or 12 in. in thickness can be used with the same machine. Every joint in the machine is adjustable, so the molding box can always be kept tight and true.

Nickerson's Double-Lock Joint Columns

The Nickerson Manufacturing Company, Knoxville, Tenn., is directing the attention of architects and contracting builders to a column which they make for interior use as well as for porches and other exterior places, and for which strong claims are made. The column involves the use of what is known as the Nickerson Double-Lock Joint, which is of such a nature, it is pointed out, that the column cannot come apart. A good idea of the construction involved may be gained from an inspection of Fig. 2 of the illustration, which represents a cross section of a column, clearly indicating the lock joint feature. The claim is made that even if one or more staves of a column are taken out the remaining ones are as securely locked as though there had been none removed, each joint being, as it were, a lock in itself. The company makes use of special ma-

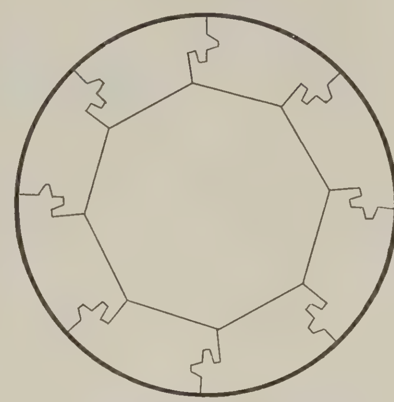


Fig. 2.—Nickerson's Double Lock Joint Columns. Horizontal Cross Section.

chinery and experienced workmen in the manufacture of its columns, and particular attention is given to the shape of the completed column.

A New Safety Cutter Head

Improvements are constantly being made in woodworking machines, with a view to facilitating the execution of the work, while at the same time safeguarding the operator from accident while in the discharge of his duty. In a woodworking shop probably the most dangerous machine tool is the hand planer, and as confirming this statement it has been said that more fingers have been lost in operating hand planers than by any other single type of tool. With a view to maximum safety to the operator the J. A. Fay & Egan Company, 221 to 241 West Front street, Cincinnati, Ohio, has lately introduced a new circular cutter head for hand planers and jointers, an end view of which is presented in Fig. 3 of the engravings. The device closely fills the opening between the tables, so that the most severe accident that could possibly happen would be the scraping of a finger or thumb. This new head is made from a solid piece of crucible steel, which is first roughed on a lathe to the desired circumference and then ground accurately to size. Afterward the seats for the two knives are milled into the steel body. High-duty tungsten steel knives are used on the cutter head, and are held in the milled slots by special blocking, which is wedged against them by sets of cup-head clamp screws. The design is such that the cutting edges of the knives protrude but slightly from the circumference of the cylindrical-shaped head, and thus permit the tables to be set very close to the cutter. This new safety circular cutter head is illustrated and described at

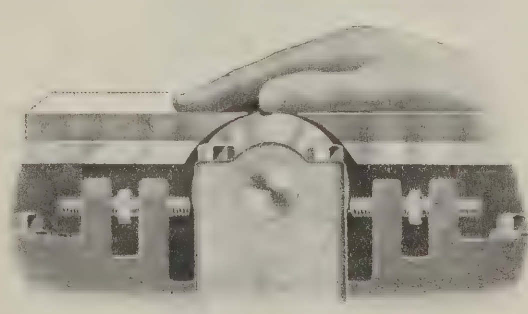


Fig. 3.—A New Safety Cutter Head.

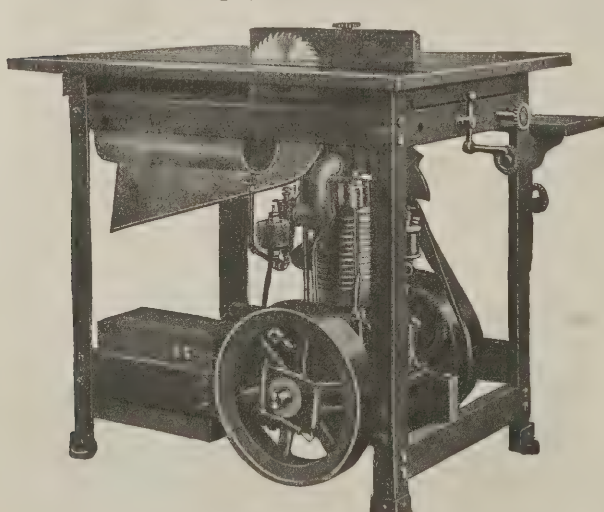
considerable length in Catalog No. 81, which the company will send to any reader sufficiently interested to make application.

Hydrolithic Cement Waterproofing

One of the questions constantly arising in connection with important building operations at the present day, and especially in connection with those portions of the structure which are below ground, is the rendering of the work impervious to the entrance of moisture. In the case of basements and cellars it is, of course, imperative that they should be kept dry and free from dampness. This is usually accomplished by the use of some method of waterproofing treatment, many of which are now in the public eye. One of the systems which is being extensively employed, and which is giving highly satisfactory results, is known as "Hydrolithic Cement Waterproofing," introduced by the Waterproofing Company, 147 East Thirty-fifth street, New York City, and with branches in Boston, Mass., and Pittsburg, Pa. The company acts as consulting engineer and contractor for waterproofing of every character, not restricting itself to any particular method or special kind of material, but is prepared to submit estimates and carry out contracts for any kind of waterproofing specified by the contractor or engineer. It is, however, the manufacturer of Hydrolithic Cement, and makes a specialty of "cement waterproofing," advocating cement only, however, when its use is considered to be of advantage to the client. Waterproofing with Hydrolithic Cement has been used in connection with some of the largest buildings in New York City, and in a very attractive pamphlet which the company has issued illustrations are given of some of these buildings, together with sectional views, showing just how the work was done. There are also specifications for waterproofing, together with directions for application of the Hydrolithic Cement in special places. Another interesting feature is the formula which the company has adopted for reinforcement against shrinkage in concrete, the formula applying to a 1 : 2½ : 5 concrete reinforced with twisted rods.

The Grimm Woodworker

A machine in which carpenter-contractors and builders operating a shop of their own cannot fail to be interested is illustrated herewith. It is known as the Grimm Woodworker, and is of such a nature as to practically constitute a portable planing mill, as its capacity is such that it generates its own power and is always ready to be used as a rip, cross-cut or jig saw, a boring machine, a jointer, molder, shaper, planer and sander, as well as to cut grooves. There are nine attachments, which are readily secured in place by means of hand wheels, or by the use of two wrenches supplied with every machine. The Grimm Woodworker represents the results of much experimentation on the part of the maker, who has had 15 years' planing mill experience and five years' experience as a contractor and builder. The idea was to produce a machine that would save both time and labor and to stand the wear and tear of the carpenter shop as well as the carting from one job to another. The machine here illustrated weighs only 350 pounds complete; can be taken into any door or up any flight of stairs by two men, requires no special foundation, does not even have to be secured to the floor, and can be used on the job in the morning and back again in the shop in the afternoon. Fig. 4 of the illustrations shows the machine ready to be used as a rip-saw, while Fig. 5 shows it as a boring machine, the boring apparatus consisting of a sliding carriage working upon a vertically-adjustable table, which supports the material to be bored. The bits used are the ordinary machine bits and fasten with a set screw. The frame of the machine is constructed of angle-iron legs and wooden girders securely bolted together, thus making a light and rigid frame. The table top is composed of narrow strips of ash glued and bound with iron to prevent warping. By simply turning a hand wheel the top may be raised and lowered according to the thickness of the wood to be worked, the top remaining level at all positions. The mandrel is of machinery steel, and runs in a cast iron yoke with long babbitt metal bearings. As a rip-saw the machine will cut up to 4 in. in thickness, so that 8-in. lumber can be cut by turning the material and resawing. The rip-saw furnished with the machine is of standard make, 8 in. in diameter, although the machine will accommodate saws up to 12 in. in diameter. The point is made that contractors find the rip-saw feature especially valuable in cutting grounds, bridging, sizing and in utilizing material that would otherwise become waste. The saw mandrel is fitted to receive molding knives, of which eight pairs are furnished with the machine. It is also supplied with a patented dado head and groover, and is adjustable in width from 1/16 in. to 1⅛ in. Any material having a thickness of 3¾ in. or less can be jointed or straightened by means of the jointer attachment. The jointer can also be used in connection with the rip-saw, thus enabling the operator to joint and straighten material being worked, as well as to size it and joint the outer edge, thus completing the work without the necessity of rehandling the material. The sand disc is applied to the right hand of the mandrel, the compression ring that holds the paper being easily removed for renewal. The Grimm Manufacturing Company, Buffalo, N. Y., maker of the machine here illustrated, states that the power is generated by a gasoline motor, conveniently placed under the table and securely supported by the frame and legs of the machine. The transmission is by a leather belt, which may be set at any desired tension by use of a tightener operated by a hand wheel. The motor is of the four-cycle, air-cooled type, generating 3 horsepower, and capable, it is claimed, of running a machine at an even speed under all loads. A gallon and a half gasoline tank is secured directly beneath the table top, and under ordinary condition is said to be sufficient for one day's operations. The general arrangement of parts is clearly shown in the illustrations. The worker is made in two styles, of which the smaller is here illustrated. The hight is 33 in. and the top 24 x 32 in. The other style of machine is 8 in. larger and more powerful, being equipped with a double-cylinder opposed motor, thus affording a capacity for handling heavier work.



Novelties. The Grimm Woodworker. Fig. 4.—The Machine as a Rip Saw.

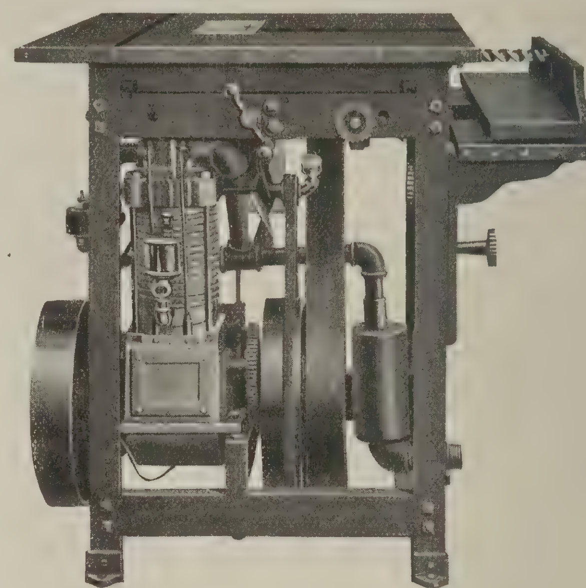


Fig. 5.—The Machine for Boring.

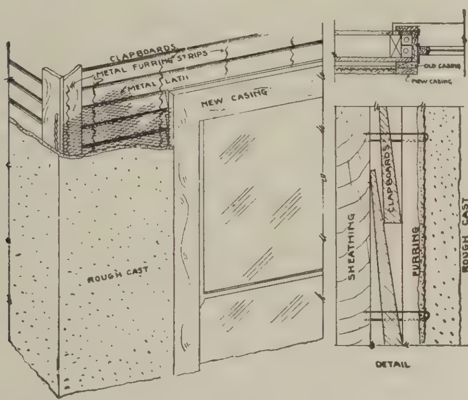
The Smalley & Trulin Improved Two-Piece Block Machine

Among the many machines upon the market for producing building blocks adapted to a great variety of purposes, special interest centers in the new improved two-piece block machine which is being manufactured by the Smalley & Trulin Artificial Stone Company, Panora, Ia., and with factory at Des Moines, the same State. The claim is made that with this machine 288 styles and sizes of blocks can be produced, and that its construction is such that it can be changed to any size or style in the space of two minutes' time. The machine has a capacity for making two 4 x 8 x 24-in., or two 5 x 8 x 24-in., or two 6 x 8 x 24-in. blocks at each operation. The point is made that two 4-in. blocks anchored close together in the machine causes dampness to travel 16 in. in order to pass through, and the wall in which the blocks are used will have two air chambers extending from cellar to garret; two blocks anchored 1 or 2 in. apart make one continuous air chamber additional, thus giving three extending the entire hight of the building.

With the machine can be made octagon blocks of any size, curbing and veneering blocks—it is in effect three machines in one, either down-face or side-face, as may be desired. The blocks made range from 4 to 24 in. in length, and 4 to 12 in., inclusive, in width. The machine has 68 attachments; is referred to as simple and durable in construction, and easily operated. An illustrated folder which the company has issued illustrates and describes the machine at length, and shows some of the styles of block manufactured and the manner in which they are used in a wall. The company states that it has a brick machine that turns out 10 bricks at once, with round or square edges as may be desired.

Cement-Mortar Coated Houses

In an attractive pamphlet sent out by the Northwestern Expanded Metal Company, 930 to 950 Old Colony Building Chicago, Ill., the merits of the "Kno-Burn" Expanded



Novelties. Cement-Mortar Coated Houses. Fig. 6.—Applying Plaster Over Old Siding.

Metal Lath, in its special adaptation for use in connection with cement-mortar coated houses, are set forth at considerable length, and in a way to interest architects, contractors and builders the country over. The title of the little work is "Overcoated Houses," and the statement is made that this is a term applied to old frame or brick houses which have been refinished on the exterior by applying cement mortar to "Kno-Burn" Expanded Metal Lath. The point is made that old houses treated in this manner have all the advantages of new stucco or cement plaster construction, while the outward appearance is brought up to date without necessarily interfering with the old interior

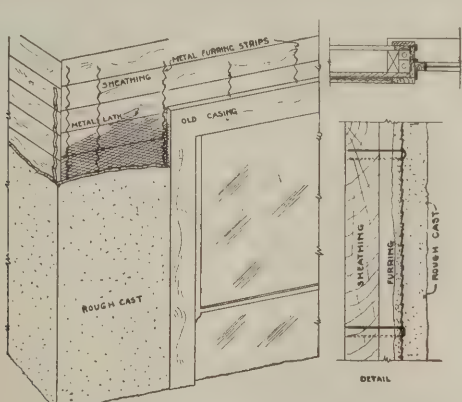


Fig. 7.—A Case Where the Weather Boarding Is Removed and Furring Stapled to the Old Sheathing.

arrangement. The company emphasizes the fact that in order to secure the best results the exterior plastering should be applied to heavy gage expanded metal lath, preferably No. 24, and coated with a good quality of pure carbon paint. The metal lath should be furred from the studding or sheathing by means of crimped steel bands, so as to make sure that a good key is obtained and that the plaster be kept away from the wood. When applying the plaster over old siding it is necessary to bring out the door and window trim to an even surface with the plaster, as indicated in Fig. 6 of the accompanying illustrations. Here the details of construction are so clearly indicated as to call for no extended comment. Where it is undesirable to put on new trim the weather-boarding may be removed, and the furring stapled to the old sheathing as indicated in Fig. 7. In still other cases the trim is entirely removed and the lath is brought around the casing, as illustrated in Fig. 8, thus securing a recessed window but with no wood showing. An interesting example of the application of the company's metal lath is found in connection with low-cost summer houses, which are built of frame in the usual manner, and then coated on the outside with plaster or

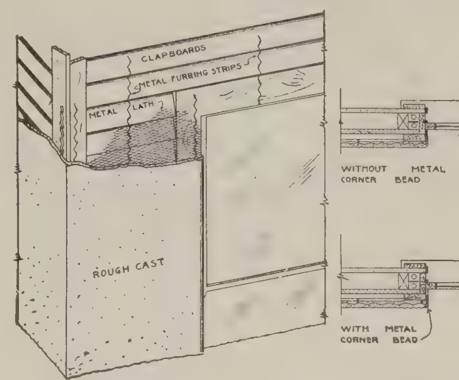


Fig. 8.—A Case Where the Trim Is Entirely Removed.

stucco applied to metal lath. In the pamphlet referred to are some interesting comments regarding the subject of plaster, followed by formula for cement plaster.

Besser Continuous-Paddle Concrete Mixer

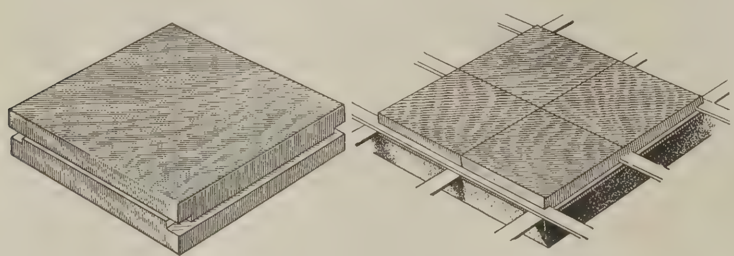
A concrete mixer embodying a number of interesting features is the Besser Continuous-Paddle Mixer, illustrated in general view in Fig. 9 of the engravings. The point is made that this mixer contains several exclusive features of advantage which appeal to every man who uses or mixes concrete in any form. The machine is provided with three hoppers which are so constructed that they measure any and all kinds of material, either wet or dry, in any proportion or capacity, and these proportions or capacities can be changed within a wide range or stopped instantly according to requirements. The hoppers are large at the bottom, and the claim is made that material will not bridge over. The arrangement of parts is such that the material is carried to a point where it drops into the mixing trough by a slide, and as there are only three slides to the bottomless measuring box it is impossible for stones to catch or do any damage in its backward movement, as is often the case with other forms of construction. Another point emphasized by the company making the Besser is that by means of the shape of the hoppers used the driest sand or cement cannot flush through faster than it is measured. The hoppers, it is stated, are low down, and the discharge end is 24 in. above the ground, thus giving plenty of room to run a wheelbarrow under it. All parts of the automatic measuring hoppers and the material as it enters the mixing trough are in plain view at all times, a feature which cannot fail to be appreciated. The paddle shaft is square, and the mixing paddles are merely strung on it, so that to replace a broken one is only the work of a minute. The company's 30-yard machine is especially adapted to be run by hand where the users do not care to install power at the outset. The Besser Manufacturing Company, Ninth street, Alpena, Mich., who makes this machine, state that it has

Fig. 9.—The "Besser" Continuous-Paddle Concrete Mixer.

given this mixer very severe tests with damp molding sand, with results that were in every way satisfactory. The claim is made that in mixing any proportions from 1 to 1 up to 1 to 16 can be instantly secured and without the necessity of emptying the hoppers. The company points out that it also makes hand and power cement drain and sewer tile machines, block and brick machines, as well as machines for producing fence posts, etc.

Steel-Woven Wood-Block Flooring

The question of fine hardwood floors in buildings of fireproof construction is one which has received no little attention in the past and many have been the methods advocated for satisfactorily solving the problem. One form of construction which is said to be very popular wherever introduced and for which strong claims are made is that of the Wood-Mosaic Flooring & Lumber Company, Rochester, N. Y., and New Albany, Ind., and illustrated herewith. This flooring is made of blocks about 1 in. in thickness and 4 in. square, the blocks being grooved on all four sides and are threaded on the floor on to strips or bands of steel. An inspection of Fig. 10 of the illustrations shows one of the blocks before and after it is placed into position in a floor. The side grooves are slightly lower than the end grooves, so that as the grain of each block is turned at right angles to that of its neighbor there is a sort of basket weave to the steel strips which gives to the entire floor the effect of a solid heavy mat. The weight of the flooring is such as to hold it in place and the point is made that it is very nearly noiseless to walk upon. The floor not being attached to the concrete in any way permits of expansion and contraction with variations of temperature, compression strips close to the wall taking up the expansion, thus resulting in a perfect floor under all conditions. An idea of the popularity of this style of floor may be gathered from the fact that it is used in the new Custom House in New York City; in the President's suite of offices in the Naval War Building at Washington; in the Lambs' Club, and St. Luke's Hospital, New York City, as well as in many other localities.



Novelties. Fig. 10.—Steel-Woven Wood-Block Flooring.

Pullman Double Extension Bolt

The Pullman double extension bolt, which is being placed on the market by the Pullman Manufacturing Company, Rochester, N. Y., is used for casement windows and French doors. The bolt is made to do the same work as any surface casement or French door bolt, eliminating somewhat the expense of metal on the surface of the door. The entire bolt shown in Fig. 11 is concealed in the door, with only a small knob or lever handle visible. The door is locked at both top and bottom with one-quarter turn of the handle. Fig. 12 shows application to two styles of meeting rails. Each bolt is packed in a box 5¾ x 2¼ in., and shipped without the ¼-in. rods, the prices, of course, being made accordingly. This arrangement is made to facilitate the shipping and at the same time avoid the necessity of merchants sustaining a loss, or the customer having to pay extra charges on account of specifications which call for bolts of odd lengths.

Pullman Double Extension Bolt. Fig. 11.—General View of Bolt.

Coal Chutes for Dwellings

The Majestic Foundry Company, Huntington, Ind., has issued an illustrated folder setting forth the merits of the several lines of coal chutes which it is offering and for which strong claims are made. Special reference is made to the "Majestic," which is offered in three sizes, and is intended to be placed in the cellar wall the same as a window for depositing coal, wood or vegetables into the cellar. The construction is such that the hopper may be easily removed if it is desired to put in very coarse coal or wood, or if a wagon chute is used. It swings back into the chute and allows the door to close. The body of the chute is made of heavy steel and the door and frame of cast iron. The door is made to lock when opened upward, and can only be released when closed. The "Model" chute is another style made by the company, and this is fitted with what is known as "rubber glass"—a non-breakable translucent substitute for glass, and is used for affording light to the cellar, as it serves the double purpose of a coal chute and window. The steel shield protects the glass when putting in fuel, and when not in use lays in the bottom of the hopper. If desired, the glass can be removed and wire screen used instead. Another pattern made by the company is the "Pittsburg" chute, constructed of steel, and is intended for use where very coarse coal or wood is burned as a fuel. The door is made of No. 10 boiler plate, the frame of heavy cast iron and the body of No. 16 sheet steel. The door is automatically locked on the inside by a heavy gravity latch.

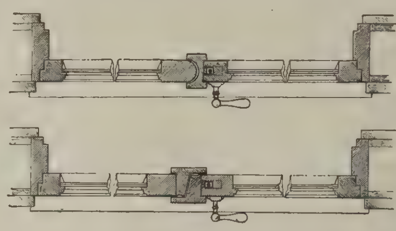


Fig. 12.—Application of Pullman Double Bolt on Two Styles of Meeting Rails.

"Union" Combination Saw No. 8

The Seneca Falls Manufacturing Company, 209 Water street, Seneca Falls, N. Y., has added to its already extensive assortment of woodworking machinery the Improved No. 8 "Union" Combination Saw, shown in general view in Fig. 13 of the engravings, and which has been brought out to supply the demand for a well-made light power machine at a low cost. Ever since various kinds of small engines and motors have become more generally employed in woodworking establishments the demand for machines

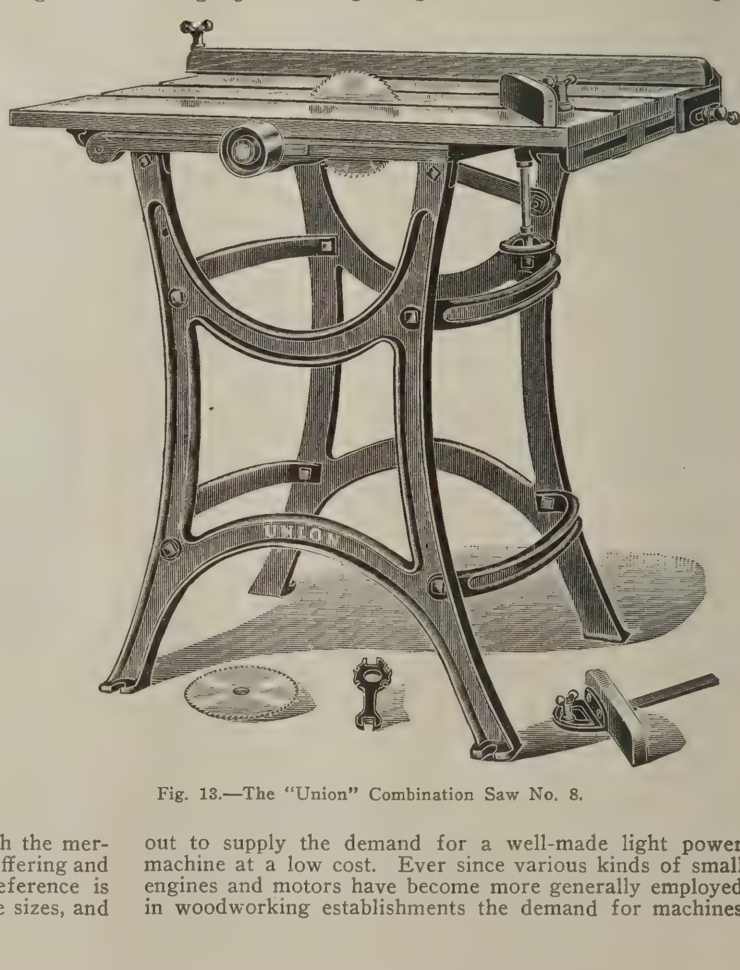
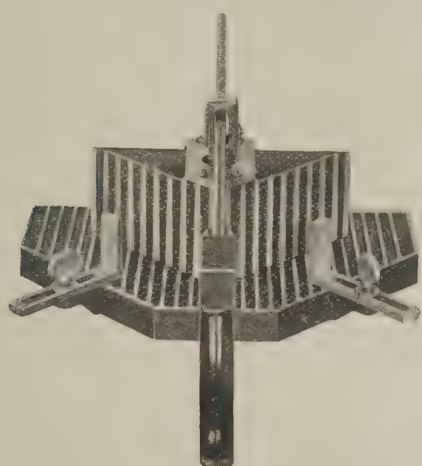


Fig. 13.—The "Union" Combination Saw No. 8.

of this kind has steadily increased. The arrangement is such that the engine may be belted directly to the saw, thus giving a compact outfit at a small cost. The machine is made with a strong and rigid iron frame, steel arbor and babbitt-lined boxes, which are adjustable. The combination wood and iron table top is 28 in. wide by 36 in. long, the middle portion of iron, being 10 x 36 in. in area, and having in the center two hardwood strips fitted one on each side of the saw. The table is hinged at the back, and can be adjusted up or down by the hand screw in front for rabbeting, grooving, dadoing, etc. The "Union" boring attachment, as well as the "Union" molding attachment, can be used on this machine, and either can be attached almost as easily and quickly as changing saws. The machine here shown is suitable for ripping up to 3½ in., also for cross-cutting and mitering, and with the attachments for boring, grooving, edge molding, dadoing, etc.

The Star Miter Box

A miter box, embodying a number of interesting features of construction, and for which strong claims are made by the maker, is that which is being introduced to the atten-



Novelties. The Star Miter Box. Fig. 14.—Tool in Position to Saw a Pair of Miters.

tion of the trade by the Star Miter Machine Company, Rockford, Ill., and illustrated herewith. The point is made that the tool is small enough to put in a satchel; that the space on which to place the work for a square is 12 x 4½ in., and for mitering positions 11 x 4½ in. The guide and block is fitted for a 3½ x 14-in. standard size saw, but the company can furnish special lengths up to 18 in. The size shown in the illustrations is sufficient for ordinary use and for rooms and electric wire moldings. It is claimed to be a most convenient tool to carry, as it weighs only 12 lb. complete with the saw and attachments. In Fig. 14 of the illustrations the tool is shown in position to saw a pair of miters at the same time, while in Fig. 15 is shown how any miter or fraction can be cut with accuracy. In order to obtain good results with any tool it is necessary to hold the work firmly while the cutting is being done. This is accomplished by a pair of quick-adjusting and sensitive clamps, that are ground off a triffle, so that when brought

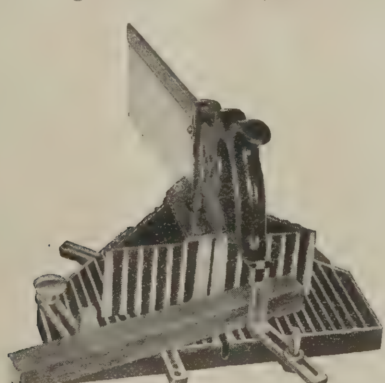


Fig. 15.—Showing How Any Miter or Fraction Can Be Cut with Accuracy.

against the work and raised to a square before clamping it will draw the work to the base plate, thereby holding the work firmly in position. The point is made that it will clamp from the smallest up to a 3-in. cube, and that the operator can saw a miter on a piece of work less than ½ in. in length. The company claims that by its new method in guiding the saw is given a natural tilting position, thus preventing jumping and tearing through the work, as is done in a two-guide box, due to the unnatural or horizontal position of the saw. The use of every point of the saw is another feature tending to superiority, and at the same time saving both time and money in producing the same amount of work while reducing the weight, both on the saw and box without loss in results. The claim is also made that the saw will work equally well from both sides, and can be raised and pushed forward, so as to leave it free for any adjustment without removing the saw.

Sanford Down-Face Hollow Block Machine

A machine for turning out hollow building blocks and embodying a number of novel features of construction which cannot fail to interest architects and contracting builders alike, is that illustrated in Fig. 16 of the accompanying illustrations, and made by the Sanford Concrete Manufacturing Company, 911 and 913 Jefferson avenue, Toledo, Ohio. This machine is known as the New Sanford No. 5, and the point is made that it operates either face up or face down, or all four sides at once. The top as well as the bottom plates are interchangeable, so the press can be operated either way. Each plate is held in position by four heavy cap screws, so that they cannot shift. The mold box can be adjusted from 6 x 2 x 4 in. in the different designs to 8 x 12 x 24 in. The illustration herewith shows the automatic cores in position the same as when a block has been pressed, the amount of compression obtained, and in fact, every detail of the mold box. The cores are moved into proper position for loading by an automatic arrangement that is placed in operation when the doors of the mold box are opened. They then remain in position until the mold box is closed, filled with material and the pressure applied, when they are forced down to the center of the block by the material under compression. In this way a block is pressed as hard below as above the cores. In the construction of this machine the pallet forms no part of the molding box. It is stated that the "Sanford" will also make well-curbing, silo and cistern blocks, and there is an outfit for making blocks for chimneys. A very attractive catalog which the

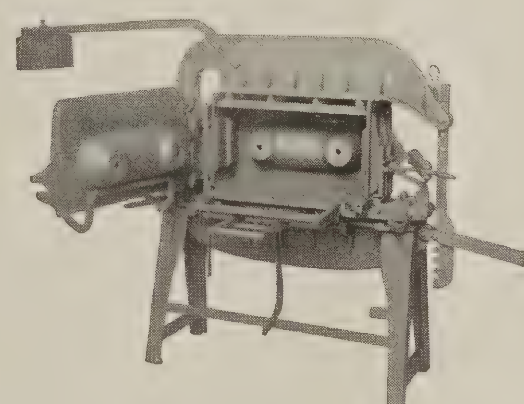


Fig. 16.—The Sanford Down-Face Hollow Block Machine.

company has issued shows various views of the New Sanford No. 5, together with the specialties in the way of concrete-working machinery for which the company acts as sales agent. These include cement roofing machines, brick machines, concrete mixers, wheel barrows, concrete carts, tile machinery, etc., etc.

Graphite as a Lubricant

The Joseph Dixon Crucible Company announces the publication of *Graphite as a Lubricant,* eleventh edition. This is just off the press, being the edition for 1910. Every two or three years the Dixon Company republishes *Graphite as a Lubricant,* which has become a standard work with them. Each new edition is thoroughly revised and brought fully to date. The present edition is more compact than its predecessor, the idea being to concentrate the information into quick, convenient form that is not bulky. The power house engineer will find the newest edition of *Graphite as a Lubricant* of considerable value to him, since it deals especially with the lubrication and treatment of power house machinery. Some thought has been put upon the appearance of this last edition, and big, readable type with liberal margins obtains throughout the 64 pages of the book; easy to read and worth reading. A free copy of this eleventh edition of *Graphite as a Lubricant* sent free to anyone interested in machinery and better lubrication. Address Joseph Dixon Crucible Company, Jersey City, N. J.

Notes on Mastic Roofing

Some very interesting information concerning Mastic Roofing is contained in an illustrated booklet sent out by the National Roofing Materials Company, Edwardsville, Ill. The point is made that "Mastic" is not a paper roofing, and is not offered in competition with coal tar or other straight felt goods. The claim is made that it properly belongs to the same class as tin, slate or shingles. Standard Grade Mastic Roofing is made on a specially woven jute canvas base, which is used to insure proper tensile strength and elasticity. The canvas is thoroughly saturated and heavily coated on both sides with the company's non-drying gum composition, which latter, it is pointed out, possesses the water-turning properties of rubber, but does not deteriorate with age and exposure. The body thus formed is given a backing of long fiber wool felt, also thoroughly saturated with the composition, and finally the wearing or weather surface is coated with a mixture of sand and ground mica. On the extra grade, in addition to the above, the canvas and its coating are overlaid with a heavy felt, also saturated and coated. The goods are made entirely in the factory, and require no coating or painting of any kind. The claim is made that this form of roofing is a perfect non-conductor, is a protection against fire from outside sources, and while not absolutely fireproof—being rated as a very slowly combustible—it secures for buildings covered with it—all other conditions being equal—the same insurance rate as if covered with metal, slate or tile. In the booklet in question there are numerous half-tone illustrations of buildings in connection with which the company's roofing has been used. There are also directions for laying the roofing, and the statement that it is made in sheets 32 in. wide and 40 ft. long, each roll being sufficient to lay 100 sq. ft. net, allowing for a 2-in. lap. Architects and contracting builders who are interested in this company's product can secure, on application, a sample of the roofing with a copy of the booklet.

Trade Notes.

American Woodworking Machinery Company, 591 Lyell avenue, Rochester, N. Y., is distributing among its friends in the trade a poster calendar for the new year, which is of a nature to prove both ornamental as well as useful. The various leaves are bound at the top with a metal strip provided with a metal loop for suspending upon the wall. In the center of each sheet are the figures for the days of the week and month, while in smaller type, at the right and left of it, are calendars for the month following and month preceding—a convenience which cannot fail to be greatly appreciated. Arranged across the top of each sheet is a half-tone group of pictures representing the various plants of the company, while scattered partially around the central panel are pictures of leading wood-working machines, each designated by a number, followed by mention of salient features. Across the bottom of each sheet are the names and addresses of the company's branches.

The January issue of the "Advocate," published by the Cortright Metal Roofing Company, 50 North Twenty-third street, Philadelphia, Pa., presents as one of its leading features a calendar for the first six months of 1910, the peculiar feature being the arrangement. The panels for the several months are arranged in a way to constitute a frame for a bust portrait of a young lady whose hair is arranged in two long braids. The display occupies an entire page of the "Advocate." Naturally the descriptive matter within the covers relates to roofing, and some of the half-tone engravings represent Southern residences which are covered with Cortright shingles. This is the beginning of the sixth year of the "Advocate's" existence, and we understand that a copy will be sent free to any one who is sufficiently interested in building matters to make application for it.

The very attractive catalog which has recently been issued by the Lefevre-Deslauriers Roofing & Cornice Company, 311 Chestnut street, St. Paul, Minn., shows sheet metal column molds which can be furnished in all diameters, from 12 in. to 32 in., made from No. 18 galvanized iron. It also treats of the use of No. 22 gauge corrugated steel sheeting for floor slab centering, and presents several pages of half-tone engravings showing the character of the buildings in which concrete columns and floors have been used, and in which the company's devices have been employed.

The Crescent Fixture Company, Grand Rapids, Mich., is erecting a new factory building, which will be divided into two sections, one of which will contain a complete equipped wood-working shop and the complete metal-working machine shop. The wood-working department will be used for the manufacture of a line of knock-down, interchangeable fixtures, for displaying articles of merchandise in show windows, and the metal-working department will be used to manufacture the Economy meat slicer, garment-locking devices and metal window fixtures.

An exceedingly neat and attractive calendar, mounted on a heavy card and bound with an artistic cord is being distributed by the Majestic Furnace and Foundry Company, Huntington, Ind., manufacturers of the Model Window Chute. This calendar is far more pleasing than the average issued by the trade, and is especially adapted for the home. Incidentally it bears on the back, consequently inconspicuously, a few words with regard not only to the "Model" chute but the "Majestic" and Pittsburgh" chutes, which they claim are built strong enough to withstand the abuse of the roughest coal heaver.

A. & G. Bohem, manufacturers of architectural sheet metal work of every description, Fifteenth and Federal streets, Philadelphia, have recently been awarded contracts for a large skylight for the Dobbins Garage, skylight and copper work for the Drexel apartment house, copper and skylight work for St. Francis de Sales Church, metal cornice work for the L. O. Caulk Building, Milford, Del., and copper and skylight work for the Nelson Valve Company's Buildings, Wyndmoor, Pa. Messrs. Bohem during the past year have furnished the metal and copper work on about 1000 dwellings and 8 apartment houses in this vicinity, and state that while immediate business is seasonably quiet, the outlook for 1910 is bright.

The Raymond Concrete Pile Company, 140 Cedar street, New York City, has just been awarded the contract for the complete foundations, including excavation, concrete piling, concrete footings, curbs, etc., of the warehouse building for E. S. Shepherd of Chicago. The architects of the new building are Ottenheimer, Stern & Reichert of Chicago. The company has also secured the contract for the concrete-pile foundations of a building at Twenty-fifth street and Michigan avenue, Chicago, for R. M. Fair. The architects are C. W. and George L. Rapp.

The Aberthaw Construction Company, of Boston, has received the contract for an additional building four stories in hight, 180 ft. long, for the Pierce Arrow Motor Car Company, Buffalo, N. Y. The new building will match the rest of the plant in general design and is to be absolutely fireproof reinforced concrete construction throughout.

Walter L. Sanford, manager of the Chicago office of E. C. Atkins & Co., Indianapolis, died at his home in Chicago, December 17, aged 55 years. He had been actively engaged in the hardware trade all his business life, and entered the employ of E. C. Atkins & Co. nine years ago as general salesman, and later was promoted to the office of Chicago manager.

Samuel H. French & Co., Philadelphia, Pa., have been distributing a very convenient and useful memorandum calendar for 1910, the general appearance and make-up being similar to those which it has been the custom of the company to distribute each year for a long time past. Each leaf is arranged for six days, with a space for memorandum purposes, and at the top of the sheet is the name and address of the company, with an indication of some one or more of the many lines handled. The calendar is in the form of a pad, having a metal swivel by which it may be suspended. It is backed with a heavy card, giving a list of the company's specialties and also a classification of mail matter with rates.

One of the first calendars for the new year to reach us is that from the Universal Portland Cement Company, Chicago, Ill., and Pittsburg, Pa. It is of the poster type, with metal strips at top and bottom, and an eye for hanging it upon the wall. The upper half of the poster is a panel printed in imitation of pebble-dash finish, and with such fidelity to detail as comes from direct reproduction from a photograph. From the lower portion of the poster are suspended the leaves for the 12 months of the year, the printing being in white letters and figures upon a grayish background. There is also a counting-house calendar for the year.

The American Electric Heater Company, Detroit, Mich., has issued circulars setting forth in comprehensive style the merits claimed for the "American" Electric Glue Pots, which are referred to as being economical, durable, absolutely safe and efficient. The glue pots are made of cast iron for factory use, are substantially built and are, therefore, very durable. The heating element is attached directly to and surrounds the inner wall of the vessel or reservoir, while the outer casings completely enclose and protect the element. Attention is also drawn to the "American" Electric Luminous Radiator, which is referred to as "a portable fireplace without flame."

EXTERIOR VIEW, SHOWING THE PLATE GLASS CORNICE EFFECT

VIEW IN DINING ROOM LOOKING TOWARD BUFFET AND FIRE-PLACE

RESIDENCE WITH PLATE GLASS CORNICE AT WATERBURY, CONN.

GRIGGS & HUNT, ARCHITECTS

The Building Age

NEW YORK, MARCH, 1910.

Residence with Plate Glass Cornice at Waterbury, Conn.

(*With Supplemental Plate.*)

IN designing buildings of various kinds the architect is constantly called upon to solve unique problems, especially in connection with dwelling houses where individual taste, in addition to family requirements, constitute a most important factor. One of the most interesting cases of this kind which has recently come to our notice is that in connection with a private residence having a deep overhang of cornice which tended to darken to some extent the sleeping rooms of the second story. In considering the original plans the architect's client objected to the overhang of the cornice for the reason stated, but in order to overcome the difficulty by ordinary methods of design it would be necessary to raise the roof or narrow the cornice very materially. It was evident that either of these schemes would destroy the lines of the house, and as the residence was of a somewhat pretentious character, striking in its exterior treatment and clever architectural management, some other means of accomplishing the purpose had to be sought.

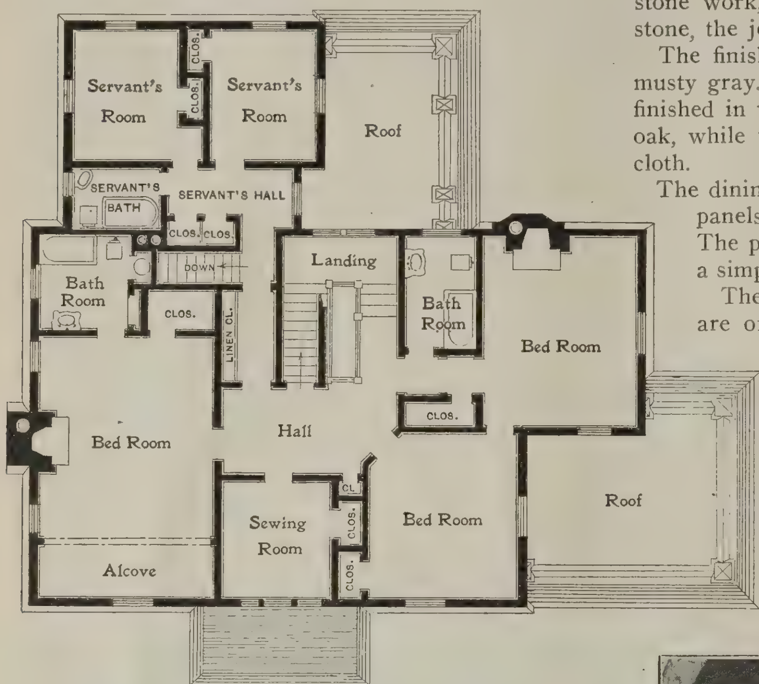
It was finally decided to use plate glass for the overhang of the cornice, this affording all the light that could be desired and at the same time, owing to the thickness and quality of the glass used, would give the required strength, while the highly polished surface kept it free from accumulations of dirt. At the same time this treatment gave an unusually striking architectural result; in fact, instead of detracting from the appearance of the house, it added an individuality which can readily be applied in connection with many residences of the better class, and at the same time the additional cost would be only a few hundred dollars.

General View of Residence Showing Cornice Effects—Direct Reproduction from a Photograph.

Residence with Plate Glass Cornice at Waterbury, Conn.—Griggs & Hunt, Architects.

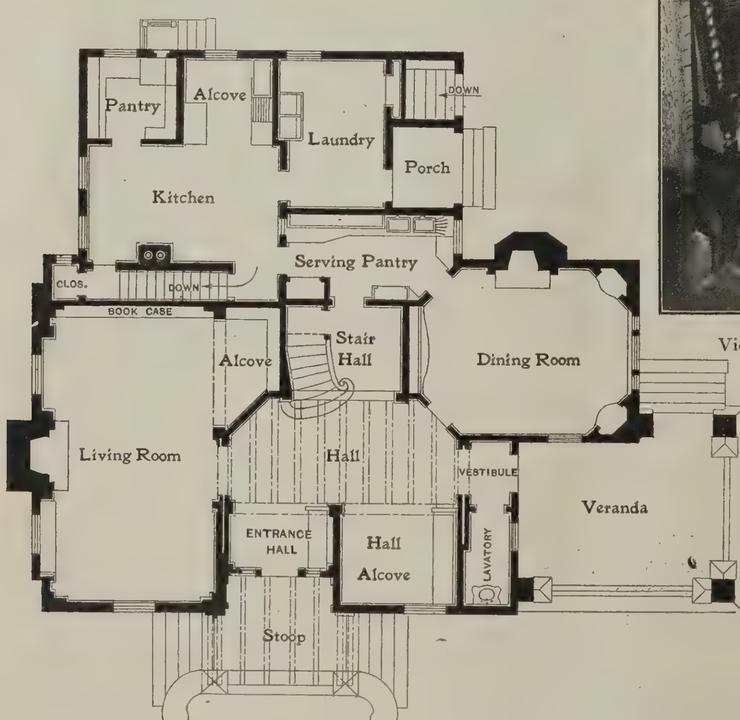
The residence in question is that of Miss C. A. Platt at Waterbury, Conn., and was erected in accordance with plans prepared by Architects Griggs & Hunt, of that place. The half-tone pictures which constitute the basis of our supplemental plate this month show an exterior view of the house looking toward the veranda and dining-room, also an interior of the dining-room looking toward the buffet and fireplace, with the door leading to the serving pantry shown between the two. The illustrations upon this and the following pages show other exterior and interior views of this attractive residence, affording an excellent idea of the general effect produced by the plate glass cornice, together with other features of architectural treatment. Prominent among these is the clever use of field stone in connection with the chimneys, the veranda piers and foundation, the front wall of the stoop and of the walk from the street to the front entrance, the whole scheme being managed in a way to give a most pleasing effect.

The interior views afford not only an idea of the trim but also of the furnishings and the taste displayed in connection therewith.



Second-Floor Plan. Scale, 1/16 In. to the Foot.

The floor plans show a commodious hall, from which rises the main flight of stairs to the second story and out of which opens the dining-room at the right and the living-room at the left. Communication between the dining-room and kitchen is by means of a serving pantry, and out of the kitchen opens the laundry, which is directly accessible from the rear porch. Upon the second floor are three main sleeping rooms,



Main Floor Plan.—Scale, 1/16 In. to the Foot.

Residence with Plate Glass Cornice at Waterbury, Conn.

a sewing-room, two servants' rooms and three bathrooms, one being for the exclusive use of the servants.

In the exterior treatment of the residence special wide clapboards are used for the first story, with shingles laid double-butted on the second story and roof. The exterior finish of the house is sawed but not planed, and the main body is stained gray, with all trimmings white. The roof is stained an English tile red. All stone work, as intimated above, is laid up with field stone, the joints being well raked out.

The finish of the main hall is oak stained a special musty gray. The rail of the stairs is of wrought iron finished in verde antique. The floors are of quartered oak, while the walls are covered with Japanese grass cloth.

The dining-room is finished in dark mahogany, with panels and frieze covered with old silk tapestry. The panels are treated plain, and the border with a simple design. The floors are of quartered oak.

The living-room doors, mantel and bookcases are of light mahogany, while the trim is white enamel. Here, as in the dining-room, the floor is of quartered oak, and the walls are covered with fawn-colored figured silk tapestry. The fireplace opening and hearth are finished in Siena marble.

The entire second and third-story rooms are finished in white enamel, with doors of dark mahogany, while the bath-rooms have tile floors and wainscoting.

View of Main Stairs, with Living Room to the Left.

Standard Practice as Applied to Building Construction

The time-saving device in the vast field of human endeavor has established an important place in the equipment of organized effort; and particularly is this true in commercial pursuits, where swift and economical results are demanded along with a high grade of output. Time-saving ideas find expression in countless ways and a constant effort is being made to spread this influence, with the result that many such devices have been developed to that degree of perfection whereby they may be classed as "standard," meaning that a certain way of doing a certain thing is the best way.

Knowing the commercial value of standard practice, why not, then, apply it to a certain extent in the making of plans for buildings? says Edwin E. Pruitt in a late issue of the *American Architect.* In a measure this is done, notably in steel framing, reinforced concrete, fireproofing and similar detail, but with items of less importance there is little attempt at a definite system of standards, such as are in use by the manufacturers of these products. For instance, in the fabrication of steel work for buildings each member of the drafting force is supplied with a set of standards to guide him in his work; thus, even at the beginning of his employment, the draftsman may have an intelligent view of the best means of doing the work assigned him, and with which he may at once proceed. In this way no time is lost, and the new man is immediately a profitable factor in the organization. This means much in the saving of cost to the employer in instructing new men, which, added to the total savings in other directions, is a large consideration.

Much of an architect's work in the drafting room may be standardized, and this, too, without hampering the imagination in the broad field of pure design.

A motive that is good within itself or a standard detail or method may be reproduced almost indefinitely. This does not mean, however, that we are to become mere machines, that the charm of variety is to be lost or that our imaginative faculties are no longer required, but that we shall know precedent and apply the best

Residence with Plate Glass Cornice at Waterbury, Conn. View of Rear of Building Looking Toward Dining Room.

that is in it to our needs by combining this knowledge with our own into a convenient, useful form.

The principles that underlie standard practice may be stated as order, simplicity and economy, which in turn cover the various perfected parts of the working whole.

The preparation of a set of standards for use in the drafting room is not the work of a novice, but requires considerable experience, and will most likely comprise the proper classification of accumulated data.

The drawings may be made on sheets of cloth of convenient size, having a border line and an appropriate title. Place upon each sheet only standards of similar items. Blue-print copies should be made of the sheets, and these bound into sets for individual use of the draftsman.

It is best to commence with some simple detail of construction, such as the usual type of window having sliding sash and a box frame. This is a detail that admits of certain fixed dimensions and arrangement of material. When a dimension is variable it may be omitted from the drawing, while keeping in mind that each standard is to have as wide application as possible and yet be wholly different from other standards. This means that only certain items may be marked with figures or otherwise specially identified. To illustrate its use, with the standard before him, the draftsman may easily find the size of glass, openings and the like, thus enabling him to proceed at once with other parts of his work long before details of the building are fixed. A great many details about a building may be similarly standardized. Some of these items have already been reduced to stock patterns by the manufacturers of mill

Living Room as Viewed from the Alcove.

work, but as the work seems to have been done by those unfamiliar with good design the result is not always pleasing; accordingly, the well-trained architect hesitates to use this product and only does so because of its cheapness.

The construction of floors, details of framing, the simpler forms of cornices, patterns of brick and stone work, certain formulæ, and notes on the provision always to be made for wiring, plumbing, heating and ventilating are some of the items that may well have a place on the list of standards.

Of course current practice will have much to do with that which can be standardized. On work of special design standard details may not apply, but where the work is of moderate cost standard practice may obviously be applied to advantage. The underlying principles, however, hold good in any class of work. Therefore, what seems to be a fixed system is in reality flexible enough to meet the most exacting demands.

Another View of the Dining Room Looking Toward the Front Corner.

The young architect should learn early to systematize his work, and so appreciate the value of standard practice, for with a clear understanding of its principles and an intelligent use of what it offers, much time is saved in consulting with others or in poring over books or drawings in search of the required information.

Thirty-One-Story Addition to Whitehall Building

After a delay of very nearly two years, work on the proposed extension to the Whitehall Building in Battery place is about to be commenced, and upon the plot immediately adjoining this building on the north will rise a 31-story and basement addition. According to the plans of Clinton & Russell, architects, of 42 Nassau street, the enlarged building will have a frontage of 307 ft. in Washington street and 181 ft. in Battery place, and with the plot of the present Whitehall Building will give an area of 51,515 square feet. The hight of the building will be 416 ft. above the level of the street, while the boiler room will be 26 ft. below it.

Some idea of the magnitude of the structure may be gathered from the fact that 14,000 tons of structural steel will be required; 7,500,000 common brick; 900,000 face brick, 45,000 barrels of cement, 535,000 sq. ft. of floor arches, 266,000 cu. ft. of cinder fill, 125,000 sq. ft. of girder covering, 450,000 sq. ft. of partition tile, 210,000 sq. ft. of wall furring and 120,000 sq. ft. of column covering.

There will be 17,000 cu. yd. of earth excavation, 5500 cu. yd. of caissons for the foundations, 2150 cu. ft. of granite, 20,000 cu. ft. of Indiana limestone and 3000 tons of ornamental terra cotta.

In the interior will be 10 miles of plumbing, 20 miles of steam pipe, 65 miles of conduits and wiring, 3000 electric fixtures, 65,000 sq. ft. of wire lath, 85,000 sq. yd. of plaster, 400,000 lineal ft. of comb grain yellow pine flooring.

There will be required 2300 windows, 60,000 sq. ft. of glass, 3000 doors, 250,000 lb. of sash weights, 30,000 ft. of copper chain, 450,000 ft. of grounds 80,000 of base and 80,000 ft. of picture molding.

The cost of the new building is placed at $4,600,000 and the general contract has been awarded to the George A. Fuller Company. It is estimated by its projectors that this will be the largest single office building in the city and will have a rentable area of 550,000 sq. ft.

View in Living Room Looking Toward the Book Case, and Showing Alcove and Stair Hall at the Right.

Residence with Plate Glass Cornice at Waterbury, Conn.

One of the latest features in connection with the development of suburban property is a combination of connected dwellings, with a system of rapid transit and forming in a way a projection of the city into the country. The idea of the inventor is to have the continuous house two or three stories in hight and extending over a considerable area in one direction. On the top is to be a promenade and at the sides, gardens or grass plots, while at stated intervals streets or thoroughfares will pass through the first story. The continuous house will provide its tenants with water, heat, light, power and transportation, but for the latter a noiseless railroad will take the place of an elevator. The idea is to make use of the monorail as well as a moving sidewalk, and to provide for mechanical deliveries of all packages and parcels as well as for the transportation of passengers and food. The inventor, with the architects and engineers associated with him, in working out the estimates of cost state that the saving in construction and maintenance will make it possible for a man to live in the country at the rent now paid for second-rate city apartments and at the same time enjoy all the advantages and conveniences to be found in connection with high-priced elevator apartment houses. The scheme is designated as the "Roadtown" and has been devised by Edgar S. Chambless, of New York City.

CONVENTION NEW YORK STATE ASSOCIATION OF BUILDERS

IN accordance with previous announcement, delegates from the leading cities of the Empire State assembled in Albany on January 19 to attend the fourteenth annual convention of the New York State Association of Builders. Represented at the sessions of the convention were 14 different cities and 18 different organizations. Owing to the absence of President B. I. Crooker in Europe, the meeting was called to order by Second Vice-President P. J. Brennan.

After the reading of several letters from prominent members who were unable to attend, the roll call showed the following delegates to be present:

Amsterdam.—C. B. Machold, H. W. Grime, F. Dessar and H. B. Schotte.
Bath.—M. E. Shannon.
Buffalo.—W. B. Ogram, T. M. Dwyer, Gus. Schierer, A. I. Holloway and J. M. Carter.
Corning.—M. E. Gregory.
Dunkirk.—Peter Meister.
Elmira.—C. Y. Spaulding and J. Cunningham.
New York City.—Lewis Harding, Isaac Hopper, F. T. Youngs, D. H. Mapes, F. T. Nesbit, R. C. Whiting, C. G. Reid, C. M. Murphy, W. G. Jones, A. Brown, Jr., J. O. Whitenack, M. E. O'Connor, P. J. Brennan and C. G. Norman.
Rochester.—J. L. Stewart, T. H. Swan, Wm. Fredericks, Wm. Vecinus, Geo. Swan, Fred Gleason, W. H. Dockstader, Ed. Strauchen and H. A. Meech.
Syracuse.—J. W. Dawson.
Utica.—Wm. Hughes, J. Hughes, E. W. G. Edwards and G. Griffiths.
Albany.—J. J. Kelly and Wm. Rooney.
Troy.—Thos. Soutar and Chas. Ducan.

The minutes of the annual meeting held in New York City under date of March 4, 1909, were read and approved, after which the report of the president was read by the secretary. In his last annual report the president recommended two important things: 1st, that a new constitution be prepared, and 2d, that in the New Uniform Contract endeavor be made to have the lockout clause inserted in Clause 7. At the last meeting the new constitution was adopted and has since been printed by the secretary.

It was suggested by the president that it might be wise if all the associations represented in the State organization in making contracts with the union bodies bear in mind that all contracts embrace an arbitration clause, and also the clause that there shall be no sympathetic strikes for any cause whatever during the life of the contract. The president pointed out that the Buffalo Association had adopted a Uniform Contract which it used in labor matters, and it was suggested that it might be well to compare the contracts as far as possible and adopt a form which will constitute as near as can be a uniform style of contract. These latter recommendations, the president stated, applied more naturally to centers outside of New York City.

In closing his address the president paid a high tribute to the memory of the late Charles A. Cowen, stating that "few men have been as loyal to the State Association or as energetic in the advancing of its interests as Mr. Cowen," and suggesting that the association before it adjourned take some recognition of his death.

Following the reading of the president's report, which was listened to with close attention on the part of the delegates, Secretary-Treasurer Carter presented his report, showing the State Association to be in a flourishing condition.

Report of Counsel Eidlitz.

Next in order was the report of Counsel Ernest F. Eidlitz, in whose absence it was presented by his associate, William H. Butler. The report as usual reviewed legislative matters of the past year and proved of marked interest to the members.

During the session of the State Legislature there were introduced in both houses 2893 bills, or 311 more than the previous year. All of these were examined by the counsel as they were introduced or reprinted, and those of importance affecting the building interests were submitted to the Legislative Committee for consideration.

Mr. Butler dwelt at some length upon the possibility of a report being given by the commission appointed by the Governor to investigate the Employers' Liability law and amendments thereto.

Lewis Harding, of New York City, moved, and it was so voted, that if this commission presented a report to the legislative bodies this season the Executive and Legislative Committees of the New York State Association convene in the office of Counsel Eidlitz to consider the report, together with the proposed law and amendments.

Just before the adjournment of the morning session a nominating committee was appointed, composed of one member from each association represented in the convention, with Fred Gleason, of Rochester, as chairman, and to report later.

Luncheon.

The meeting adjourned at 12.30 for luncheon, the delegates being the guests of the association to an informal banquet in the parlors of the Ten Eyck Hotel.

Afternoon Session.

The delegates reassembled at 2 o'clock in the afternoon and the first order of business was the report of the Nominating Committee, with the following names for the offices designated:

President.............. C. A. Pulford, of Elmira.
Vice-President..........D. H. Mapes, of N. Y. City.
Second Vice-President...Georgt L. Swan, of Rochester.
Secretary-Treasurer.....James M. Carter, of Buffalo.
Counsel................E. F. Eidlitz, of N. Y. City.

These officers were duly elected and installed, Vice-President D. H. Mapes taking the chair as presiding officer.

It was then voted to refer the matter of formulating a Uniform Contract to the Executive Committee, with the request that that committee appoint a standing committee of five members to consider matters pertaining to a Uniform Contract.

Committee on Resolutions.

The chair appointed a committee consisting of Lewis Harding, D. H. Mapes and Isaac Hopper to prepare and present suitable resolutions on the death of Charles A. Cowen. The following resolutions were duly presented by the committee and adopted in silence by a standing vote.

The members of the New York State Association of Builders in regular session assembled bend in silence and sorrow as we remember that our beloved friend and co-worker, Charles A. Cowen, has passed away, and that we may perpetuate his memory upon the records of this body, have adopted the following resolution:

RESOLVED, That in the death of Charles A. Cowen we have lost a friend who commanded to an exceptional degree our love and esteem. We loved him for his kindly spirit and genial manner. We respected him for his business capacity and his sterling honesty.

We miss his wise counsel in our gatherings, and unitedly mourn his death.

Be it further resolved, that these resolutions be recorded upon the records of this body, and a copy of the same be engrossed and forwarded to the family of our deceased friend.

Scale of Wages.

C. G. Norman, of New York City; G. Griffiths, of Utica; M. E. Gregory, of Corning, and J. W. Dawson, of Syracuse, reported on the wage scale paid mechanics in various cities of the State as given by the delegates present. The general report indicated a tendency toward an increased schedule to be paid mechanics the ensuing year—in many instances carpenters and bricklayers already having been granted the advance. In most cases the advance amounted to 5 cents per hour, and will become operative on the first of May.

It was voted that the secretary be instructed to issue a revised schedule, showing the wages paid builders and mechanics in the States and cities tributary to New York State.

Licensing of Builders.

Isaac A. Hopper presented a resolution to the effect that the State Association recommend the licensing of master builders. A committee appointed to consider the matter was composed of Isaac Hopper, F. T. Youngs and C. G. Norman, of New York City; Gus Schierer, of Buffalo, and G. Griffiths, of Utica.

Considerable discussion followed as to whether or not it would be advisable to extend the meetings of the New York State Association over a two days' session instead of one, but it was finally decided that the matter be referred to the Executive Committee.

Executive Committee.

The chair appointed 20 delegates as members of the Executive Committee to serve for the ensuing year, Lewis Harding, of 335 East Forty-sixth street, New York City, being chairman.

It was voted that the next meeting of the New York State Association of Builders be held in the city of Albany in January, 1911, unless otherwise directed by the Executive Committee.

CONVENTION NATIONAL BRICK MANUFACTURERS' ASSOCIATION

As regards the quality of the various papers presented for discussion, the general interest manifested in the proceedings during the sessions, the number in attendance and the general good-fellowship which prevailed, the twenty-fourth annual convention of the National Brick Manufacturers' Association of the United States of America, held in the city of Pittsburg, February 9, 10 and 11, was without doubt the most successful in its history. The sessions were held at the Fort Pitt Hotel. The attendance numbered 599 delegates, who, with their wives and daughters, brought the number up to nearly 1000.

On the afternoon of February 9 the meeting was called to order by President Lemon Parker, and the regular order of business was inaugurated with prayer by Chancellor S. B. McCormick, of the University of Pittsburgh. An address of welcome was delivered by City Solicitor Charles A. O'Brien, to which response was made by H. L. Matz.

This was followed by the report of Treasurer John W. Sibley, showing the finances of the organization to be in good shape, and then came the report of Ross C. Purdy, secretary of the Committee on Technical Investigation. This was received with close attention on the part of the members, who evinced deep interest in all that was said.

The election and installation of the following officers then ensued:

President........William P. Blair, Indianapolis, Ind.
1st Vice-Pres........C. M. Crook, Youngstown, Ohio.
2d Vice-Pres........C. A. Bloomfield, Metuchen, N. J.
3d Vice-Pres......W. H. H. Rogers, Rochester, N. Y.
Secretary..........T. A. Randall, Indianapolis, Ind.
Asst. Secy..Miss Addie M. Wallace, Indianapolis, Ind.
Treasurer...........J. W. Sibley, Birmingham, Ala.

The evening session was given up to an illustrated lecture on "Recent Architecture in Pittsburgh," by Prof. Henry McGoodwin and Henry Hornbostel, of the Carnegie Institute. There was also an address by W. P. Blair on "Structural Brick Street Pavements."

The second day of the convention was devoted to routine matters and the discussion of papers dealing with the subject of clay products generally. In the morning there was a paper by H. C. Mueller, Trenton, N. J., on the "Artistic Qualities of Burned Clay Products"; an illustrated talk on "A Trip Through a Modern Pottery—Its Construction, Operation and its Products," by H. E. Ashley, Pittsburg, while J. L. Cite, Fishkill-on-Hudson, N. Y., read a paper on "Modern Brick Yard Equipment."

The afternoon session was along the same general lines, and among the papers read were "The Lure of the Clay Bank," by D. V. Purington, Ocean Springs, Miss.; "The Significance to Brickmakers of the Revolution Now Taking Place in Domestic Architecture in America," by Donn Barber of New York City, and "Brick-Paved Yards," by A. B. Lea, Cleveland, Ohio.

Building Brick Manufacturers' Association

Without doubt the most interesting feature of the afternoon session was the formation of what is to be known as the Building Brick Manufacturers' Association, as an auxiliary of the National body, the purpose being to disseminate knowledge of brick construction by means of a campaign of publicity. A yearly fund of $100,000 is to be raised for the purpose of defraying such costs as may arise.

The Executive Board of the Building Brick Manufacturers Association held a meeting at the hotel during the evening and elected the following officers:

President..............S. C. Martin of Pittsburg, Pa.
Vice-President....R. L. Quiesser of Cleveland, Ohio.
Secy. and Treas........J. P. Fiske of New York City.

The first paper of the morning session of the third day was that by W. D. Richardson of Columbus, Ohio, the subject being "The Small Brick Plant and its Relative Economy as Compared to the Large Plant." This evoked considerable discussion on the part of various members. Several topics for discussion were taken up, including "Why do Shale Brick Cost More than Clay Brick?" Other topics were "What Are the Advantages of Metal Over Plaster Molds for Roofing Tile Presses," and "Is Co-operation Among Brickmakers With a View to Creating Better Prices Practical?" There was a paper by F. Vogt, Milwaukee, on "Advantages of Artificial Draft as Compared with Natural Draft in Drying and Burning Brick"; also one by Dr. Holmes, Washington, D. C., entitled "Some Problems of the Clay Industry and What the National Government is Doing and Can Do for Their Solution."

At the afternoon session other papers were presented, and there were several questions for general discussion.

The banquet was a most enjoyable affair and was held in the English room of the Fort Pitt Hotel on the evening of February 10. The toastmaster of the evening was Chancellor McCormick of the University of Pittsburg, who was introduced by President W. P. Blair of the Association. There were a number of speakers, and their remarks were of both a serious and humorous nature.

INTERESTING EXAMPLE OF MODERN STORE ARCHITECTURE

THE problems which the retail merchant of the present day usually sets before his architect is to so design a building for store purposes that the first story shall afford an unusual expanse of show window interrupted as little as possible by the supports of the upper stories, the idea being to provide the greatest possible space in which to display the goods to be sold. Ordinarily, if the supporting columns of the upper stories are made as small as possible and set back from the building line sufficiently to allow the plate glass of the show windows to pass them without interruption; then the space filled between the ceiling of desire to obtain the best results possible architecturally as well as commercially, is shown in the illustrations presented upon this and the pages which immediately follow. These represent the new building on Fifth avenue, Pittsburg, Pa., filling the block front between Market and Union streets, and recently erected in accordance with drawings prepared by Architects Alden & Harlow, Farmers Bank Building, Pittsburg, Pa., for the Regal Shoe Company of that city. The lot has a frontage of 85 ft. on the avenue and of about 15 ft. on each of the two streets mentioned. The building is in a measure of skeleton frame construction in that

General View of Building as Reproduced from a Recent Photograph.

Plan Showing General Arrangement of Space.—Scale, ⅛ In. to the Foot.

An Interesting Example of Modern Store Architecture—Alden & Harlow, Architects, Pittsburg, Pa.

the show window and the ceiling of the first story with prism lights and the columns enclosed with mirrors, results have been achieved which generally satisfy the average merchant whose only idea is to display his goods, but which are not altogether successful or satisfactory from an architectural standpoint.

Sometimes, however, the client of the architect is willing to go to additional expense in order that the requirements of his business may be met without the sacrifice of that which makes for good architecture, and a most interesting example of what may be done when client and architect work together with a sincere steel columns are placed close against the old party wall at the rear, while the steel columns of the first story are set back on the line of the paneling forming the back of the show window. Upon these columns rest steel girders carrying the curtain walls enclosing the second story and the upper tier of columns which support the roof and which are enclosed in the brick curtain wall.

The walls in the second story, to a height of 6 ft., as well as the soffits of the overhang, are covered with fine mesh expanded metal lath firmly fastened with staples. The expanded metal lath is also placed over all chases in brick walls which are not furred. All external angles are protected with Parker metal corner beads. To this metal lath was applied a scratch coat of plaster 1 in. thick made with equal parts lime and cement mixed with sand and an extra quantity of long hair. The scratch coat was given a coat of cement and sand about 1 in. thick and hand floated. The soffits and overhang of the second story were also plastered in the same way, except that the finish coat was ½ in. thick. The roof is covered with vitreous shingle tile of various sizes with 2-in. lap, made by the Akron Tile Company. The tile is fastened to the roofing boards with copper nails.

The floors of the basement and entrance are of reinforced concrete guaranteed to withstand an uplift of 300 lb. per square foot, due to hydraulic pressure.

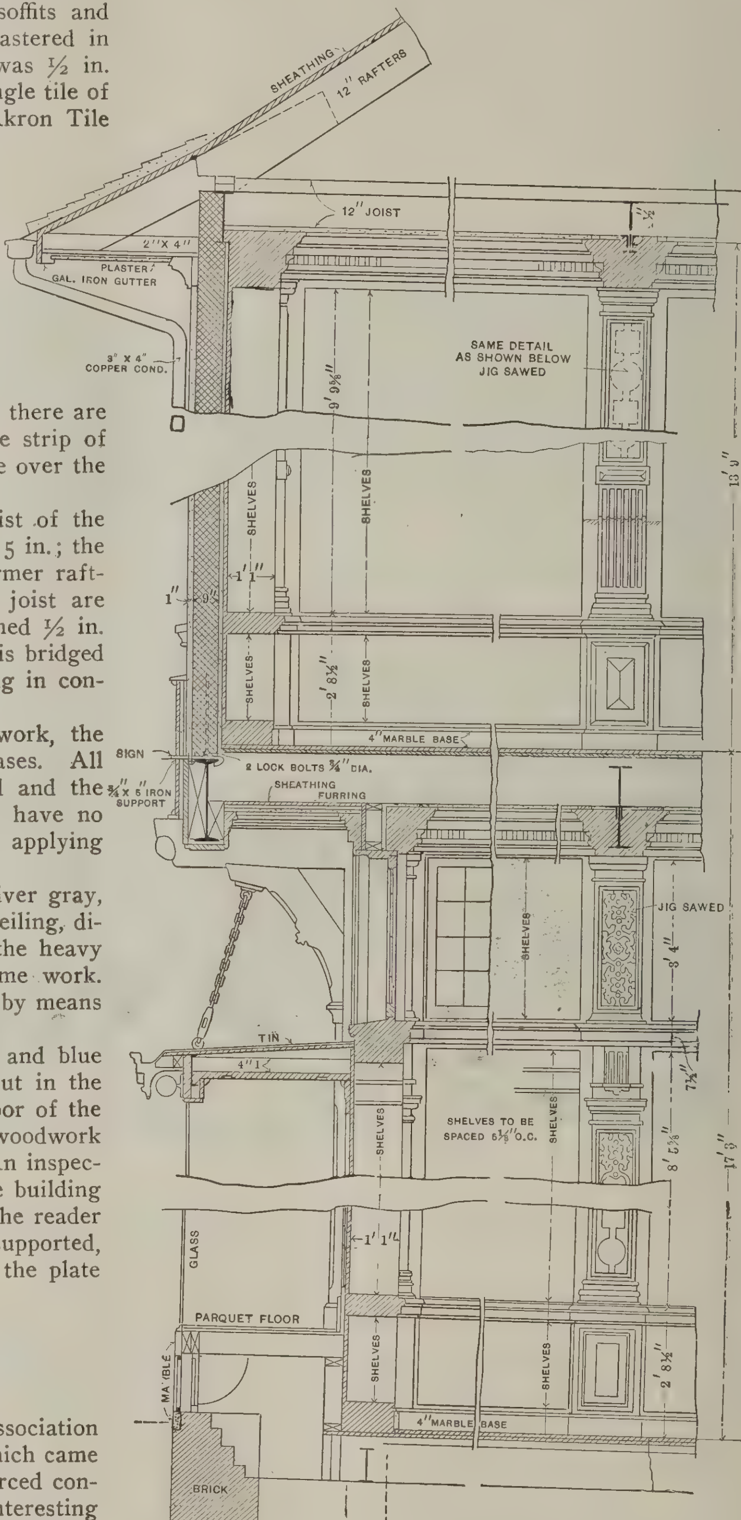
The under floors in the first and second stories are of hemlock boards not over 8 in. wide laid diagonally. The upper floors are of matched yellow pine, with 2½ in. face and blind nailed. In the show windows there are parquetry floors of oak, with borders of one strip of white holly and one of mahogany. The space over the second story has a single floor.

The floor joist, as well as the ceiling joist of the second story, are 2 x 12 in., the plates are 4 x 5 in.; the main roof rafters are 2 x 12 in., and the dormer rafters 2 x 6 in. All floor and roof framing joist are spaced 16 in. on centers; all joist are crowned ½ in. in 20 ft. and set crown edge up. Each floor is bridged with 1¼ x 3 in. double herring bone bridging in continous rows from one end to the other.

The interior plastering is of three-coat work, the plaster being carried to the floor in all cases. All the interior brick walls that are not furred and the inside of the exterior terra cotta tile walls have no scratch coat but a heavy brown coat before applying the first coat of plaster.

The interior is finished in oak stained a silver gray, with shelving for shoe boxes carried to the ceiling, divided at intervals by pilasters which, with the heavy beams in the ceiling, enclose the steel frame work. Access to the sceond story of the building is by means of an electric elevator.

The characteristic color scheme of brown and blue adopted by the company has been carried out in the marble base below the show windows, the floor of the entrance vestibule, the color of the interior woodwork and plaster, and in the colors of the signs. An inspection of the vertical cross section through the building presented in connection herewith will afford the reader an idea of the manner in which the signs are supported, also of the roof and cornice construction of the plate glass show windows.



Vertical Cross Section Through the Building, Showing Details of Construction.—Scale, ¼ In. to the Foot.

An Interesting Example of Modern Store Architecture.

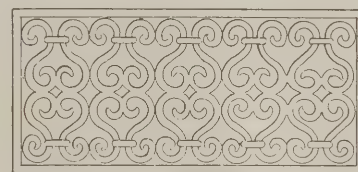
Cost of Concrete Buildings

At the recent convention of the National Association of Cotton Manufacturers one of the topics which came up for discussion related to the use of reinforced concrete buildings for textile mills, and much interesting comment was brought out. In speaking of the cost of factory buildings, J. P. H. Perry, of New York City, presented the following views:

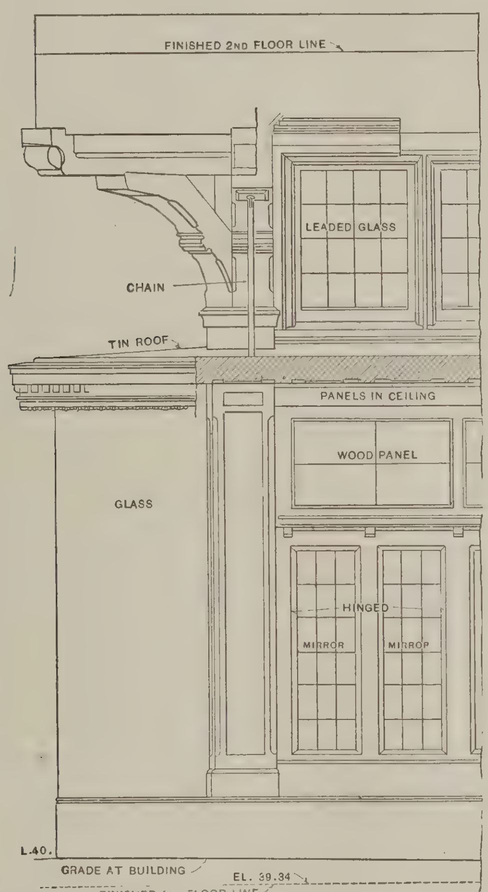
Reinforced concrete will generally run from 5 to 15 per cent. higher in first cost than first-class "mill construction," and will be from 10 to 20 per cent. lower than steel construction fireproofed. A large warehouse in Brooklyn was begun in May, 1908. At that time new construction work was scarce and all contractors figured very closely. The successful reinforced concrete figure was $30,000 lower than the best bid on the same plans in fireproofed structural steel. A large factory in Philadelphia was designed in steel. The architects considered an alternative in reinforced concrete and saved $60,000. A large publishing house and loft building was recently completed in Springfield, Mass., of reinforced concrete throughout, thereby saving $40,000 over the probable cost in steel. These three instances represent respectively savings of 12, 25 and 10 per cent. In competition with mill construction the percentage depends almost entirely on the size of the building.

For structures costing $40,000 and less, and of a hight of four stories or less, the brick and wood construction will run about 15 per cent. less than concrete. On larger buildings, however, concrete gets closer to the cost of the mill construction. The designers of a very large hardware building in Minneapolis were surprised to find concrete figures slightly under those of mill construction. A similar case occurred in Toledo, Ohio. Both of these propositions exceeded $150,000 in value.

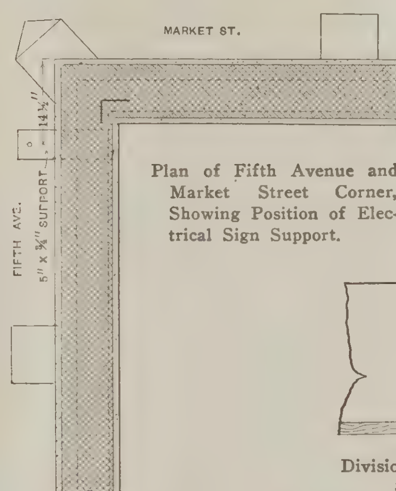
In considering the costs of different types of construction the initial cost should not be the only criterion. There are certain fixed charges which enter into the relative values of buildings. These may be briefly summarized as follows: Insurance, maintenance, depreciation, amount of light available, freedom from vibration, elimination of vermin and the assurance that a fire cannot destroy the building. It is difficult to put an exact monetary value on these different items. Each plant manager would have his own views and local conditions would alter materially any assumptions. If, however, due consideration be given to the saving which can be obtained on each of these items by the use of reinforced concrete building, it will generally be found that even though the concrete structure cost complete 10 per cent. more than mill construction, there will be a saving annually of from 1½ to 2 per cent.



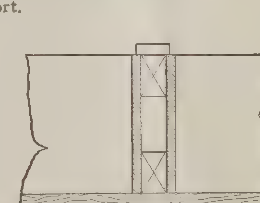
Design of Grille for Cellar Windows.



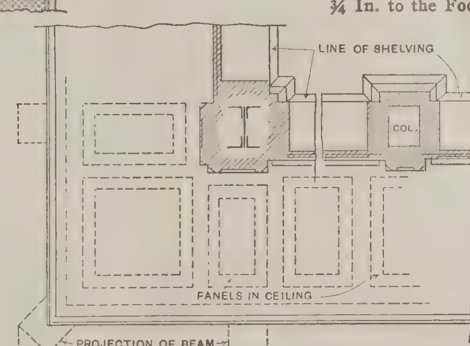
End Elevation of Building Up to the Second Story.—Scale, ¼ In. to the Foot.



Plan of Fifth Avenue and Market Street Corner, Showing Position of Electrical Sign Support.



Divisions for Shelving.—Scale, ¾ In. to the Foot.



A Corner of the Building at the Second Floor.—Scale, ¼ In. to the Foot.

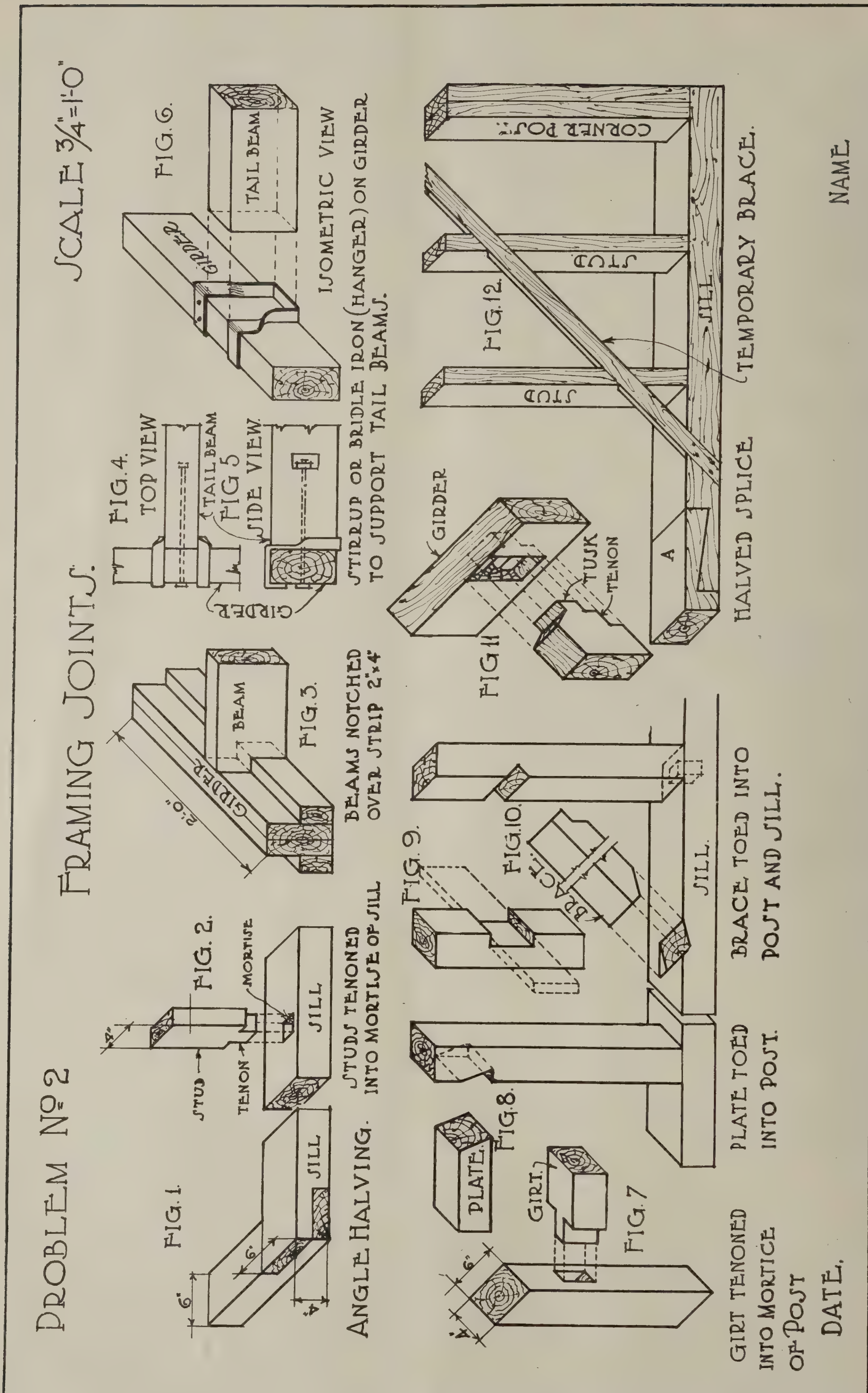
Miscellaneous Constructive Details of an Interesting Example of Modern Store Architecture.

Fire Waste in the United States

A bulletin just sent out by the United States Geological Survey, compiled by Herbert M. Wilson and John L. Cochrane, contains some very significant figures regarding the fire waste in the United States in 1907. The statistics are compiled from reports received from 2976 cities and villages, with a population aggregating 34,102,453. The reported fire loss for these cities was $86,476,029, or a per capita loss of $2.54. The postmasters in rural districts reported a total loss of $3,519,769, making a total loss of $89,995,798, and a per capita loss for cities, villages and rural districts from which returns were received of $2.51, an index sum that would give an aggregate loss for the United States in the year named of $215,084,709. The significance of these figures is realized when it is found that the average per capita loss in the cities of the six leading nations of Europe amounts to 33 cents.

The total loss on buildings in the United States was $109,156,894 and on contents $105,927,815. There were fires in 36,140 brick, iron and stone buildings, with a loss of $31,092,687 on the buildings and $37,332,580 on the contents, and in 129,117 frame buildings, with a loss of $78,064,207 on the buildings and $68,595,235 on the contents. In cities and villages with a population of 1000 or more there were 6324 fires that extended beyond the building of origin, with a total exposure loss of $13,913,694. The loss on fires that were confined to the building of origin in the cities and villages amounted to $93,179,589.

A CATHEDRAL in Poti, situated in the mountainous regions of the Caucasus, Russia, and designed in the Byzantine style, has been built in reinforced concrete. The walls were built double at the ground floor, the inner part being 8 cm. thick, the air space 18 cm., and the outer part 10 cm. thick. Three massive pillars were made to contain the ventilation and heating channels. The work was carried out with rapidity, the time required from the concreting of the foundations to the concreting of the large cupola, including the cross, being 10½ months.



Lessons in Architectural Drawing for Beginners—Scale of Sheet, 3/4 of the Original Size.

LESSONS IN ARCHITECTURAL DRAWING FOR BEGINNERS

By ALFRED AUSLANDER.

WE will take up for the subject of the second lesson the framing of joints and will first define a wood joint.

The surface of two pieces of wood, which are brought into contact and held firmly together either by glue, or by opposite pressures, or by the weight of one of the two resting upon the other, is called a wood joint.

The joints in the framing may be made, *1st*, by simply framing them into each other, or *2d*, they may be framed so that the surfaces of wood butt against each other and are only held together by means of bolts, keys, iron straps, etc., or *3d*, they may be framed so that both systems are combined.

Two or more beams may be framed together so as to make any angle with each other from 0° to 180° and the two united pieces again may be oblique, vertical or horizontal. One piece of wood put on top of the other in the same direction forms 0°, and two pieces of wood framed so that they run directly in opposite directions form 180°, as shown at "A" in Fig. 12.

We call the front view of an object the "Front Elevation," the side view of an object the "Side Elevation," etc. We can ascertain the true length and hight, but not the thickness of the object.

Plan.—By "Plan" is meant a drawing of an object as it appears, or is intended to appear, on the ground (generally looking down). We can tell by the plan the length and thickness, but not the hight of the object.

Section.—By "Section" is meant a drawing representing the object as though it was divided in two parts, or as though it was cut through the object by planes, and it is done in order to explain the construction of the inside, and the connection between the different materials.

Detail Drawings.—Drawings showing how the different pieces are to be put together or how the pieces appear as taken apart are called "Detail Drawings."

To represent an object by drawing, it is necessary to show the plan and at least one section and elevation. If, however, all parts of the body cannot be seen by these it will be necessary to show one or more details. Sometimes it is more convenient and clearer to show three views (plan and two elevations) in one diagram, and this is called "Isometric View."

All diagrams in "Problem No. 2" on the opposite page are shown in isometric view excepting Figs. 4 and 5. This drawing is made to a scale ¾ in. equals 1 ft. The student, however, should draw it to a scale 1 in. equals 1 ft., and all measurements for laying out the drawing will be given for a scale of 1″ = 1′.

Explanation of Diagrams.—After the foundation and cellar walls are built the first piece of timber for a frame house to be put in place is the main sill. This is a piece of wood varying in size, 4″ x 6″, 6″ x 8″, etc., and should lay flat on top of the wall well bedded in mortar in order to have an even bearing at every point and should be set well away from the outside face of the wall. The least dimension for this is one inch.

Fig. 1 shows a sill at the corner. Both pieces are cut each half way through and placed together afterwards. This joint is known as a "halved joint" or "Angle Halving." Fig. 2 represents the mortise and tenon joint. If a hole is cut into one piece of wood and a corresponding projection on another piece of wood which is to fit into the hole it is called mortise and tenon joint. The hole is the mortise and the projection of the other is called the tenon.

Fig. 3 shows a beam notched over a strip 2″ x 4″ wide and nailed to the girder. Both ends of all floor beams should rest at least 4″ on the wall. Where the span is greater than the length of the beams, so that only one end of the beam can be laid upon the wall, it is necessary to use another beam running parallel to this wall, which will take the other end of the beams. This beam is generally supported by piers or columns and carries the floor beams, and is called a "girder." If the beams rest on top of the girder it is called a sunk girder. If the beams are flush with the girder on top the girder is called flush girder, as shown in Figs. 3, 4, 5 and 6. The girder shown in Fig. 3 consists of two pieces of wood 2″ x 8″ each, well spiked together, with 2″ x 4″ strips on each side spiked to the girder, over which the floor beams are notched.

Figs. 4, 5 and 6 show again a flush girder. The beams are held in place by an iron hanger and bolted by a ¾″ bolt. Fig. 4 is the plan, Fig. 5 the side elevation and Fig. 6 the isometric view of the same girder, hanger and beam. The beam in this case is called the tail beam.

Fig. 7 shows the girt framed into the post. A wedge should be driven into the tenon to hold it firmly in place. Fig. 8 shows the plate toed into the post, while Fig. 9 shows the post notched out to receive the ledger board, which in turn carries the floor beams. The ledger board, also called "ribbon," is shown by dotted lines. This construction is used in balloon frame. The ledger board is 1″ thick and 4″ x 7″ high. The notch, always on the inside of the studs, should be one-half inch more than the thickness of the ribbon, so as to allow a key for the plaster.

Fig. 10 shows a brace tied into the post and sill—a construction used in braced framing, wherever a post makes a right angle with the sill, girt or plate.

Fig. 11 shows a tusk and tenon joint, which is used to frame out for a fireplace or stairs, etc., or uniting tail beams to girders or headers. This joint is very often used instead of using bridle iron, as shown in Figs. 4, 5 and 6.

In Fig. 12 is shown a corner post and studding on top of the sill with a temporary brace. The corner post consists of two studs 2″ x 4″ spiked together and the studs 2″ x 4″ are placed 16″ on centers. The studs and corner post are notched out to receive the temporary brace. This construction is used in balloon framing only. As soon as the outside sheathing is put on the brace may be removed, although it is not customary to remove it.

Laying out the Drawings.—First draw a margin line measuring 10″ x 14″. Use paper horizontal. Measure off 4″ (actual measurement) from the upper margin line and draw a light line, which will be the bottom line for Figs. 1 to 6, then measure off 2″ (actual size) and draw a light line for bottom line of Figs. 7 to 12. The corner of the sill for Fig. 1 is 1¾″ (actual size) from the left margin line. Measure off at this point 4″, to the scale 1″ = 1′ and draw a line parallel already drawn. Draw two lines under 45° from the two points obtained 1′ 3″ long; measure off on these lines 6″ from the width of the sill, thus giving a sill 4″ x 6″. Show the halving as on the opposite drawing. For Fig. 2 continue sill of Fig. 1, making it 1′ 6″ long and show on top of it a square hole measuring 2″ x 2″, which will indicate the mortise in the sill. Project all corners of the mortise; for the tenon of the stud—show this stud 2″ x 4″ and about 15″ long.

Fig. 3.—Draw a vertical line 5½″ (actual size) from left border line; measure off 8″ on the vertical and 4″ on the horizontal line towards the right and draw a rectangle. From these four points draw lines under 45°—2′ long—draw the 2″ x 4″ strips and the beam 2″ x 8″ as shown.

Fig. 4.—Draw a horizontal line 2¼″ (actual size) from upper margin line, beginning 5¾″ (actual size) from the right border line. This will be the center line

of the tail beam. Measure off 2″ on each side of this line and 4″ for the girder in a right angle to the tail beam. Draw the hanger 1½″ wide. This will be the plan of the girder, tail beam and hanger. Project all lines from the plan and measure off 8″ from the first line drawn for the hight of the beam and girder and ½″ for the thickness of the hanger, which will give the elevation.

The girder for Fig. 6 is 3¾″ (actual size) from the right margin line and 4° from the top margin line.

The student should draw Figs. 7 and 11 on another sheet.

Fig. 8.—Draw the 4″ x 4″ post 2″ (actual measurements) from left margin line 2′ 6″ high. Sill 2′ 3″ long.

Fig. 10.—Draw post 4″ x 4″ and 6½″ (actual measurements) from left margin line and sill 4″ x 6″—3′ 4″ long. Show brace 4″ x 4″ under 45° and broken so as to clearly indicate the toes in the sill and post.

Fig. 12.—Show corner post 4″ x 4″ or 2—2″ x 4″ one inch from right border line on top of sill 4″ x 6″. Show sill 6′ 0″ long and post and studding 2′ 6″ high. Place studding 16″ on centers and show temporary brace 1″ x 2″ under 45°—4′ 0″ from corner post.

All measurements for this drawing are to be taken as shown on Figs. 1 and 2.

Is the Architect or the Builder Responsible?

A somewhat curious accident was the cause of the death of a laborer in London recently, and the principal facts were elucidated at the Coroner's Court later. It appeared that a new building was to be erected on a site partially covered by an existing house that had been built many years ago. The architect, in designing the new building, found that an existing gable wall coincided with a required wall in the new premises. It was arranged, therefore, that the demolition should not be complete, but that the wall in question should, as far as necessary, be left standing and utilized in the new work. No doubt a saving of expense entered largely into the reasons for the proposal. The work proceeded in accordance with this arrangement, and at the time of the accident the condition was that the building had been demolished, except the wall, some 8 ft. or 9 ft. high. On one side of the wall the ground remained clear and on the other some tons of ballast were stored. During the shifting of this, a considerable portion ran down the slope of the heap and rested 2 ft. or 3 ft. deep against the lower part of the wall. The lateral pressure proved too much for the wall's stability, and it fell over, killing a man in so doing.

In commenting upon this a London building paper says: An examination made of the material of which the wall was composed showed that the mortar was much decayed and the bricks, a common stock, were not properly bedded. On one side the pointing had been removed, and on the other a plaster surface prevented a close examination of its condition. These circumstances afforded an opportunity for the rotten state of the wall to escape notice. It is questionable, however, if such should have been the case. Before any portion of an old building is incorporated in a new, it would appear to be a *sine qua non* that its strength should approximate to that of the structure to be erected. During the demolition of the other and principal part of the building it should have been possible to ascertain to a great extent the general condition, and unless the part pulled down was much more sound than that left, an unlikely event, knowledge should have been gained to warrant a total demolition. Further, it is not impossible to a practical man to easily find where unsound work exists. There was no evidence that this had been done. The jury brought in a verdict of "Accidental death," and added no rider. Beyond this we have no intention of going, but the question will necessarily arise who should be responsible in such procedure as is here illustrated, independently as to whether or not an accident is the result. An architect wishes, no doubt, to carry out his work as reasonably as possible, but his knowledge must be such that his plans and specifications involve the use of nothing defective.

A builder's point of view, if he contracts at competitive prices, is somewhat different. If he sees that a mistake, or potential causes for mistakes are given to him in the conditions under which he tenders, it may be to his advantage to keep silent until the contract is signed. An error afterwards discovered is often an opportunity to increase profits; such cases have been known. But the concealment of a mistake until dangers arise can have no justification, and a builder would show up badly if such a fact could be definitely proved. A foreman, again, should undoubtedly draw attention to such an occurrence immediately it becomes known to him, and any neglect to do so would throw upon him a responsibility from which he would have a difficulty to free himself. These three should be sufficient to enable errors to be discovered, but it is probable that the division of authority enables detection of a fault to escape, each relying upon the other. It is a pity that this should be so, but it is difficult to devise a means of altering and improving the system.

The Air We Breathe in Buildings

The important influence exerted by the heating contractor on the air in the home makes it incumbent upon him to recommend that the heating apparatus purchased provide for a renewal of the air warmed, so that it will add to the comfort as well as to the purity of the interior atmosphere. Where efforts in the past have been in a measure fruitless, it is a pleasure to note that the daily press is bringing the matter of pure air into prominence. The New York *Tribune* recently printed the following timely discussion at the season both of heating and legislation, and effort should be made to amplify the laws bearing on the quality of air in public and industrial buildings:

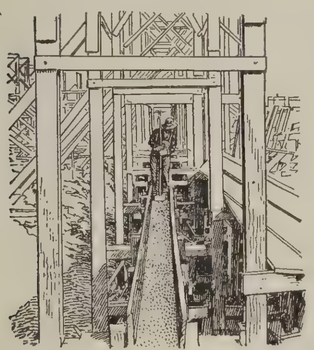
The lungs acquire tolerance to impure air and adapt themselves to conditions, but at the price of lessened vitality. There is a terrific struggle to get adapted. Every one who has spent a vacation at the seaside or in the mountains knows with what loathing upon his return to town his lungs breathe the vitiated atmosphere of office and shop. It takes several days for the lungs to accustom themselves to the metropolitan mixture. Afterward the air seems fairly good. It comes as a fresh discovery next season that the country air is different.

Many artificial systems of ventilation are farcical. Dusty and otherwise contaminated air is taken in at the sidewalk level, heated so that its solid particles are made more injurious and its oxygen thinned by expansion, and then forced into the office or workroom. The filtering device often stops half the air and does not filter the rest. No expert is needed to tell where the air comes from when it brings an odor of the sidewalk vendor's sausage and the tarry smoke of street repair. The supply of air for artificial ventilation should be piped from the roof of the building.

The top flat in an apartment house has always the best air and the lofty rooms in a tenement house, open on three sides, are more hygienic than the ground floors of costly private dwellings. Oil heaters and gas cook stoves use up the air faster than several human beings could. Whenever possible they should be connected with flues. It is pretty well understood that subways, street cars, theatres, churches and other public meeting places are not the rendezvous of oxygen, though discomfort felt in such places is largely due to heat and fetid odors. The air enthusiast will not ride in the subway if he can help it, and will stand on the platforms of street and elevated cars rather than go inside.

CONVENTION NATIONAL ASSOCIATION OF CEMENT USERS

THE sixth annual meeting of the National Association of Cement Users was held at the Auditorium Hotel, Chicago, February 21-25, in connection with the Third Annual Cement Show. The formal opening of the convention was at the evening session, Monday, February 21. Preceding this formal opening, various committee meetings were held on Monday, including a meeting in the morning of the Executive Board.



In the afternoon there was held a joint meeting of the sectional committees on Art and Architecture; Building Laws and Insurance; Concrete and Reinforced Concrete; Exterior Treatment of Concrete Surfaces; Machinery and Appliances; Roadways, Sidewalks and Floors; Specifications for Fireproofing; Specifications for Cement Products, and a general discussion covering the preparation of materials, laying, finishing and costs. Owing to the fact that the chief questions of interest were to be the subject of formal consideration during the convention, the attendance at the afternoon session was light and the discussion of a random character.

Convention Formally Opened

At eight o'clock Monday evening the convention was formally opened by President Richard L. Humphrey, of Philadelphia, with about 100 members present. The delegates were welcomed to the city by a representative of the Mayor, with a response by the president.

Judge C. C. Kohlsaat, of the United States Circuit Court, who is chairman of the board of trustees of Lewis Institute, a technical school, was introduced and made an informal address on technical education, describing briefly the institution with which he was identified and its efforts to give young men and women a practical education that would fit them for useful work in the world. He expressed the hope that the members would interest themselves in their home cities in similar work.

John M. Ewen, of Chicago, recognized as an authority on concrete, was introduced and made a brief address. Mr. Ewen became interested in this subject ten years ago, when he was employed by a large construction company to investigate reinforced concrete and make a report. At the present time he is engineer in charge of six or eight buildings of reinforced concrete which are under construction in Chicago, and he recounted briefly his observations of the progress of the industry. Each year he has noted an improvement, and at the Cement Show this year he had observed substantial progress over the exhibits shown a year ago.

Frank R. Charles, city engineer of Richmond, Ind., read a paper on the construction of concrete roadways. The first paving of concrete was laid in Richmond in 1896, and has stood the wear well. It has become a favorite type of paving in his city and gives general satisfaction. A foundation is laid of five to six inches of concrete, using a 1:2:5 mixture, with a a surface of one and a half to two inches thick of a 1:2 mixture of cement and coarse sand, and the best results have been obtained with joints which make blocks ten to fifteen feet square.

George C. Wright, consulting engineer, Rochester, N. Y., who is secretary of the association, presented a paper giving data and stereopticon views of an experimental road laid near Rochester. The surface was of two-inch cubes of concrete, laid on a stone foundation leveled with gravel.

C. W. Boynton, chairman of the Committee on Roadways, Sidewalks and Floors, presented a report from his committee proposing a number of minor amendments to the Standard Specifications of the association for work of this character. There was a general discussion of the amendments offered by the committee, which were adopted in part.

Tuesday's Sessions

There was something of a departure from the original program which called for a discussion on the manufacture, cost, etc., of cement hollow building blocks, etc., as well as reports of various committees, including that on Specifications for Cement Products and the presentation of "Standard Specifications for Architectural Concrete Blocks."

The important feature of the evening session was the annual address of the president, and considering the significance of the day it was quite natural he should make more or less reference to the career of Washington as an engineer. He pointed out that the most important undertakings of his day were the building of turnpikes and canals, in connection with which Washington was a leading figure. He was active in the construction of turnpikes and recommended in a report the route ultimately adopted for the national turnpike over the mountains, made a recognizance of the route subsequently adopted for the Erie Canal and records show that he was the constructing engineer of the Potomac Canal, eventually completed as the Chesapeake and Ohio Canal.

President Humphrey stated that when he began the investigation of cement one of the first books which he perused was a volume on the subject of cement printed nearly a century and a half ago, which had been owned by General Washington and bore his signature—a book that was undoubtedly studied by Washington in connection with his engineering work on canals.

The data presented by President Humphrey threw a new light on the character of Washington as a builder and engineer and was received with profound interest on the part of those in attendance at the convention.

Other speakers addressed the convention on the subject of Washington, making the occasion a celebration appropriate to the day. There was an accompaniment of music and recitations, the real serious business being deferred until the next session.

Wednesday's Sessions

The sessions on Wednesday were well attended and great interest was manifested by those present in the amendments proposed by the committees on Standard Specifications and for various classes of concrete work and cement products. The officers elected for the ensung year were as follows:

President............R. L. Humphrey, Philadelphia.
First Vice-Pres....... E. D. Boyer, New York.
Second Vice-Pres..... M. S. Daniels, New York.
Third Vice-Pres.......E. L. Larned, Boston.
Fourth Vice-Pres..... F. A. Norris, Boston.

Under the new by-laws which were adopted at this time the above officials, with the five most recent past presidents, constitute the Executive Board. Among other duties it is the province of the Executive Board to appoint other officers and the chairmen and members of the various sectional committees. The association now has over 800 paid-up members, excluding those who have been dropped from the rolls for non-payment of dues.

The place of the next meeting of the association was left to the Executive Board, which will give notice of its decision in due course.

Inter-State Mantel and Tile Dealers' Association

The seventh annual convention of the Inter-State Mantel and Tile Dealers' Association was held at the Auditorium Annex, Chicago, February 8, 9 and 10. This association began six years ago with 15 members and has grown into a national organization extending from coast to coast and from St. Paul to New Orleans. More than 100 members were present and there were also about 100 representatives of manufacturers. The ladies have become greatly interested in these annual conventions and more than 60 were in attendance at Chicago. A special program was prepared for their entertainment and on the local reception committee were six ladies who lived at the Auditorium Annex, where the convention was held. Two matinee parties were arranged for the ladies exclusively and there were also two evening theatre parties which the gentlemen were permitted to attend. On the morning of the third day of the convention the ladies and the manufacturers were invited to a special trip to the Union Stock Yards and on Thursday evening a banquet was held at which the ladies were especially remembered again by souvenirs. The menu had been prepared in souvenir form consisting of a wooden tray, inlaid with a picture of a bull dog, suitable for a ladies' dresser; the menu for this occasion being on the back of the tray. The ladies were also especially favored with a decorated china souvenir.

The officers elected for the ensuing year were:

President........... Joseph W. Lantry, New York.
First Vice-Pres...... George F. Eubanks, Atlanta, Ga.
Second Vice-Pres.... Robert Beck, Chicago, Ill.
Treasurer........... Thomas J. Foy, Cincinnati, Ohio.

All the arrangements for the convention and the entertainment features were planned by a committee of the Chicago Mantel and Tile Dealers' Association, consisting of Robert Beck, chairman; Thomas F. Keating, secretary, and John M. Dodd, George C. Harrison and Charles F. Lorenzen.

It was decided to hold the next meeting in New York City.

Illinois Lumber Dealers and Builders' Supply Association

At a convention held in Chicago, February 16, 17 and 18, the Illinois Lumber Dealers' Association and the Illinois Masons' Supply Association were consolidated in one organization, under the title of the Illinois Lumber Dealers and Builders' Supply Association. The dues were made $10 a year, the annual dues in the lumber association having been $7 and in the masons' supply association $5.

M. E. Holden, Danville, Ill., was elected president of the consolidated association; E. S. Cheaney, Petersburg, Ill., vice-president, and G. W. Hotchkiss, Chicago, Ill., secretary and treasurer.

The directors elected to fill vacancies were J. W. Paddock, Pana, Ill., and H. H. Halliday, Cairo, Ill.

This was the twentieth annual convention of the Illinois Lumber Dealers' Association and Secretary Hotchkiss gave in his address an interesting history of its origin and growth, it having begun in 1890 with 17 members. The principal subject discussed at this convention was the experience of members under the Illinois lien law.

THE CONCRETE for the Christian Science Church at Pasadena, Cal., was deposited almost entirely through an 8-in. pipe leading from the bottom of a hopper erected on a high tower. The pipe was hung from a trussed boom and had a swivel joint in it so as to allow the discharge end to be manipulated easily.

A Plea for Better Buildings

The following comments emphasizing the desirability of better building regulations in the larger cities of the country appeared in a recent issue of the *American Contractor*, and are of such general interest that we present them herewith:

Hundreds of cities are now revising their building regulations, or writing new ones, or have just put amended ones into force. It shows that the great fires of the past few years have not been wholly unfruitful lessons. People are awakened to a realization that something must be done. They are tired of having their lives and property constantly in peril, the while paying out nearly $300,000,000 a year for fire protection and $200,000,000 a year to the insurance companies in premiums, while over $215,000,000 of property goes up in smoke every year.

Perfect building is absolute economy, good building is sensible and shoddy construction is positive extravagance. A city full of good buildings means lessened maintenance cost for each owner, fewer repairs, a longer life for the buildings (and in consequence lower rents would obtain), much less expense for fire departments and water protection, and the very minimum of insurance rates and premiums, safety of life and property. It would mean millions upon millions of dollars saved and a great municipal problem solved.

A first-class city can only be an aggregation of first-class buildings. Therefore in at least the congested districts only perfect construction can be tolerated, the complete and total elimination of the combustible in building materials.

All buildings, new and old, of a public or semi-public nature should be conspicuously and officially labeled, just what classes they belong to, "First Class," "Second Class," "Dangerous," etc. That will keep the building department alert in properly classifying the buildings and will keep owners from falsely claiming that their inferior and dangerous buildings are "fireproof."

Then the department should make every effort to have the tax system so amended that there will be a scale of rates rather than a flat rate. The owner of a first-class building requiring the minimum of fire protection and expense on the part of the city should pay a lower rate of taxes than the owner of the fire trap for whose benefit and protection and the protection of the neighboring property he endangers, the expensive fire departments have to be maintained. That man should pay the maximum rate of tax. Further, the building departments should try to influence the insurance companies to create the "neighboring risk" that exists in most European cities, whereby the individual becomes amenable for the damage done to other than his property through his neglect or carelessness.

In other words, if fire extends beyond a man's own premises, he would get but part of his insurance. In Europe this works a charm, people become most careful where they deposit ashes and waste paper and cotton waste, and all those fire-breeding things are kept in fireproof receptacles. Many people clamor for as few restricted fire limits as possible; the building departments should clamor for as wide limits as possible. It is only a question of a few years when the existing fire limits of any city have to be extended. Then they take in all the second class buildings permitted under the old regulations, these old ones endanger the new buildings and the latter have to be superlatively well built to withstand the adjacent fires that are sure to rage in the old buildings. We must all realize that with as rapidly growing a population the town of to-day is the city of to-morrow. Every one of our cities is now suffering from an inheritance of fire traps handed down by previous generations. The city that would make its fire limits comprehend all of its corporate extent would indeed be a sensible city, a really first-class city.

THIRD ANNUAL CEMENT SHOW AT CHICAGO

THE Third Annual Cement Show at Chicago opened Friday evening, Feb. 18, at the Colisseum. Every foot of available space in the galleries as well as on the main floor was occupied by exhibitors, and many applications were received after all space had been taken. The exhibits of concrete mixers and machines were numerous, but every branch of the industry was well represented, there being in all 314 exhibits. The attendance from outside of the city was unusually large, as contractors and others interested in cement or concrete in all parts of the country have come to look upon the Chicago Cement Show as the battle ground where new inventions and products wrestle for recognition in the building industry.

Profiting by experience the management of the exhibition obtained a fine artistic effect by requiring that all the booths be uniform in decoration, with mission furniture. Practically all the machinery was shown in operation, driven by individual motors, so that the various types of mixers could be compared in their operating features, as well as block and brick machines. Even wheelbarrows were shown in operation with the wheel resting on a revolving eccentric wheel, which more than reproduced the bumps of ordinary usage. The wonderful development of machines for handling cement and concrete shows the extent to which this new industry has taken hold of the people. A towering statue in the center of the Colisseum representing the cement age was contributed by the management of the exposition to show the artistic effects that can be gained when the possibilities of cement are fully utilized. It would take a volume to do justice to any descriptive mention of the exhibits, but the following will afford the reader an idea of the lines represented:

ADJUSTABLE STEEL CENTERING CO., Fond du Lac, Wis.—Steel sewer, conduit, and culvert centers.

ADVANCE MIXER CO., Jackson, Mich.—Concrete mixer, mortar mixer, hoist.

ALPHA PORTLAND CEMENT CO., Chicago, and Easton, Pa.

AMERICAN CEMENT ROOFING CO., Columbus, Ohio.—Cement roofing tile.

AMERICAN HYDRAULIC STONE CO., Denver, Col.—Concrete block machinery.

AMERICAN SAND AND GRAVEL CO., Chicago.

AMERICAN STEEL & WIRE CO., Chicago, Ill.—Triangle wire mesh reinforcement.

AMERICAN SYSTEM OF REINFORCING, Chicago, Ill.—Concrete reinforcing devices.

ANCHOR CONCRETE STONE CO., Rock Rapids, Iowa.—Block machines. Concrete blocks, for constructing a wall with a continuous air-space.

ARCHITECTURAL STONE CO., Cincinnati, Ohio.—Roofing tile machine and samples for roofing tile.

ARROWSMITH CONCRETE TOOL CO., Arrowsmith, Ill.—Concrete finishing tools.

ASHLAND STEEL RANGE & MFG. CO., THE, Ashland, Ohio.—U. S. Standard mixers and cement block machines.

ASSOCIATION OF AMERICAN PORTLAND CEMENT MANUFACTURERS, Philadelphia, Pa.

ATLAS PORTLAND CEMENT CO., New York, N. Y.—Atlas Portland Cement, and products made from it.

BALLOU MANUFACTURING CO., Belding, Mich.—Concrete mixers.

BARRETT MANUFACTURING COMPANY, Chicago, Ill.—Roofing, waterproofing, damp-proofing and insulating materials.

BARTON SYSTEM OF REINFORCED CONCRETE CONSTRUCTION, Chicago, Ill.

BENNER, E. E., Lincoln, Neb.—Cement block and a block machine.

BESSER MANUFACTURING CO., Alpena, Mich. — Besser vertical core face down wet process block machine.

BIRD, J. A. & W., & Co., Chicago, Ill.—Roofing.

BLAW COLLAPSIBLE STEEL CENTERING CO., Pittsburg, Pa.

BOLTE MANUFACTURING CO., Kearney, Neb.—The Bolte concrete mixer.

BRIGGS LABOR SAVING SPECIALTY CO., Waterloo, Iowa.—Concrete spreaders and carts.

BROWN HOISTING MACHINERY CO., THE, Cleveland, Ohio.

BRYAN MANUFACTURING CO., Chicago, Ill.—Wheelbarrows.

CABOT, SAMUEL (Inc.), Boston, Mass.—Slabs and panels showing different cement surfaces stained and waterproofed with Cabot's stains.

CEMENT MACHINERY CO., Jackson, Mich.—Systematic continuous concrete mixer. Sand block machines.

CEMENT TILE MACHINERY CO., Waterloo, Iowa.

CENTRIFUGAL CONCRETE MACHINERY CO., Chicago, Ill.—Machine for making blocks by the wet process.

CENTURY CEMENT MACHINE CO., Rochester, N. Y.—Hercules concrete block machines and power tampers.

CERESIT WATERPROOFING CO., Chicago, Ill.—Ceresit waterproofing.

CHANNON, H., & CO.—Contractors' machinery, pumps, buckets, shovels, tampers, etc.

CHICAGO BUILDERS' SPECIALTIES CO., Chicago, Ill.

CHICAGO MONOLITH CONSTRUCTION CO., Chicago, Ill.—Monolith collapsible concrete forms, for constructing hollow or solid walls.

CHICAGO PORTLAND CEMENT CO., Chicago, Ill.

CHRISTOPHER, GEORGE C., & SON, Wichita, Kan.—Eclipse stone machine. Eclipse continuous mixer.

CLIMAX COMPANY, Chicago, Ill. — Reinforced concrete beams.

CLINTON WIRE CLOTH CO., Chicago, Ill.—Wire fabric for concrete reinforcements. Wire lath.

CLOVER LEAF MACHINE COMPANY, South Bend, Ind.—Clover Leaf concrete mixing outfits.

COLLINS, W. A., & COMPANY, Chicago, Ill.—Concrete reinforcing bars, woven wire fabric, metal lath, corner beads.

CONCRETE MACHINERY CO., Butler, Ind.—The 20th Century concrete mixer.

CONCRETE STONE & SAND CO., Youngstown, Ohio.—Tile and stucco decorations.

CORRUGATED BAR COMPANY, St. Louis, Mo.—Round and square corrugated steel bars.

COWHAM SYSTEM PORTLAND CEMENT MILLS, Jackson, Mich.

CROPP CONCRETE MACHINERY COMPANY, Chicago, Ill.—Concrete mixers. Mortar mixers.

CROWN POINT SPAR CO., INC., Crown Point, N. Y.—Building blocks faced with spar.

D. & A. POST MOLD CO., Three Rivers, Mich.—Concrete posts and molds for making them.

DECORATORS' SUPPLY CO., Chicago, Ill.—Ornamental cast cement work.

DEXTER BROTHERS CO., Boston, Mass.—Petrifax, a coating for exteriors and interiors.

DIAMOND CONCRETE MACHINERY CO., Chicago, Ill.—Self-lining, interlocking concrete blocks.

DIETRICHS CLAMP CO., Little Ferry, N. J.—Dietrichs concrete wall form for making a continuous hollow wall.

DUNN, W. E., & CO., Chicago, Ill.—Concrete block machines. Concrete chimney tops.

EUREKA MACHINE COMPANY, Lansing, Mich.—Concrete mixer, and a mortar mixer.

FELLGREN, C. W., & SON CO., Chicago, Ill.—A patented system of concrete construction, for the erection of buildings.

FILLMORE MACHINERY CO., Cincinnati, Ohio.—Concrete mixers.

FISHER HYDRAULIC STONE & MACHINERY CO., Baltimore, Md.—Machinery for making concrete blocks.

FOOTE CONCRETE MACHINERY CO., Chicago, Ill.—Foote batch concrete mixers.

GAUNTT, F. G., MANUFACTURING CO., Fort Wayne, Ind.—Gauntt adjustable mixers.

GENERAL FIREPROOFING CO., Chicago, Ill.—A portion of a concrete roof, constructed with "Trussit" metal. Cold-twisted lug bars, square lug bars, expanded metal and wire fabric reinforcement. The Herringbone built-up girder frame, with rigidly attached shear member. "All-steel" fireproof furniture.

GERMAN-AMERICAN PORTLAND CEMENT WORKS, Chicago, Ill.

GLIDDEN VARNISH CO., THE, Cleveland, Ohio.

GOULD, E. E., Chicago, Ill.—Nashold centrifugal block, brick and shingle machine.

GOSHEN CEMENT COLUMN CO., Goshen, Ind.—Cement columns and cement column molds.

GRUMMAN CONCRETE MACHINERY CO., Zanesville, Ohio.—Concrete roofing and floor tile machinery.

HALL-HOLMES MANUFACTURING CO., Jackson, Mich.—Grand portable concrete mixer.

HARTWICK MACHINERY CO., Jackson, Mich.—Continuous concrete mixer.

HAYDEN AUTOMATIC BLOCK MACHINE CO., Columbus, Ohio.

HILDRETH MANUFACTURING CO., Lansing, Mich.—Hoisting outfits for contractors and builders.

HOTCHKISS LOCK METAL FORM CO., Binghamton, N. Y.—Metal forms for laying cement sidewalks.

HUGO, O. K., Whitewater, Wis.—A reinforced concrete lock joint tile.

HYDROLITHIC CEMENT CO., New York City, N. Y.—Hydrolithic waterproof coatings and samples of stucco decorated and undecorated.
IDEAL CONCRETE MACHINERY CO., South Bend, Ind.—Ideal face down block machines, veneer and brick machines, etc.
ILLINOIS DAMP PROOFING CO., Chicago, Ill.
INMAN CONCRETE BUILDING BLOCK & MACHINE CO., Beloit, Wis.—The Inman patent building block and system of wall construction.
INSULITE CHEMICAL COMPANY, Aurora, Ill.—Concrete tanks, waterproofed with Insulite.
IRONITE COMPANY, Chicago, Ill.—Specimens of concrete, brick, stone, etc., waterproofed with Ironite.
KADE ADJUSTABLE CEMENT CLAMP CO., Chicago, Ill.—The Kade cement clamp, a system of form construction.
KEMPER, E. G., Burlington, Iowa.
KENT MACHINE CO., THE, Kent, Ohio.—Kent Precision mixers.
KLINE CO., INC., H. Z., Indianapolis, Ind.—Red Star waterproofing.
KNICKERBOCKER COMPANY, Jackson, Mich.—Coltrin concrete and mortar mixers.
KOEHRING MACHINE CO., Milwaukee, Wis.—Concrete mixing machinery.
KRAMER AUTOMATIC TAMPER CO., Peoria, Ill.—Automatic tamper for tamping concrete blocks and concrete brick.
LAGRANGE SPECIALTY CO., Lagrange, Ind.—Little Giant brick machine, steel fence post, and porch column molds.
LEHIGH PORTLAND CEMENT CO., Indianapolis, Ind.
LITTLEFIELD & CLARK, Buffalo, N. Y.—The Grimm portable woodworker.
LOCK JOINT PIPE CO., New York, N. Y.—Sections of different size reinforced concrete pipe made under the Meriwether patents.
MARSH-CAPRON MANUFACTURING CO., Chicago, Ill.—M-C concrete mixers, concrete handling machinery.
MARSH COMPANY, Chicago, Ill.—Marsh concrete mixer.
MILWAUKEE CONCRETE MIXER AND MACHINERY CO., Milwaukee, Wis.—Milwaukee concrete mixer.
MILES MANUFACTURING CO., Jackson, Mich.—Simplex concrete mixer. Down-face, Miles block machine and Singer machine.
MIRACLE PRESSED STONE CO., Minneapolis, Minn.—Miracle continuous mixer. Miracle double-staggered air-space block machine, etc.
MONOLITH STEEL COMPANY, INC., Washington, D. C.—Monolith steel reinforcement for all kinds of concrete construction.
MOORE & SON, W. D., Creston, Iowa.—Poured concrete building blocks.
MULTIPLEX CONCRETE MACHINERY CO., Elmore, Ohio.—Hand lever pressure block machines. Various concrete products.
MUNICIPAL ENGINEERING AND CONTRACTING CO., Chicago, Ill.—Concrete mixing machine.
NATIONAL FIREPROOFING CO., Chicago, Ill.—Construction of fireproof houses, utilizing hollow tile, cement, stucco and reinforced concrete in combination.
NATIONAL MIXER CO., THE, Rochester, N. Y.—National concrete mixer.
NATIONAL ROOFING COMPANY, Tonawanda, N. Y.—Composition roofing and paint, and roof coating.
NATIONAL WATER-PROOF CO., Chicago, Ill.—"Te-Pe-Co." Liquid compound for waterproofing concrete, sandlime brick, sandstone, and porous stones.
NATIONAL WIRE CLOTH CO., Sandusky, Ohio.—Woven wire fabric for concrete reinforcement, etc.
NORTHWESTERN EXPANDED METAL CO., Chicago, Ill.—A concrete floor slab, reinforced with expanded metal; also exterior plaster work.
OHIO CERAMIC ENGINEERING CO., Cleveland, Ohio.—Concrete mixers, hoists, conveyors, carts, etc.
OHIO POST MOLD CO., Toledo, Ohio.—Fence post machines.
OVERTURF & CO., C. W., Dumont, Iowa.—Portable power mixer.
PEERLESS BRICK MACHINE CO., Minneapolis, Minn.—"Peerless One-Man Cement Brick Machine."
PREMIER CONCRETE BLOCK SYSTEM, Marion, Ind.—Concrete block machine, and equipment for making blocks by the wet process.
RAYMOND CONCRETE PILE COMPANY, Chicago, Ill.—Miniature pile driver in operation.
ROCKFORD SAND AND GRAVEL CO., Rockford, Ill.
ROSS & CO., J. A., Chicago.—Success chimney block machine.
SANDUSKY PORTLAND CEMENT CO., Sandusky, Ohio.—Medusa white Portland cement. Medusa waterproof compound.
SANFORD CONCRETE MACHINERY CO., Toledo, Ohio.—Sanford Pressure Block Machine.
SASGEN BROTHERS, Chicago, Ill.—Builders' derrick.
SHARON STEEL HOOP COMPANY, Chicago, Ill.—Slotted steel studding for use in the construction of fireproof partitions, suspended ceilings, wall and column furring. Parker steel corner bead. Concrete steel silo (hollow walls).
SIMMONS GRAPPLE CO., Chicago, Ill.—A mechanical device for carrying concrete block.
SIMPSON CEMENT MOLD COMPANY, Columbus, Ohio.—Concrete porch columns, newels and other porch trimmings.
SIOUX CITY CEMENT MACHINERY CO., Sioux City, Iowa.—McCracken patent double end, cement block and tile machine.
SKILLEN & RICHARDS MFG. CO., Chicago, Ill.—A working exhibit of elevating and conveying machinery.
SMALLEY & TRULIN, Panora, Iowa.—Two-piece, two air space, and solid third air space, concrete block machine.
SMITH COMPANY, THE T. L., Chicago, Ill.—Concrete mixers.
SMITH, F. P., WIRE AND IRON WORKS, Chicago, Ill.—A line of reinforcing steel.
SNELL, R. Z., MANUFACTURING CO., South Bend.—Snell batch concrete mixers.
SOMERS BROTHERS, Urbana, Ill.—Somers pressure brick machine.
STANDARD ASPHALT & RUBBER CO., Chicago, Ill.—Sarco waterproofing.
STANDARD SCALE & SUPPLY CO., Chicago, Ill.—Concrete mixers, engines, scales, trucks and barrows.
STERLING PATTERN WORKS, Sterling, Ill.—New State concrete mixers.
STERLING WHEELBARROW CO., Milwaukee, Wis.—Wheelbarrows and carts for handling concrete.
SVENSON-SHUMAN MACHINE COMPANY, Pittsburg, Pa.—Svenson concrete mixers.
THE LUCK CEMENT POST CO., Aurora, Ill.—Cement post molds, cement posts and reinforcements, also molds for making cement block of any shape or size by the pouring system.
TOLEDO WHEELBARROW CO., Toledo, Ohio.—Wheelbarrows and carts for handling concrete.
TORNOTILE MFG. CO., LTD., Chicago, Ill.—Floor, roof and ornamental tile.
TRUSSED CONCRETE STEEL COMPANY, Detroit, Mich.—Reinforcing steel for concrete, Kahn trussed bars and other products for concrete building.
ULLRICH, H. A., Chicago, Ill.—Machine for making a building block simulating a block of pressed brick.
UNITED CEMENT MACHINERY MFG. CO., Plain City, Ohio.—Everything used by block maker or concrete worker.
U. S. CHAMPION CEMENT ROOFING TILE CO., Kansas City, Mo.—The U. S. Champion roofing tile machine products.
U. S. GYPSUM COMPANY, Chicago, Ill.—Fireproof gypsum products.
U. S. GAS MACHINE COMPANY, Muskegon, Mich.—Block machines, with different attachments.
UNIVERSAL BRICK COMPANY, Utica, Ill.—Cement pressed brick.
UNIVERSAL PORTLAND CEMENT CO., Chicago, Pittsburg and Minneapolis.—Universal Portland cement and products made from it.
UNIVERSAL SANITARY APPLIANCE CO., New York and Chicago.—Reinforced concrete ash and garbage receptacles.
VAUDREUIL, E. J., REALTY CO., Vaudreuil, Wis.—Reinforced cast cement ornamental work. Cement blocks for silos.
WABASH PORTLAND CEMENT CO., Detroit, Mich.—Wabash Portland cement and products made from it.
WADSWORTH, HOWLAND & CO., Boston, Mass.—Bay State brick and cement coating for the decoration and protection of brick, cement and concrete surfaces.
WARDROP & FOSS, Chicago, Ill.—Concrete construction for use in the erection of garages, workshops, small dwelling houses, garden walls, etc.
WARREN REFINING CO., THE, Cleveland Ohio Ebonite.—A cement paint for protecting roofs, gutters, engines, tanks, bridges, etc.
WATERLOO CEMENT MACHINERY CORPORATION, Waterloo, Ia.—Polygon concrete machinery.
WERT, C. S., Kendallville, Ind.—Perfect brick machines, cistern and silo molds.
WESTERN BRICK MACHINE COMPANY, La Crosse, Wis.—Concrete building machinery and cement brick machines.
WHITTLESEY, M. B., Detroit, Mich.—Hobbs concrete block machinery.
WILLIAMS, DAVID, COMPANY, New York, N. Y.—"The Building Age," and books relating to the various branches of building construction.
WISCONSIN LIME & CEMENT CO., Chicago, Ill.—Aquabar Water Proofing. A concrete filled stanchion and beaver board for wall covering. Sample jars of mortar color, hydrated lime, etc.
WOLVERINE PORTLAND CEMENT CO., Coldwater, Mich.
X-L-ALL MANUFACTURING CO., Chicago, Ill.—The X-L-ALL Concrete Tools. Ferguson Tile Machine.

THE JOBBING CARPENTER AND SOME OF HIS WORK*—XII

By EDWARD H. CRUSSELL.

WITH the picture or print in place, the necessary thing is to cut and fit the back boards. If there are only one of two pictures to frame, the backs can be made from a few odds and ends of boards dressed down until they are of the required thickness. If there is much framing to do, however, it will be better to procure boards cut especially for this purpose. They are mostly used about ⅛ of an inch thick, and any sawmill can make them. They should always run the short way of the frame, and can be cut to length by drawing the corner of a chisel across them on each side and then snapping them off. They are fastened in place with small brads, care being taken that when driving them we do not in any way injure the frame. The very best way is to push them into place with a small pair of pliers.

In order to make a good job, all the cracks between the boards and around the edges of the frame should now be covered with strips of paper to prevent dust getting into the picture.

These strips may be either pasted or glued—glue being given the preference by the professional, because it is at hand and dries quicker.

The appearance of many pictures is much improved by placing a cut-out mount between them and the picture frame, and in order to make the subject complete, a few general instructions will be presented for cutting these mounts from cardboard. The novice generally looks upon cutting beveled mounts as a difficult undertaking, but there is really nothing difficult about it, as a few minutes' practice on a spare piece of mount cardboard should give him all the confidence he requires. A wide, thin, straight edge is best for this, as it is not so liable to slip, while a 1-in. chisel ground with a fairly long bevel will be found the proper tool for doing the cutting. A beveled straight edge is the kind more generally used, with the chisel laid flat on the bevel, but one with a square edge can be made to answer if it is kept back far enough from the penciled outline of the opening to give the chisel the correct bevel. An end view of this arrangement is shown in Fig. 77.

The correct size and shape of the opening should first be marked on the cardboard and then holding the straight edge firmly with the left hand, take the chisel in the other and with one stroke cut right through the cardboard from one corner to the next. It is necessary to make the cut right along one side with one stroke if you wish to get a straight even bevel, but be careful you do not cut beyond the intersection of the lines at the corners. There is usually a little roughness at this spot after the center portion has been removed, but this is easily cleaned off with the chisel while the mount is lying flat on a spare piece of cardboard. The chisel is not held by the handle but by the blade, and only one corner of it is used for cutting, as shown in Fig. 78. This and the previous figure carefully studied in connection one with the other should make everything perfectly clear to even the novice.

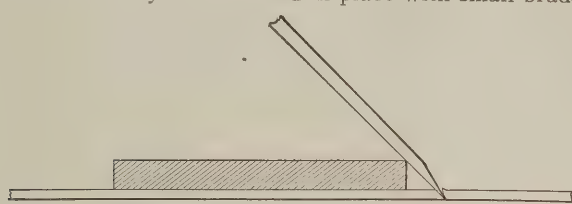


Fig. 77.—End View of Chisel and Straight Edge When Cutting Cardboard Mounts.

Figs. 79 and 80.—Sections of Simple Frame Moldings.

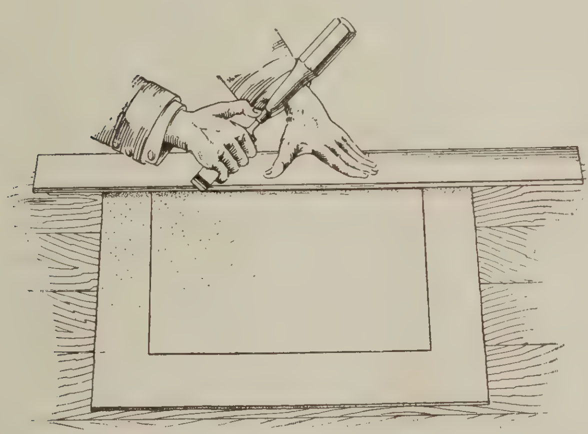


Fig. 78.—The Proper Manner of Holding Chisel in Cutting.

Figs. 81 and 82.—Sections of Machine Stuck Moldings.

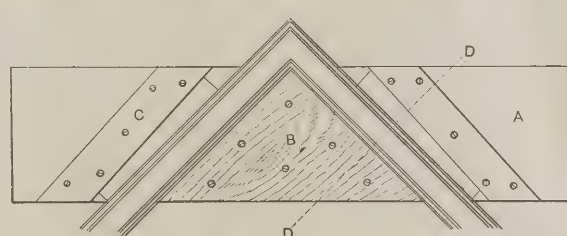


Fig. 83.—Plan View of Simple Home-Made Cramp.

The Jobbing Carpenter and Some of His Work.—XII.

The opening should be cut in the mount first and the mount then fitted to the frame in the same manner as mentioned for pictures in the January issue of the paper. That is, the mount should be laid face up on the bench; the frame placed over it and correctly adjusted to position by measurement from the edges of the opening. A pencil line should then be run around the rabbet of the frame, marking its correct size on the mount, after which the mount should be trimmed with chisel and straight edge or with shears, as may be most convenient. The mount is sometimes arranged to show an even margin all around the picture, and sometimes so as to have the top sides of even width and the bottom a little wider.

The foregoing method of holding the straight edge with the left hand answers well enough for small mounts, but for a large one it will be better to hold it

* The author of these articles will be glad to discuss any phase of work in the line of jobbing carpentry that the reader may suggest. —Editor *The Building Age.*

by some mechanical means. If only one or two mounts are to be cut the straight edge can be fastened down over them with a wood screw through each end of it, but if there are many of them it will permit of quicker work if one end of the straight edge is fastened to the bench with a hinge and a cord and treadle attached to the other end. The straight edge should be so fastened that the end with the treadle projects an inch or so over the side of the bench, and then, after the cardboard is in position, by stepping on the treadle the workman has everything fast, while both hands are free to do the cutting. Of course, by this latter arrangement a thin straight edge will not answer the purpose. One should be used that is stiff enough to have a good bearing on the cardboard for its entire length. A piece of close grain hardwood, on which to do the cutting, should be used beneath the straight edge in all cases.

In Figs. 79 to 82 inclusive are shown sections of four simple frame moldings. Fig. 79 is merely a plain-rabbeted strip, but is very effective if fine figured woods, such as quartered oak or mahogany, are used. In plain woods its surface may be broken up with beads or the edges may be chamfered.

The molding represented in Fig. 80 can be easily made with a No. 45 plow plane, and it is one of the most effective moldings that the writer has ever used. No one looking at a section of this molding would believe how well it appears when mitered up in a frame. It can be used in all widths from 1 in. up to 2½ in., with the beads proportioned, of course, according to the width of the frame.

Figs. 81 and 82 represent machine stuck moldings and are designed with the idea of showing the figure of the

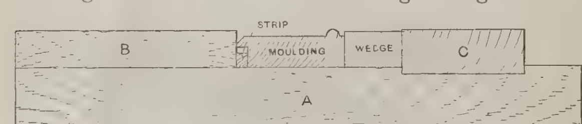


Fig. 84.—An Enlarged Section on Line D-D of Fig. 83.

which to fill out the rabbet, so as to give the molding an even bearing. In Fig. 84 is represented an enlarged section on the line D-D of the previous figure, and which, we think, will render the construction perfectly clear.

The pieces C-C are also made of hard wood, about 1 in. thick and 2½ in. wide. They are fastened far enough from the piece B to take in the largest molding likely to be used, and if they are gained into the base board they will probably stay in position longer. Hardwood wedges of the proper taper and of different widths, so as to accommodate all sizes of moldings, should always be kept on hand. The less taper the wedges have the tighter they can be driven, and this should be remembered when fixing the pieces C-C.

The writer once saw a description of the above style of cramp in an English periodical, wherein the wedges were placed the other way round; that is, the thin edge of the wedge pointing toward the corner of the frame, as in Fig. 85. If one should make the cramp this way he may be pretty certain that when he comes to nail the frame the first blow of the hammer will loosen the wedge and the second or third blow will drive both wedge and molding out of the cramp.

In many home-made cramps a piece of cord is an important factor. The four pieces of molding after being glued at the ends are assembled in their proper order; the cord is placed around them, tied loosely and then twisted tight with a piece of stick, thus cramping all

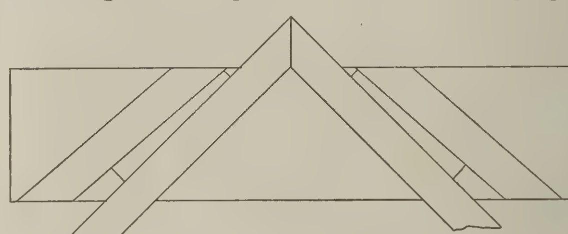


Fig. 85.—View Showing the Wedges Placed the Wrong Way.

The Jobbing Corpenter and Some of His Work.—XII.

wood to the best advantage rather than have any beauty of outline. Fig. 81 looks best with a gilt lining. Figs. 79, 80 and 82 can be used either with or without the gilt lining, according to taste.

The regular picture frame moldings may be procured at the dealers of almost every conceivable size, color and shape. As is well known they are all polished when bought, and to do good framing it is necessary that these home-made moldings be finished in the length before being cut and made into the frames. If frame moldings can be obtained locally at a reasonable figure there is no use of one going to the trouble of making them by hand, unless for the purpose of using up a scrap of fine figured wood or for some sentimental reason; but when the dealer wants to charge you from 12 to 15 cents per foot for a 2-in. hardwood molding, it is time to look around and see if there is not some cheaper way of getting it.

As previously mentioned, picture frame cramps are seldom used by the professional picture framer, but an article on picture framing would hardly be complete unless some mention was made of them. Fig. 83 represents a plan view of what is probably the best simple home-made cramp of them all. It consists of a base board A, about 3 ft. 6 in. long, 10 in. wide, and from 1½ to 2 in. thick, on which is firmly glued and fastened the angle piece B and the pieces C-C, against which the edges are bearing. The piece B should be made of hard tough wood of a true right angle and with the grain running as shown, so that the wood shrinking will not affect the shape of the angle. It may be made just so thick as to go into the rabbet of the molding, but it will be better to have it ⅞ or 1 in. thick and keep a couple of thin strips of wood with

four corners of the frame at once. If you can get this far without breaking the cord, the frame is then laid on one side until the glue has set, after which with extreme care the frame is finished by nailing the corners. An illustration of this molding is not here presented because the writer does not think very much of it. Indeed if you expect to have much framing to do you had better not bother with cramps at all but learn how to nail up the frames in the vise as described in the January issue.

New Machine for Making Pressed Brick

A brickmaking machine, which, it is expected, will revolutionize the manufacture of pressed brick, has been invented by Charles Pratt, a contractor and practical brick mason of Dresden, Tenn. The feature of novelty is said to be found in the fact that it makes hard-pressed brick from dry dirt without the use of water in mixing. The dirt, which is fed into the machine without treatment or the addition of sand, is ground to a dust and conveyed to the molds, where the brick are formed by hydraulic pressure. The brick are then taken from the machine to the kiln and the result is said to be a brick which is not absorbent after being placed in the wall.

THAT PORTION of the city of New York located just above the new Pennsylvania Railroad Station, particularly between Thirty-fifth and Fortieth streets and Seventh and Eighth avenues, has been designated as the new publishing-house center, owing to the tendency of concerns of this character to build in that particular locality.

CODE OF DERRICKMEN'S AND STONE SETTERS' SIGNALS

ALL iron setters engaged in the erection of steel skeleton-frame buildings or others in which iron columns, beams, girders, etc., are utilized, together with stone setters who lay up the encasing masonry, have a code of signals which they use when communicating with their derrickmen and engineers. This code is exceedingly interesting and at the expense of considerable time and trouble we are enabled to present it to the attention of our readers. The usual practice is to employ a sober, industrious and absolutely trustworthy signalman, whose business it is to transmit to the engineer the orders and desires of the foreman through the medium of two cords—one held in the right hand and the other in the left hand—which are attached to two gong bells of different tone placed on the side wall of the shanty enclosing the engine.

The following code of bell signals is generally used, while the accompanying sketches fully illustrate the motions of the hands of the foreman, who by this means transmits his orders to the signalman holding the bell cords; the signalman then striking the number of strokes on each gong bell for the guidance of the engineer, who acts as directed.

With the left hand.	With the right hand.
1 Bell—Hoist on fall.	1 Bell—Raise boom.
2 " —Stop on fall.	2 " —Stop.
3 " —Lower fall.	3 " —Lower boom.

Referring now to the accompanying sketches, the first illustration indicates the position of the hand for signaling "To hoist full speed." The right hand is held with the fingers closed and the thumb in a vertical position is given a circular motion from right to left, as shown by the arrows in Fig. 1. To hoist "Slowly" the left hand is placed under the right and the thumb twirled slowly.

To lower—First motion, the first or index finger of the right hand is held pointing down and twirled from left to right as indicated by the arrows, all as shown in Fig. 2.

To lower rapidly—Second motion, the right hand is held extended and moved up and down from the wrist as indicated in Fig. 3.

To lower slowly, the left hand is moved slowly, placed under the right.

To stop when hoisting or lowering, the hand is held extended perfectly flat and steady, with the palm down as shown in Fig. 4.

When both hands are half flat with palm down and then spread apart as shown in Fig. 5, the signal conveyed is "all right" or "lay off."

When on the platform or street sidewalk bridge where the stone setters are raising their building materials by means of a derrick fall, Lewis or sling the foreman setter or derrickman communicates his wishes to the engineer on the boom and winding engines by means of a shrill whistle which he carries like a ship's boatswain suspended around his neck with cord or chain. The codes of signals vary as may be agreed upon, some foremen having each their own to prevent accidents or errors, but those generally prevailing are about as follows:

FALL SIGNALS.

2 short blasts—"Hoist rapidly or at full speed."
2 long blasts—"Hoist slowly."
3 short blasts—"Lower rapidly or at full speed."
3 long blasts—"Lower slowly."
4 short blasts—"Rest" (as for firing or preing, etc.).
4 long blasts—"Stand by engine."
1 short blast—"Stop hoisting."
1 short blast—"Stop lowering."

The boom signals are the same, but with a whistle of a different tone or key.*

Fig. 1.—Signal to "Hoist Full Speed."

Fig. 2.—Signal "To Lower."

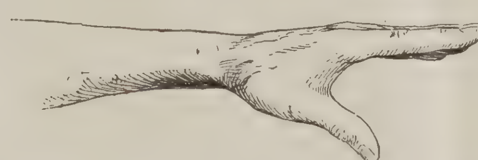


Fig. 4.—Position of Hand When Signaling to "Stop."

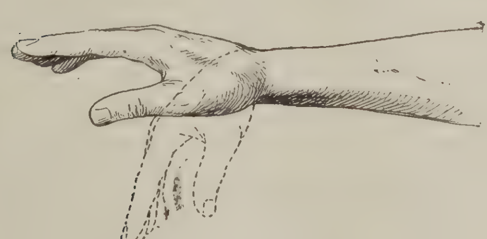


Fig. 3.—Signal to "Lower Rapidly."

Fig. 5.—Position of Hands When Signaling "Lay Off" or "All Right."

Code of Derrickmen's and Stone Setters' Signals.

As a general thing the codes are roughly printed on paper or board, signed by those in charge of the work and nailed or placed alongside and in sight of the engineer, with a penalty attached for disturbance or interference.

A "No Admittance" sign on the outside of the engineer's house or enclosure should never be omitted in order to prevent his mind being distracted from his duties by visitors or idlers.

The engineer makes use of a code of signals for his engine and boiler requirements, one whistle being for coal and two for water.

* We shall be glad to have our readers send in for publication the signals which derrickmen, stone setters or others may use in the localities in which they reside.—Editor *The Building Age.*

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MARCH, 1910

Competent Mechanics in the Building Trades

A month or two since we commented somewhat at length upon the need of competent mechanics in the various branches of the building and allied industries. pointing out some of the many phases of the subject and calling attention to the interest which was being manifested in promoting the welfare of the youth of the country along the line of technical and manual training. It goes without saying that the training of young men to fill the ranks of expert workmen is, in the vernacular of the day, "a live wire proposition." To whatever influence it may be credited it is an indisputable fact that throughout the length and breadth of the country there was probably never before such an awakening to the need of giving men who must do mechanical work the right sort of training as at the present time. Not only is it the theme for papers read at conventions of manufacturers and tradesmen, but in the reports of associations more or less enthusiasm is manifested over the achievements of young men eager to learn all they can of the theories and principles governing their trades, and to acquire that expertness in doing the work which not only is acceptable to themselves and to their employers, but is looked upon from a broader viewpoint as a part of the worth of the nation.

Future Supply of Mechanics

In this connection it is gratifying to note the tenor of an article in a recent issue of one of our valued contemporaries dealing with the question from the standpoint of the painting trade. It was there pointed out that one of the most serious questions affecting this trade in the near future will be the supply of competent mechanics. "We hear at the conventions," the writer says, "a good deal about boys wanting clerkships and positions in stores and offices, where they can wear good clothes and need not soil their hands, even though these positions pay much less than a man can earn at one of the building trades, but we overlook the fact that a boy who is faithful to his employer in a store or office is reasonably certain of permanent employment, and, though his weekly wage may be lower, he gets it for 52 weeks in the year, while many building trades employees are idle more than half the time, this being especially true of painters; and where a boy has a mechanical bent and a natural love for the building trades he will find steadier employment and higher daily wages in almost any of the other building trades than he will in painting. Does it not seem reasonable then that the boy's parents prefer him to learn carpentry, bricklaying, plumbing or tile setting, for they naturally look forward to the future as well as to the immediate present?"

Situation Requires Study

The writer also points out that the situation is becoming such a serious one, it is high time the master painters, both organized and unorganized, wake up to it and begin to study it from a new light. From this it will be seen that a particularly deep interest is being manifested in the welfare of the youth of the country, especially those of a mechanical turn of mind, and employers should be stimulated to still greater effort in providing for the future requirements of the trade in the way of competent apprentices. Attention should also be called to still another class who burn the midnight oil and have not the inspiration of a sympathetic instructor at hand, but who are taking courses in the various correspondence schools. It was not so many years ago that the New York Trade School was the only institution where a young man could receive both theoretical and practical instruction in any one of the various branches of the building trades, but now classes are conducted in connection with some of the leading builders' exchanges of the country, with Young Men's Christian Associations, and sometimes in connection with the shops of contracting builders. The extension of this training is now such as to open to the young man in most of the large cities opportunity to so improve the use of his time as to increase his value to himself and as a citizen.

Co-operative Apartment Houses

That the co-operative apartment house is growing in popularity in this immediate section of the country is manifest from the number which are being planned from time to time. Reference has previously been made in these columns of several enterprises of this nature and of the generally satisfactory results achieved, as viewed from the standpoint of those investing the required capital. In connection with important apartment house developments within the last few months, Park avenue has furnished several buildings of a somewhat conspicuous character, one of the largest being a million-dollar apartment building which will have a frontage of 80½ ft. on Park avenue and 117½ ft. on Sixty-second street. The building, controlled by a co-operative syndicate, will be 14 stories in hight, of the most modern construction, and will be built from plans prepared by Herbert Lucas. The new building will enjoy unusual light privileges, as, being erected from plans of the same architect as the building on the adjoining corner of Sixty-first street which has its greatest length on Park avenue, the proposed Sixty-second street structure will have its greatest frontage on the street.

New York State Association Master House Painters and Decorators

At the twenty-fifth annual convention and Silver Jubilee of the New York State Association of Master House Painters and Decorators held at Syracuse, January 11, 12 and 13, the following officers were elected for the ensuing year:

President............ Thomas Pierpont, of Rochester.
First Vice-Pres.......Casper Glunz, of Buffalo.
Second Vice-Pres.....Charles F. Wood, of Utica.
Secretary-Treasurer...D. T. Holland, of Troy.

In the course of the proceedings a number of very interesting papers were read and discussed, one of special consideration dealing with the question, "What relationship should exist between master painter and employee?"

North Dakota Association of Builders' Exchanges

The second annual meeting of the North Dakota Association of Builders' Exchanges held in Grand Forks, N. D., the last week in February was a very interesting affair. The president's address was full of timely suggestions, and the subject of Employers' Liability came in for considerable discussion.

The election of officers resulted in the following choice:

President............J. H. Bowers, of Fargo.
First Vice-Pres..... D. A. Dinnie, of Minot.
Second Vice-Pres... A. G. Schultheis, of Grand Forks.
Third Vice-Pres.... P. Wikstorm, of Wahpeton.
Secretary-Treasurer. G. H. Phelps, of Fargo.

After the business meeting a banquet was tendered the visiting delegates by the local Builders' Exchange, at which time addresses were made by a number of those prominently identified with the organization. The next convention will be held at Minot.

A feature of the second term at the School of Architecture of Columbia University is a series of talks by graduates to the students, the first talk having been arranged for March 1. The subject is "Interior Decoration in France in the Eighteenth Century." The second talk will be on "The Architect as a Reformer;" the third on "Surface Texture in Architecture and Decoration;" the fourth on "Architectural Draftsmanship." There will be a talk or lecture each week until April 26. The subjects for some of the later dates have not yet been announced.

New Home for Chemists' Club

The Chemists' Club is to have a new home in East Forty-first street, Borough of Manhattan, N. Y., in the shape of a 10-story clubhouse and office building, the plans for which have just been filed by the architects, York & Sawyer, of 156 Fifth avenue. The new building will be of white marble in French Renaissance of the Louis XVI. period finished with Ionic pilasters and balconies at the second story and also at the top story. On the main floor in the rear will be a large auditorium with a balcony, while the second floor will be fitted as a lunch room, with social rooms opening out of it. The fourth and fifth floors will be devoted to living and sleeping rooms for the members. The five upper stories will contain laboratories. The building will cost $200,000 according to the estimate of the architects.

Another 20-Story Office Building

One of the old landmarks of New York City, and one with which is associated many interesting incidents of days long since gone by, is the Clarendon Hotel, located on the southeast corner of Fourth avenue and Eighteenth street, and now to give way to the onward march of modern building construction. Upon its site will soon rise a 20-story skyscraper, which will have a frontage of 78½ ft. on the avenue and 175 ft. on the street, and involve an estimated outlay of something like $900,000. It will rise to a hight of 263.8 ft. and will be two stories higher than the proposed American Woolen Company's building on the opposite corner of Eighteenth street. The structure will be of the modern Renaissance type of architecture, with mezzanine bays at the three lower stories and ornamental cornice at the third and nineteenth stories, as well as at the roof tier, the facades being of brick, with trimmings of limestone and terra cotta.

Barn Built Around an Elm Tree

The proverbial veneration which New England people had for many of the noble trees in and about the yards surrounding their homes is strikingly demonstrated in the case of a man in Kennebunk, Maine, who, in selecting the site for his barn, found that a large elm tree was in the way. Reluctant to cut it down, he proceeded with the erection of his barn, building it around the tree, but leaving an open lattice work from the ground to the eaves so that the tree might have plenty of light and air. The base of the elm is said to be very nearly 6 ft. in diameter, but its age is uncertain. It is, however, conceded that when the British were in Kennebunk during the Revolutionary War this tree and its mate were large, well-grown shade trees. These were so highly prized by the owner that, as above stated, instead of cutting down one of them which happened to be in the way, he constructed his barn around it.

Another remarkable thing about this barn is the door at the end of the building, which is said to be an almost perfect representation of the stars and stripes.

THE DESIGN PREPARED by Architect R. F. Graf, Knoxville, Tenn., for the Appalachian Exposition to be held in that city next summer, has been accepted and work will commence at an early date. There will be a main building, a manufacturers' building and a large stable with 250 stalls. The administration building will front the lake at Chilhowee Park and will cover an area 400 x 150 ft. The exterior will be "stucco" finish and similar in design to the administration building at the St. Louis Exposition. Under the contracts all the work must be completed by the first of May next.

SUGGESTIONS FOR BUILDING A MODERN DWELLING

By William Arthur.

WHAT is the ideal plan for the average home? One might as well ask what is the ideal human face in a world where there are so many pleasant and unpleasant ones. Each particular ideal may be a good one, but there is a variety of taste and requirement which is constantly calling into play the ability of the architect. Houses resemble one another, yet they are different in many essential respects. Architects recognize this craving for variety and are constantly striving after new effects, as is evidenced by many books of plans that are published showing houses of all styles and sizes—some weird enough to astonish even the stoical tepee man. For a small sum one may purchase a book of plans and, after picking out a suitable plan, secure a set of blue prints and specifications for a nominal sum. If the design is suitable, this is undoubtedly a cheap way of purchasing the brains of an architect, for the regulation schedule for supplying plans and specifications for dwellings is at least 3½ per cent. on the cost of the work. Many architects charge about twice as much, while others, under stress of competition, cut the price in half.

Ready-Made Plans

If ready-made plans are selected by the prospective home builder, only one set is usually sent him, and if these are not carefully handled they are often unfit to work from long before the key of the front door is turned over to the owner of the house. There are several drawbacks to the ready-made plans, the first of which is that the estimates often accompanying them are from 25 to 50 per cent. too low. In a wide continent like ours it is impossible to make estimates to suit all localities; for lumber costs twice as much in one section as in another, wages differ greatly, and the distance from a railroad, or a long wagon haul, materially affects the total. It is thus seldom safe to depend upon estimates made for only one locality unless a bill of material accompanies the bill, so that it may be priced and the rate of wages considered.

Another trouble is the want of competent superintendence. With a conscientious builder, however, there is no reason why as good a dwelling should not be built from book plans as from those made to order, for this would be to acknowledge that an architect in one part of the country cannot make plans for a house in another, and the strongest opponents of the ready-made blue print system would hardly go so far as to admit that. With a builder inclined to be dishonest the matter is rather serious, for such a one could slight a house in a score of ways even with the owner looking on. There is a possibility of being lynx-eyed as to trifles and wall-eyed as to structural deficiencies. There is something really pathetic in the belief of many an otherwise sensible man that he understands all that is worth understanding about the building of a house. The common saying is that "there are tricks in all trades," but many an owner who understands the tricks of his own business appears to think that he can also watch those of a builder. There are many conscientious builders who take pride in their work, especially when they are well paid for it, but there are also a few of the other kind, and the way is open for poor workmanship when they are allowed to go ahead without a good superintendent. The regular charge for superintendence is 1½ per cent. of the total cost of the work.

Another danger of the bought plan is that it may be out of date. A period of 10 years often makes more difference in a house than in dress. For a few years around the turning of the century it seemed that every one was determined to have a house with a gambrel or Dutch roof, in spite of its disadvantages of loss of space and high cost. From that style we have now turned to the more sensible plan of the square house, although its supremacy is threatened by the bungalow fad.

Good Features

One good feature of a popular ready-made plan is that it has been used several times—some, indeed, have been built from more than 100 times—and an architect has thus had an excellent opportunity to correct any errors in the original design. With a specially prepared plan there are apt to be a few mistakes, for house planning is the poorest paid and the least desirable of architectural work and is often slighted. It is easier to draw plans for a large brick warehouse than for a $10,000 dwelling, especially if a full set of details is made. The ready-made plans usually follow one style of detail work, and this means a great saving.

Before arranging a plan in any way it must be decided whether the house is to be turned the long way to the street or whether the reverse is to be the case. The position of the rooms depends greatly upon the view desired. It may happen that a ready-made plan good enough in itself is unsuited to the location.

If the amount of money available does not warrant the erection of the entire house at once, by all means plan it in its entirety before constructing any portion of it, for it is frequently a serious undertaking to change a house or building to another of larger size, because there has been no provision made at the outset for extension.

On the other hand, if the complete plan had been made in the first place the addition would prove a comparatively easy matter. Many an owner has grumbled over the heavy cost of remodeling his home when most of his trouble was due to his own lack of a little foresight.

Remodeling Expensive

Remodeling is often a rather trying undertaking for both architect and builder and a decidedly expensive one for the owner unless provision has thoughtfully been made for it. Passages run the wrong way; bedrooms are located where they should not be; the bath room, with expensive plumbing, is needed for a new stairway; partitions have to be put across floors hardly fit to bear their weight, or heating pipes cannot be carried up without tearing the structure all to pieces. Only an architect who knows what a delicate matter it is to arrange everything in a new house to fit one part of the plan to another from basement to attic, to change a trifle here and a little there, to move one window on the outside so that the chimney will not show through, and to make a score of such minor but necessary changes—only such a man knows how hard it is to remodel an old house to be serviceable on the inside and presentable to the critic on the street. The styles may have to be slightly mixed; there may be, as it were, a long, shiny, beautiful dress hat in what the learned call too close juxtaposition or contiguity to a very common, worn-out smoking jacket, but there is often no help for it. One distinct advantage of the Queen Ann style was that such excrescences could be upheld as a part of the design.

(To be Continued)

CORRESPONDENCE

Truing up a Level or Plumb Rule

From O. B. M., New York City.—Building mechanics, especially those engaged in the trades which cultivate the manipulation of the rougher materials such as stone, bricks and iron suffer much annoyance and discomfort through their levels and plumb rules getting "out of true," or, in other words, inaccurate and unreliable. Every tool of this kind should be straight, absolutely parallel from end to end, square on the edges and flat, being neither twisted nor hollow, neither should it be convex on the surface. Whether or not any of these conditions exist can readily be determined

Truing Up a Level or Plumb Rule. Fig. 1.—Inspecting a Level for Inaccuracies.

by looking across the surface with one eye closed in the manner indicated in Fig. 1 of the accompanying sketches. This operation should be repeated by squinting across the ends, reversing the tool end for end from left to right. If the tool is perfect and everything as it should be it will appear as at B in Fig. 2.

But the level may get a jar or a fall, in which case if it does not break the bulb tube it may perhaps knock it out of true and then the question arises what is to be done. Simply take any two points as indicated at A, Fig. 2—anything will do, stones or timbers—and set the level on them with the bulb in the center. Then keep moving the level until the bulb remains in one place. The amount it is to one side or the other of the cross line will represent the amount of error.

I would state, however, that it would be best to take out the bob and line before truing the level tube.

In correcting the plumbing tube practically the same operation is followed as with the correction of the level tube.

The friction of the materials injures to some extent the working edge, as it is applied either horizontally or perpendicularly to the work, or it may wear at either end according to the pressure of the hand and become out of true as indicated at C, or it may become hollow as at D. In order to remedy this the tool must be brought to a carpenter who will plane off the edge to a lesser width, say ⅛ or ¼ of an inch, thus restoring the accuracy and usefulness of the tool. These hints apply to bob rules, battening rules and straight edges.

Preventing Plaster from Cracking on Yellow Pine Lath

From G. B. S., Montgomery City, Mo.—Will the practical builders of the country kindly tell me through the columns of the Correspondence Department how to prevent plastering from cracking on yellow pine lath? Do the builders generally make use of lath of this kind and, if so, do they have the same trouble with the plaster cracking? Is there any way to prevent it?

Cutting Bridging for Floors

From E. B., Farmingdale, N. Y.—There is one question that I would like to submit to the practical readers of the Correspondence Department of the paper. I put it to a prominent contractor and builder in this vicinity and he was unable to give me a clear explanation of it; therefore I think it would be of benefit to many of the readers if it was discussed in this department.

How can I find the length of bridging and the angle to which to cut it? Say, for example, the floor beams are 10 in. deep and are spaced 24 in. apart; that is, where the bridging is to fit, and the bridging is to be cut 1⅜ in. thick. I do not want the "cut and try method," but I want to know how to do it with the steel square.

Plans Wanted for Five-Room Bungalow

From R. L. C., Odessa, N. Y.—Will some of the architectural friends of the paper kindly furnish for publication floor plans for a five-room bungalow and oblige an interested reader?

What Effect Has Creosote Stained Shingles on Rain Water?

From S. H., Minneapolis, Minn.—I would like to have the readers of the paper tell me what effect creosote stained shingles has on rain water that may be carried from the roof of a building to a cistern, with the ultimate object of using it for washing purposes.

What is the best arrangement in a modern house where the city water is too hard and it is desired to use

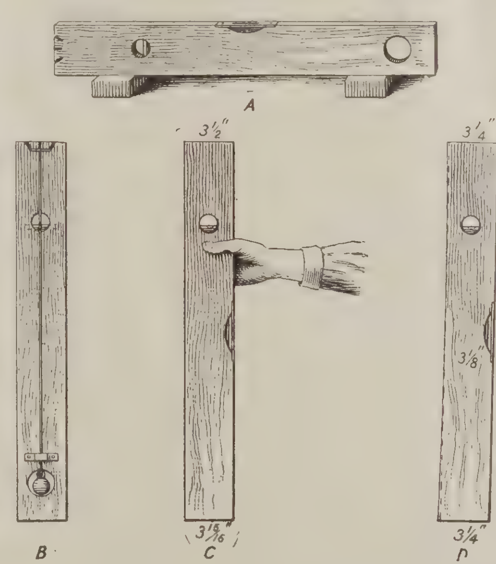


Fig. 2.—Showing the Level Under Varying Conditions.

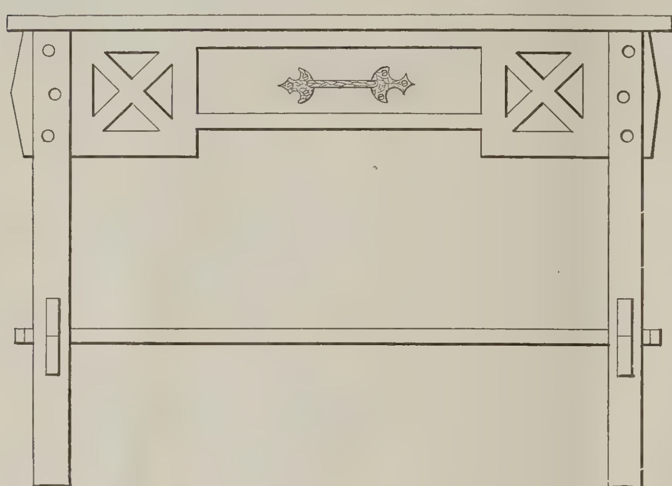
the cistern rain water for washing purposes? I mean how should the connections for the two different supplies be arranged?

Panel Soffit for a Geometrical Staircase

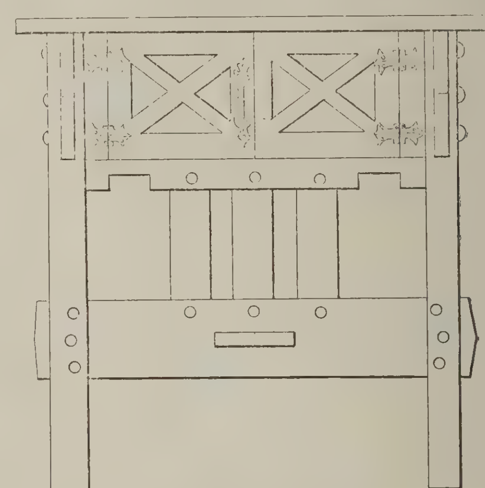
From A. P. S., Butte, Mont.—Your paper has been a great help to me in the past and I have been a subscriber to *Carpentry and Building* for many years. I am greatly interested in the letters and articles by Morris Williams dealing with stair work and hope he will tell us how to get out a panel soffit for a geometrical staircase.

Design for Study Table and Box Seat

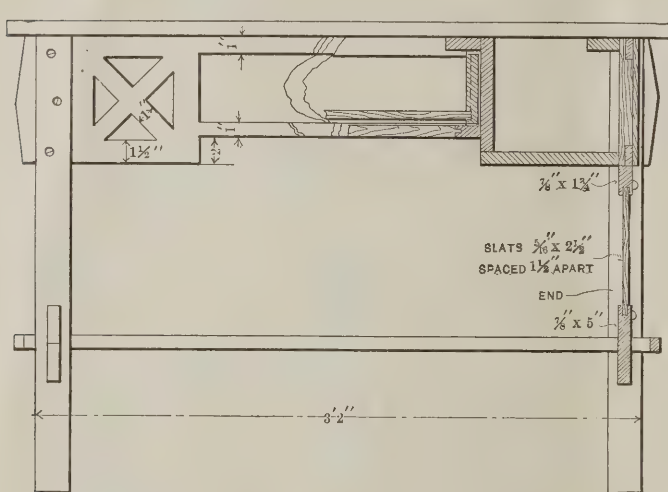
From Matt Riley, Sturgeon Bay, Wis.—Answering the inquiry of which appeared some time ago from "Seemore," Bloomfield, N. J., I am sending a sheet of drawings showing a "Mission" study table and seat, which I trust will be of interest to him. My intention is to have the table and seat faced with ⅞-in. re-sawn lumber dressed to whatever thickness it will make when halved. Then cut out to the design shown by the elevations and glue on to ⅞-in. material as indicated. All posts should be mortised out at least ¼ in. in depth to receive facing and not leave the joint across the material exposed. All the posts measure 2¼ x 2¼ in. when finished. The top of the study table measures 3 ft. 6 in. by 2 ft. 6 in. Other dimensions are clearly indicated on the drawings.



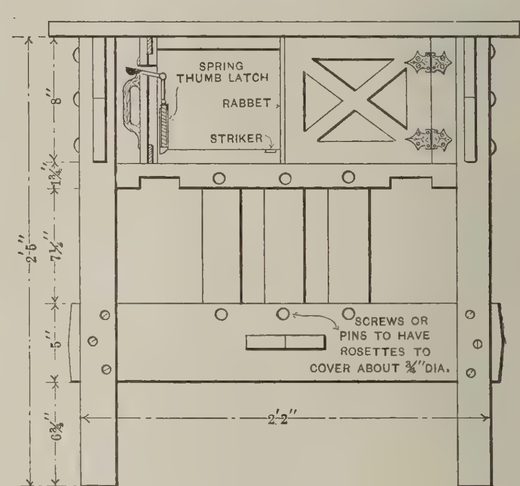
Front Elevation of Study Table.



End Elevation of Study Table.



Partial Elevation and Section Showing Construction of Locker and Drawer.



Partial Section Showing Mechanism of Spring Thumb Latch.

Design for Study Table and Box Seat.—Contributed by Matt Riley, Sturgeon Bay, Wis.

Use of "Grounds" in Connection with Interior Trim

From H. J. Aurlie, Spring Valley, Minn.—For many months past I have been closely following the columns of the Correspondence Department to see what the readers would have to say regarding the questions raised in the issue of *Carpentry and Building* for February of last year by "C. H. M.," St. Johns, Newfoundland.

The point raised by the correspondent was that the person for whom he was doing the work objected to the method indicated by his drawings, as no "grounds" were shown under the pilasters on the outside next to the plastered wall. The correspondent contended that "grounds" in such a place would be meaningless and out of order, and that they were in no way a part of the work and they should never be used in connection with such work only on the outside of wooden houses where they were required to stop clapboards, shingles or other weatherboarding against them. Even then they were to be considered not as a part of the Doric order under treatment, but as part of the face of the wall upon which the order was set. The correspondent desired to know which of the two ways outlined was the proper one.

Thus far I have noticed no answer to this question and beg leave to make a few remarks. I am inclined to the opinion that the correspondent's Figs. 1 and 2 as shown in the February issue represent the more nearly correct method of the two styles. I have seen a good many examples which bear this out and I see no reason for the extra "grounds" or back casing on the other side, although I have seen examples in which the work was done in this way. In most cases, however, it has been different at the cornice, as the grounds extended out above the capital of the pilaster with the outline of the molding and then the molding was broken around. This, however, makes considerable work and is not often employed.

I would like to ask if any reader can furnish me with the issues of *Carpentry and Building* for November, 1905, and July, August, September, October and November, 1906.

Plans Wanted for Low Cost Houses

From W. A. S., Wilmington, Ohio.—I have been taking your valued paper for a number of years and have gained much knowledge from a perusal of its columns, but this is the first time that I have knocked at the door of the Correspondence Department for admittance. If it would not be asking too much I would like to see published plans and perspective views of houses ranging in cost from $1,500 to $3,000.

Note.—We shall be glad to have our architectural friends who have designed dwelling houses of the character indicated send plans for publication, together with photographs if available. Blue-prints will serve every purpose so long as the lines are unmistakable. It is not necessary to specially prepare pen-and-ink drawings for direct reproduction, as in making our engravings we use what is known as the "wax" process.

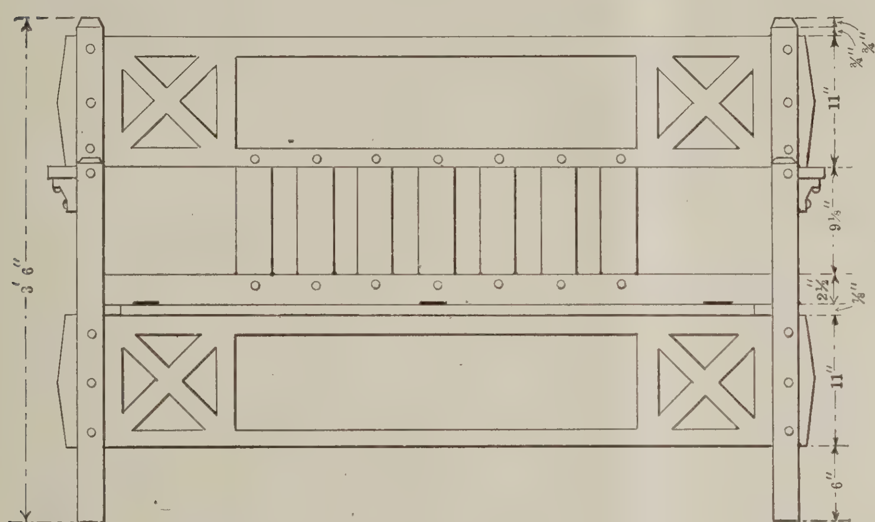
In many sections of the country a great deal of building of this nature has been done during the past year, and we should imagine that there would be excellent material available for illustration with a view to meeting the requirements of this correspondent, as well as others who are likely to be interested in low-cost dwellings. In publishing the designs full credit will be given to the architect furnishing the drawings, as well as to the contractor executing the work.

A Question in Rafters

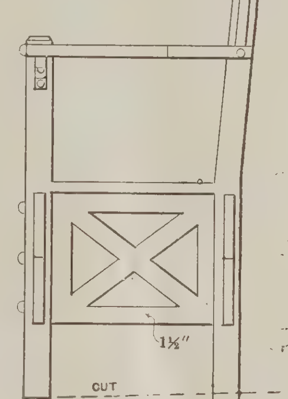
From Parallelogram, Mt. Carmel, Ill.—I have been a constant subscriber and reader of *Carpentry and Building* for more than twenty years and have just received the first issue of its successor, to be known as *The Building Age*. I am free to confess that I am very much pleased with its appearance.

I would like to say a few words about the much-discussed problem of "H. W. P.," page 249 in the issue of *Carpentry and Building* for July last. In the November issue, page 386, three different correspondents had something to say about it. It is my impression from what they say that none of them understands what "H. W. P." wanted to know, or else I do not understand him. What "H. W. P." asks is "if the common rafter of a 45-deg. pitch represents the run of the hip rafter, why will not the length of the common rafter in a roof of one-third pitch represent the run of the hip rafter?"

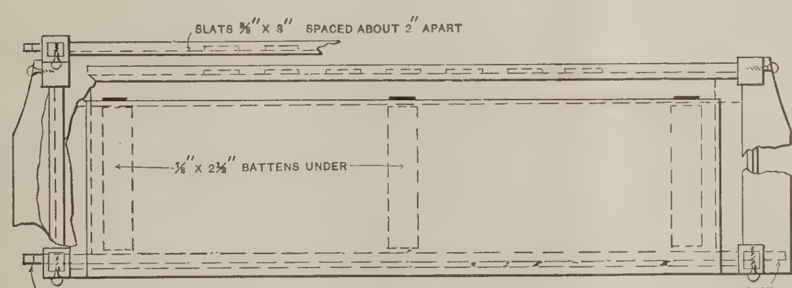
I say it does not represent the run of the hip rafter of a one-third pitch. Take, for example, the instance of the roof of a house 24 ft. in width, as suggested by the correspondent originally asking the question. The run of the hip rafter is the diagonal length from opposite corners of a square, each of the four sides of which is 12 ft. The length of this is 16.97 ft., which is also the length of the common rafter—the hip being 20.78.



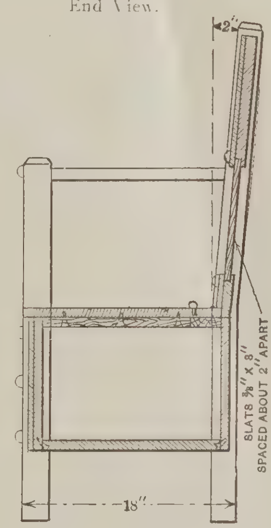
Front Elevation of Seat.



End View.



Plan of Seat, Indicating Construction.



Section Through Seat.

Design for Study Table and Box Seat.—Contributed by Matt Riley, Sturgeon Bay, Wis.

Now take one-third pitch of the same roof, which is 8 ft., then the run of the hip rafter would be the diagonal distance from opposite angles of a parallelogram, the two sides of which are each 12 ft. and the two ends of which are 8 ft., which is 14.42 ft. and the hip 16.49 ft., which is also the length of the common rafter.

This is true of any pitch, the length of the common rafter being equal to the run of the hip if the roof is square in plan.

I hope *The Building Age* will have a long and successful career.

Design Wanted for Gymnasium and Dancing Hall

From W. D., Crabtree, Ore.—I have been a reader of *Carpentry and Building* for many years and now come to the Correspondence Department for help in securing plans for a building which I will describe. We wish to erect a gymnasium hall to be used by an athletic club. The building is to be 40 ft. wide, two stories in hight and from 80 to 100 ft. in length. The lower floor is to be used for gymnasium purposes and all kinds of athletic exercises, while the second floor is to be used for dancing and public exhibitions. On one end 16 or 18 ft. is to be allowed for a stage and on the other end two wardrobes and two closets.

The dancing floor must be clear of all columns and the upper ceiling sufficiently braced to hold the weight. The outside finish is to be of the Doric order; the roof should be one-third pitch. We want the building constructed so as to allow for a hot-air or steam-heating plant to be installed in the basement. I would say that this will be a rural building located just out of town. I would like to have some of the readers who may be interested or have had experience in connection with work of this kind forward to the editor for publication such a plan as will meet the above requirements.

Question Regarding Position of Valley Rafters

From T. K. W., Lake Providence, La.—Will some of the readers of the paper who are up in roofing matters tell me the correct way to place long and short valley rafters when they come alike on both sides of the building? For example, the main building is 34 x 64 ft. in size, with a roof 8 in. rise to the foot run. There is a room on each side of the building 20 ft. in size and of the same pitch. Now, this calls for a long and a short valley rafter.

Should both long valleys strike the ridge at the same point—of course on opposite sides of the ridge piece—or would it be better to let one run north and the other south, so to speak, so that their meeting points at the ridge line would not be directly opposite each other?

Queries on Greenhouse Heating

From N. G. L., Oregon.—I intend to build a greenhouse this summer and as I am not very well informed in regard to the science and practice of heating such structures I bring my troubles to the Correspondence columns and ask the assistance of those of its many readers who are in a position to enlighten me. If I should succeed in getting half as many replies to my inquiries as were so freely furnished some months ago to aid in locating the difficulty in a defective fireplace I shall certainly be well repaid.

In size the greenhouse is to be about 20 x 50 or 60 ft., running north and south, and will be heated with hot water. The lowest temperature we have here is about 10 deg. below zero, but it very rarely falls that low and it is wished to maintain an inside temperature of 60 deg. when necessary. Ordinarily the outside temperature in this section ranges about 30 deg. above zero. I cannot afford to install one of the regular greenhouse boilers as should be done, but must try to get along with something cheaper.

I have been told that I could construct a furnace of concrete, with a coil of pipes inside. Can this be done without lining with fire clay? The latter costs 20 cents a pound here. How thick should the walls be made?

I would like to make it long enough to take in 4 ft. wood. What should be its dimensions: hight, width, etc.? Where should the pipe coil be located and what diameter should be the pipe to furnish the desired heat for such a house? Would it be necessary to put in grate bars and at what hight should they be located?

The flue will be of concrete. How should the dampers be arranged in it to secure the best control of the heat, and how large should be the flue?

What should be the size and number of flow and return pipes?

I will also be glad to have some one explain the theory and use of the expansion tank and show what size will be needed in this case, and where it should be situated. The house will have a 3 ft. wide bench along each side, while the middle bed will be on a ground level. Any assistance from the readers of *The Building Age* in this matter will be greatly appreciated. So, dear reader, if you have any knowledge that will be of help to me, please do not hesitate to advise.

Suggestions for a Small Carpenter Shop

From R. W. M., Uniontown, Pa.—I would like to ask some of the readers of the paper to give me through the columns of the Correspondence Department an idea or two for a small shop for light work in which foot power machinery would be the only kind used and little of that. I would not want the shop over 16 x 10 or 12 ft. at the outside.

What Old Subscribers Say of "Carpentry and Building" and "The Building Age"

From D. A. Betts, Franklin, N. Y.—In renewing my subscription for 1910 I would like to add my name to the list of pioneers as a reader of *Carpentry and Building*. I notice in the January number that "J. M.," of Washington, D. C., and "T. A. H.," of Ottawa, Canada, are some of the oldest subscribers. I think that is a good report to make and the reason I think so is because it agrees with my own record. I have taken *Carpentry and Building* every year since it was published, beginning with Volume I, No. 1, January, 1879. I have taken the *American Builder* and a great many other publications, but I know of none that I could recommend more to young and old than *Carpentry and Building*, now known as *The Building Age*.

Each and every number of the paper is read with care—not for the purpose of critising or finding fault, but to learn that sometimes a slight error is a good thing in that it calls for special study and in the end the reader will have a better understanding of how to do the work, although of course I do not endorse errors for this particular purpose. A slight error is apt to cause one to go over a solution a number of times before he grasps the idea that a slight mistake has been made and by reason of his careful study he is better satisfied in the end.

Regarding the new name of the paper—*The Building Age*—I would say it is all right. May it become great and as prosperous as *Carpentry and Building* has been in the past. I fully endorse all my pioneer friends have said in praise of *The Building Age*.

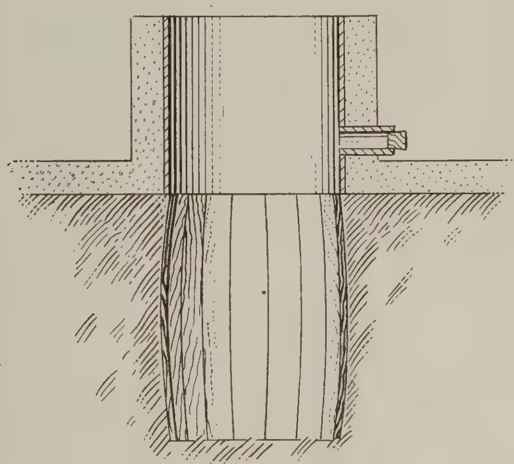
From T. K. W., Lake Providence, La.—I have received the first number of *The Building Age* and beg to say that if the paper keeps up to the mark of our old friend *Carpentry and Building* the name is of little consequence, as you know that a "rose by another name smells just as sweet." I have derived great pleasure as well as profit from the columns of *Carpentry and Building* and write these lines not for the purpose of throwing bouquets at the editor, so to speak, but to express my opinion concerning the change of name, feeling sure that the editor would like to know the impression of the readers concerning it.

From G. J. S., Grinnell, Iowa.—I too am an old subscriber of the paper, but I confess I somewhat dislike to see the name *Carpentry and Building* discontinued. I have taken it so long that it has become a familiar visitor to me and the name *Carpentry and Building* almost a household word. I suppose, however, the name matters little if the paper is kept up in the future to the same high standard that it has enjoyed in the past.

Waterproofing a Concrete Cellar

From J. E. S., Delaware City, Del.—In answer to the inquiry of "W. H. S.," Lima, Ind., in the January issue, I will give him my experience. I have a cellar with 13-in. brick walls and a cement floor, underlying which is a bed of quick sand. When the water came up in the spring and fall I had about 12 in. in the cellar and it remained for some time before it soaked away. Not only did it make the cellar exceedingly damp, but it raised and cracked the floor.

With a view to remedying the difficulty I took up part of the old floor where there was a crack and repaired it with new concrete. I have plastered up the sides of



Waterproofing a Concrete Cellar.—Method Suggested by "J. E. S."

the cellar for a distance of about 2 ft. While putting in the floor I sunk a barrel about 3 ft. below the cellar bottom and then above the barrel I used a sheet iron cylinder or pipe of about 14 in. diameter. I placed around the pipe above the floor 4 in. of concrete. I extended the pipe from the bottom of the concrete to about 18 in. above the floor level, allowing the bottom of the pipe to rest practically on top of the barrel, as indicated in the vertical section of the arrangement which I send herewith. I made a wooden form for the outside concrete, encasing the pipe or cylinder, and then took it off after the cement had set.

The barrel or opening can be made as deep or as high above the floor as circumstances would seem to require and the pipe may be built of brick, sheet iron or terra cotta. There should be a hole in the pipe with a knock-out plug as shown. By this arrangement I have 12 in. of water in the pipe above the cellar floor, but the floor is relieved of the pressure of the water and is dry. My theory is that water always seeks its natural level and will follow the plane of least resistance, hence if there is an opening in the floor the water will flow to that opening, relieving the other parts of the wall or floor which it would otherwise sustain. I might mention that the outside measurements of my cellar are 16½ x 20 ft., and with the body of water I had I very much doubted if 8 in. of concrete would hold it had I not sunk the barrel in the floor as explained above.

In my opinion "W. H. S." could try this method at not very much cost by cutting out the floor and inserting an 8 in. or 10 in. terra cotta pipe about 4 ft. long, allowing it to extend 2 ft. below and 2 ft. above the cellar. If he saw fit he could connect this with the sewer and as the water rises in the pipe it will not only relieve the floor, but it will take off his superfluous water.

Roof Trusses for a Garage

From C. C. H., Brookville, Pa.—I am figuring on the construction of a garage of hollow tile 8 x 8 x 16 in., made the same as red brick; that is, of shale, ground and burnt the same as brick. The width of the building is 43 ft. from out to out, and I want to span this with self-supporting trusses built up of 2-in. hemlock.

I would like the practical readers to give details of a truss for this building, giving the sizes of the different pieces as well as of the bolts needed for the truss.

The length of the building is 90 ft. and I am thinking of putting in six of the trusses, which would make the distance from center to center of truss about 12 ft. 10¼ in. I would like details of the truss as well as how to frame the rafters.

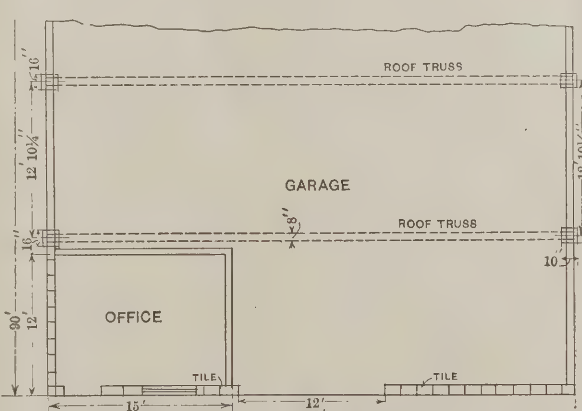
I prefer to make the trusses for ¼ pitch roof; that is, 6 in. rise to 1 ft. run, unless it is necessary to make it steeper on account of giving more strength to the truss. It is my idea to sheath the roof with ⅞-in. sheathing boards and then cover with Ruberoid roofing. I send a partial plan showing my idea of building the walls where the trusses rest on them. I thought of making the pilaster 16 x 16 in. constructed of tile placed on end and the openings running from the foundations to the top of the wall can be filled at every course as the work goes on with concrete. If necessary I could plant a 1-in. bolt so as to bolt the truss to the wall.

I would like to know what the practical readers think about the scheme which I have outlined and to express their views as to the spacing of the trusses—whether they should be closer together or farther apart than I have indicated. I want to do a good job and have everything done in a way to give the best results.

What are the Opportunities for an Ambitious Carpenter?

From F. S. B., White Plains, N. Y.—Having been a subscriber to *Carpentry and Building* for four years, I would like to ask through the Correspondence columns if some of the employers of building mechanics would tell me what the building trades have to offer a young man; what incentive is there for a young man of intelligence and ambition to spend his life in the business? What I have in mind is a man who will spend a portion of his earnings for technical instruction and for some of the best technical books to the end that he may be of value to his employer. Is there really anything in the business for which he should conscientiously strive?

I am 30 years of age and for eight years have worked



Roof Trusses for a Garage.

at the trade of carpentry. I work at it because I like it. I really love to do a piece of work the very best I can and when I am able to turn out a piece of work in good shape I feel a pride and satisfaction that is a keen joy to me. I have studied architecture four years with the end in view of making myself of more value to my employer than the average mechanic; also with the expectation of being able to command steady work and a little more pay. I have also studied conscientiously several standard works in carpentry, but I find after all this that a few men will come on to a job with a few tools in a basket, will go to work a little under price and the boss will keep them, after a while discharging his abler men and keeping the basket men because they work cheaper. A man who has spent part of his wages for tools and instruction in his trade instead of treating the foreman to beer and has remained at home nights studying, that he may become proficient in his work instead of wasting his evening at some neighboring saloon, does not seem to get along any better than the other fellow and the other fellow has preference every time. I can state with truth and certainty that seven-tenths of the basket men absolutely cannot properly frame a rafter for an ordinary gable roof, neither do they own tools enough to build a decent chicken house.

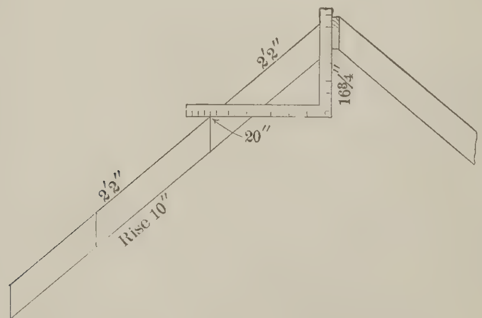
I ask in all sincerity if there is really any demand or any real need of expert mechanics in the building industry at the present day. If a man has mastered the practical part of his trade and is striving to master the theoretical or technical part of it, has he any chance to succeed over the man who is perfectly satisfied with his hewing axe and cut-off saw?

If there is a chance for an ambitious man, what branch of the building industry offers the best opportunities and which has the most to offer—the mechanical or the drafting end of it? I have gone into the matter with the intention of making it my life work and getting just as near the top as it is possible for me to go, but I have about made up my mind that the field of carpentry has very little to offer a young man ambitious to climb. I am really seeking information and I know there are many more who find it as discouraging as myself.

Finding the Length of Jack Rafters

From W. W. B., Kansas City, Mo.—As the letter and sketch published in the issue of *Carpentry and Building* for February, 1898, and referred to by "Constant Reader" in the February issue of *The Building Age* was from my hand, I will try and make it clear to the correspondent, so that he will require no figures from me but can find them for himself for any pitch or distance on centers. For example, take 20 in. on the blade of the square as in the accompanying sketch and slide the tongue down until it is parallel with the cut at the top of the rafter. Where the 20-in. mark strikes the rafter will represent the length of the longest jack. The correspondent can either take the rise thus found or measure down the rafter to the first cut.

I lay off all the lengths on the common rafter and take all lengths from it. I send a sketch so that others who have not seen the February issue of *Carpentry and Building for* 1898 may readily catch the idea.

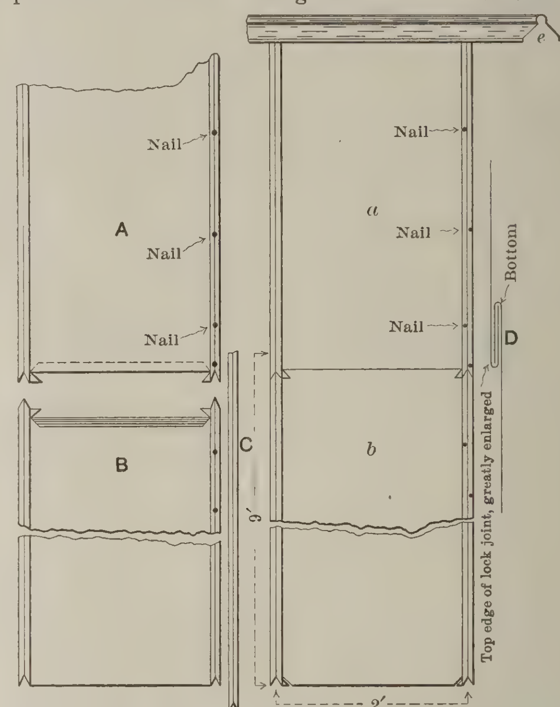


Finding the Length of Jack Rafters.

It might be interesting to "Constant Reader" to know that I am past roof framing, being now 72 years old, but I have not lost interest in the Correspondence Department, which is the first section of the paper to be examined as it comes to hand month by month.

Why Does the Roof Leak?

From W. N., Anderson, Ind.—I have been enjoying the monthly visits of *Carpentry and Building* for the past three years and must compliment the editor upon the good work he is doing in helping those who are willing to help themselves. I have watched with interest the articles on Stairbuilding by Morris Williams, and have followed what he has had to say with close attention. I enjoy the Correspondence Department and have prepared answers to three or four inquiries which appeared in the past, but I did not submit them for publication because I thought that some of the older and more experienced mechanics might impart the desired information in a clearer and more comprehensive manner. In fact, I have read the paper from front to back several times before it is placed on file for future reference.



Why Does the Roof Leak.—Diagram Accompanying Letter from "W. N."

At present I am in need of the advice of my brother craftsmen and desire to ask them through the Correspondence columns of the paper why the roof leaks. Referring to the sketches A is a sheet of V-crimped galvanized iron roofing, at the lower end of which a slit was cut about 1⅛ in. from the inner edge of the V-crimp on each side of the sheet and on an angle of 45 deg. toward the crimp and stopping at the inner edge of it, thus the lower end of sheet A is made free from the crimp and the strip 1⅛ in. is turned under the lower end to form a lock joint. At B is represented the same kind of a sheet treated in the same manner at the top end as A was at the bottom, only the end turns back, making the lower half of the lock joint.

At D is shown a sectional view of the joint thus formed, while C is a strip of wood triangular in shape with sides about 1 in. each. Strips of this kind are used under the V-crimp to support the iron ridges.

Referring now to *a* and *b* these are the same as A and B, but show the coping *e* at the top and the appearance of the roof when laid. My hardware dealer and the manufacturer both say the roof is properly laid, except the hardware man says "nail on top of the ridge as indicated in A and B," while the manufacturer says "nail on the sides of the ridge as indicated in *a* and *b*." Yet both seem to leak the same. The leak is from the top of the ridge to the eave directly under the V-crimp and leaks the same in a gentle shower as it does in a driving rain accompanied by wind.

I will be very thankful indeed for a remedy or cure of the trouble, and take this occasion to express my best wishes for *The Building Age* and my fellow craftsmen.

REINFORCED CONCRETE FOR FACTORY CONSTRUCTION

THE value of reinforced concrete for use in the construction of factory buildings and other structures where heavy loads are to be carried by the various floors is most instructively considered in a paper by J. P. H. Perry, of the Turner Construction Company, and presented at a recent meeting of machine tool makers in New York City. The author points out that the most frequent question asked is whether or not concrete is an experiment. In discussing this and other points he says:

Reinforced concrete is now an established structural material of recognized merit. It is not necessary to base this statement merely on the existence of some 4000 or 5000 reinforced concrete buildings of ages varying from 12 years down to a few weeks, for a study of the material itself is an assurance of the permanency of the structure in which it is used.

Concrete has been known from the earliest ages. In many parts of Southern Europe concrete foundations, viaducts, bridges, etc., can be found, many of them 2000 years old. Reinforced concrete is simply an improvement over this ancient concrete, because of the better quality of cement used to bind the aggregates together, and the addition of steel reinforcement. A beam in a building is subject to tension at the bottom and compression at the top. Concrete possesses great strength in compression, while in tension it is weak, but by placing bars or wire at the underside of a simple beam it becomes an economical structural member. The reinforcement takes the tensile stresses and the concrete the compression. It is possible to make the combination, because concrete and steel expand and contract in almost identically the same ratio. This combination was first made by Monier, a French flower-pot maker, in about 1860, but the commercial use of reinforced concrete does not date much back of 1897 or 1898 in this country.

The Average Reinforced Concrete Building

The average reinforced concrete building is constructed similarly as a structural steel building—a skeleton or cage construction of the columns and floors is run up first, and as soon as the forms or centering have been removed from any one story, the building of the walls, stairs, partitions, etc., begins, and then follows the progress of the framework of the building as fast as possible. In this way an economical distribution of labor and material and very rapid construction are possible.

Backed by skill and experience a reinforced concrete building can be completed in about the same or less time than a structural steel building. While a reinforced concrete skeleton for a building cannot be erected as fast as one of steel, it can be begun and partly erected before the necessary structural steel can be detailed, rolled, fabricated and shipped from the mills, and the building finished ready for occupancy before the steel structure can catch up with it. Under present market conditions it takes from six to nine weeks to obtain steel from the mills. The necessary small size bars for reinforcing concrete can always be obtained out of stock on 24 hours' notice. An amount of cement, sand, stone and lumber sufficient to get a job started can nearly always be obtained locally. With reinforced concrete construction it is not necessary to wait before concreting the footing, and the first-story columns to have complete detail drawings of the building, such as is the case in structural steel work.

The Rogers & Pyatt factory at 34 Fletcher street, Manhattan, N. Y., is a 10-story and basement building, roughly 60 x 70 ft. in plan, of reinforced concrete throughout. After the completion of the foundations from the day that the first concrete was put in the basement columns to the completion of the roof but 47 working days elapsed, and the building was turned over to the owners for occupancy in three and one-half months. The Isaac Mason Warehouse, 137 Johnson street, Brooklyn, N. Y., is a seven-story and basement reinforced concrete building, 40 x 80 ft. in plan. It took but 48 working days to put the roof on this building after the excavation was finished, and but a few days over three months before the owner moved into the building. The Bush model factory, No. 3, at Thirty-sixth street, South Brooklyn, N. Y., is 600 ft. long, 75 ft. wide, six stories and basement in hight, of reinforced concrete throughout. The roof was put on this building in 63 working days after the piles were driven.

These three records should demonstrate clearly that reinforced concrete construction does not mean slow construction.

In the case of extension No. 3 of the Bullock Electric Company, at Norwood, Ohio, reinforced concrete was adopted because of the great reduction in the time necessary to complete as compared with steel construction. This building is two stories high, 256 x 150 ft., and was ready for the steel roof trusses in nine weeks after the contract was signed.

Weight-Supporting Ability

Reinforced concrete buildings are noted for their strength and for their ability to safely carry unexpected loads. Floors have been designed to carry as high as 5000 lb. per square foot, and have been doing their work satisfactorily for seven years. In several buildings which have been constructed by the company with which the speaker is connected floors have been designed to carry 600 lb. superficial load per square foot, and have been subjected to 1500 and 2000 lb. live loads without the slightest indication of injury or increased deflection. Perhaps as remarkable an instance of the strength of reinforced concrete floors under severe load is furnished by an embossing press on the seventh floor of the Robert Gair Company's factory in Brooklyn, N. Y. The floors in this building are designed for live loads of 250 lb. per square foot. The press in question weighs 16 tons and rests on a base 3 x 6 ft.; the load is therefore nearly one ton per square foot. There is no deflection noticeable under this press, and there have been no precautions taken to distribute the load.

Joseph Bancroft & Sons, Wilmington, Del., who have a reinforced concrete dyeing establishment with floors 6 in. thick, spanning between the beams 10½ ft., state in a letter: "This floor was unintentionally subjected to an impact test by a piece of granite falling 32 ft. and striking on one corner, making a concentrated blow over an area of 6 x 4 in. The piece of granite was 6½ ft. long, 18 in. wide and 8 in. thick and weighed 173 lb. per cu. ft. The floor is still in use and this accident occurred four years ago. All of our floors are subject to heavy loads and heavy shocks, and wherever this material has been employed, it has given satisfaction."

Little Vibration

In a building where many machines are installed the matter of vibration is important. The majority of owners of concrete plants are well satisfied that they get less vibration with this kind of construction than with any other. The Robert Gair Company's large plant in Brooklyn consists of two six-story brick and first-class mill construction buildings, and one nine-story and basement reinforced concrete factory. All three structures are filled with the heaviest presses, cutters, embossers, etc. The vibration in the mill construction buildings is such that a plumb-bob hung parallel to any one of the walls will sway to a considerable extent; in fact, the buildings show that it would be difficult to produce more severe vibration than they are subject to. The reinforced concrete structure directly across the street, subject to the same conditions of foundations, loads, vibration, etc., is remarkable for its rigidity. This building measures 231 x 200½ ft. and is nine stories and basement, having 10 acres of floor space. On a typical floor are a number of very large presses; one room on the seventh floor 231 ft. long is filled with presses which operate rapidly and have very heavy reciprocating parts, yet a coin will stand on edge anywhere on their base frames. All through this factory one may lay his hand against a column and feel scarcely a tremor.

The Ketterlinus Building at Fourth and Arch streets, Philadelphia, Pa., is a lithographing factory 80 x 67 ft., eight stories and basement, of reinforced concrete throughout, excepting a facing of brick with terra cotta trimming, which adjoins an older part of the plant. The old building is of steel construction fireproofed with terra cotta. In both buildings heavy machinery is running and large printing presses are at work on the third, fourth and fifth floors. A comparison of the serviceability of the two types of construction shows the advantages of reinforced concrete.

In the building of steel and terra cotta, the vibration from the machinery is noticeable as soon as one enters, while in the new wing, the concrete, because of its greater mass and inertia, absorbs the vibrations. The machinery is such that it is difficult to appreciate its vibratory tendency. As a result of the reduction in vibration in the reinforced concrete building, the noise of the machinery is greatly lessened. This is in a building of comparatively small size, but considerable hight—a type more susceptible to vibration than a larger structure would be.

The Floor Question

If concrete floors in factory buildings are objected to as being either hard on the operatives or producing dust, which would seriously interfere with the manufacturing process, wooden floors can be laid on top of the concrete. This increases the cost, but not seriously. The prejudice against concrete floors is largely dying out among employees in the average plant. For perhaps 10 days a mill hand will find that his feet hurt if he is working on concrete, but after that he gets used to it and learns to wear thicker-soled shoes, and his complaints are likely to be few, because he realizes that the floors are there to stay, whereas he is necessarily not permanent. The great advantage of a concrete floor over a wooden one is that it can be easily washed and is of itself more sanitary.

Concrete walls do not need waterproofing. Because of the dampness in many concrete block bungalows the impression is that reinforced concrete buildings having walls of the same material are damp. This is quite the opposite of the facts. The company with which the speaker is connected has erected over 280 reinforced concrete structures, representing over 100 acres of floor space, and in none of these buildings is there any trouble from dampness on the walls. In several buildings brick curtain walls were put on the front and rear and concrete walls on the sides. After heavy storms the 12-in. brick walls will show moisture, whereas the concrete walls have remained impervious. In this class of construction the concrete is placed quite wet and when set thoroughly the walls are very dense and homogeneous. During the process of drying out the walls will undoubtedly be damp, but as this rarely, if ever, takes over four months, the building is dry by the time the stairs, partitions, heating, lighting, plumbing, elevators and other detail fittings have been installed.

Other Advantages of Reinforced Concrete

Long spans can be constructed of reinforced beams or girders in an economical manner, when compared with structural steel beams and girders. Where light loads such are occasioned by roofs have to be carried, long steel trusses will, in most cases, be better. For heavy loadings reinforced concrete has been used up to 50-ft. spans in a great many instances, and there are several cases on record of concrete spans running up to 70 and 80 and to 112 ft. These are, of course, exceptional, and are merely cited to give an idea of the general adaptability of this type of construction for buildings where traveling cranes have to be used or where large assembling rooms are on the first floor, and the ceilings have to be designed to carry loads on the floor above.

One of the principal advantages offered by reinforced concrete construction of buildings is the amount of light obtainable. In the ordinary mill construction building not more than from 30 to 35 per cent. of the wall area can be used for windows. Reinforced concrete buildings generally have 50 per cent. of their walls in window area, and if necessary 80 per cent. of the walls may be windows. This is possible because of the skeleton method of construction. The light in the interior of a reinforced concrete building is increased by the white, clean interior always obtained. The concrete is left as it comes from the forms, and is given a coat of cold water paint. From the very nature of the material, the construction is sanitary. Vermin are impossible, as there are no places for them to hide. The floors and walls can be washed down at any time, as the construction is waterproof.

Fireproofness

If there is one feature of this construction which has successfully withstood criticism it is fireproofness. Baltimore and San Francisco tested concrete and found it good. Single fires like the Dayton Motor Car Works, the F. W. Tunnell Company, a glue manufacturing plant in Philadelphia, and the Pacific Coast Borax buildings, in Bayonne, N. J., demonstrated the absolute safety of this material. The insurance rates applying on reinforced concrete buildings are as low as on any type of construction. In fact, some of the mutual fire insurance companies offer to write the lowest rates on concrete industrial buildings; lower, indeed, than on any other type of construction.

Where large plants are built of brick or stone the owner or architect may hesitate about using concrete construction, as it will contrast too sharply and be out of keeping with the other buildings. In such cases a skeleton of reinforced concrete can be erected and brick curtain walls filled in or brick bearing walls used. This scheme has been used on a great number of buildings throughout the country and has been found very satisfactory.

Comparisons of Cost

In most instances the determining factor in the choice of structural material for a new building is the cost. Reinforced concrete will generally run from 5 to 15 per cent. higher in first cost than first-class mill construction and from 10 to 20 per cent. lower than steel construction fireproofed. A large warehouse in Brooklyn was begun in May, 1908. At that time new construction work was scarce, and all contractors, both in the concrete and steel lines, figured very closely to secure the job. The successful reinforced concrete figure on this particular building was $30,000 lower than the best bid received on the same plans executed in fireproofed structural steel. A large factory in Philadelphia was designed in steel and estimates received on the original plans. The architects considered an alternative in reinforced concrete construction and saved the owner $60,000. A large publishing house and loft building was recently completed in Springfield, Mass., of reinforced concrete throughout, thereby saving $40,000 over the probable cost in steel. These three instances represent, respectively, savings of 12, 25 and 10 per cent. In competition with mill construction the percentage depends almost entirely on the size of the building. For structures costing $40,000 and less, and of the hight of four stories or less, the brick and wood construction will run about 15 per cent. less than concrete. On larger buildings, however, concrete gets closer to the cost of the mill construction. The designers of a very large hardware building in Minneapolis were surprised to find that the estimate on reinforced concrete construction was slightly under that for mill construction. A similar case occurred in Toledo, Ohio. Both of these propositions, however, exceeded $150,000 in value.

The initial cost should not be the only consideration. There are certain fixed charges which enter into the relative values of buildings. These may be briefly summarized as follows: Insurance, maintenance, depreciation, amount of light available, freedom from vibration, elimination of vermin and the assurance that a fire cannot destroy the building. It is difficult to put an exact monetary value on these items. Each plant manager would have his own views on the subject and local conditions would alter materially any assumptions. If, however, due consideration be given to the saving which can be obtained on each of these items by using a reinforced concrete building, it will generally be found that, even though the concrete structure cost, complete, 10 per cent. more than mill construction, there will be a saving annually of from 1½ to 2 per cent.

A Slide Rule for Reinforced Concrete Slabs

The latest addition to that steadily increasing family of calculating devices is a slide rule for reinforced concrete slabs. This new instrument has been invented by Arthur W. French, professor of civil engineering at the Worcester Polytechnic Institute, Worcester, Mass. In appearance the rule differs very much from the ordinary type, as it is slightly shorter and considerably wider, the exact dimensions being 4¼ x 9 in. The principle is the same, however, although there are two sliding and three stationary scales instead of two of each, as found in the regular rule.

The top or A scale, as it may be called, represents the span in feet. The upper sliding, or B scale, is graduated in the total load per square foot, and the middle stationary scale, C, gives the bending moment in inch-pounds. The lower sliding scale, D, furnishes the depth of the slab, and the bottom scale shows the cross section of the steel required. Below this area value are lines giving the sizes and spacing of square and round reinforcing bars, and the thicknesses of expanded metal and with cloth, providing the same amount of reinforcement.

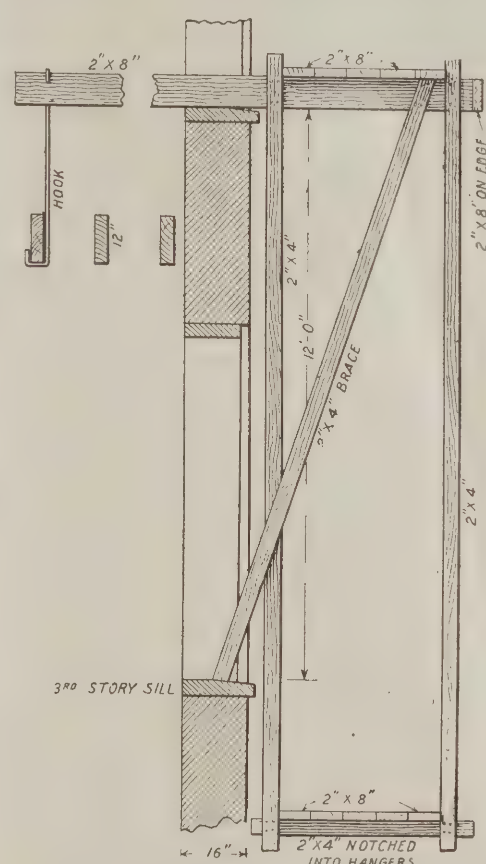
The method of using the rule is as follows: Under the span, as given on the A scale, set the proper factor on the upper edge of B for simple or continuous spans.

The total load per square foot, as marked on the lower edge of this scale, is directly over the bending moment on the C scale. An arrow on the upper edge of D is set under the bending moment value just obtained and under the lines of this scale, designating the depth of slab, the cross section of the required reinforcement is given in square inches. Carrying this value down into the tables previously mentioned gives the amount of the different reinforcing materials required to produce the given cross-sectional area.

It is stated that only formulæ recognized as best by leading engineers and the technical societies are used in designing the rule, and that the results obtained are both conservative and accurate. The rule is simple to operate and is durable. The slides and lining are of mahogany and the face is of heavy paper, which is coated over the printed lines and figures.

A Hanging Scaffold of Novel Construction

In connection with the erection of buildings intended for business and other purposes, necessity develops many unique expedients for facilitating the work of construction. Among these mention may be made of a rather novel form of scaffolding which is often employed. In the sketch presented herewith we show the section of a wall of a building with a hanging scaffold, such as was used in the construction of the new addition to the Hotel Martinique, at the northeast corner of West Thirty-second street and Broadway, New York City. It is of such a nature that it can be easily constructed and will be found to do good service.



A Hanging Scaffold of Novel Construction.

The idea is to scaffold between stories at any hight for the purpose of executing, for example, extra work or doing some special job that calls for the temporary use of scaffolding at that particular point. The dimensions of the various members of which the scaffold is constructed are clearly indicated on the sketch, the material being such that any carpenter can build it from pieces readily available about the building.

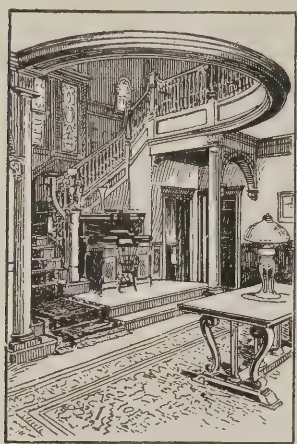
Practical experience has demonstrated the fact that spruce or other good wood should be employed and to eschew hemlock, as it is notoriously unreliable for purposes of this kind, especially when wet.

A scaffold of this kind will be found well adapted to meet a great many emergencies, and while it is possible that it is familiar to building contractors in many sections of the country, we shall be glad to hear from our practical readers as to any novel forms of scaffolding or other building devices which they may have used in connection with the construction of buildings.

SOME PROBLEMS IN STAIR BUILDING—XV.

BY MORRIS WILLIAMS.

WE shall now proceed to explain the nature of the bevels and their function in wreath construction, and will take for an example the construction of a wreath over a plan curve less than a quarter turn; the wreath to have two equally inclined tangents similar in all respects to the illustration presented in the diagram, Fig. 101.* It has already been stated that the bevel in wreath construction indicates the angle of inclination of the plane the wreath is assumed to rest upon while ascending and winding around a cylinder. In Fig. 101 is shown the plan *a c* of a wreath, the plan tangents *a b* and *b c*, also the springing lines *a o* and *c o*. The wreath in this example is to rise from the point *a* to the point *c* equal to the hight shown in the elevation from *c* to *c''*.



Note that this is the total hight the wreath rises from the lowest point *a* to the highest point *c''*, a distance covering the whole plan curve. By transferring the point *a* from the plan to *a''*, as shown by the dotted arc *a a''*, and connecting *a''*, the lowest point, to *c''*, the highest point, we obtain what is called the pitch line of the tangents as represented by *c'' b'' a''*. In this case it will be observed that the two tangents incline equally.

Now if we revolve the point *a''* back to *a* in the plan the pitched tangent *a'' b''* will then stand over and above its plan tangent *a b*, as does the pitched upper tangent *b'' c''* stand over and above its plan tangent *b c*.

Now let it be understood that the plane of the wreath whereon it rests is determined by the pitch of the tangents relatively one to another. In order to make this as clear as possible we have prepared the diagram shown in Fig. 108, wherein is shown all the lines of the plan contained in Fig. 101, and also the elevation of all the plan lines. Note the pitch of the tangents in this diagram as from *c''* to *b''* above the plan tangent *b c* and from *b''* to *a* above the plan tangent *b a*. Note also the plan and elevation of the springing lines *a o* and *c o*. The elevation lines as shown in this diagram define clearly the plane whereon the wreath ascends from the lowest point *a* to the highest point *c''*.

The center line of the wreath is shown in the diagram ascending upon the plane from *a* to *c''*, winding above and around its plan curve *a c*. Note now that the side *c'' o''* of the plane is much higher than its opposite side *b'' a*, and that the side *b'' c''* also is higher than its opposite side *a o''*.

These lines stand in relation one to the other something similar to the relation existing between a wall plate and a ridge pole in roof construction. If we consider this plane to represent the plane of a roof requiring a rafter to reach from the tangent or wall plate *a b''* to the springing line or ridge pole *o'' c''*, we should require to know the difference in vertical hight between these two lines, which in roof construction we call the "rise" of the roof; we should also need to know the distance horizontally between the two, which in roof construction is called the "run."

Having a knowledge of the "rise" and "run" of a rafter and using the figures representing them on the steel square—the rise on the tongue and the run on the blade—marking along the tongue will determine the top cut of the rafter to fit against the ridge pole, marking along the blade will determine the heel cut to fit upon the wall plate. The heel cut of a rafter indicates the angle the inclined plane of the roof makes with the horizontal plane, while the top cut indicates the angle it makes with the vertical plane.

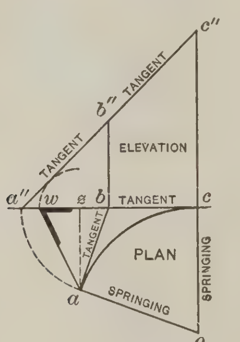


Fig. 101. — Brought Forward for Convenience of Reference from Last Issue.

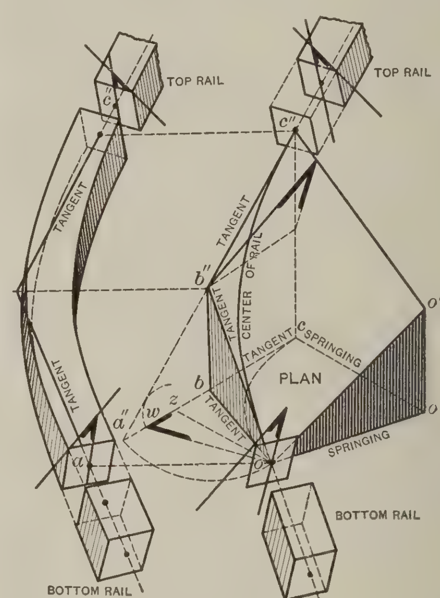


Fig. 109.—The Wreath After It Is Squared and in Position Upon Its Plane of Inclination.

Fig. 108.—View of Fig. 101 Folded Into a Solid, the Reference Letters in the Two Figures Being the Same.

Some Problems in Stair Building.—XV.

When the rafter is in position its top cut will fit against the vertical face of the ridge.

This last cut or bevel is precisely what is meant by "bevels" in wreath rail construction. It represents the angle of inclination to the vertical plane of the inclined plane the wreath rests upon while winding around the cylinder from the lowest to the highest point, as the center line of the wreath is shown upon the plane winding above its plan curve from *a* to *c''* in Fig. 108.

The bevel for the wreath represented in this figure and Fig. 101 is shown upon the inclined plane, Fig. 108, assuming the position of a common rafter. If we apply it to the end *a* of the wreath as shown in Fig. 108 then the sides of the wreath will be vertical, as shown.

By squaring the top and bottom faces from the vertical sides we shall have its top and bottom horizontal, which is the condition required for the wreath when finished and in position.

A view of the wreath when in position is indicated in Fig. 109, where also is shown the bevel applied to each

* For convenience of reference we have brought forward from the last issue Fig. 101, and present it in connection with its accompanying text.—EDITOR *The Building Age.*

end producing vertical sides and horizontal top and bottom faces.

We will now explain briefly the operation of squaring the wreath as practiced by stairbuilders. In Fig. 110 is shown a piece of plank of sufficient thickness to cut from it the wreath material. Upon the face of the plank place the face mold as shown, mark around the inside and outside curves and the joints at each end. Cut out the piece marked square to the face of the plank all around. The piece cut out will then appear as indicated in Fig. 111. Now gauge a line from the face right through the center of the plank as shown at z on each end in Fig. 111; also square a line from the tangents on each end through z as shown. The point z indicates the center of the plank at each end.

Now find the center of the plank at the minor axis as shown at x. Apply the bevels at each end as shown by holding the stock parallel to the joint, and in such a position that the blade will cut the point z in the center of the plank, all as clearly indicated in the diagram. Now draw a square section of the rail upon the blade of the bevel at each end.

It will be observed that the bevel at the end c'' is directed toward the outside of the wreath, and that at the end a'' it is directed toward the inside of the wreath. The inclination of the plane as shown in Figs. 108 and

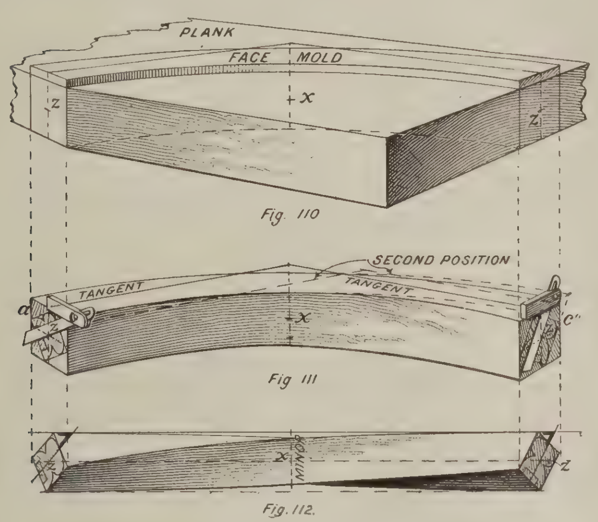


Fig. 110.—Showing How Wreath Material Is Cut Out of a Piece of Plank Square to Its Face and to the Tangents.
Fig. 111.—Application of the Bevels to Square the Wreath and the Application of the Face Mold to Mark the Twisted Concave and Convex Sides.
Fig. 112.—Showing the Center of Wreath in Center of Plank as $z\ x\ z$.

Some Problems in Stair Building.—XV.

109 will explain the why and wherefore of this operation.

The dotted lines shown in Fig. 111 to be parallel to the tangents and drawn at each end from the points where the bevels cut the face of the plank are what are known as the "second position of the tangents" and are required and used as guides to fix the face mold on the face of the plank for the purpose of marking the curves of the wreath preparatory to the actual squaring.

Now place the face mold so that its tangents will be upon these dotted lines and mark the curves as shown by the dotted curved lines at the end c." This process must be repeated on each end as well as on both the top and bottom face of the plank. By working the vertical sides of the wreath to these curved lines parallel to the bevels as shown at each end and squaring the top and bottom faces from the sides the operation of squaring the wreath is accomplished.

In the manipulation of squaring, however, care must be taken to see that the center of the wreath when finished coincides with the center of the plank. It can be easily accomplished by using point z at each end and the point x at the minor axis as guides in working the wreath to its correct thickness.

In Fig. 112 we show the wreath after it is correctly squared. The center line of the wreath is shown in this figure extending from z at one end, through x on the minor to z at the other end; and to coincide with the center of the plank.

A New Building Material Needed for Residences

On the part of suburban builders there is a pronounced demand for the introduction of lighter forms of fireproof construction than are now available in this territory for dwelling-house work of a speculative nature. The opportunities which would present themselves to builders who could produce a fireproof dwelling that could be marketed for $7000 or $8000 were typified by inquiries made by a Newark builder among reinforced concrete engineers and architects here in New York City, says a writer in the *Record and Guide*. This builder, who is now well engaged with contracts of the usual order, has had a proposition made to him by a large syndicate to produce a detached dwelling of fireproof construction that can be sold at the average price which homeseekers can pay. This builder stated that the forms of fireproof construction with which he is acquainted are too heavy for the class of small houses which it is desired to build. He is required to show a specimen house, and if he can meet the conditions he will expect a contract to erect hundreds.

The demand seems to be for a fireproof house no more expensive than one constructed of wood. It is not a vain hope. We understand that a process has been invented by a New York engineer by which concrete can be rapidly molded into hollow tile suitable for building purposes of the kind referred to, but which has not yet been publicly offered. Hitherto concrete building blocks have been made of "dry concrete," which does not possess the mechanical strength of or the weatherproof qualities of normal concrete. The new process is said to be revolutionary in the concrete industry, as it is the only method ever devised that permits the delivery of wet process concrete in hollow shapes from molds with speed and economy.

It can be used for foundations, floors, walls, roofs and partitions, strong, true and light, to which stucco and plaster will adhere and which can be procured at a cost that will bring the dwelling within the limit of cost heretofore mentioned, and it is said to be especially suitable for the application of stucco. Many new textures and colors are now available in stuccos, and in addition there are beautiful effects derivable from the use of color masses in faience, mosaics and other materials which are destined in time under more favorable circumstances to do wonders for suburban architecture.

Large Reinforced Concrete Building

One of the largest reinforced concrete buildings in this section of the country, if not in the world, is the new 13-story structure now rapidly approaching completion on Prince street, Brooklyn, N. Y., for the Thompson & Norris Company. It covers an area 86 x 170 ft. and rises to a hight of 155 ft. above the level of the curb. The concrete work was begun the last week of August, 1909, and on the first of December the roof was completed. In constructing the building 10,000 barrels of Portland cement, 12,000 tons of sand and gravel and 500 tons of high carbon twisted steel were used.

The upper floors and the roof are slab and girder construction. The columns are 18 ft. on centers and range from 30 in. square on the first floor to 16 in. square on the top floor. The girders are reinforced with seven 1¼ in. steel bars and the beams with three 1¼ in. steel bars. In the floor slab the reinforcing is of ½ steel bars set on 6 in. centers. Two sets of stairways, built entirely of concrete, extend from bottom to top of the building.

LAYING HARDWOOD FLOORING BY THE CARPENTER

BY WARFIELD WEBB.

WHILE it does not require the services of an expert carpenter to lay a hardwood floor, there are, as a rule, some things that are essential in the workman who essays to do this character of work and are of vital importance to him. The great increase in the demand for hardwood flooring has given some men the idea that it can be laid much the same, in so far as ability is concerned, as the ordinary flooring. This is a serious error, and one that must be eradicated from the mind of the man who hopes to attain reasonable success in his field.

Some men argue that the matter of properly laying a hardwood floor is of such importance that only an expert can do a creditable job, and that it is wrong for the ordinary carpenter to endeavor to undertake such work. They say that this work should be left entirely to those who have made it a special line, and that the increased use of this flooring is hurt by inferior work done by men who are either ignorant or careless. In some respects this argument holds good, and it is a matter that should be considered very carefully by any carpenter who undertakes such work, with the hope of making a successful job of it.

Knowledge of Stock Necessary

The primary knowledge to possess by the hardwood flooring man is that of stock. Many of us know that as a general rule for fine work, quarter-sawed oak is most commonly used for hardwood flooring, particularly for center-field work. This comes in tongue and grooved stock, for ordinary flooring contracts, and in strips for the more particular kind of jobs. For the borders, walnut, mahogany, cherry, maple, light and dark oak are used, in varying designs and figures, and much of these woods are used in parquetry flooring. Sometimes the borders and parquetry come direct from the flooring manufacturer pasted to cloth, so that they can be laid direct upon the surface floor and nailed. However, this is not always the rule, and the most expert workmen do much of their own designing, following a pattern calling for the several kinds of stock to be used in the work.

The centering boards are, as a rule, 1¾ in. in width and 5/16 in. in thickness, the length being generally in 6 or 12-foot strips. Some manufacturers also make roll goods, being in some respects easier to lay, the strips being 1⅜ in. wide, and the rolls being from 28 in. to 36 in. long. The strips are glued to canvas and come in bundles. This stock is used for field work, and when combined with the border makes a pleasing surface, and is somewhat less costly than the other styles.

It would appear to be an easy matter for the average carpenter to lay this style of flooring, and so it is, where a first class job is not desired. However, as the rule with hardwood flooring contracts is that the work must be above the ordinary it becomes a matter for serious consideration for the man who undertakes to lay it. He should be able to properly estimate the exact amount of material required for each room, so that there will be no waste material. He should have his foundation floors in the best possible condition to receive the flooring, and this requires great care. In new work, that is, where there has been no flooring laid, the joists are generally filled with concrete, which gives them a solidity that insures a stable foundation for the flooring. In such events the workman must see that the joists are level, otherwise there will be an unevenness in the floor, which will be detrimental to the best work. This can readily be ascertained, and the work of laying the flooring proceeded with as soon as the matter has been ascertained.

When Work is Difficult

Where hardwood flooring is to be laid over an old floor, the work of the hardwood flooring man is in some respects more difficult. In undertaking such work there must be considerable care given the matter of seeing that the old flooring is perfectly level. This will require care in removing the uneven places so that the surface will not in any respect mar the evenness of the hardwood floor when it has been nailed to the same. It is sometimes necessary to remove some portions of the old floor and strengthen the joists or otherwise secure the foundation floor before proceeding with the hardwood material. In this matter a man will be compelled to use good judgment, and there is reason why the most particular pains should be exercised.

In placing the boards in position to be nailed, there is required the same care that is due to other portions of the work. Small wire nails are used for this purpose, and the work of nailing the flooring is to be done in a way that demands the most particular pains. Where the corners and other portions of the floor are to be fitted, there is demanded a great amount of patience and nicety in doing a first-class job. Naturally there is some objection raised by the experts to the average carpenter doing this work.

When the floor has been laid the work has only been started, because it is just as important to have a floor finished with care as to have a good floor itself. The nails should be driven below the surface of the boards, and this will permit the finishing to be done in a way that will insure a good job. There will naturally be a few uneven places in the floor, and these are to be removed with scrapers and sandpaper until there is not a semblance of roughness possible. This portion of the work calls for painstaking labor and particular work. The beauty in a hardwood floor is its smoothness, and this is not possible without the best workmanship.

With the floor well smoothed there must be added the filler, so that there will remain no possible portion of it, including the nail holes, that is not level and perfect. One coat is all that is applied to floors, and this is followed by two coats of floor wax, which, when polished, makes the floor one of the most pleasing and durable possible. The polishing is done with a floor brush that is weighted, and the polishing is an easy operation.

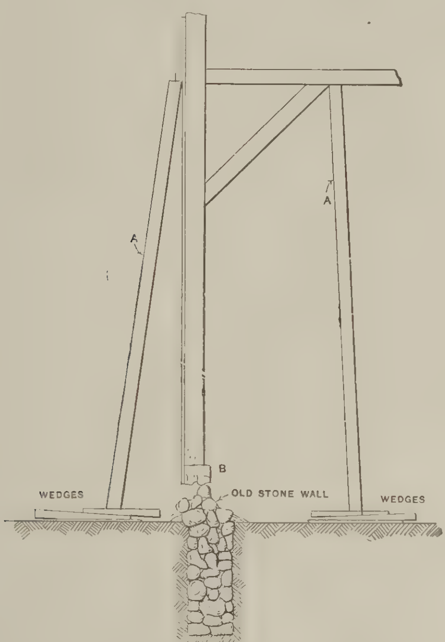
Staining the Strips

In ordinary hardwood flooring, where the strips are laid, as in the tongue and grooved stock, it is often customary to stain them. But there is far less care demanded in laying these floors, and the same finish is never given them. An ordinary carpenter can easily lay such flooring, and there is no reason why he could not do the work just as well as a hardwood flooring expert. In the matter of particular work, such as parquetry or strip flooring, there is ample reason to have a full knowledge and a regard for the veriest details in the matter of laying the same.

For the latter work there are demanded the best materials and the best tools, as well as the best ability. With these essentials there is no reason to feel that the average carpenter cannot become an expert in this line, and he should give it some serious consideration, because it will be helpful to him in such times as work may be slack in the regular lines that he generally follows.

Replacing Decayed Sills of Buildings with Concrete

It is perhaps in connection with barns and some of the other farm buildings more often than with structures elsewhere that the wooden sills and posts become so decayed and the foundations more or less uncertain as to render their renewal imperative if the use of the building is to be continued. Concrete has been proven an excellent material for use as a substitute for these portions of farm buildings and many interesting examples might be cited where it has been utilized with altogether satisfactory results. Possibly the foundation wall, although in bad shape, can be left in position and boxed in with concrete, or the circumstances of the case may be such as to render it necessary to entirely remove the old portions and provide new.



Replacing Decayed Sills of Buildings with Concrete. Fig. 1.—Method of Bracing Wall While Old Foundation and Sill Are Being Replaced.

In the two illustrations which are presented herewith we show how that portion of the foundation walls of a barn or other building, for that matter, which appears above the grade line, may be replaced with concrete, the material forming, as it were, a cap to the wall which is below ground. In doing the work it will be necessary to temporarily relieve the posts of their burden so that the decayed sill and portions of the foundation wall may be removed. This is accomplished in the manner indicated in Fig. 1, where A A are 4 x 4-in. supports placed as indicated and that portion of the building slightly raised by driving wedges under the supports as shown. The part marked B is a 6 x 8-in. sill in bad shape supporting a post, the bottom of which has more or less rotted away.

In a light building a single prop or support either on the outside or inside of the building will doubtless be sufficient to carry the load temporarily, but in the case of large barns bracing on both sides will be required. The brace on the inside should be placed under the second floor beam, while on the outside directly opposite the post to be raised it will be necessary to nail a block of wood or board at least 2 in. thick in order to give a sufficient bearing for the outside prop or shore.

After the wedges have been driven up and the load taken off the post the old sill can be removed and the post cut off above the decayed portion provided it is not destroyed so far up as to practically necessitate a new post. If the posts are all decayed to a comparatively uniform hight they can be cut to a uniform length or a number of adjoining posts may be cut to the same length and then the concrete can be built up accordingly. If an occasional post is in a worse condition than the others it can be cut and spliced, so that it will be the same length as those on either side of it.

In order to give the best results the old plank floor of the barn may be removed and also replaced with concrete. In Fig. 2 of the engravings is shown the way in which the job appears after the work has been completed. The decayed post has been cut off; the old sill has been removed; the cobblestone foundation wall has been leveled off a couple of inches or so below grade and a new concrete wall constructed as shown. On top of the wall and under the posts has been placed a new sill or plate 2 x 8 in. in size and a new concrete floor has been put down. The part marked "S" is the old stone foundation below grade, which did not require replacing.

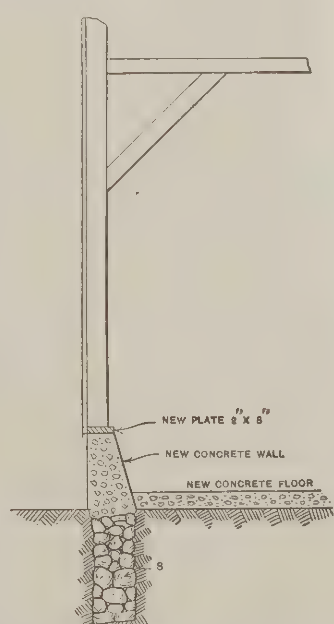


Fig. 2.—Appearance of Foundation and Floor When Repairs Are Completed.

Establishment of Manual-Training Schools in Brazil

Vice-Consul-General Joseph J. Slechta, of Rio de Janeiro, reports that a decree has been issued authorizing the establishment of manual training schools in the capitals of the several States of Brazil. At least five of the most important industries of the State are to be represented in each school, training in more than the five branches being given when such authorization is given by the Government. The schools are expected to supply the demand for skilled laborers and foremen in the several industries. These skilled artisans are to be taken from the ranks of the apprentices showing most aptitude in their respective trades. Apprentices are to be received between the ages of 11 and 13 years. The expense of running the schools is to be met, so far as possible, by the sale of material and products manufactured or partly manufactured in the institution. The agricultural inspectors are to fiscalize the schools in their respective districts.

At the recent dinner of the New York Chapter of the American Institute of Architects announcement was made that it would offer a medal to the owners of the best apartment house and best tenement house erected in the course of the year.

WHAT BUILDERS ARE DOING

THE effects of severe mid-winter conditions throughout the country are forcibly reflected in the reports which reach us from leading cities of the country covering building improvements for which permits were issued during the month of January. The falling off in the amount of vested capital involved in new enterprises, alterations, repairs, etc., is very heavy as compared with December, amounting to very nearly 25 per cent, while as compared with the opening month of last year the shrinkage is appreciable, although not so marked as for December. The cities showing increases and decreases are pretty evenly divided, although the reduced operations in some of the principal centers, like New York, Chicago, Buffalo, Pittsburg, Milwaukee, Cleveland, Denver and Atlanta, seriously influence the showing for the month in question.

Locally, the shrinkage in the volume of operations, as compared with the opening month a year ago, is largely traceable to the falling off in the housing accommodations projected in the various boroughs, and possibly it may be due in part to the rumblings of discontent growing out of the differences existing between the steam fitters and their employers, and gradually spreading to other branches of the building industry. The situation teems with serious potentialities, although it is hoped that all differences may be amicably adjusted before spring opens, so that there may be no important interference with building operations in the city and the carrying out of improvements for which permits have lately been issued.

Buffalo, N. Y.

There was a falling off in building permits issued by the Bureau of Building for the month of January, as compared with the same month in 1909, both in number and amount; attributable, largely, to the severity of the weather during the month. The number of permits issued was 137, amounting to $418,000, against 178 permits, aggregating $553,000, issued for the same month of last year—a loss of 24 per cent.

Building operations for February will, it is expected, show a considerably greater total, as a large number of building projects are under way.

These include a ten-story office and theater building, 50 x 200 feet, Main street near Seneca street, to be erected by Mitchell H. Mark and Henry J. Brock; the remodeling of the Linn Museum into a theater of 1000 seating capacity, to cost $50,000; a physicians' office building at Delaware avenue and Allen street; a $50,000 apartment house at Delaware avenue and West Ferry street; German Evangelical Lutheran Church at Adams and Peckham streets, $40,000; a six-story cold-storage warehouse at Elk Street Market, to be erected by Cummins & Dunphy at a cost of $250,000; a seven-story piano factory, by the Chase & Baker Company, at Dewey avenue and New York Central Belt Line; a factory, 70 x 400 feet, four-story, for the Superior Motor Vehicle Company, at Elmwood avenue and New York Central Belt Line, and two new blast furnaces, with ore dock extensions for the Rogers-Brown Iron Company, at a cost of $2,000,000.

Plans are being prepared by State Architect Franklin B. Ware, Albany, for the replacement of the present State Normal School building, Jersey street and Normal avenue, Buffalo, with a group of modern normal school buildings, at a cost of $400,000. The Hutchinson High School Commission will soon receive competitive plans from local architects for the three-story and basement high school to be erected by the city on Johnson Park, at Elmwood avenue and Chippewa street, at an estimated cost of $450,000.

Building operations in nearby manufacturing towns will also be considerable. At Tonawanda, N. Y., the McKinnon Electric Chain Company and the Martinizing Process Company are each making additions to their plants. At North Tonawanda the American District Steam Company will build a machine shop, 240 x 250 feet, two stories, with two wings, each 50 x 60, supplementing extensive additions recently completed. The Automatic Coin Wrapping Company, manufacturers of coin wrapping machines, is also to build a plant at North Tonawanda. At Lockport, N. Y., the United Indurated Fibre Company has let contracts for three reinforced concrete buildings, each 100 x 200 feet, two stories, for the manufacture of asbestos goods. A large amount of machinery is to be installed, and it is stated the total cost of the improvements to be made will approximate $900,000.

A banquet to commemorate the twentieth anniversary of the organization of the Buffalo District Council of the United Brotherhood of Carpenters and Joiners of America, was held at the City Convention Hall on the evening of February 9, and was the largest banquet of a craft organization ever held in Buffalo, being participated in by 1500 members.

A number of the officers of the International Brotherhood were present as guests, including International President William D. Huber, of Indianapolis, who made the principal speech of the evening; William Duffy, Indianapolis, general secretary; William G. Schardt, Chicago, chairman of the Board of Trustees, and Richard Fuelle, of St. Louis, general organizer. William B. Macfarlane, of Buffalo, general organizer, acted as toastmaster.

Chicago, Ill.

Building permits in Chicago for the month of January, 1910, amounted to $6,054,300, covering 482 buildings with a frontage of 13,929 feet. The total is less than for January, 1909, but is more than twice the amount for the same month in any preceding year since 1902. Owing to the severe weather which prevailed in the city during January, the only building work that could be carried on was on buildings already enclosed. A number of new projects are under discussion for large bank and office buildings, and there is also talk of a thirty-story hotel at the corner of Clark and Madison streets. A special permit would have to be obtained from the Council for a building of this hight, and it is expected that considerable difficulty will be encountered in getting the consent of the City Fathers, as the members of the Council from outlying wards are hostile to any measure that would promote the further concentration of business in the loop district.

The down-town district in Chicago is becoming more and more congested, and the transportation facilities are already overtaxed during the rush hours of traffic. Plans for subway construction are beginning to assume tangible form, and it is believed will materialize in the near future. The railroads will carry on a large amount of track elevation work the coming year in Chicago, and hopes are also entertained that the Pennsylvania Railroad will begin actual work on the construction of a new union depot west of the river.

Cleveland, Ohio.

Building operations in this city have been largely at a standstill during the past few weeks owing to the unusually severe winter weather. This has prevented the starting of new work, and as a result the number of building permits issued during January were light. During the month there were 183 permits issued by the city building inspectors' office for a total estimated value of $281,659. Of these 58 permits were for frame buildings to cost $90,585; 27 were for brick and stone buildings at an estimated cost of $135.800, and 98 were for additions and alterations, the estimated cost of which is $55,274.

Architects and contractors are making plans for and figuring on a good volume of new work, contracts for which will be let in time to start as soon as spring opens. Several large mercantile and office buildings will be erected in the city during the year if the present plans are carried out. The contract for one of these, a large sixteen-story addition to the Rockefeller building, has been let.

Denver, Col.

The severe winter weather which has prevailed throughout this section of the country during the past two months is reflected in the falling off in the amount of new building work projected in January. Building Inspector R. Willison shows in his report for that month that 127 permits were issued for new buildings, alterations and repairs calling for an estimated outlay of $449,300, while in the first month of last year 234 permits were issued by the department calling for an outlay of $694,475.

Of the work projected in January there were 57 brick residences calling for an outlay of $145,300, and one terrace, $2,500. There were six business buildings for which plans were filed calling for an outlay og $20,000, and one hotel to cost $173,500. Among the other improvements mention may be made of a grain elevator costing $38,000.

Detroit, Mich.

The Builders and Traders' Exchange held its annual meeting in January, when it elected a board of directors, which in turn organized by choosing the following officers for the ensuing year:

President..................George F. Stokes.
Vice-President...............John L. Austin.
Treasurer...................C. L. Batchelder.
Secretary.................Charles A. Bowen.
Assistant Secretary............G. E. Wallace.

The membership now includes 180 firms and the organization is in a most flourishing condition. It has just occupied its new quarters in the Penobscot building, where a feature is the exhibit of building materials and equipment.

Grand Forks, N. D.

At the recent annual meeting of the Builders and Traders' Exchange the following officers were elected for the ensuing year:

President ....James Dinne.
First Vice-President...........Thomas Berge.
Second Vice-President........K. H. Johnson.
Treasurer ....C. N. Barnes.
Secretary ....C. W. Graves.

Jacksonville, Fla.

The annual meeting of the Builders' Exchange was held in the headquarters at 111 East Bay street, in January, and proved to be a very pleasant ending of a successful year. The various reports presented were of an encouraging nature, and the organization was shown to be in flourishing condition.

The president's report reviewed the work of the organization during the past year, pointing out that the membership has increased; that in December last the organization was incorporated; that its services are appreciated; its influence felt, and it is recognized as an important factor in the up-building of the city. The officers elected for the ensuing year were:

President ....J. H. Hooker.
First Vice-President..........O. T. Woodcock.
Second Vice-President........W. S. Kadz.
Secretary ....E. J. Gartley.
Treasurer ....George H. Keefe.

At the close of the business session the members retired to the banquet hall, where a spread had been prepared by the ladies of St. John's Guild. After doing full justice to the good things provided, speech making and humor were the order of the hour.

Los Angeles, Cal.

Notwithstanding the fact that the weather during the month of January was not particularly favorable to new construction, a large amount of new work was started and still more was planned for immediate construction. According to the official showing of new work for which permits were granted, the month was one of the best, if not actually the best, in the history of the city. Certainly the month was the largest January, in point of the total value of the permits issued, that has ever been recorded. The total value of the permits issued in January was $1,766,000, as compared with $646,000 for the month of January last year. The building records for December and November last were $1,238,000 and $1,339,000, respectively.

In view of the large amount of new work already under way and the still larger amount planned, it seems certain that the spring and summer will be particularly active in this city. The situation in materials and labor has not changed greatly since last month. All lines of materials are firm and are fairly steady. There is some complaint that lumber and most other materials are higher than conditions justify, but builders are apparently convinced that nothing will be gained by waiting.

Builders are inclined to think that the building for the year will run more largely to brick, concrete and steel construction than in the last few years. The permits issued in the first month of the year show nearly one-half of the total valuation to be for this class of buildings. These include two steel frame buildings to cost $400,000; one reinforced concrete building to cost $100,000; 22 class C buildings to cost $273,000, and brick alterations to cost $53,000.

Contracts amounting to about $80,000 have been let on the Los Angeles Market Syndicate Building at Sixth and Alameda streets, to the Eureka Mill Company, the entire building will cost about $140,000.

F. S. Allen of this city is preparing plans for two reinforced concrete school buildings to be erected at Holtville, Cal., at a cost of $70,000.

Bids are being asked for the construction of the six-story T. Ashton Fry Hotel Building at Fifth and Los Angeles streets in this city, Arthur R. Kelley, architect.

Louisville, Ky.

The building outlook in this city and vicinity is regarded as most encouraging, and weather permitting it is expected that February will top all previous records. Very little actual work, however, is being done at the moment owing to the continued severe weather. During the month of January, 88 permits were issued for building improvements estimated to cost $271,956, as compared with 121 permits for building improvements estimated to cost $132,830 in the first month of last year.

The Builders' Exchange held its annual election on February 3, when all the old officers were retained for the ensuing year. The list is as follows:

President ....E. G. Heartick.
First Vice-President..........W. C. Magruder.
Second Vice-President........W. B. Pell.
Treasurer ....Alfred Struck.
Secretary ....J. M. Vollmer.

Milwaukee, Wis.

At the annual meeting of the Builders and Traders' Exchange, held in the headquarters of the organization, on January 11, officers for the ensuing year were elected as follows:

President ....Arthur Riesen.
First Vice-President..........Peter E. Posson.
Second Vice-President........August Bartelt.
Secretary ....Frank Spetz.
Treasurer ....Anton Hennecke.

At the same time the members of the Builders' Club elected officers as follows:

President ....William Gregory.
Vice-President ....F. J. Gruhl.
Secretary ....U. F. Durner.
Treasurer ....Henry Weden.

Here as elsewhere throughout the Northwest the severe winter weather is reflected in the serious shrinkage in new building work projected during the opening month of the year, as compared with the same month in 1909. The Bureau of Building Inspection shows that only 81 permits were taken out for building improvements estimated to cost $180,195, while in the opening month of 1909 there were 126 permits issued for new work calling for an estimated outlay of $238,141.

Minneapolis, Minn.

The report of Building Inspector James G. Houghton shows that the permits issued for building improvements in the first month of the current year call for a greater investment of capital than has been the case in any previous January since the department was organized. The number of permits issued was 178, calling for an estimated expenditure of $602,395. In January, 1909, there were 193 permits issued for improvements, but the capital called for was only $337,840. The record for January heretofore was that of 1906, when 199 permits issued called for the expenditure of $432,705. It is confidently predicted that if anything like the record of January is maintained throughout the year the total will far exceed that for 1909, when more than $13,000,000 was spent in new buildings and improvements.

Newark, N. J.

The annual meeting of the Builders and Traders' Exchange was held January 20 at the headquarters of the organization, 45 Clinton street, and with one exception the old officers were re-elected. The various reports presented showed the Exchange to be in a flourishing condition, especially as regards membership and finances.

The choice of officers resulted in the election of the following:

President ....Archibald S. Reid.
Vice-President ....Hugh Kinnard.
Secretary ....Charles Grover.
Treasurer ....Louis C. Rusling.

The new year opened with a marked lull in the amount of new work projected as compared with the same period the year before, the falling off being noticeable not only in the number of permits issued but in the amount of capital involved. According to the figures compiled in the office of Superintendent of Buildings O'Rourke, 105 permits were issued last month for buildings to cost $482,877, while in the opening month of 1909 there were 172 permits granted for work calling for an outlay of $620,090.

Omaha, Neb.

The character of the work for which permits were issued last month was of a somewhat more pretentious nature than that for the first month of last year, as evidenced by the fact that the lesser number of permits issued from the office of Building Inspector C. H. Withnell called for an increased amount of capital.

The Builders' Exchange has recently occupied its new quarters at 315 South Fifteenth street where the various rooms on the second floor of the Elks building have been arranged and fitted to meet the requirements of the organization. We understand that one of the rooms is to be devoted to a permanent exhibition of building materials. Secretary Charles A. Gregg is active in the movement, and very satisfactory results are expected from this feature of the Exchange.

Peoria, Ill.

One of the noticeable features of building operations in this city during the year just past was the increasing number of buildings of concrete construction, which, while not of a pretentious character, have demonstrated the fact that concrete is rapidly growing in favor for building purposes.

The total value of buildings for which permits were issued last year was $1,321,366, which is a considerable falling off, as compared with the $1,754,932 of the 12 months of 1908. Of the total for last year, permits were issued for 319 frame buildings costing $649,147, as contrasted with 325 frame buildings valued at $683,668 in 1908. Last year there were 69 brick buildings projected, involving an estimated outlay of $645,884, and nine concrete buildings costing $20,660. In 1908 there were 47 brick buildings, for which permits were issued valued at $471,264, and one fireproof structure estimated to cost $600,000. The permit for this was issued on the 31st of December, 1908, so that the work of construction was really done last year.

Philadelphia, Pa.

Unfavorable weather conditions have interfered to a considerable extent with building operations in this territory, and outside work has been largely suspended. The records of the Bureau of Building Inspection, however, show that 376 permits were issued in January for 568 operations, estimated to cost $2,131,775, which was exceeded but once before in that month in the history of the bureau, that being in 1907, when the total expenditure authorized was $2,488,460. Compared with January, 1909, a sharp gain is to be noted, the value of work started in that month being $1,677,025.

Dwelling houses again lead in the amount of work undertaken. In January, 1909, the erection of 261 two-story, and 14 three-story houses was begun, at an estimated cost of $476,000 and $80,400, respectively, while during the same month this year permits were taken out for 162 two-story and 65 three-story dwellings, the former at an estimated cost of $452,485, the latter at $335,500, indicating that the work so far undertaken this year was of a higher grade than that during the same period last year. The value of manufacturing buildings, warehouses, engine and boiler houses begun during the month, shows a comparative gain of nearly $300,000 over that for the same month in 1909, the betterment in this direction reflecting the general improvement in industrial activity.

The activity during the month foreshadows prosperous conditions in the building trades during 1910, for, with the present good start, builders believe that even the tremendous record of last year will be broken. Plans are in preparation for an enormous amount of work, and in dwelling-house operations particularly the programme is very extensive. Quite a large amount of suburban work is contemplated during the year, and the trade is preparing for a very extensive amount of general work.

There is a strong possibility of an early settlement of the labor difficulties, which have interfered with several branches of the trade, more particularly with the granite cutters. Conferences between employers and labor interests have about adjusted the difficulties, and it is believed that the strike, which has inconvenienced builders to a considerable extent since early in November, will be shortly called off.

Calvin W. Rogers has recently taken bids for 14 three-story brick dwellings, 16 x 58 feet each, which he proposes to erect at Fiftieth and Sansom streets.

We understand that plans are being prepared by Walter Smedley, architect, for a bank and mercantile building, to be erected on Chestnut street above Thirteenth street.

Plans have been completed by E. Allen Wilson for 24 two-story, nine-room, porch front dwelling houses, to be erected at Fifty-fifth and Webster stretts, for William A. Lechler. The same architect has started plans for a further operation of 120 dwellings, particulars regarding which are not yet ready for publication.

One of the larger operations on which work is expected to be started in the spring is that of some 180 dwellings to be erected in the southern section of the city, by T. J. and J. R. Whelan. Sixty-five of these are to be porch fronts, 100 straight fronts, and the remainder stores and dwellings; practically all will be two stories in hight. The operation will be in the vicinity of Tenth and Butler streets.

Burton C. Simon, Broad and Passayunk avenue, is taking bids for the erection of 243 two-story dwellings, to be erected in the neighborhood of Twentieth and Jackson streets. The estimated cost of the operation is $500,000.

John V. Schisler, Eleventh and Wolf streets, has started work on an operation of 129 dwellings and 10 stores and dwellings, which he will erect at Twenty-third and McKean streets, the cost of which will be about $300,000.

At the annual meeting of the Master Builders' Exchange held on January 25, the following seven directors were elected to serve, together with fourteen whose terms have not yet expired, during the ensuing year: D. O. Boorse, George T. Watson, John R. Wiggins, J. Turley Allen, Jacob L. Tyson, William T. Reynolds and Williams S. Lilly.

At the regular monthly meeting of the directors held February 8, the organization for the year was completed and the following officers were elected:

President .... Frank A. Reeves.
First Vice-President.......... James Johnston.
Second Vice-President........ S. H. Andrus.
Third Vice-President......... John R. Wiggins.
Treasurer .... Henry Reeves.
Secretary .... Charles E. Smith.

Trustees.—George Watson, John S. Stevens and Henry Reeves, the latter named being also a director of the Exchange, resigned as such, and the vacancy was filled by the board by the appointment of A. J. Slack.

Pittsburg, Pa.

Buildings of a somewhat more pretentious character than usual were projected in January, as evidenced by the figures compiled in the office of Superintendent S. A. Dies. These show that 126 permits were issued for building improvements to cost $673,085, while in January, last year, there were 207 permits issued for building improvements to cost $684,614. Of these permits 51 were for new buildings to cost $442,625. Of the new structures 19 are to be of brick, 13 of frame, nine brick veneer, six stone and four concrete.

Portland, Ore.

Severe weather throughout the last month had a serious effect on building operations in this city. Poor progress was made on most of more important work under way, and a general tendency to hold up new work was shown. Beginning with the first of February, however, there has been considerable improvement, and builders are still confident that the present year will hold at least up to the high standard of last year.

During the month of January a total of 339 permits for new buildings were issued, with a total estimated valuation of $624,000. While this is but little over half of the average for recent months, it is nearly 50 per cent. above the record for the month of January, 1909.

A summary of the larger buildings now in plan at the offices of the local architects shows a total of about fourteen and one-half millions, exclusive of residences. Of these, probably not more than one-half will actually be started during the present year, but the fact that so much large work is contemplated is taken to indicate that the activity of last year will be continued throughout the present spring and summer.

W. L. Morgan has taken out a permit for a four-story reinforced concrete building, at Fourth and Alder streets, to cost $80,000. A considerable number of permits have also been taken out since the first of the year for brick or reinforced concrete buildings, to cost from $20,000 to $40,000 each.

Providence. R. I.

Members and friends of the Builders and Traders' Exchange of the City of Providence to the number of about 125 gathered in Masonic Hall on the evening of February 1 for their thirty-second annual banquet. A reception was held early in the evening, after which was the banquet and entertainment. A very pleasing feature of the evening was the presentation to Secretary George S. Ross, of the Exchange, of a gold watch and chain as a token of appreciation of his service by his many associates.

President V. W. Beck acted as toastmaster of the evening, and in well-chosen words introduced the various speakers. Charles Angell, Charles Kelley and Thomas H. Doane spoke briefly on the work of the Exchange. James S. Hudson urged upon the members the advance of cordial relations in business transactions, and referred to the social functions as an excellent opportunity of bringing members together in a closer relationship. A musical entertainment was furnished, which was greatly appreciated. Souvenir calendars of various fancy styles were distributed to all present.

The committee having charge of the arrangements were F. L. Pierce, Chester E. Butts and Mark C. Bennett.

The present officers of the Exchange are:

President .... Vere W. Beck.
Vice-President .... T. A. Perry.
Secretary .... George S. Ross.
Treasurer .... James S. Hudson.

Salt Lake City, Utah

The outlook for building in this city the ensuing year is extremely encouraging, and if half of the projects now under consideration are carried to a conclusion 1910 will be a banner year, notwithstanding the fact that 1909 showed an increase of 70 per cent over the year before. The tendency of building materials at the present time is toward a lower rather than a higher level, but dealers account for this largely by reason of the large amount of stock on hand rather than to the natural price of materials. It would appear that if all the buildings at present under consideration are erected there will be a decided tendency toward higher prices. Up to the present time, however, prices of materials have not appreciably influenced operations. The use of concrete in construction is constantly on the increase, and is regarded with considerable favor by architects and contractors alike.

For the twelve months of 1909 the inspector of buildings issued 1288 permits for improvements estimated to cost $8,077,820, but in the twelve months of 1908 there were 1092 permits issued for improvements estimated to cost only $4,728,380.

San Francisco, Cal.

During the last few weeks the weather in Central California has been decidedly against building, and many projects planned for the early part of the year have been held up, awaiting better conditions. As a result the record for the month of January has been lower than for some time past; also lower than the month of January, last year. The outlook is considered promising, though it is not believed that the present spring will prove quite so active as in some of the previous years.

During the month just closed the value of the buildings undertaken reached a total of $1,170,000, as compared with $2,166,000 for the same month last year, and with $1,900,000 for December, 1909, and with $2,400,000 for the month of November, 1909. There is some little talk that the check in building is due in part to the feeling that the price of materials is being maintained at a point not justified by the law of supply and demand. Aside from brick, nearly all materials are high in price and are quite firm at the high level, notwithstanding the slackening in the demand. Lumber is not only holding at the old figure, but is apparently in a fair way to go still higher. Brick, on the other hand, is still lower, and is weak at the present figure, which is about $6 per thousand.

Among the buildings that are planned for construction during the early part of the year are the following: A five-story steel frame building at the corner of California and Battery streets to cost $139,000; a six-story steel frame hotel building for R. S. Browne, at O'Farrell and Taylor streets, to cost $101,000, and from plans of Sutton & Weeks, architects; the reconstruction of the Rialto Building at New Montgomery and Mission streets at a cost of $200,000, Bliss & Flayville, rchitects; a 30-apartment brick building for Samuel Dusenbury on Eddy street, near Larkin, to cost $65,000, O'Brien Bros., architects; a six-story brick and steel business block to be erected on Geary street nlear Stockton at a cost of $200,000, L. B. Dutton, architect; the six-story L .H. Sly brick apartment house on Van Ness avenue, near Sacramento street, to cost $200,000, and the six-story hotel building to be built at the corner of Eddy and Leavenworth streets from plans by J. E. Craft & Sons, architects.

Contracts have been let for the construction of the Knights of Pythias Building at the corner of Valencia and Hermann streets for $78,000; for the construction of the Macdonough Estate Building at Front and Market streets, and for the partial construction of the Children's Hospital on California street for $160,000.

Seattle, Wash.

The opening month of the year showed a decided shrinkage in the value of building improvements as compared with the same month a year ago, although the number of permits was considerably ahead of last year. The report issued by Francis W. Grant, Superintendent of Buildings, shows that in January 986 permits were granted for improvements costing $1,274,985, while in the first month of 1909 there were 918 permits taken out for building improvements costing $2,072,465.

Of the new work projected last month 264 permits were for frame residences costing $418,100, and 163 were for frame business structures costing $153,605. Brick and reinforced concrete were fairly well represented in the totals, permits having been issued for six brick structures to cost $73,000, and for three reinforced concrete buildings involving an estimated outlay of $441,000.

St. Louis, Mo.

There was more new work projected in the building line the first month of the current year than was the case in the corresponding period of 1909, the report of Building Commissioner Smith showing the value of the improvements for which permits were issued to be $1,461,000, while in January, 1909, the total was $1,124,219. The principal feature of the current building movement is brick structures, there having been permits issued last month for 134, calling for an estimated outlay of $1,247,548, which, it will be seen, is a very large proportion of the total of all the improvements for which permits were issued during the month.

In January, 1909, there were 148 permits for brick structures costing $889,711. There has been considerable doing in the way of frame buildings, but these have been of a comparatively inexpensive nature, permits for 127, calling for an outlay of only $57,705, which figures compare with 188 permits for frame buildings costing $90,530 in January, 1909.

St. Paul, Minn.

Notwithstanding the wintry weather which has been experienced, the month of January shows a larger amount of building work projected than was the case in the opening month of last year. According to the figures compiled in the office of Building Inspector Cunningham, 184 permits were issued in January of the current year for new buildings estimated to cost $354,592, while in the same month of last year 165 permits were taken out for improvements estimated to cost $285,576.

Nearly 400 members and guests of the Builders' Exchange were present at the eighth annual dinner of the organization, held at the Hotel Ryan, on the evening of Thursday, January 27. An interesting feature was the menu, which was in pamphlet form, and interspersed between the various courses were clever skits upon different members of the Exchange. After the good things provided for the "inner man" had been duly considered, President A. C. Raymer officially welcomed the members and guests, and then introduced A. K. Pruden as toastmaster of the evening.

The first speaker was Governor A. O. Eberhart, who referred to the benefits of organization, and pointed out that there never was a time when the opportunities for contractors appeared to be better than the present.

Mayor D. W. Lawler, for the city of St. Paul, paid a tribute to the builders as the real creators and makers of the city, declaring that the contractors are those who really do good and lasting work. He pointed out that the city had contracted for buildings amounting to about $2,000,000 in the past year and a half, and there had been no force more uplifting and more beneficial than the suggestions which came from members and officers of the Exchange.

What might be regarded as the address of the evening was that of L. D. Harvey, president of the Stout Institute of Manual Training, at Menomonie, Wis. The talk was intensely practical and to the point. He stated that it was necessary to modify our educational system in order to meet the problems of the day, and he complimented Minnesota upon the fact that it has put more manual training departments in more cities than any other State. "Manual training," he said, "is not industrial education, but it will lead to it." The three things which must be learned in mastering any trade, he pointed out, are: First, what to do; second, how to do it, and, third, the repetition which alone will bring speed and skill.

Secretary Cobb, of the Duluth Builders' Exchange, presented greetings and best wishes, and told of prosperous conditions in his section of the country.

Utica, N. Y.

The Master Builders' Association held its first annual banquet at the New Century Auditorium on the evening of January 27. It was a well-attended and most enjoyable affair. The speeches were pithy, and interspersed between talks were various musical numbers by a quartette.

The toastmaster of the evening was President Griffiths; who, among others things, referred to the important part played by architects and material men, and showed the close relationship existing between them and the builders. The first speaker was Fred H. Gouge, who had a good word for the labor unions, and referred to the efforts which were being made to secure a building code for the city. Next in order was A. B. Wing, of the Stone Construction Company, who wished for the Master Builders' Association and every member of it a prosperous year. Other speakers were Architect G. Edward Cooper, J. L. Hughes, who moved that a committee be appointed to start a new builders' exchange; E. C. Richards, who talked about the obstacles put in the path of the builder by those disinterested; William H. McCann, who talked about plaster; George A. Kennedy, who spoke for the roofers; Thomas Williams, of the Central Stone Company; Hugh R. Roberts, F. E. Conley, George Fuller and John Kerner.

Wichita, Kan.

There is no let up in the building operations in this city, as shown by the report of Fire Marshal A. G. Walden for the month of January. While last year was the greatest by far in the history of the city, this year bids fair to outstrip it as far as 1909 did all previous ones. Chief Walden's report for January, 1910, shows that 91 permits were issued from his office, of which 64 permits were for residences, to cost $107,500; 20 permits were for business buildings, to cost $625,400, and 7 permits were for stables, additions, etc., to cost $2,175, or a total of $735,075. In addition to this, the Santa Fe Railway Company improvements under way, and the passenger depot planned, will cost $250,000. The Stock Yards Company contemplates expenditures for new yards, barns, etc., amounting to $30,000, and plans are now in preparation for a $20,000 hotel building. The Wichita Railroad & Light Company will build a new power plant, car barns and trackage at an estimated cost of $700,000.

Architects now have under way the preparation of plans for the new High School and the Auditorium, each to cost $150,000, adding $300,000 more to the total, and making a grand total of $3,911,833.24, already in sight for the year 1910. To this might be added $1,500,000 for the elevation of the tracks of the Santa Fe, Rock Island, Frisco & Orient Railroads' tracks, and a union depot, which, while not definitely settled at the present writing, it is thought very probable by many who are in touch with the railroad officials, that this improvement may be decided upon within the next thirty days. If this amount is considered, the total amount of improvement in sight for the year 1910, and only one month gone, makes the very respectable showing of $5,411,833.24.

Winnipeg, Can.

At the recent annual meeting of the Builders' Exchange, of Winnipeg, the following officers were elected for the ensuing year:

President	W. H. Carter.
First Vice-President	F. H. Davidson.
Second Vice-President	Thomas Kelly.
Treasurer	T. D. Robinson.
Secretary	J. H. Buxton.

The association is in a very flourishing condition, the membership having been increased by more than 200 during the past year. Considerable enthusiasm was manifested on the part of the members in the decision to secure a central site and erect a new structure to be known as the Builders' Exchange Building.

LAW IN THE BUILDING TRADES

By A. L. H. Street

RIGHT TO RECOVER UNDER BUILDING CONTRACT

A stipulation in a building contract that no work shall be considered "extra" unless a written order for it shall have been given to the contractor by the architect defeats a recovery for extra work unless the contractor first received the architect's written order therefor, unless the owner or his authorized agent waived written orders. The stipulation is not so modified by a provision making the architect the supervisor of the building, with authority to order and direct in its construction, that the owner is bound by an oral order of the architect, being the agent of the owner for the purposes of the contract by its provisions. A stipulation in a building contract that in case of payment a certificate shall be obtained from the architect, reciting that the work has been done in accordance with the specifications and that the payment is due, makes the certificate of the architect a condition precedent to the maintenance of a suit for compensation, in the absence of a showing of a fraudulent, malicious or unreasonable refusal to issue the certificate or a waiver of the condition, or inability of the contractor to obtain the certificate by some cause over which he has no control. A stipulation in a building contract that the owner will not be responsible for any damage which the contractor may sustain in material or work at the hands of any other contractor relieves the owner from liability for damages sustained by the contractor through the negligence of other independent contractors of the owner.

A mere payment of a part of a claim, for which the party making the payment is not liable, is not an implied promise to discharge the remainder of the claim. Where a building contract stipulated that the owner should not be responsible for any damage which the contractor might sustain at the hand of any other contractor, a payment by the owner of a part of a claim of the contractor for damages through the negligence of another contractor was not a waiver of the contract provision. (Tennessee Supreme Court, Bannon *vs.* Jackson, 117 Southwestern Reporter 504.)

RIGHTS OF THIRD PARTIES TO BUILDING CONTRACTS

Where there is no express provision for payment for labor or materials either in a building contract or in the contractor's bond, a general understanding that the contractor shall perform the contract does not run to third persons. A building contract, expressly obligating the contractors to pay for all labor and material used in the work when due, and a bond given by them, conditioned on their faithfully performing the contract according to its terms, together constituted a contract primarily for the benefit of third persons, and authorized suit on the bond by material men for its breach, under the Code provision authorizing suit by the real party in interest. Compliance with a provision in a contractor's bond, requiring written notice to the surety of any act of the principal, or his employees, which may involve a loss for which the surety is responsible, within ten days after the occurrence of such act, with a verified statement of the facts, etc., is a condition precedent to a recovery on the bond. When the undertaking of the surety is generally to guarantee the performance of a contract without conditions, failure to notify the surety of a breach from which damage has resulted is a matter of defense, and need not be negatived by plaintiff in an action on the bond, though it is otherwise where the surety stipulates for notice within a certain time as a condition precedent to liability. (Indiana Supreme Court, Knight & Jillson Company *vs.* Castle, 87 Northeastern Reporter 976.)

SUFFICIENCY OF PERFORMANCE OF BUILDING CONTRACT

A building contract, providing for payment in instalments, provided that a payment should be made when "the total walls, interior and exterior" had reached a specified hight above the top of the foundation walls. The contractor built walls to the designated hight and demanded an instalment, a part of which was paid without the owner objecting that all the walls were not as high as required. Some of the walls were not of the required hight, but the parties so construed the contract that they were not the walls required to be built to the designated hight. Held to show a performance by the contractor of the contract entitling him to an instalment. A building contract required the contractor to give bond, premium to be paid by the owner. The owner applied for a bond and agreed to pay the premium. The agent of the bond company made out an application, and sent it to the contractor, who returned it because it provided that he should pay the premium. A second application was sent to the contractor, with a statement that the owner would pay the expense thereof. The contractor signed the application, and returned it to the agent, who took it to the owner, and he filled out answers to questions. The bonding company required the owner to sign an agreement that it would pay the premium before the bond was issued, and this the owner refused to do. Negotiations were then entered into by the owner with another agent. Held that the failure to furnish a bond was not by the fault of the contractor, and a forfeiture of the contract could not be based thereon. (Iowa Supreme Court, Schillinger Bros. & Co. *vs.* Boschryan Grain Company, 122 Northwestern Reporter 961.)

MEASURE OF RECOVERY FOR PERSONAL INJURIES

Plaintiff was 27 or 28 years old, a carpenter, with an earning capacity of $3.50 a day. By an accident in a planing mill he lost the entire little finger of his left hand, the middle finger above the knuckle, and the end of the index finger was cut off diagonally without injuring the bone; the ring finger having been cut off in childhood. The injured fingers were very sensitive to touch and cold, and plaintiff could not take up material or tools with the injured hand, and is greatly hampered in climbing ladders, etc. Held that a verdict for $3,008 was not excessive. (Washington Supreme Court, Rood *vs.* Seattle Electric Company, 104 Pacific Reporter 249.)

ARCHITECT'S CONTRACT CONSTRUED

An agreement required architects to furnish preliminary specifications, with an estimate of the cost, and provided that if the drawings, etc., were not satisfactory the architects should correct them to conform to the suggestions of the authorities, and so that the estimated cost, including architects' fees and cost of surveys and inspection, should be within $50,000. Held that the paragraph requiring the estimate to be including architects' fees, etc., within the sum of $50,000, did not apply to the preliminary plans, but was limited to the revised and corrected plans. (New York Supreme Court, Appellate Division, Second Department, Bernstein *vs.* City of New York, 118 New York Supplement 901.)

New Publications.

The Building Trades Handbook. 372 pages. Size, 3½ x 5½ in. Bound in board covers. Published by the International Textbook Company. Price, 50 cents.

This is the second edition of a little work compiled for use as a convenient manual of reference on building construction and covers carpentry, joinery, roofing, plastering, painting, bricklaying, structural design, masonry, plumbing, lighting, heating, and ventilation. These phases of building construction are treated comprehensively, and there is much information on the computation of quantities and the costs of materials. It is intended for the use of all persons connected with the building trades, and in addition to a number of tables giving the properties of materials used in construction, practical rules for laying out work, etc., it presents methods for solving problems involving strength and stability which occur in building practice. The matter has been compiled by the International Correspondence Schools and is arranged in a way to prove of special interest to those connected with the various branches of the building trades.

Elementary Course in Perspective. By Sherman M. Turrill. 72 pages; numerous illustrations and folding plates. Bound in board covers. Published by D. Van Nostrand Company. Price, $1.25.

The aim of the author of this little work has been to illustrate the mechanical application of the principles of descriptive geometry to the making of a perspective drawing. In the presentation of the matter two methods are employed, known respectively as the "Method by the Use of the Plan," where the orthographic projection of rays are used, and the "Method by Scale." The author points out that in the former method all details should be drawn with instruments, especially if there is much mechanical labor entailed, while, on the other hand, the second method should serve the purpose and is, in fact, the quicker process, where the accurate location of the leading or important points only is desired. The first method is discussed within the covers of the little book mainly for the assistance of the mechanical draftsman, whereas the second is intended for the artist and freehand draftsman. The author has assumed that the student is already more or less familiar with descriptive geometry, and the subjects have been selected with a view toward illustrating important principles and for their general interest.

The work is divided into ten chapters, equally divided between the two methods already mentioned.

Manual Training and Industrial Education

One of the most interesting features of the eighth annual banquet held by the members of the Builders' Exchange at St. Paul, Minn., the latter part of January, was the address of L. D. Harvey, President of the Stout Institute of Manual Training at Menomonie, Wis. He pointed out that it was necessary to modify our educational system to meet the problems of the day and stated that manual training is not industrial education, but it will lead to it. Industrial education will give the boy a chance to find out early in life what he may look forward to as a means of livelihood. He expressed the belief that there is no kind of skilled labor that cannot be better taught than under apprenticeship. It is possible to teach in a systematic and orderly manner in less time than can be done to an apprentice, and the long years necessary to train through an apprentice system is a cause for its gradually passing into oblivion.

"We must," he stated, "carry on this training in connection with our present system. The trade school is often referred to and its success in other countries; but we have not the same conditions which exist there. There the lines have been drawn and crystallized so that the father's occupation practically determines his boy's. Here it is the boast that any young man may aspire to any trade or profession which may appeal to him. But it also prevents the following up the application of the trade school idea as it is done in the old countries."

He cited the Milwaukee trade school as illustrative of what may occur with the latter. That school has been in existence three or four years and now has but 66 day students and about as many night, making the per capita cost far above $300. That school will not accept students under 16 years of age on the ground that they are not sufficiently advanced to be able to master the details of a trade until that age. But the boys that leave the grade schools do so between the ages of 12 and 14 or 15. They frequently do not leave because of having through poverty to earn a living for dependents, although that often happens, but more often because they do not see in what they are taught in the grade schools anything that will enable them to earn a living. And so they go out from school and hunt a job, anything that they can find, or perhaps they loaf in the streets. If they find work it is necessarily of the unskilled kind that they can do with their hands.

"The public school should include a training which will enable them to see something in it that they can use to earn a living. We cannot wait until they are 16 years of age. We must find an opportunity for hand work and hand training. The mechanics arts high schools are fine, but it is well and desirable to extend manual training to the grade schools. Handwork will train the boy to be handy with his hands and intelligent in his thoughts, no matter what vocation they may later take up." He recommends making the training as varied as possible to give the beginnings of a trade. He declared there was as much justification for the state training for a trade as for a profession. He stated that they knew from their own experience that it is possible to make very excellent beginnings to trades in the grade work.

They are now experimenting in the Stout school with teaching plumbing and brick laying in the grade school. They have not determined what they can do as yet. But 90 out of every 100 boys leave school to earn a living with their hands. To reach them it is necessary to begin below the high school and below the trade school. It is possible to reorganize the present manual training work to lead out toward greater efficiency.

There are three things which must be learned in mastering any trade: First, what to do; second, how to do it; and third, the repetition which alone will bring speed and skill. Much may be done in the elemental school for the first and something for the second, which can be continued in the high schools; and they can be sent out reasonably well trained to take up the third.

Factory Construction in New Jersey in 1909

The report of the chief of the Bureau of Statistics for the State of New Jersey recently issued, shows that the total amount invested in 1909 in factory construction and improvements was $5,364,092, of which $2,913,057 represents the cost of new buildings and equipment and $2,451,035 the outlay on the enlargement and improvement of old establishments. In extent of factory construction and enlargement the city of Newark leads all others, there having been 24 new manufacturing plants started last year, while 30 old establishments were extensively enlarged.

San Francisco's New Building Law

The new San Francisco building law, which has been under consideration for several years, was finally passed on December 20. The law limits the hight of Class C brick and concrete buildings to 84 ft. where metal lath is used and to 55 ft. where wooden lath is used, and reduces the hight of frame buildings from 45 to 40 ft. The fire limits are left unchanged, but a fireproof roofing limit has been fixed.

An important section has been added relating to the use of new materials and devices not treated of in the ordinance. This reads as follows:

In cases in which it is claimed that any equally good or more desirable mode or manner of construction or material or device for fireproofing other than specified in this ordinance can be used in the erection or alteration of buildings, the board of supervisors, upon written application to them for a permit to use the same, shall have power to appoint a board of examiners consisting of not less than three nor more than five members, one of whom must be an architect, one a civil engineer and one a builder, each of whom shall have had at least ten (10) years' experience in San Francisco as an architect, civil engineer or builder, who shall take the usual oath of office. Said examiners shall adopt rules and specifications for examining and testing such mode or manner of construction, or material, or device for fireproofing, and furnish a copy of the same to the applicant. The said examiners shall thereupon notify such applicant to submit to such examination and to make tests in the presence of the said examiners, or a majority thereof, according to such rules and specifications. All expenses of such examiners and of such examinations and tests shall be paid by the applicant, and said examiners may require security therefor.

The said examiners shall, after such examination and tests, certify the results and their decision on the said application to the board of supervisors, who shall have power, in the event of the examination and tests being satisfactory, to grant a permit to the applicant in accordance with such decision of the board of supervisors.

Concerning the measurements for length, hight and breadth the following provision is made:

The greatest horizontal linear dimension of any building shall be its length, and the next greatest horizontal linear dimension its width.

The hight of buildings shall be measured from the curb level at the center of the main front of the building to the top of the highest point of the roof beams in case of flat roofs, and for high pitched roofs the average hight of the gable shall be taken as the highest point of the building.

For a building erected upon a street corner the measurements shall be taken from the curb level opposite the center of either front.

When the ground upon which the walls of a structure are built is above the street level, the average level for the ground adjoining the walls may be taken instead of the curb level for the hight of such structure.

In computing the seating capacity of any room or building in which seats are not fixed an allowance of 8 sq. ft. of floor area shall be made for each person, and all space between the walls or partitions of such room or building shall be measured in this computation.

The provisions concerning the construction of Class C buildings is more definite and more rigid than in the former law. The same is true of frame buildings. The law provides that all theatres and similar buildings shall be of strictly Class A type, and that no building not now in actual use as a theatre and not conforming to the requirements for theatres shall hereafter be used as a theatre. The regulations concerning the use of reinforced concrete are amplified as follows:

Reinforced concrete walls shall be at least 6 inches thick. If the area of wall surface included between any two adjacent wall columns and adjacent floor girders exceds 300 sq. ft. and is less than 400 sq. ft., the thickness of the wall shall not be less than 8 in. If the area exceeds 400 sq. ft., the wall thickness shall not be less than 12 in., supported on the frame at each story.

In reinforced concrete walls the area of steel reinforcement shall aggregate one-half of one per cent. of the area of the concrete, and may be placed vertically or horizontally, or part vertically and part horizontally.

No reinforcement shall be spaced more than 24 in. apart. Additional reinforcement shall be placed around openings, and all reinforcement shall be wired at each intersection. All reinforcement shall be rigidly connected at columns and girders to the steel frame.

Reinforced concrete walls may be built in the form of bearing walls of uniform section, and of same thickness required for brick walls.

If walls are built of piers and connecting walls, the piers shall be calculated and constructed as columns. The connecting wall, if built of reinforced concrete without windows, may be considered as self-supporting, in which case the thickness shall be 6 in. in the upper 40 ft., followed by an increase of three inches in thickness for every additional 40 ft. hight.

Where such walls are pierced by openings for doors and windows the entire loads shall be concentrated on the piers, which shall be proportioned as columns.

CONTENTS

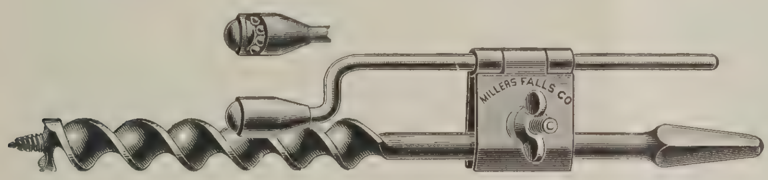
NOVELTIES.

Frink's Reflectors and Lighting Specialties

The rapidly growing popularity of Frink's Special Cluster Reflectors for Tungsten or Mazda lamps is strikingly demonstrated by the extent to which they are being installed in buildings throughout the country. One of the latest installations is that of more than 70 special Tungsten clusters in the Chicago headquarters of Hart, Schaffner & Marx, while over 100 have been put into the Fifth avenue store of Franklin Simon & Co., New York City. Frink's special brass reflectors for lighting the desks and screens of banks are also meeting with great success. Among the recent installations being those in the Old Colony Trust Company, Boston, Mass.; the New England National Bank, Kansas City, Mo., and the Mechanics-American Bank, St. Louis, Mo. These reflectors and lighting specialties are manufactured by I. P. Frink, with New York offices at 551 Pearl street, and St. Louis office in the Bank of Commerce Building, and we understand that sketches, catalogues and estimates will be submitted free of charge to architects, contractors, engineers and supply dealers who may desire detailed information on the subject.

Anti-Friction Auger Bit Stop

The Millers Falls Company, Millers Falls, Mass., and 28 Warren street, New York City, has put on the market the anti-friction auger bit stop No. 2, shown in Fig. 1, and for which a patent has been applied. The stop has a ⅜-in. anti-friction steel ball in the end of the socket, this ball, in turn, running on six smaller steel balls, as shown in the sectional view given. This construction greatly minimizes the friction in boring and prevents defacement of delicate or polished material in operation. The tool is 5½ in. long



Novelties.—Fig. 1.—Anti-Friction Auger Bit Stop, No. 2.

over all, and the rod is 3/16 in. in diameter. There is an offset of ⅝ in. between centers. The tool is highly polished and nickel-plated. In use the stop is clamped to the shank of an auger bit, as shown. The reverse end of the thumbscrew is fitted in a square socket to prevent turning.

Important Decision in Concrete Building Block Machine Case

The Ideal Concrete Machinery Company, South Bend, Ind., has just received a second decree in its patent litigation involving the manufacture and sale of a machine for turning out hollow concrete building blocks. The decree rendered fully sustains the company's patent, especially Claims Nos. 5, 6 and 7, upon which the suit was based. In other words, it sustains the patents covering block machines having horizontally-movable cores, in which the block is rolled out to a discharging position on a portion of the mold which is formed of hinged sections. In a second suit brought by the company against an infringing manufacturer in Michigan, the court rendered a decree in favor of the company, sustaining all claims from Nos. 1 to 7, inclusive. Both decrees, we understand, further enjoin the manufacture, sale or use of said machines.

Catalog of Woodworkers' Tools

The Stanley Rule & Level Company, New Britain, Conn., and 107 Chambers street, New York, has issued Catalog No. 102, containing 128 pages. The lines shown in great variety include rules, plumbs and levels, try and miter squares and T bevels, gages, planes, scrapers, miter boxes, bit braces, screwdrivers, awls, spoke shaves, brackets, etc., with a large assortment of specialties in woodworkers' tools of a miscellaneous character. The extensive works are shown on two pages in front, and at the back are 12 pages relating to telegraph code, code index, original packages and contents, weights and measurements, all helpful to merchants whether in domestic or foreign trade, but particularly to exporters and buyers abroad. There is also a No. 101 catalog identical, except in size, of which there is a limited edition.

Plumb or Level Attached to Straight Edge

In the exercise of their daily vocation carpenters frequently have occasion to use a plumb or level attached to a straight edge for setting door jambs, posts, windows, etc., and the same sort of an arrangement is of equal convenience for the stonemason and bricklayer. In Fig. 2 of the accompanying illustrations we show the method which has been adopted by the Baker, McMillen Company, proprietors of the Akron Spirit Level Works, Akron, Ohio. From an inspection of the picture it will be seen that it is only

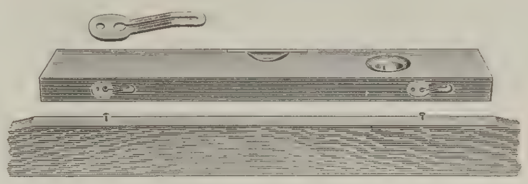


Fig. 2.—Plumb or Level Attached to Straight Edge.

necessary in attaching a level to a straight edge to drive two 8d. nails into the latter and the plumb and level can be instantly attached. The company points out that it has experimented for a long time, and has had submitted to it a great many different methods for attaching a plumb and level to a straight edge, but that shown herewith is regarded by them as the simplest yet designed.

The Cornwall Portable Concrete Mixer

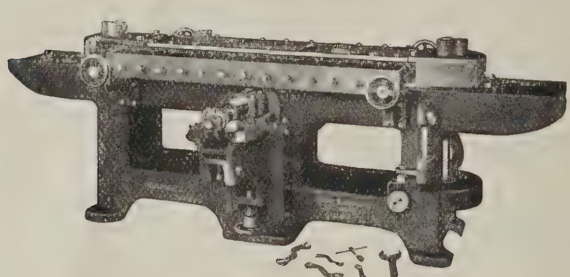
A new adaptation of one of the earliest types of concrete mixing machines has been brought out recently by the United States Steel Mixer Company, Atwood Building, Chicago, Ill. As shown in Fig. 3, which represents the mixer ready to be filled, it consists of a steel mixing cube mounted upon two steel standards, which are supported by a frame and axle carried upon two wheels 3 ft. in diameter with 4-in. tires. Power to revolve the cube is obtained from the cart wheels when in motion through two 23-in. gears with 2½-in. face attached to them. These engage two similar gears keyed to the trunnions of the cube, to the diagonally opposite corners of which the latter are riveted. Through the trunnions, which are hollow, a pipe is inserted and connected at

Fig. 3.—The Cornwall Mixer Open, Ready to Be Filled.

one end leading to the water tank. Inside of the mixer the pipe is perforated, and water for the batch is supplied by turning a small valve. To prevent drip from the supply pipe the bearings attached to the inlet side are protected by a 2-in. iron sleeve extending beyond the wheel. The tank holds 16 gallons, and is fitted with a gage glass showing the hight of the water. Thus the amount of water required for a given batch may be evenly regulated. The gears and bearings of the machine are protected against falling grit and dirt by steel shields. When drawn by horses the cube revolves and the materials are mixed in transit. Eleven complete revolutions are made by the cube in each 102 ft. of travel and, being displaced three times in each revolution, the contents are turned 33 times in this distance. Raw materials are introduced through the door, which is securely held by a locking device in open or closed position, either with shovels or ordinary loaders. To guard against movement while loading, a pawl is provided which engages the lower gear and holds the machine steady. The driving mechanism is thrown in and out of gear by a lever within easy reach of the driver. The mixer is made in two sizes, No. 1 designed to mix one sack of cement, or about ¼ yd., and No. 2 having capacity for about double that amount of mixed concrete to the batch. While adapted to any kind of work requiring concrete mixture, this machine is especially advantageous in street paving work, where with this method it is necessary to handle the materials but once, since they are mixed in transit and dumped in place. The weight of the machine is about 1400 lb.

New Continuous Feed Glue Jointer

One of the latest additions to the already extensive assortment of woodworking machinery, which is being turned out by the J. A. Fay & Egan Company, 221 to 241 W. Front street, Cincinnati, Ohio, is the continuous feed glue jointer, illustrated in general view in Fig. 4 of the accompanying engravings. In designing this machine it was the chief aim of the company to make a glue jointer which would be suited to a larger range and variety of work than has heretofore been introduced to the trade. In connection with it special attention is directed to the frame, which is a simple rigid casting, and to the fact that the chain links are interchangeable and instantly detachable. Reference is also made to the arbors, and to the fact that the worm and gear for driving the machine are protected against wear by ball bearings for the end thrust. The machine makes what is called a concave joint used on long stock, to keep the joint from opening up at the ends, while the claim is



Novelties.—Fig. 4.—New Continuous-Feed Glue Jointer.

made that for short stock it is just as efficient. The machine here illustrated is referred to as being especially adapted for cabinet shops, sash, door and blind factories, for furniture and piano makers, etc., etc. An interesting little pamphlet which the company has issued, entitled "Parting of the Ways," illustrates and describes this glue jointer somewhat in detail.

Tenoning Attachment for Universal Woodworker

In connection with its well-known Universal Variety Woodworker, the Sidney Tool Company, Sidney, Ohio, has brought out an improved tenoning attachment, which, with very little work, can be placed on or taken off the machine. When it is placed on in shape for working the claim is made that the attachment is just as complete as any single-end tenoner, and will do as accurate and clean work. It is adjustable for cutting tenons at all different angles, and the head is also adjustable for cutting different depths and thicknesses. Those who are interested in the class of work which can be done on the company's Universal woodworker, with the different attachments, can secure a copy of a pocket catalog known as "Catalog B," which gives in detail the information desired.

Catalogue of Mechanics' Tools

We have received from the Cincinnati Tool Company, Norwood Station, Cincinnati, Ohio, a copy of its 1910 catalogue of mechanics' tools. It is an attractively printed publication of 50 pages, profusely illustrated with well-executed engravings, the most of which are direct reproductions from photographs of the finished goods. Prominent among the lines in which our readers are interested may be mentioned adjustable hollow augers, screwdrivers, the Hargrave column clamp, an illustrated description of which appeared in these columns a short time since, bench stops, spoke shaves, drills of various kinds, an extended assortment of cabinetmakers' and joiners' clamps, bit gages, saw vises, brad awls, etc., etc. The catalogue gives evidence of careful preparation, and the matter is arranged in a way to attract attention. The descriptive text is ample, and in connection with the various illustrations are prices, dimensions and other particulars calculated to be of interest to mechanics.

May's Sandpapering Plane

One of the latest candidates for popular favor in the way of a plane for the use of carpenters, cabinet makers, painters, and in fact woodworkers generally, is the device illustrated in Fig. 5 of the engravings. It was patented in August last and has just been placed upon the market by Augustus May, 1023 Second street, New Orleans, La. It is shown in the engraving "loaded"; that is, with 12 sheets of sandpaper attached to the plane ready for use. The cut represents the plane one-fifth the actual size. The picture so clearly shows the construction that extended comment would appear to be unnecessary. With each plane as sent out are directions for attaching the sandpaper, and the statement is made that when a sheet is exhausted the plane

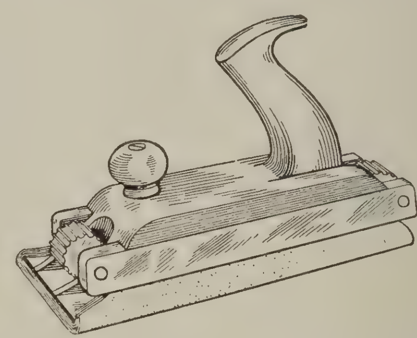


Fig. 5.—May's Sandpapering Plane as It Appears Ready for Use.

is turned upside down, a knife inserted under the exhausted sheet and ripped down either extreme bottom edge. The pieces are then torn off at the clamping bars and another layer is ready for action. The point is made that the motion of the plane in action is quicker than that of the ordinary plane, partaking more of the nature of a rubbing motion.

A New Portable Saw Rig

A practical and compact portable planing mill generating its own power and capable of performing a great variety of work is the C. H. & E. portable saw rig. illustrated in general view in Fig. 6 of the engravings. The nature of the apparatus is such that it can readily be taken from job to job, and as the frame is built of No. 1 maple, strongly bolted together, there is no possibility of breakage as would be the case of a table with cast-iron legs. The outfit carries a gasoline tank holding a gallon of gasoline and has a suction feed, so that no gasoline, it is claimed, can flow unless the engine is running, thus allowing the rig to be used on any job. The cylinder and frame of the engine is cast in one piece of special gray iron, making it very rigid. The crank shaft is of high carbon drop forge steel, while the studs are fitted with double check nuts, thus in-

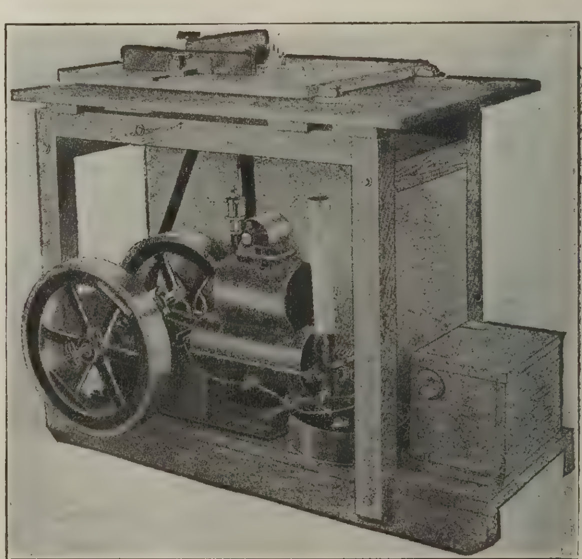


Fig. 6.—New Portable Saw Rig.

suring safety. The engine is of 3-horse-power capacity and is water hopper cooled. Every part of the rig is made and assembled in the factory of the C. H. & E. Manufacturing Company, Milwaukee, Wis. The claim is made that the outfit is strong and rigid and will stand the hardest kind of usage, while at the same time it is an economical operating mill, requiring no line shafts or large amount of floor space.

Sanitary Flooring

In practically every modern dwelling of the present day, a feature of the principal rooms is the finish flooring, usually of thin oak strips laid over a substantial under-floor and having a polished waxed surface. It is generally regarded that thin veneer flooring laid over a good hard pine base is the most satisfactory floor covering for either new or old buildings. It meets the requirements from a sanitary standpoint, being non-shrinkable, tight jointed, and calling for a minimum amount of care in keeping it clean. While the under-floor, as found in the average residence, affords a fairly good basis on which to lay the thin oak flooring, occasionally the carpenter who may be called upon to do the work is obliged to resort to the use of the foot-adz or chisel for the purpose of leveling the foundation for the finish flooring. In a great many instances, however, no preparatory work is required. Where there is any chance of dampness coming from below the floor, it is well to place over the old or sub-floor a layer or two of good waterproof building paper, and on this place the thin flooring. The latter can be put down in various ways, depending upon the kind of design required. Perfectly plain effects can be obtained with the strips running from baseboard to baseboard, although an ornamental border of parquetry around the room adds greatly to the appearance

Novelties—Sanitary Flooring.—Fig. 7.—Laying Plain Strip Floor.

of the finish floor. Strip line borders of various woods, such as rosewood, white maple, walnut, cherry and mahogany are frequently used to good effect. With a view to affording the ambitious and progressive carpenter some suggestions regarding a few of the more important points in laying the thin flooring, we present the accompanying illustrations, which represent various stages of the work, as recommended by the Interior Hardwood Company, Indianapolis, Ind. In Fig. 7 is shown the method of laying the plain strip floor surrounded by an ornamental border, the latter being laid first and the center filled in afterward. In laying the centers where square-edged plain strips are used, it is pointed out that as many as 50 strips can be placed and keyed tightly together by the use of a V-wedge, all as clearly indicated in Fig. 8. At this stage of the work it is necessary to tack the strips with brads just enough to

Fig. 8.—"Keying" the Strips in Place.

hold the work in position until the entire floor is laid out and fitted. After the fitting is completed, the workman lines off the center by chalk line or pencil at intervals of 6 in. and proceeds to top nail the entire floor as shown in Fig. 9. The brads are then countersunk and the floor is ready for scraping, as indicated in Fig. 10. It is pointed out that floor specialists in large cities generally use a Stanley No. 12½ steel scraper, which gives very satisfactory results in connection with work of this kind. Proper sandpapering of the floor is essential, use being made of No. 1½ garnet paper for the purpose. The wood should

Fig. 9.—Nailing the Floor.

first be sanded across the grain and then with the grain. The work of finishing is generally given to the painters or finishers, and in doing the work different finishes can be used to equally good effect; among these being a coat of paste wood filler, two coats of white alcohol shellac, and the finishing coat of wax well polished. Floor manufacturers are undoubtedly in a good position to advise their clients regarding the most satisfactory results to be obtained in the finishing, this being a most important part of the work of laying hardwood flooring. In nearly all the large cities of the country the floor manufacturers are represented by specialists who carry their own forces of floor layers, but in all of the smaller places there is room

Fig. 10.—Scraping the Floor.

and opportunity for a good floor contractor, who can undoubtedly increase his business by contracting for hardwood floors in either new or old houses. The company above referred to manufactures flooring in all styles, and their colored catalogue and literature will enable any good carpenter to figure on this class of work.

Treatment for Floors, Woodwork and Furniture

The tenth edition of the very interesting booklet entitled "Proper Treatment of Floors, Woodwork and Furniture" has just been issued by S. C. Johnson & Son, Racine, Wis., the well-known authorities on wood finishing. The booklet is profusely illustrated in color, and the entire subject is very fully treated, instructions being presented for finishing and refinishing all kinds of wood—natural or in color—and gives many suggestions for finishing inexpensive soft woods so as to give beautiful effects. There is also presented much information regarding the care and treatment of highly polished woodwork and floors. The firm has made a specialty of wood finishing for the past 23 years, and their line is of particular interest to architects, builders and houseowners generally. Samples of any or of all their preparations, which include "Prepared Wax," "Wood Dye," "Under-lac," "Plasto-Filler," "Electric Solvo," etc., together with a copy of the new booklet, will be sent to any reader of *The Building Age* who may make application for them.

New Branch Houses of Henry Disston & Sons

With a view to better facilitating the filling of orders and taking care of the increasing trade in those sections of the country, the proprietors of the Keystone Saw, Tool, Steel and File Works—Henry Disston & Sons—Philadelphia, Pa., have recently opened branch houses in Seattle, Wash.; Portland, Ore., and Vancouver, B. C. The branches will devote their attention exclusively to what is known as the "mill goods" business, such as inserted and solid tooth circular saws, mill, band, cross cut, cylinder and stave saws, machine knives, saw tools, files, steel, etc. The company has recently secured 4 acres of ground in Toronto, upon which two new buildings have just been erected to provide facilities for handling the company's increasing business in that city and vicinity. One of the new buildings covers an area 250 x 60 feet, and is two stories in hight, while the other is 170 x 55 feet in plan and one story in hight. These buildings have been equipped with the latest improved machinery for the manufacture of mill goods, and will be motor-driven in groups. The buildings are heated with an improved hot-air apparatus driven by a fan, and so arranged that the rooms can be kept cool in summer and warm in winter.

Beloit Swing Cut-Off Saw

An improved swing saw, which is adjustable in every direction and which combines strength and simplicity, is illustrated in Fig. 11 of the engravings. It is made by Slater & Marsden, Beloit, Wis., and has a frame which, with the exception of the lower portion carrying the arbor, is cast in one piece and cored hollow, thus giving, it is claimed, a maximum strength with a minimum weight. The frame is suspended on hangers instead of on the countershaft, which does away with imperfect alignment caused by wear, and insures the utmost rigidity. The arbor is made of spindle steel, and is grooved at one end to prevent lateral motion. The head carrying the arbor has a stem turned to fit the reamed holes in the lower end of the body, and is held in place by means of cap screws. By loosening two cap screws the head may be turned on the body so as to bring it in exact line with the countershaft, a feature which cannot fail to be appreciated by those having occasion to make use of swing cut-off saws. The guard will accommodate a saw up to 20 in., but when so desired the manufacturers can furnish a guard for a 24-in. saw. The length of the frame is 6 ft., and the tight and loose pulleys 8 x 5 in. The drive pulley is 16 x 5 in., and the arbor pulley 5 x 5½ in.

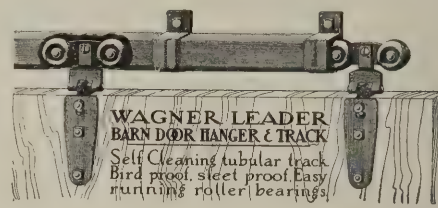
Novelties.—Fig. 11.—Beloit Swing Cut-Off Saw.

Tile for Floors, Vestibules and Hearths

We have received from the Star Encaustic Tile Company, Pittsburg, Pa., a series of sheets or plates carrying designs in colors of tile for floors, vestibules and hearths. These designs are of a varied character, and are intended to meet all conceivable requirements along the lines indicated. The color work is in exact imitation of the finished tile, and affords an excellent idea of the various patterns as they would appear when laid in the shape of a floor or hearth. In some instances the patterns intended specially for vestibules have the name of the owner of the house or an indication of the nature of the business to which the store is devoted set in letters made of the tile. The effects produced are striking and effective. The various plates of designs show the patterns to a scale of ¾ inch to the foot, with here and there a few drawn to a scale of 1 inch to the foot. The tile turned out by the company named are of a nature to interest architects, contractors and houseowners, all of whom are likely to find convenient for reference such a set of plates of designs as that now before us.

Turner Construction Company's Buffalo Office

The Turner Construction Company, of 11 Broadway, New York, has opened a Buffalo district office at 312 Prudential Building, that city. James L. Bruff is district manager, and associated with him are W. E. Lyle, building superintendent, and H. E. Plumer, chief engineer. Mr. Bruff regards Buffalo and the Niagara frontier as a productive field for the erection of reinforced concrete factories and warehouses—a class of construction specialized by his company. The company now has under contract and construction extensive additions to the plant of the Pierce-Arrow Motor Car Company, Buffalo, reinforced concrete, and has recently completed substantial structures for the Carborundum Company at Niagara Falls. Mr. Bruff gave a reception in the newly-opened Buffalo offices February 4, and a large number of architects, professional men, manufacturers, contractors and members of the Builders' Exchange availed themselves of the opportunity to personally meet the new working force and familiarize themselves with the work of the company.



Wagner's "Leader" Barn-Door Hanger.—Fig. 12.—Showing Hanger in Use.

Wagner's "Leader" Barn Door Hanger

What is referred to by the maker as the latest idea in barn door hanger construction is the "Leader," which is being introduced to the trade by the Wagner Manufacturing Company, Cedar Falls, Ia., and which embodies new and novel features that cannot fail to attract attention. The barn door hanger, it is pointed out, is built for strength; that there is no needless weight in wheels and no waste tread surface on wheels running over slot in the track. Fig. 12 of the illustrations shows the general application of the hanger and track in connection with a barn door, while Fig. 13 is an end or sectional view, clearly indicating the shape of the track as well as the double side plates on the door. The point is made that for adjustment of the hanger the only tool required is an ordinary screwdriver. The track and brackets in connection with which the hanger is used are made of 14-gage steel with ¼-in. slot on the underside. The inside measurement is 2¼ x 1¾ in., and the track is furnished in 3-ft. 6-in. lengths. The bottom formation is such as to make the track self-cleaning and easy running. The brackets are made to fit the track and hold it rigidly in position.

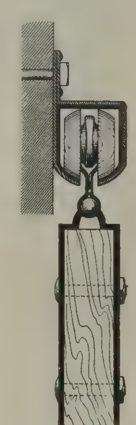


Fig. 13.—End View of Hanger and Track.

Meinken's Collapsible Core for Concrete Walls

With a view to facilitate the construction of hollow concrete walls, John Meinken & Co., 688 Euclid street, St. Paul, Minn., has brought out a collapsible core, the use of which it is claimed results in a great saving of the materials employed. The construction of the core is said to be one of the greatest improvements in molds for forming vertical openings in concrete walls. The mold consists of a No. 27 galvanized sheet metal rectangular casing, inwardly depressed on its four sides and with round corners. Between the opposite depressed sides are arranged a plurality of expanding unions composed of malleable iron. The point is made that by this means an expanding union is secured which may be worked in a very small tube and with a large amount of expanding power. Any desired number of these unions may be employed, according to the length of the cores. The manufacturer states that the preferred size is 6 in. in diameter and 8 ft. in length, and having expanding unions on each end, and one in the center connected with a ¼-in. galvanized pipe and a suitable handle on the top. By pulling on the handle the sides of the mold are drawn away from the surrounding concrete, thus permitting easy removal of the mold. The statement is made that the use of these cores effects a saving of one-third in the amount of materials required, and at the same time improves the wall by giving it the necessary air spaces.

(Trade Notes on following page.)

TRADE NOTES.

THE RICHARDS MANUFACTURING COMPANY, Aurora, Ill., has been distributing an attractive leaflet calling attention to the merits of its No. 90 and No. 93 steel hatchets. The former has a plain head, and the latter a claw head, each being fitted with hollow steel handle, oil tempered blade and heavy strap head. The blades re cut from high-grade steel, and carry a fine cutting edge. The parts are claimed to be absolutely immovable, and reference is made to the tool as "an ideal household hatchet."

THE AMERICAN COLUMN COMPANY, Battle Creek, Mich., announce that it has changed the name of its columns from "American" to that of "Stay-Locked Columns," as the company claims that the columns stay locked and are guaranteed for five years.

THE BERGER MANUFACTURING COMPANY, Canton, Ohio, sends us a very striking calendar for the new year in the shape of a heavy cardboard 10 in. in width by 17½ in. in hight, the greater portion being devoted to a photographic reproduction of the interior of an office provided with Berger's steel filing equipment. The leaves constituting the calendar proper are printed in black upon a white ground and are attached to the lower right-hand corner of the card. The entire make-up is very effective and well adapted to serve the purpose for which the calendar is issued.

A COPY OF THE VERY ATTRACTIVE CATALOGUE of columns and porch work recently issued from the press by Hartmann-Sanders Company, Elston and Webster avenue, Chicago, Ill., can be obtained by any architect, builder or contractor who may make application for it. The company manufactures Koll's patent lock-joint column, and within the covers of the new catalogue will be found much interesting information relative to these goods.

"COLLIER'S TRIBUTE TO THE INTERNATIONAL CORRESPONDENCE SCHOOLS," of Scranton, Pa., is the subject of a very attractive folder which is being distributed by the institution in question. It consists of a reprint of an article on "Teaching by Correspondence" written by Mark Sullivan, one of the editors of "Collier's," who devoted a great deal of time in gathering data from many sources relative to the high value of the schools in question.

SAMUEL CABOT, 141 Milk street, Boston, Mass., is distributing an exceedingly neat and attractive little pamphlet in which is set forth in comprehensive style the merits of Cabot's waterproof brick stain and preservative. It is stated that one gallon will cover about 200 sq. ft., two coats, on rough brick, and proportionately more on smoother bricks. Directions for applying are given, together with other information of interest in this connection. The claim is made that the waterproofing effect is practically everlasting, while at the same time the cost is low. Numerous half-tone illustrations scattered among the pages show important buildings in connection with which the waterproof brick stain has been used. There are also a number of testimonial letters, all of which speak in unmistakable terms of the satisfaction which the stain and preservative has given wherever used. Attached to the last page of the cover of the pamphlet is a color card showing the shades in which the brick stains may be supplied. Special shades, it is pointed out, are made on request.

GENASCO READY ROOFING, made of Trinidad Lake asphalt, is the subject of a very interesting pamphlet sent out by the Barber Ashphalt Paving Company, Philadelphia, Pa. The roofing in question is of a character, it is claimed, to be very durable, is thoroughly waterproof and gives entire satisfaction wherever used.

THE UNIVERSAL PORTLAND CEMENT COMPANY is constructing a new plant to be known as No. 6, at Buffington, Ind., which will have a capacity of 2,000,000 barrels of cement per annum. This plant will be located along side of plants Nos. 3 and 4 of the company, which have been in operation for some years. It will be so designed as to be readily extended to its ultimate capacity of 4,000,000 barrels per annum without interference with operations. The plant will be operated entirely by electric motors, the power being transmitted five miles from the power station at Gary, Ind., which is operated by gas engines, utilizing the waste gases from the blast furnaces. It is expected to have the new plant at Buffington in operation by the beginning of 1911, when the Universal Portland Cement Company will have a total output capacity of 10,000,000 barrels of cement, all manufactured from blast furnace slag and limestone. The United States Steel Corporation, of which the Universal Portland Cement Company is a subsidiary, has authorized the expenditure of $2,450,000 in the construction of plant No. 6.

IN THE FEBRUARY issue of "Graphite," issued by the Joseph Dixon Crucible Company, Jersey City, N. J., reference is made, among other things, to the establishment of a branch office in Atlanta, Ga., of which J. H. Lewis is manager, and in connection therewith presents an excellent picture of him. Mr. Lewis was formerly with the Tower Manufacturing & Novelty Company, being the Southern representative for that concern for 20 years, and is therefore well acquainted with Southern trade conditions.

THE H. W. JOHNS-MANVILLE COMPANY reports that on March 1, its Chicago branch will occupy quarters in the four-story and basement building Nos. 27 to 29 Michigan avenue, where it will have 32,500 sq. ft. of floor space, offices, store and stock rooms all under one roof. A full stock of J-M products will be carried, thus insuring prompt shipments. Its Baltimore office, store and warehouse will hereafter be located at No. 30 Light street, where the company will have considerably more room than before, and will keep on hand a large stock of J-M products.

A REINFORCED CONCRETE POWER HOUSE, sufficient for 4000 horse-power is a part of the work in connection with the power development of the Etowah River, near Creighton, Ga., for the Blue Ridge Power Company, a contract for the construction of which has been secured by Frank B. Gilbreth, Incorporated, 60 Broadway, New York City.

NATIONAL MANUFACTURING COMPANY, Sterling, Ill., is sending out the second edition of its booklet, "Ornamental Ideas," which illustrates and describes in detail the company's line of National ornamental butts and hinges. The booklet includes drawing and directions for hanging doors with ornamental butts.

A LARGE POSTER, distributed by the Invincible Concrete Form Company, 5577 Delmar Boulevard, St. Louis, Mo., directs attention to the Invincible system of concrete forms, the salient features of which are simplicity, saving in lumber, no measuring or spacing of forms required in erecting the latter, and collapsible plank holders, which are referred to as being indestructible and at the same time adjustable to all shapes and conditions. The claim is made that the system is adapted for cottages, flats, mills, factories, barns, silos, bungalows, grain elevators, fences, etc., etc. We understand that a copy of the poster will be sent to any architect, builder or contractor who may be sufficiently interested to make application for it.

WE HAVE RECEIVED from Gordon, Van Tine Company, Davenport, Ia., a copy of the "Book of Plans for Everybody," which it has issued from the press. It has been brought out with a view to assisting prospective home builders to select the plans for a cozy cottage or bungalow, and in connection with the brief specifications and estimate of cost, particulars are presented showing how the plans may be secured free of charge. It is accomplished by ordering the building materials from the company when a rebate to the amount of the value of the plans and specifications is allowed. The arrangement of the matter gives evidence of careful attention to the requirements of prospective clients, and among the designs presented we notice a few which have appeared in previous issues of "Carpentry and Building." Among the latter pages are a number of designs of summer cottages, farm buildings, granaries, ice houses, poultry houses, corn-cribs, etc. The company makes the point that every building shown in the book is "built on experience"; that the figures of cost are reliable, and that each building was designed with the idea of getting a first-class investment value. The book is sent to customers on receipt of 10 cents to cover postage.

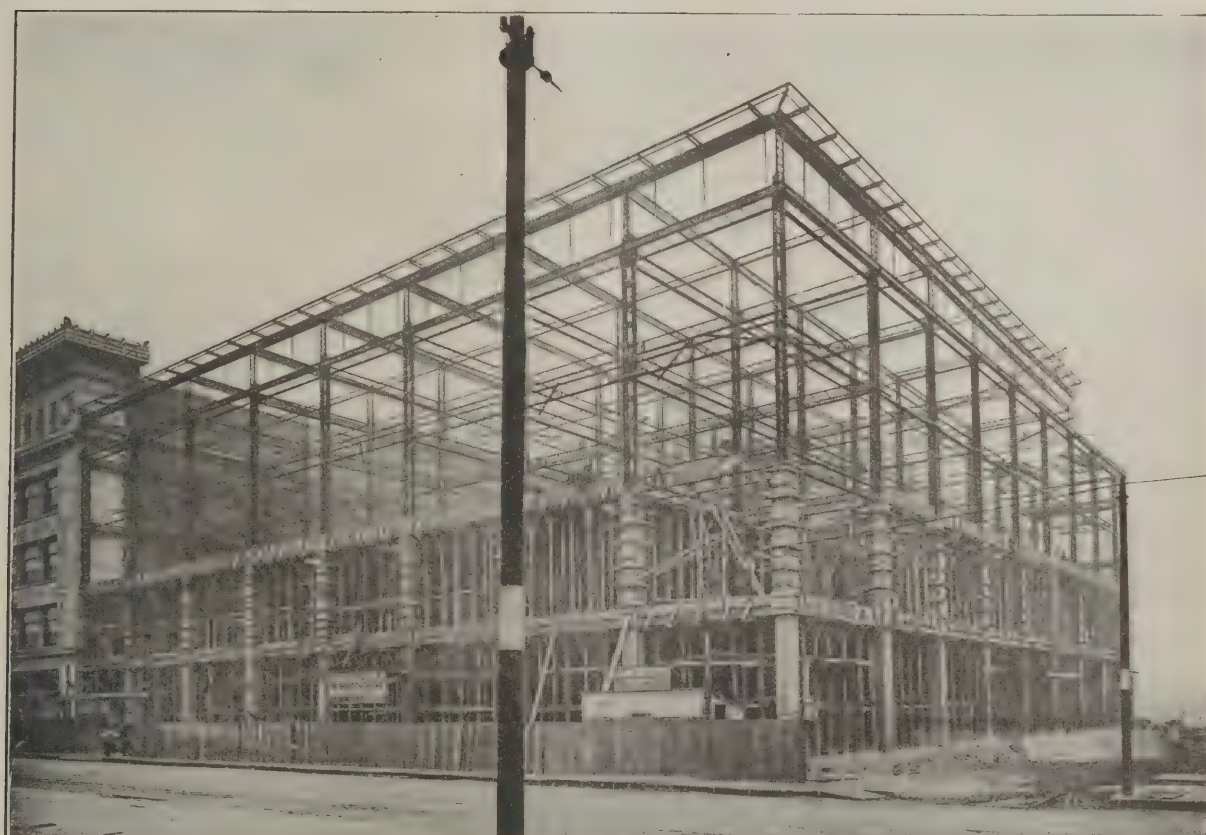
A VERY ENJOYABLE AFFAIR, which will doubtless live long in the memory of those participating, was the second annual banquet tendered the foreign and traveling representatives and heads of departments by E. W. Edwards, president of the Edwards Manufacturing Company, at the Business Men's Club Rooms in the Chamber of Commerce Building, Cincinnati, Ohio, on the evening of Thursday, December 30. Amony those participating in the festivities were: E. W. Edwards, H. W. Edwards, G. R. Edwards, W. A. Edwards, G. D. Myers, J. M. Reynolds, O. S. Larkby, W. E. Larkby, G. F. Doll, H. W. Woodward, N. D. Jones, T. Reed Chunn, O. F. Kline, Louis R. Hildreth, A. E. Watson, L. A. Hildreth, A. J. Pearce, Chas. Spornhauer, Lawrence Dieckelman, J. F. Agnew, H. E. Moomaw, W. H. Daycock, Jr., Jas. Kinsella, Sr., Frank Wilfert, Chas. Zeh, Wm. J. Richardson, Jos. Wilkins, Jas. Robinson, T. McCabe, Jas. E. Tracey, A. T. Spornhauer and B. A. Trimpe. Mr. Edwards left the latter part of January for a six months' trip around the world and with a view to visiting the principal cities in which the company has representatives.

The Building Age

NEW YORK, APRIL, 1910

The Higbee Reinforced Concrete Mercantile Building

ONE of the latest additions to the colony of reinforced concrete buildings for business purposes, of which the city of Cleveland can boast, is the mercantile structure nearing completion on Euclid avenue for the Higbee Company. The building is four stories, basement and attic, in hight, covers an area 176 x 180 ft. and is of heavy construction, to provide sufficient strength so that six stories may be added later on should such a course be found desirable to meet the exigencies of the business of the company in question. In order to be able to add these additional stories what may be termed the attic is not concreted but simply bolted, the roof and attic columns being bolted to the fourth-story frame work.



General View of the Building, Showing Steel Frame Work in Place, and the Concreting up to the Third Floor.

The Higbee Reinforced Concrete Building.—Abram Garfield, Architect.

We present upon this page a general view of the building, with the steel framework practically completed and the concreting up to the third floor. The concrete encasing the outside columns is shown completed for the ground floor, but at the second story the wooden forms are indicated in place. The first-story framing plan, together with details of girder construction of the main cornice, are presented upon the pages which follow.

The general method of construction is the same as that adopted in the erection of the adjoining building the year before, the work being done by the same engineering concern. Each supporting column is placed upon a cast iron base of ordinary construction, which in its turn rests on a reinforced concrete foundation of the required size. The reinforcement of the column foundation consists of four groups or rods as shown in the details upon a following page, the two lower groups passing diagonally through the bottom of the base and the two other groups, which are placed directly above the former ones, cross the foundation at right angles. An inspection of the detail indicating the column footings reinforced with square rods in all directions will make the construction adopted perfectly clear to the reader. By the arrangement shown the loads are carried in the shortest way possible to the support, which in this case is formed by the cast iron base.

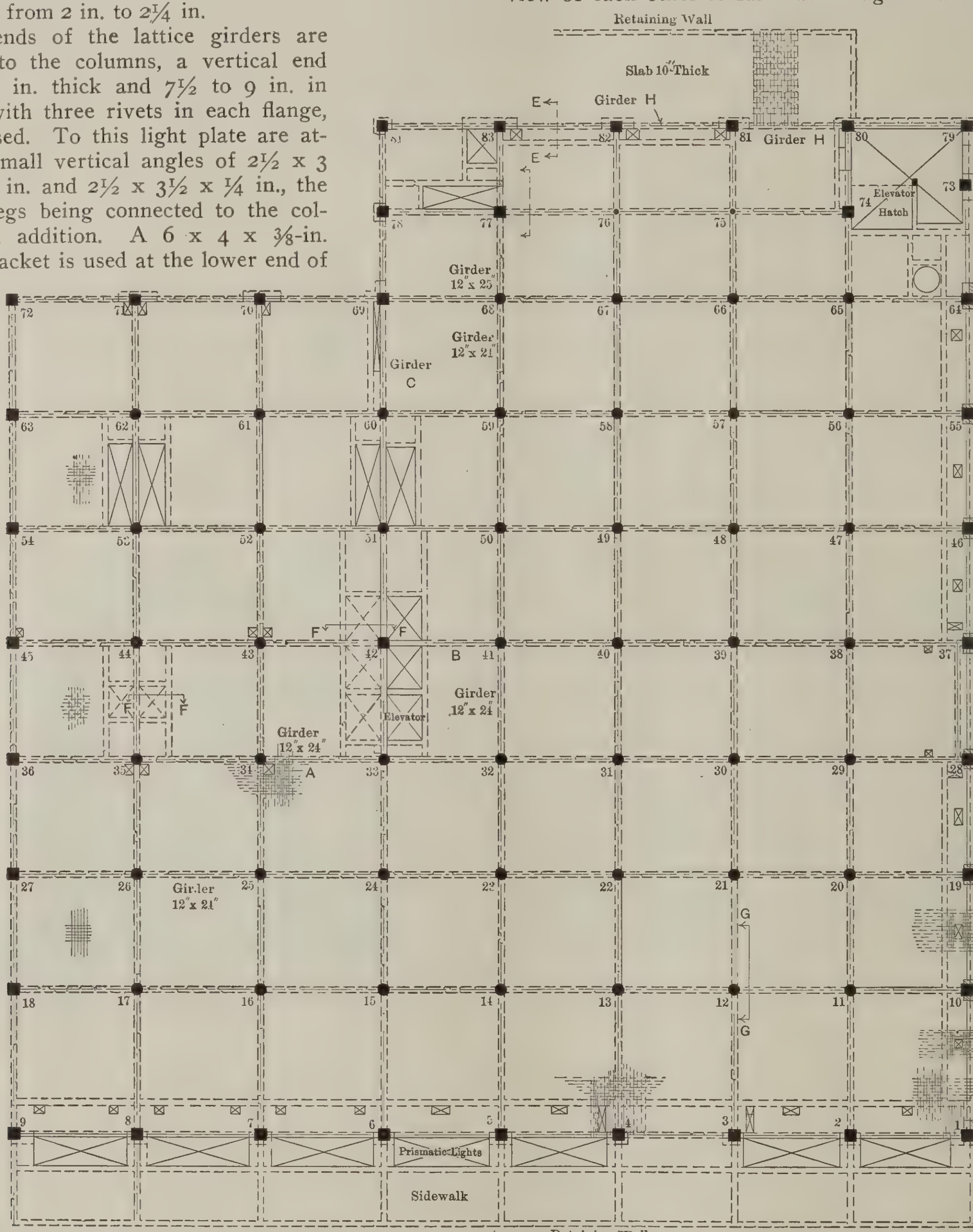
The girders are built of two pairs of angles connected by lace bars and afterwards properly filled in with concrete. The lower pair of angles has in its net section the amount of steel required to withstand the tension of the girder. The upper pair is made as light as possible, just sufficient to form during the time of erection the top flange of a latticed strut of the size required, so as to properly brace the building temporarily. The lace bars in the middle portion of the girder are as light as possible and increase toward the ends in section to such sizes that the girder is able to withstand by means of these lace bars in connection with the surrounding concrete the maximum shearing stresses.

At this point it may be interesting to state that the mixture used in the Higbee Building was one part of cement, two of sand and four of either furnace slag or stone—sometimes one being used and sometimes the other.

A space of 1½ in. was left between each pair of angles in order to allow the concrete to flow easily around them, this space, it is claimed, being sufficient for angles with flanges up to 4 in. The width of the concrete beam is fixed by the size of the beam flange angles. When angles up to 4 in. are used it is sufficient to leave 1¾ in. of concrete outside of each angle, but for 5-in. and 6-in. angles it is better to increase this concrete from 2 in. to 2¼ in.

The ends of the lattice girders are riveted to the columns, a vertical end plate ¼ in. thick and 7½ to 9 in. in width, with three rivets in each flange, being used. To this light plate are attached small vertical angles of 2½ x 3 in. x ¼ in. and 2½ x 3½ x ¼ in., the larger legs being connected to the columns in addition. A 6 x 4 x ⅜-in. angle bracket is used at the lower end of the girder and a 3 x 3 x ¼-in. angle bracket at the upper end. In cases where one girder connects with another a vertical plate 7½ to 9 in. wide by ¼ in. thick is inserted between the flange angles of the carrying girder and the end of the other girder is attached by the same means as that used for the connection between girder and column.

The Higbee Building was designed by Abram Garfield, architect, while the engineers on the concrete and steel construction work were the Osborn Engineering Company, and the general contractor was the Reaugh Construction Company, all of Cleveland, Ohio. The structural steel used in the framework of the building was furnished by the Forest City Steel and Iron Company, also of Cleveland.



First-Floor Framing Plan, Showing Columns, Girders and Run of Reinforcing Rods.—Scale, 1/32 In. to the Foot.

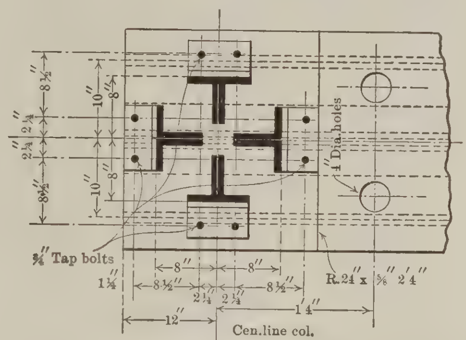
The Higbee Reinforced Concrete Mercantile Building.

Value of Rivalry to Labor Efficiency in Building Construction

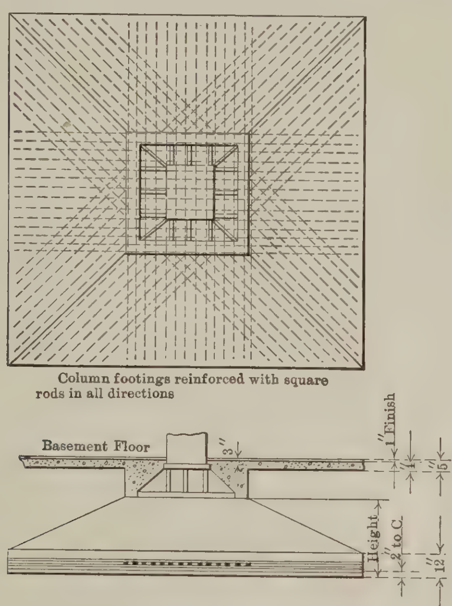
The highly stimulating effect of personal rivalry in physical tasks when the contestants are working within view of each other is familiar enough in athletics, but it has seldom been made use of as a means of increasing the efficiency of common labor in large construction work. A particularly interesting example of the money saving that can be accomplished by creating a friendly rivalry between labor gangs engaged on the same piece of work is afforded by the experience of the Aberthaw Construction Company, of Boston, in building last summer a pair of similar buildings for the Winchester Repeating Arms Company, of New Haven, Conn.

The Aberthaw Company had several times before made use of this principle of rivalry between gangs on the same job, but the New Haven contract offered an unusually good opportunity for another test of the system, both because the work was large, and because it was possible to divide it into two parts whose equality was very apparent. The New Haven construction comprised two steel reinforced concrete buildings 300 ft. by 60 ft., two stories high, lying side by side, and connected by a middle structure which provided a passage-way between the two buildings or wings, besides toilet rooms and elevators. With the exception of the storage room on the roof of one wing, the two buildings were precisely alike.

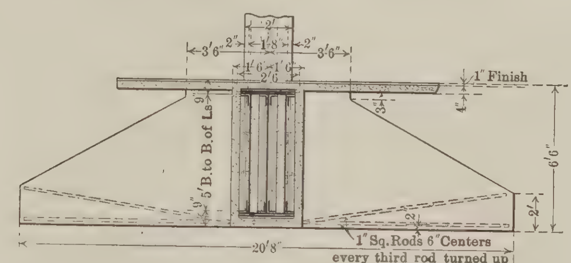
The work was organized on the usual system of the Aberthaw Company, which sent to New Haven a superintendent, with clerical assistants, timekeeper, two peting gangs should feel that they were starting with a square deal. The dividing line, which was satisfactory to the labor foremen, was drawn 6 ft. 8 in. to one side of the center of the connecting court, and the foremen then snapped up a cent for choice of sides. The two competing gangs were given duplicate equipment, and the foremen were allowed to select their labor bosses, carpenter foremen, and were given a free hand to some extent in the number of carpenters or laborers they should employ on their respective parts. A bonus was promised to the two labor foremen, to be divided between them in a given proportion based on the labor



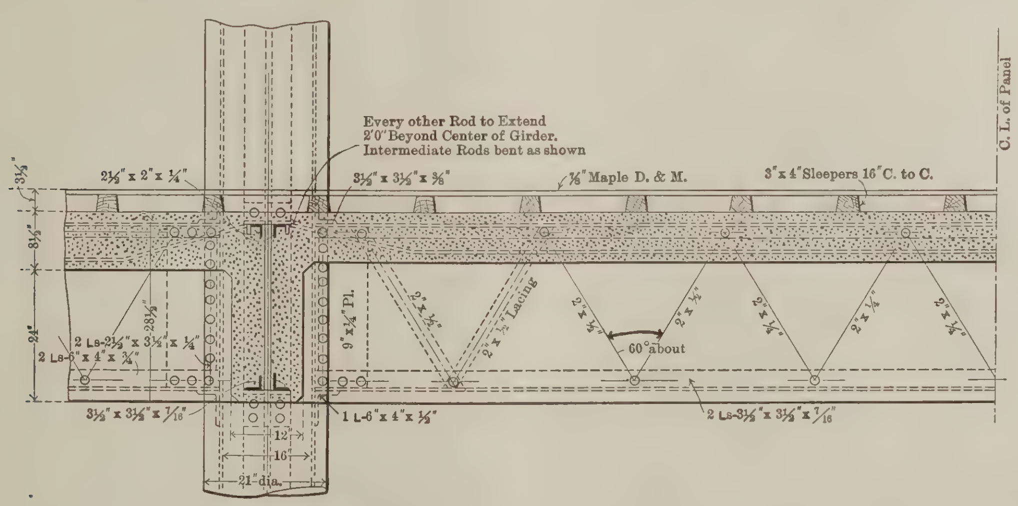
Detail of Column Connection to Girder.—Scale, ½ In. to the Foot.



Details of Base-Plate and Footing for All Interior Columns.—Scale, ¼ In. to the Foot.



Section Through Foundation for Columns 17 and 18 of the Plan.—Scale, ½ In. to the Foot.



Section Through First-Floor Construction on Line G-G of the Plan.—Scale, ⅜ In. to the Foot.

Miscellaneous Details of the Higbee Reinforced Concrete Mercantile Building.

labor bosses and two carpenter bosses, with a small gang of experienced carpenters for work on the forms. The rest of the laboring force was recruited on the ground by the labor bosses and was very largely Italian. The character of the labor force makes the successful working of the competitive scheme the more significant, as it seems to show the universality of the sporting instinct and the ease with which it can be worked up with almost any kind of labor gangs.

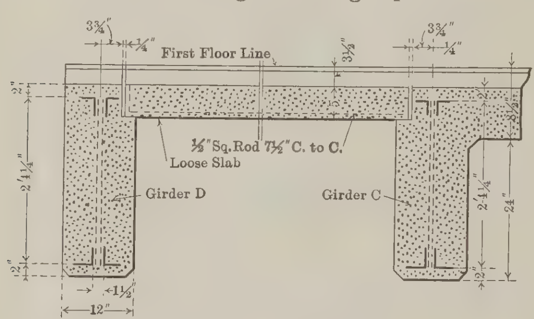
The first step was to make a careful estimate of the amount of work involved in the whole job, and to divide this work into two even parts, so that the com- economy effected during the progress of the work. Placing the forms and handling the concrete naturally made up the chief labor cost of the work.

Rivalry between the two sides began at the outset of the job and continued with increasing keenness until the end. Competition put a new spirit into the whole work, and the laborers attacked their task with an energy and an evident interest and enjoyment in the game that had a very marked effect on the efficincy of their labor. The two competing gangs were separated only by the width of the central court and were of course in plain sight of each other. The amount of centering placed by the carpenters on one side set a mark for the carpenters on the other side, and each gang tried to outdo the other. It was the same with the steel setting and the concrete work. The north wing started two days earlier than the south building, but during the job the gang on the south wing made up half of this time, so that through a greater part of the work it was just 24 hours behind its rival. This visible competition of the two gangs was brought to a focus at the concrete mixers, which were placed side by side, so that the two concrete gangs worked from the same stock pile; this nearness of approach did a good deal to highten the intensity of the competition.

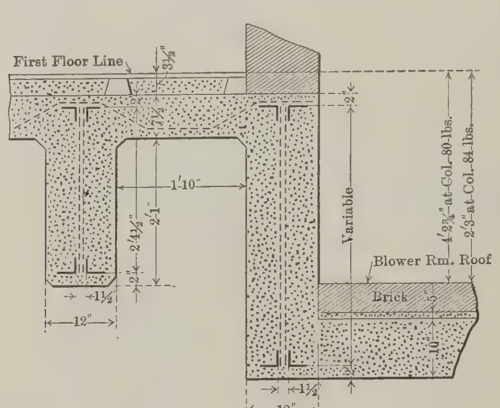
The last day's work on the north wing was two bays' length of the building on the roof. The Italian laborers went after this for a record and made it, after which they raised an American flag on the elevator shaft and made loud talk to the other side regarding efficiency in one's chosen field of labor. The south gang started at seven o'clock the next morning with exactly the same amount of work to do. That day's work was as wonderful an exhibition of endurance as is likely to be found on any athletic field. The laborers from the stock pile were moving on the run; the men at the top of the tower took the material away in the cars at the same gait. In one hour less time than the men on the north wing had taken for the corresponding work the south wing laborers completed their job. Then they raised a large Italian flag on their elevator tower, with a string of small American flags running up below. This breach of international etiquette was allowed to pass unrebuked by the superintendent. Only those with a full knowledge of the niceties of vituperative Italian could appreciate to the full the refinements of the remarks hurled by the men of the south gang at their rivals on the north, but it is known that a general free-for-all fight headed by the labor bosses of the two sides was barely averted.

The labor cost saving on the New Haven job is estimated by the Aberthaw Construction Company as 10.8 per cent. of what the labor cost would have been without the competition between the labor gangs. Such an estimate is of course a good deal a matter of judgment in selecting the standards of comparison. The Aberthaw Company uses an accounting system which shows the unit cost of each item, and the estimates of saving of the New Haven job were based on the unit labor cost in two other concrete buildings of about the same size as those at New Haven, also constructed by the Aberthaw Company. Using this standard it appeared that the saving in labor costs on the New Haven job, in detail, was 19 per cent. on the concrete labor, 5 per cent. on the labor on forms, and 22 per cent. on the labor on steel erection. There was less than $400 difference in the final labor cost of the two wings.

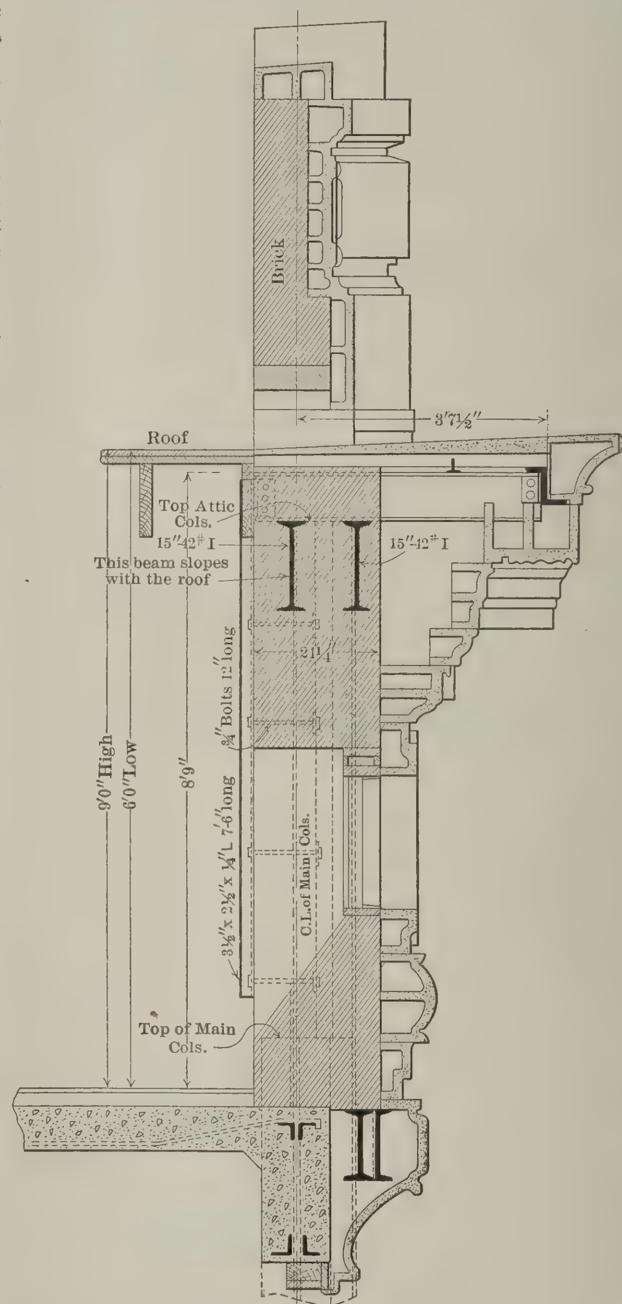
It seems evident that, where circumstances permit, competitive organization of labor gangs like this at New Haven brings a combined spirit of play and sport into the work that makes it go more rapidly and more pleasantly. It is hardly necessary to add that the superintendent in charge needs to keep a sharp lookout for imperfect work, which is the danger especially to be guarded against when gangs are working in competition. On the New Haven job the inspection was particularly severe, and the superintendent rather restrained than encouraged the competition.



Section on Lines F-F of the Framing Plan.—Scale, ⅜ In. to the Foot.



Section on Line E-E of the Framing Plan.—Scale, ⅜ In. to the Foot.



Section Showing Cornice Support.—Scale, ⅜ In. to the Foot.

Miscellaneous Details of the Higbee Reinforced Concrete Mercantile Building.

CONTRACTORS AND BUILDERS AN ABUSED CLASS

BY ARTHUR W. JOSLIN

IT has long been in my mind to write the matter that follows, but I do not know as I should have gotten around to it for years were it not for a letter I recently received from the editor of *The Building Age* asking some questions in regard to customs in the building trade in Boston. Let me start by making the statement that builders generally are "easy marks" and are not accorded the usual courtesies of business that prevail in almost all other lines of trade and in nearly all professions.

The average builder, either himself or by his paid employees, spends enough in time and money every year to maintain him in comfortable circumstances in figuring upon work that never comes to a head; approximating work for architects, and in giving advice gratuitously to people who intend to build, architects and real estate agents. Most of the people who profit by our approximate figures and advice in regard to building matters and methods are comparative strangers to us and seldom or never put us in the way of making a dollar out of them. Do not assume that I think a man's sole aim in life is to make money. However, the basis of all business is profit and a man owes it to himself and his family to so conduct his business that it is profitable to him.

Why Should Builders Furnish Estimates Free?

If we go to a lawyer or doctor of our acquaintance for advice we expect to pay for it, and pay a good price too, and we are seldom disappointed. Why, then, should a builder be called upon for figures and advice of all kinds and seldom get thanks, let alone money? And when, as it sometimes happens, we do get a job in return for a lot of figuring and advice, why should we be obliged to sign contracts and specifications that compel us to furnish labor and materials which the architect overlooked in making his plans and specification; make the building conform to the laws and ordinances of the community, when the architect should have informed himself of said laws and ordinances and made his plans and specifications accordingly and then accept payments from the owner anywhere from a week to a month after they are due, according to contract the owner expecting us to live up to the minute in regard to our contract time for completing the various parts of the work; also to continually give the owner or architect a little bit more in stock and labor every day or two during the course of the work, because (as they always say) "it don't amount to hardly anything on a contract so large"? Perhaps the particular small thing they want done to-day hardly amounts to enough to make a charge for and it might well be overlooked if the same thing did not happen nearly every day or if they ever overlooked anything themselves.

Do not think that I find all architects and owners as bad as above inferred, for I do not. But as a plain fact, in over twenty years' experience, I have found so few who do not come in the class I have described that I am not likely to ever forget these few. I know, and I have talked with many builders and they are of one mind on these subjects. I refer to established and successful builders in making this statement and not to unsuccessful "soreheads."

I hardly care to be the doctor and prescribe remedies for these evils of the building trade, but I will offer a few suggestions.

First, let me give a few reasons for the state of affairs I claim exists in the trade. From as long ago as when I first began to prick up my ears and listen to what was said around me, I found that builders generally seldom had a good word to say for their competitors and would almost cut off their right hand before they would do any one of them a favor. This results in every builder's having to make his fight, for existence and fair treatment, alone. Such associations of builders as there are in existence to-day have, until very recently, effected no very substantial reforms. I think the principal reason for this is that builders generally are so busy trying to make a living, and so harassed by the unusual cares and annoyances that are so much a part of the business, that they scarcely have time left to eat and sleep, let alone trying to carry our reforms. Now for some remedies:

Every city and many large towns have a Builders' Exchange or Master Builders' Association and I would suggest that every reputable builder join with these associations in insisting upon the following reforms:

Insist on Following Reforms

First.—Refuse to figure upon any plan unless furnished with a complete set of plans and specifications, without charge, for a reasonable length of time. The time, of course, would be governed by the size and nature of the work to be figured. I feel that it is perfectly legitimate for an architect to request a deposit sufficiently large to insure the prompt return of the plans and specifications. The whole amount of said deposit should be refunded when the plans and specifications are returned. Architects sometimes demur when asked by the owner to get out more than three or four sets of plans to send out for figures. In this case they should have sand enough to make the owner pay for the extra sets required, as he is the party most benefited by a large competition. The builder, who has perhaps one chance in ten or even twenty of getting the job, certainly should not contribute anything to either an owner or an architect for the privilege (?) of spending his time and money to figure a job.

Second.—Refuse to sign a contract until the architect strikes from his general conditions the following customary clauses:

1. "All work and materials shall comply in all respects with the building laws of the city and State in which the building is located. All such laws shall be considered a part of this specification and the contract to which it relates."
2. "Everything needful for the completion of the building according to the intent of the plans and specifications shall be furnished, whether same is specifically called for or not."
3. "The plans and specifications are intended to cover a completed building, except for such parts as are specifically mentioned as not included, and in cases of misunderstanding as to the meaning of said plans and specifications, the architect's decision as to said meaning shall be final and binding on all parties."

These, or similar clauses intended to cover the same ground, occur in nearly every specification. Some architects are entirely fair and reasonable in their interpretation of such clauses. The great majority, however, are decidedly unfair to the builder in their interpretation of them. This is to be expected, as they get their money from the owner and thus are naturally prejudiced in his favor. The owner hires the architect as an expert. Why should not the architect thoroughly inform himself, before starting his plans, as to the State and city building laws and so make his plans and write his specifications that they will comply with these laws? The average architect is always much better educated than the average builder and thus ought to be better able to interpret the meaning of the laws than the builder. Also, why should not the owner pay for the installation of any part that may have been overlooked? It is fair to assume that if it was not called for the builder did not figure it. Has the builder always got to be the man to stand in the gap and pay for everybody's mistakes and shortcomings? Up to the present moment he has done so in 95 per cent. of the cases which occur.

During the progress of the average building many minor changes can be made to the advantage of all parties concerned; and there is no reason why they should not be made without involving extras for invalidating the contract. The trouble usually comes from the fact that if the change is to the owner's advantage he and the architect expect it for nothing; if to the contractors' advantage, however slightly, the owner wants a rebate and expects, and usually has, the architect's support in getting it. When the final reckoning comes the owner has usually forgotten all of the matters where the builder has strained a point in his (the owner's) favor, but never fails to remember every little matter in his own favor. Consequently he wants the builder to accept something less than the face of the account in consideration of a speedy settlement without resort to law.

Average Cases

Let me again state that I am citing *average* cases. We by no means have found all of the architects and owners with whom we have done business as unreasonable as those I have described or we would have put up the shutters long ago and gone into some other line. We have, however, found many just such owners and architects and I know that most other builders have found them also.

The average builder has to put up with all of these adverse conditions of the business until such a time as he has established a reputation and built up a clientele that permits of his being independent to the extent that he can choose the owners and architects for whom he will do work.

During the last decade the architectural profession has increased greatly in popular esteem and their work has come to be recognized as one of the useful and necessary arts. Is it not about time that the building trade had more recognition than has been accorded it? And why should not architects co-operate with builders in bringing about the reforms suggested above to the end that the owners of property be compelled to pay builders generally such prices as permit of the business being made more remunerative? The architects would lose nothing in money or self-respect, and it is an open question if they would not actually gain in both, and what the builders would gain would soon place the building business on a higher plane, where it rightfully belongs.

Just one further suggestion. Inasmuch as everyone in the building trade, from the architect down to the smallest sub-contractor, has to devote so much time to estimating upon work, a large percentage of which does not go through, or if it goes through at all not until refigured several times, I believe that there should be devised by architects and builders some method of compensation for such services, the expense to be borne by the owner. If such a custom prevailed, architects and builders would have more time to attend to legitimate and profitable business and thus give their clients—the owners of property—better service and more satisfactory results.

Measuring Buildings for Making Scale Drawings

In taking measurements from actual buildings for the purpose of making measured drawings, the instruments required are few and of an ordinary character, such as every architectural student possesses, says the London *Building News*. Besides tape, a pair of calipers, and a two-foot rule, little more is needed than a couple of five-foot rods. By producing the angles of large mouldings and cornices with one of these (laying flat with wall or soffit), the various mouldings from it by means of the other than it will be found more accurate to measure the set-offs of by using the tape, which is often likely to be held a little out, especially if working single-handed. The greatest accuracy, where extreme precision is required, is doubtless that obtained by means of plumb-bob and line, dropped from the various members to the rod beneath. A large set-square, such as used by builders, will also be found extremely useful at times, in the latter case. A large pair of calipers are also essential for taking accurate measurements of the hollows in Gothic work, and of the small columns, and the bowtel mouldings which so frequently occur.

When commencing any work, all the main measurements should be taken first as running dimensions—that is, from the starting point, with larger scale details fully dimensioned, of the various mouldings, cornices, caps and ornaments. Where it is impossible to obtain a running dimension throughout, owing to a projecting colonnade, or some similar structure, the hights must, of course, be then taken in two or more lines of figures. Should there also be a fall in the ground level at the same time, it being necessary to take vertical measurements from various horizontal points, it is preferable to make the starting point for measurements either from a plinth near the ground line, where such exists, or from a chalk line datum drawn around the building so far as is necessary, by means of a straight-edge and spirit level. In large work, such a straight-edge might be formed by a portion of match or floor boarding, say about a 12-ft. length, the edge being machined up true.

Taking Vertical Measurements

When taking vertical measurements, it may often be more convenient where ladders are unattainable, to commence at the top, dropping the tape to the various hights, when, with a little aid, the chief measurements may be taken. It is, however, generally speaking, impossible to obtain thorough and accurate dimensions of large cornices without the aid of ladders, so in any extensive work, such as the measuring of a whole building, or even a single bay, where the facade consists of a series of repetitions, arrangements will have to be made with someone near for supplying these, there usually being no very great difficulty on this point. When measuring the various mouldings in detail, it is advisable to adopt the same principle of running dimensions described, so far as possible, at the same time taking great care that the total figure—for instance, the depth of a cornice—agrees with that given on the smaller scale in the vertical running dimensions.

There is nothing more annoying with this class of work than to find that what proves ultimately to be some very requisite piece of detail, or a measurement or two, missing, when one comes to plot out a building which, if not altogether inaccessible again, is so for the time being. The student, however, bearing this point fully in mind, and both sketching and measuring his detail completely and thoroughly, will have no necessity to return again at some future date, possibly at some very considerable inconvenience, to decide a point which has been overlooked. To make such omissions is not a very difficult matter, especially if any attempt has been made to hurry over the work. This is, however, always a bad plan, almost invariably leading to a few return visits. In consequence, the necessity of taking one's time, and of doing the work most carefully and very thoroughly, must be fully appreciated from the commencement. The best method for the novice when commencing his first attempts at measured drawings undoubtedly is to do a little finished work, plotting it out on the spot, as he will thus readily apprehend what measurements are essential for the making of a full and complete set of drawings in every respect.

A CHURCH DOME OF CONCRETE SLAB CONSTRUCTION

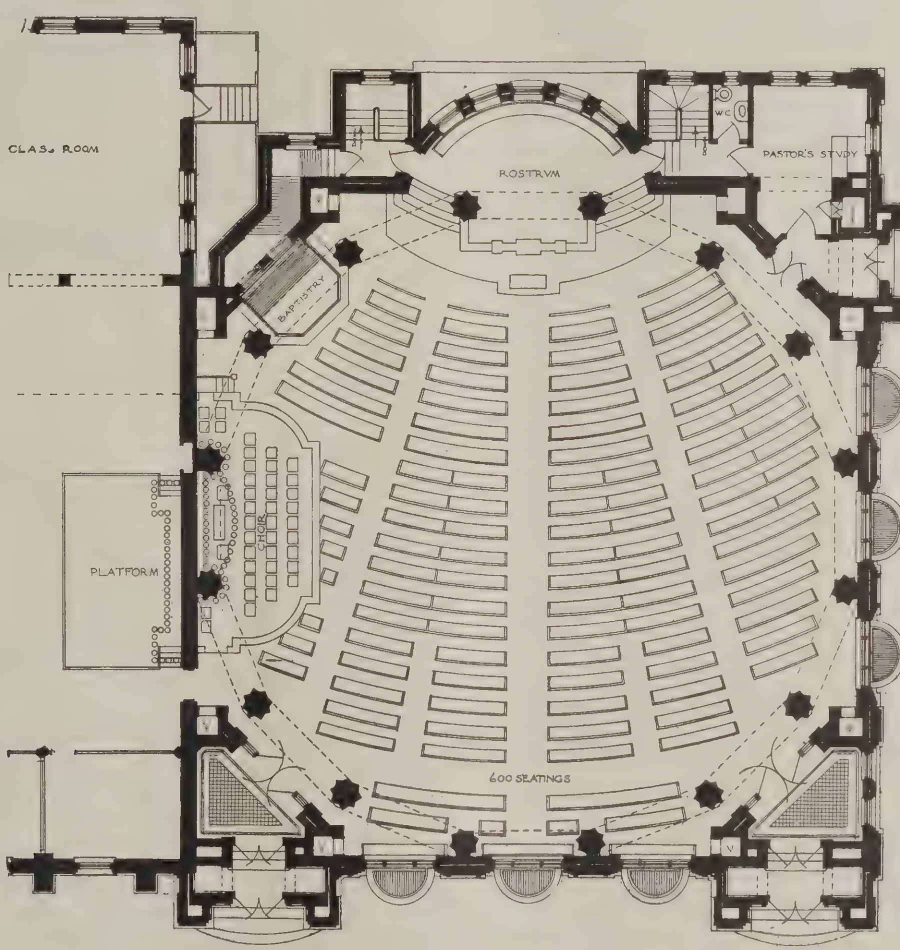
WHAT is without doubt one of the most interesting developments in connection with the use of concrete slabs in building construction is the recently completed dome of the Linden Baptist Church, located at the corner of Ninth and Linden streets, Camden, N. J., various details of which are illustrated and described herewith. The church consists essentially of two buildings, one of which is known as the Bible School erected in 1904-05, while the church proper was built during the past year. Upon this page we show a plan of the auditorium of the church and at

the left a part of the plan of the Bible School, indicating the position of the platform and class rooms. A scale drawing of the Linden street elevation of the church proper is shown on the following page, while the first half-tone illustration on the page succeeding it shows the appearance of the church before the cement slabs were applied to the dome. The view is that of the building as it would appear when looking toward the lower right-hand corner of the floor plan.

The general exterior construction of both buildings, which are attached as shown by the plan, is practically the same, the fronts being of hard brick with stone trimmings and the foundations, walls, partitions, etc., of the dimensions required under the building regulations of the city named. The square dimensions of the church building as represented by the plan are 76 x 88 ft., and a seating capacity of 600 persons is provided. The rostrum is directly opposite the Linden street entrance, while the choir and baptistry are at the left as one enters the building from this thoroughfare.

The dome, constructed of concrete slabs, is supported by 16 pillars of octagonal design 32 ft. in hight and 32½ in. in their greatest diameter, built up of reinforced poured concrete. Considering the dome as an arch, its greatest hight is 27 ft. from the spring line or supporting columns, while its radius is 36 ft. 2½ in., thus giving a diameter at the top of the columns of 72 ft. 5 in. The concrete slabs are carried on wooden rafters, 16 in number, each being built up of 12 yellow pine boards 10 in. wide by 1 in. thick. These were curved to the desired radius in a template on the ground and maintained the desired radius by being securely fastened together by ¾-in. bolts in staggered positions equidistant throughout the length of the rafters. They were also well nailed throughout. Draw bolts held the rafters in a firm position when erected, being placed at three equally distant points on the curved rafters through which they were bolted, the upper two being 1 in. and the lower one 1¼ in. in diameter. At the points where the draw bolts were located two additional ¾-in. bolts were used to hold the built-up rafters firmly at that point.

The rafters when raised to position were supported at the base in a cast iron shoe bolted to a concrete ring which was placed on the tops of the 16 columns. The construction of this shoe is presented on the page of de-



Plan of Church Auditorium.—Scale, 3/64 In. to the Foot.

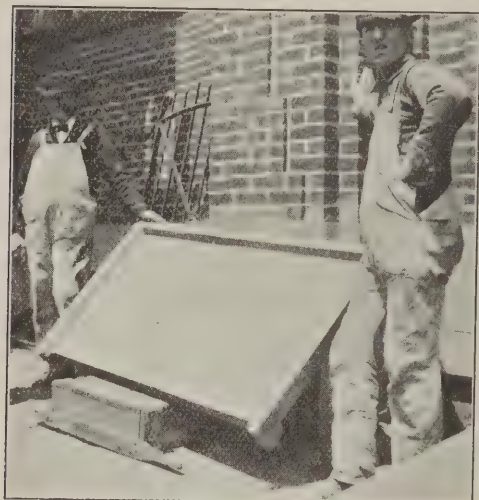
A Church Dome of Concrete Slab Construction.—Arthur Truscott and Arnold H. Moses, Associate Architects, Philadelphia, Pa.

tails which follows. The thrust in the curved rafters was further taken up by means of a tie rod 1¾ in. in diameter, placed at the back of the cast iron shoes, the tension being maintained by turn buckles between each pair of rafters. At the head the rafters were carried by a steel ring made up of two 6 x 6-in. angle irons ⅜ in. thick, to which the rafters as well as the circular top structure of the dome were bolted.

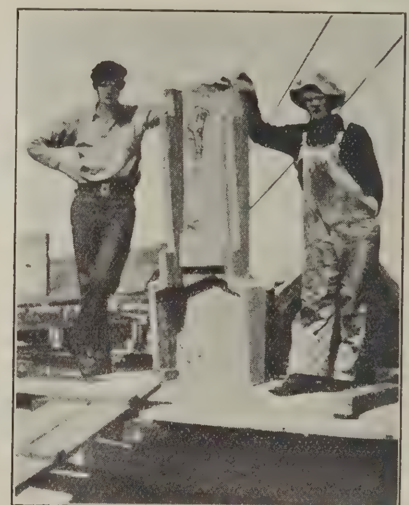
On the page of details presented herewith is shown a quarter plan of the dome, clearly indicating the position of the turnbuckles in question. There is also a vertical half section of the dome indicated in sufficient

covered with a three-ply layer of roofing felt, which was carried to the base of the dome and cemented into the main body of the roof, thereby precluding any possibility of leakage.

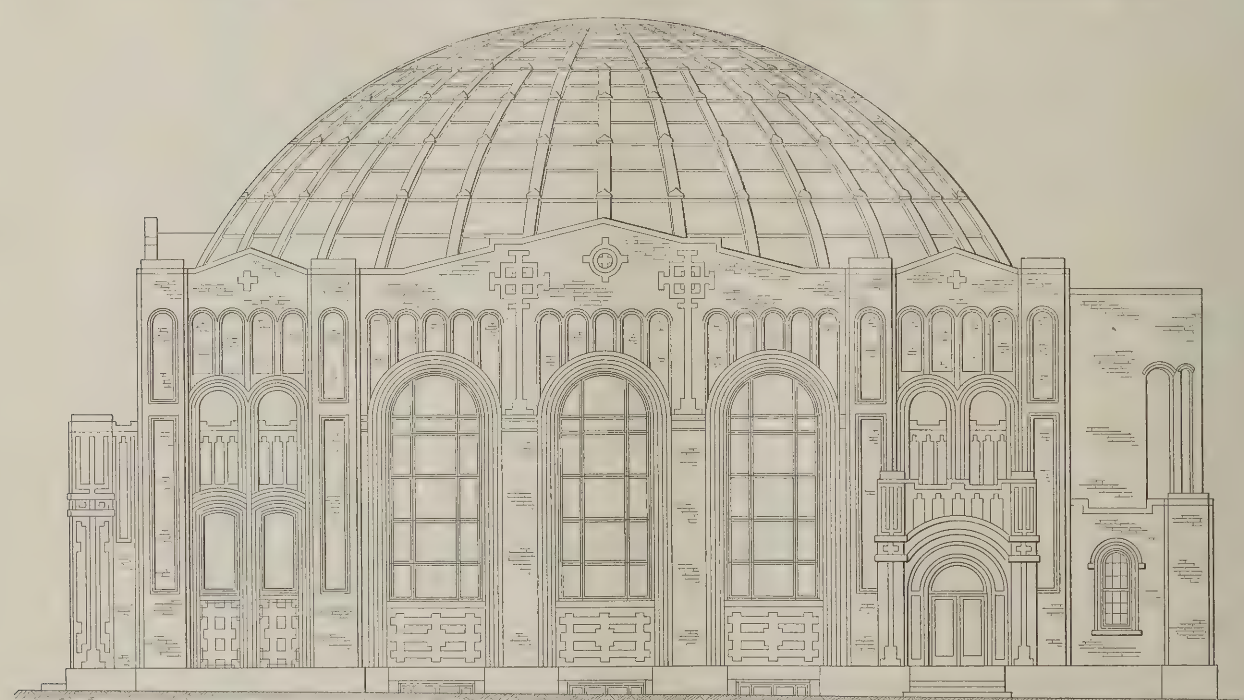
Fifteen courses of concrete slabs were used on the dome, varying in size from 77 to 73 in. in length, 31 in. wide and 1¼ in. in thickness. A view of one of the largest slabs is shown herewith; also of one of the slabs used to cover the hips. Cover tiles, 12 in. wide and 6½ ft. long, were used to cover the end to end joints of the slabs as well as those of the longer cover tiles themselves, and all were made on the premises, being com-



View of One of the Largest Cement Slabs.



One of the Slabs Used for Covering the Hips.



The Linden Street Elevation of the Church Building.—Scale, 1/16 In. to the Foot.

A Church Dome of Concrete Slab Construction.

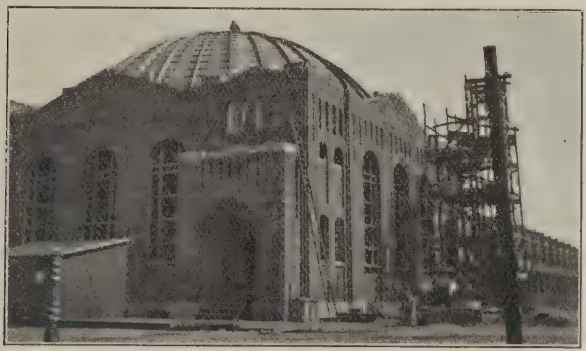
detail to afford an excellent idea of the method of constructing the rafters and also of the way the cement slab tiles were placed.

It is stated that the method of building up the rafters was entirely satisfactory in all respects and upon raising them into position they were perfectly rigid, showing no sign whatever of springing from the radius desired. On these rafters were laid two thicknesses of 1 in. yellow pine boards, care being taken to so place them as to break joints. These were laid straight and the ends forced up to a butt strip placed on the curved rafters. On these boards 2 x 3-in. cleats were nailed to hold the ends of the concrete slabs and the whole was

posed of one part Edison Portland cement, two parts bar sand and two parts ¼-in. trap rock. The materials were mixed quite wet.

A reinforcement of No. 26 expanded metal weighing about 2½ lb. per square foot was used, and in finishing the slabs and covers a drier of one part Edison cement and one part bar sand was sprinkled on and troweled in. Care was taken that all exposed surfaces of the slabs were well troweled and smoothly finished.

The work of laying was begun at the base, the width between the rafters for the first nine courses being so great that two sections of tile were used, the central joints of these as well as the main joints over the rafters being protected by the cover tiles. The construction of the various slabs and tiles was such that



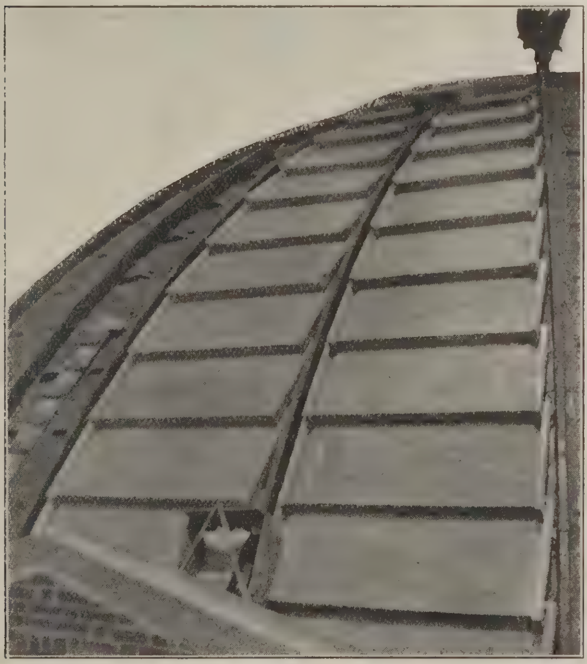
A Church Dome of Concrete Slab Construction.—View of the Church Before the Cement Slabs Were Placed in Position.

they were practically interlocking at the overlapping joints and therefore proof against water leakage.

The center of the dome, the framework of which was bolted to the angle irons carrying the heads of the rafters, was covered with boards and roofing felt in the same manner as the dome proper; then the whole was covered with a concrete tile about 10 ft. in diameter.

The interior finish of the dome is in heavy panels, false ribs being placed between the rafters in longitudinal position, these being of the same general dimensions as the rafters themselves. The inner surface of the roofing boards of the dome are covered with slow-burning plaster board; the ribs and rafters with thin poplar boards, and the wall finished in white paint with gold decorations.

The scheme of utilizing cement slabs for covering the dome in question was worked out by Arthur Truscott and Arnold H. Moses, associate architects, 136 South



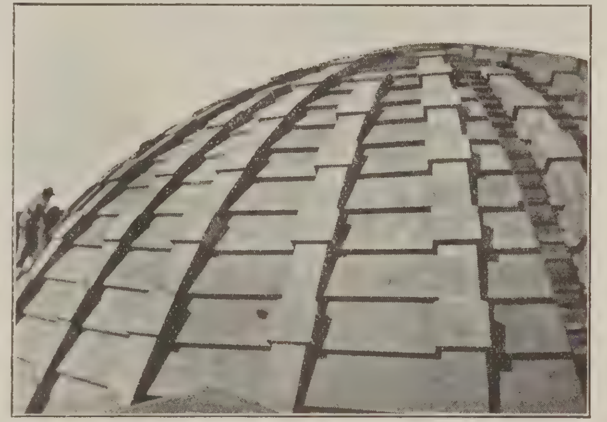
A Section of the Dome of the Church, Showing Some of the Cement Roofing Slabs in Place.

Fourth street, Philadelphia, Pa., while the general contract was executed by Turner & Stewart, of Camden, N. J.

The great extent to which aid is extended by workmen to each other through co-operative insurance and benefit funds or societies in cases of disability, death, or other adversity and the tendency of employers to assist in the support of such funds and to grant pensions to superannuated and disabled employees are shown in the report of the Commissioner of Labor.

Computing Strength of "Mushroom" Floors

At the recent meeting of the National Association of Cement Users in Chicago, one of the many interesting papers presented described a simple method for computing the strength of flat reinforced concrete plates or what is known as "mushroom floors." The author of the paper was Angus B. MacMillan, engineer of the Aberthaw Construction Company, Boston, Mass., and therefore what he has to say on the subject is of special interest. He considers the slab around the head of the column and to the point of inflection as a flat, circular plate, supporting a uniform load over its surface and a concentrated load consisting of the rest of the slab with its superimposed load hung from the perimeter of the plate. Radical and circumferential reinforcing is used over each column out to the point of inflection, while the balance of the slab is reinforced by rods both diago-



Appearance of the Roof When Finished.

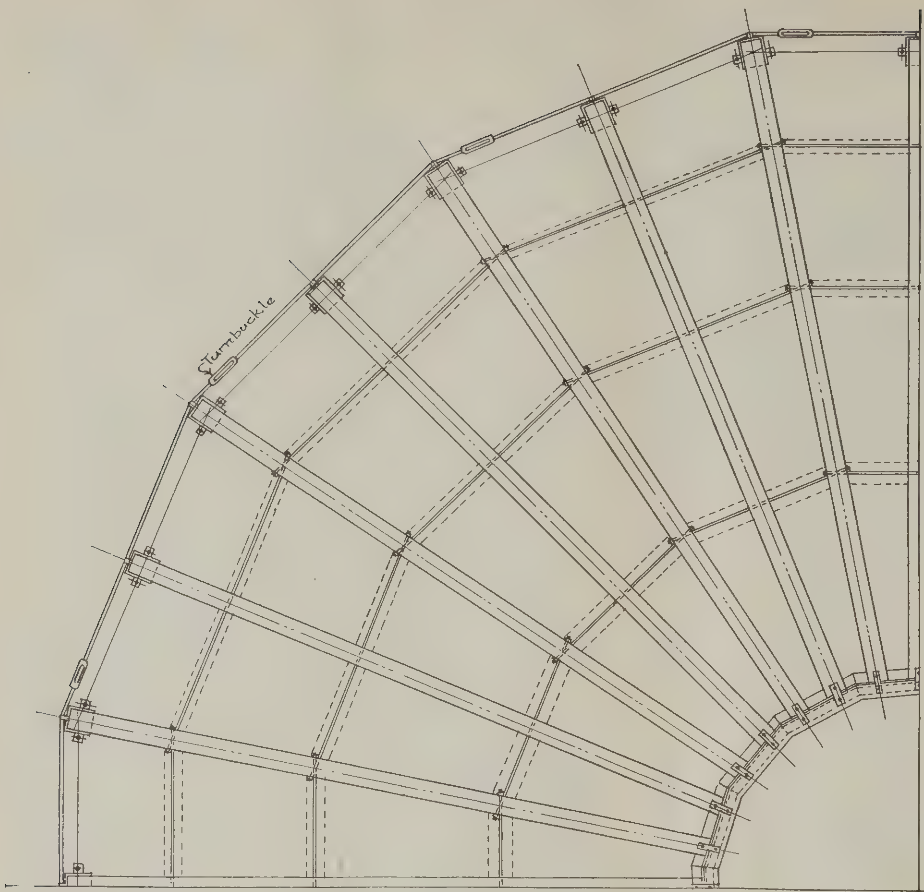
nal with and parallel to the lines of columns. A minimum thickness of 8 in. for the slab is advised.

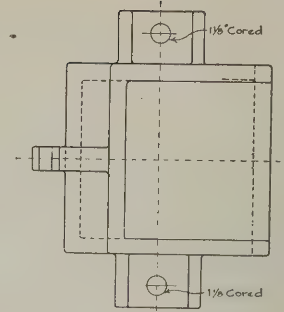
This method has already been used by Mr. MacMillan in designing girderless reinforced, concrete floors and roof for the Congress Building, at Portland, Me.; a fire station at Weston, Mass.; a storage building for the Pierce-Arrow Motor Car Company, at Buffalo; a storage building for the Hood Rubber Company, at Watertown, Mass., and with slight modification for the Winchester Repeating Arms Company new loading buildings at New Haven, Conn. All of these buildings were put up by the Aberthaw Construction Company.

A test was made on a panel 20 ft. square in the refining building of the Hood Rubber Company, with a live load of 450 lb. per square foot. This slab was 9 in. thick, with reinforcement consisting of ½-in. round bars 7 in. on centers. The test was made 88 days after casting. The deflection under total load was 5/64 in. This is about 1/3000 of the span, with over twice the figured live load superimposed. This certainly does not seem to indicate that as thick a slab or as much steel as this method seems to demand was necessary.

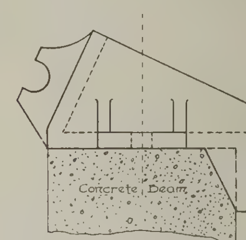
This type of floor gives greater head room, the forms are much easier and cheaper to make and the best steel is reduced to a minimum and are generally quite small in sections and easily handled.

Architects Rowe & Keyes, 161 Devonshire street, Boston, Mass., have prepared the plans for a three-story and basement residence for Fred C. Sayles, to be erected at Irvington, N. Y., the building to be 45 x 90 ft. in plan, constructed of cut stone, with fireproof floors and a slate roof. The interior finish will be hardwood throughout and the building will have the most approved plumbing, electric wiring, steam heating and other up-to-date appliances and conveniences. The contract for the construction work has been awarded Frank B. Gilbreth, Inc., 60 Broadway, New York City.



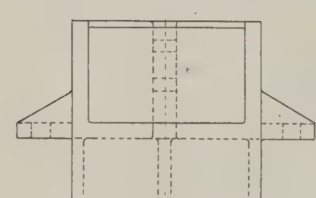


Plan of Cast Iron Shoe.—Scale, 1 In. to the Foot.

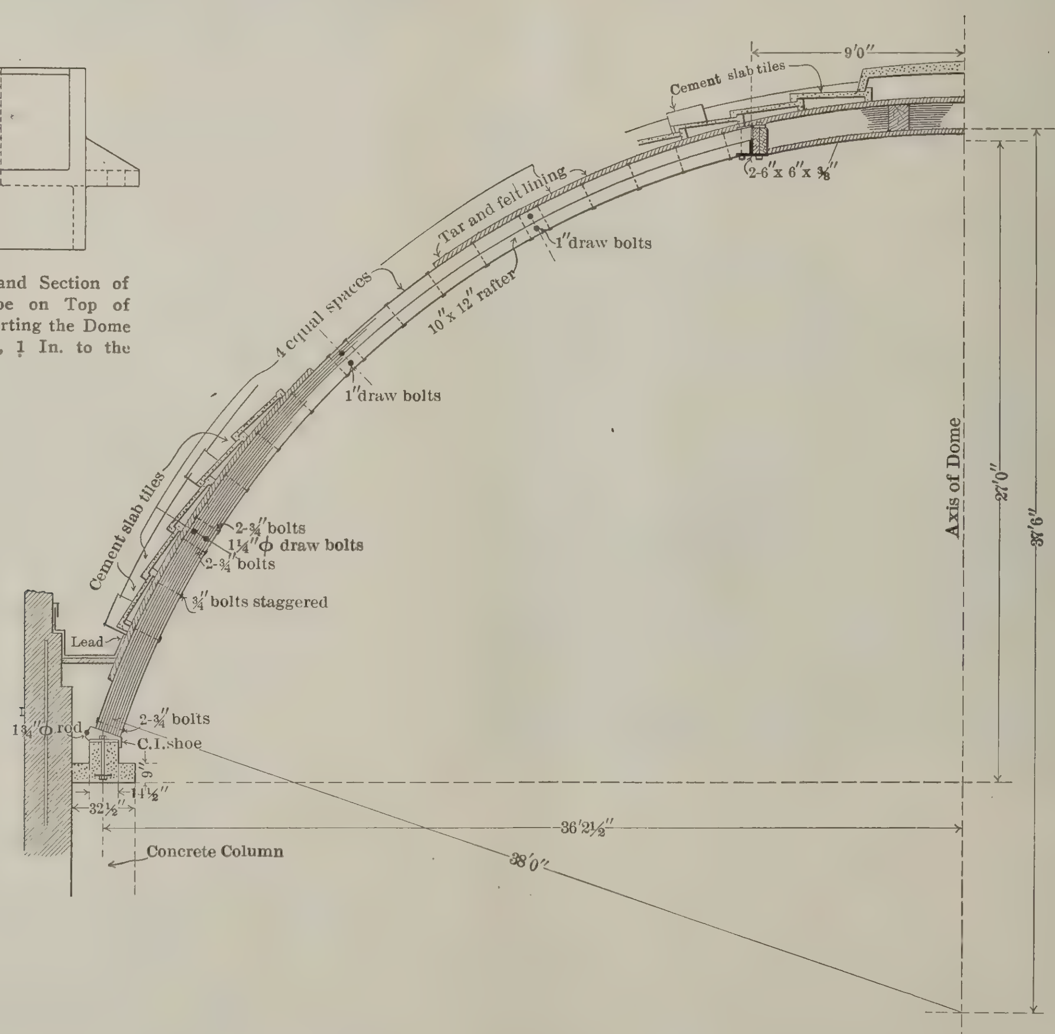


Side Elevation and Section of Cast Iron Shoe.—Scale, 1 In. to the Foot.

One-Quarter Plan of the Dome.—Scale, ⅛ In. to the Foot.



Front Elevation and Section of Cast Iron Shoe on Top of Columns Supporting the Dome Rafters.—Scale, 1 In. to the Foot.



Vertical Section Through One-Half of the Dome, Showing the General Construction of the Rafters and Roof.—Scale, ⅛ In. to the Foot.

Miscellaneous Constructive Details of a Church Dome of Concrete Slab Construction.

SUGGESTIONS FOR BUILDING A MODERN DWELLING

By WILLIAM ARTHUR

IN considering the floor plans of a building it may be stated that a house costing from about $2,500 upwards has usually a hall, parlor or sitting room, dining room, kitchen and pantry down stairs; and three or four bedrooms and bath room upstairs. A couple of extra rooms are sometimes made in the attic.

Now, this is not merely a copy on a smaller scale of the great houses of the past. The vestibule, for instance, is necessary in many climates to keep the wind from blowing everything to pieces when the front door is opened, and is about as far as it is necessary for a messenger boy or a mail-carrier to come. The hall is often made a little reception room with an ornamental staircase, because it is not always convenient or necessary to take the chance visitor of a few minutes into the main rooms; and surely a dining-room is not without its uses, even if it is not so grand as the baronial hall of the historical novelist.

The dining-room and the front room might, of course, be made into one large living-room that would give more opportunity to move around, and many are now following this style, but others think that it is not so suitable as the present arrangement with a sliding door between the two rooms, which permits of practically both spaces being turned into one, and yet gives privacy if desired. There are two projections of partitions in this scheme, and they provide a space in both rooms for a chair or other piece of furniture. The matter is one for individual taste, if the partition extension is not required for heating pipes.

Heating the House

Most moderate priced houses are now heated by furnace or hot water, and this does away with the necessity of making only a small opening between the two main rooms so that the one might be shut off from the other, as when a stove was used, and in severe weather only one room could be really heated. Under the new conditions large openings are ordinarily made between the hall and front room, and between that and the dining-room. Either a hinged common door or one that swings both ways is put between the dining-room and kitchen.

The space between the dining-room and the front room is sometimes filled with a sliding door, although many people save the expense. The advantage of the door is that the dining-room may be shut off if desired. We are not always in what the French call *grande tenue de ceremonie* when dining in family life on a day when the thermometer registers 105 in the shade. The extra cost of a door above a plain opening in pine is about $50, in the best oak from $80 to $125, depending upon finish, if the work is done when the house is built. In many cases the money can be used to advantage in another way.

The old fashion of using a double folding door is now happily done away with, as too much good room was lost when the doors were swung back. The opening should either be left without a door or a sliding one used.

Vestibule

A vestibule is desirable, especially in a dusty, windy climate. Before opening the outside door the one to the hall can be shut, and the dust kept out. The common method in a house of the ordinary type is to take half of the vestibule space from the hall and the other half from the porch.

If the front door opens directly on the hall the wood floor has to be carried forward, while with a vestibule a division is made and a tile floor used. Messengers, agents, and others with muddy feet need not then soil the hall floor. Tile can be kept from staining, but wood is easily spoiled. This advantage alone is sufficient to recommend a vestibule, even if it has to be small.

Hall

A good sized square hall is now considered almost essential. In other days there used to be a little narrow passage-way for a hall, and a stair running straight up the side of the wall. Something of a more artistic nature is now imperative. The stair is looked upon as more than a way to reach the second story. Even in the plainest houses we have come to see that a good-looking stair will perform its natural service as well as a sort of sloping ladder.

Main Rooms

They are made as large as possible. What more can be said until we know how large the bank account is? If any difference is made as to size the advantage is usually given to the dining-room, for a good deal of the space is there taken up with a table, and room for chairs is required on both sides. Senator Coppers and the wealthy require space behind the chairs also, so it is evident that the dining-room should be the larger of the two.

The "Living Room"

Some wit has said that the women of our time are bent upon knocking out all the partitions on the first floor of their home and calling it a living-room. If this plan is chosen it must never be forgotten that furnace pipes have to reach the second story, and that we have not as yet reverted close enough to the primitive to allow them to go on the face of the wall. They are usually hidden in the partitions. They must not only be watched on the first floor, but their landing-place on the second has to be considered.

The living-room may be made out of the hall and the front room, or out of the two rooms only. The hall and front room seem to make the best combination, because the dining-room can then be shut off and treated by itself. Many dining-rooms have a beam ceiling, for example, and most economical home builders would find it too expensive to carry pilasters, in some cases paneling, and beams all over a large room.

Bay Windows

A bay window is usually put in the dining-room, where more space is necessary than in the front room, but this arrangement is reversed to suit special requirements, such as the possibility of a better view from the front room than from the other.

A square bay gives the most space inside, but unless it can project about three feet there is not much chance for hung windows on the side, as they require room for weights. This extension would permit of glass sixteen inches wide, or twenty inches over the sash.

To save going out so far the sides are often put on an angle, and this gives a better chance for a window.

The newer designs make only a half window, or single upper sash, in the center of the bay. With the other windows there is light and ventilation enough, and with the half window a piece of furniture can be set below without being seen from the outside. This arrangement is particularly advantageous in the dining-room.

Another method that has a good deal to recommend it is to run the wall on a straight line on the inside up to a height of 30 inches or three feet, and then project out a little square bay, or rather, oriel, window, making a shelf about 18 inches wide. Occasionally a seat is used instead of a shelf, and the height put about 20 inches from the floor. The shelf scheme is preferable. This style makes a beautiful finish with three or four small windows in the front, but seldom any in the ends.

Foundation for Bay Window

For the average bay window it is not really necessary to run the masonry of the foundation out, as the joists can be projected, and building paper or some other material used to keep out frost. It is better to carry out the wall, undoubtedly, but a straight foundation is cheaper than one with angles, and the money can be used elsewhere.

French Windows

These are seldom advisable in a windy, rainy climate unless they are sheltered by an enclosed porch or something of that kind. They open like any double store door. When fitted with flush bolts they should be bored in and not grooved in the face of the wood, as the filling piece never matches with the main stile.

Chimney

The chimney should be built clear down to the ground, and not be set upon a bracketed shelf, except in small 1-story cottages. In cities the building regulations require that chimneys shall go to the ground in 2-story houses, but an exception is sometimes made for 1-story cottages.

Fireplace

A large open fireplace is a pleasant feature in a house if a sum of from $80 upward can be afforded. By the time investigations are made and the right kind of mantel chosen, with a fine tile for the hearth to match, it may be discovered that the prices are principally "upwards."

With a good system of heating all through a house a fireplace is not really necessary. If one is put in the ashes should be dropped in a duct in the brickwork down to the basement. People in the modern house do not carry ashes out by hand and raise dust all over the best rooms.

The outside wall is not considered the best location for an open fireplace. More satisfaction is given when it is near the center of the house, or at some inside partition.

One unquestioned benefit of a fireplace is the aid it gives in properly ventilating the house. The experts are after us in these days, and insist upon changing the air in rooms so many times per hour. The heated air in an open fireplace rises and draws the vitiated air after it to fill the vacuum, and this in its turn draws in fresh air from the outside through the crevices of the doors and windows. There are many who cannot afford to keep a fire burning for this purpose, but the advantage is here set forth. In this world it is always well to keep a high ideal ahead of us, with the hope that one day we may reach it.

Instead of coal or wood, a gas-log is sometimes used, and pipes must be arranged in time if the log is wanted.

The Kitchen

We have changed our ideas as to the size of the kitchen. In the old days this room was almost the largest in the house, but now it is often made the smallest. The theory is that the space can be used to better advantage in the dining room or the pantry. Everything is so arranged with sink, gas stove, cabinet, table and pantry that a woman is supposed to take as few steps as possible. By standing in the center of her domain, as it were, she is supposed to be almost able to grasp the handle of the particular machine she is operating by merely swinging on her heel. It sometimes seems, however, as if the theory were being carried too far. Nevertheless, much kitchen work can be done in small space. Did you ever think of how many people are served by the tiny kitchen of a railroad diner?

Cabinet

It is not always easy to find space for a kitchen cabinet, but they are useful and are now made in large numbers, with every requirement, by manufacturers at a cost of about half of what the local carpenter would be obliged to charge.

Pantry

A common practice is to place the pantry, and in combination with it, often an entry hall for the refrigerator, outside of the main line of the building, and going up only one story.

A small kitchen usually means a small pantry, but unless there is a storeroom in the basement a large pantry is very desirable, for there seems to be no end of material that should find a place in this little room. A good idea that can seldom be attended to under the usual exigencies of space necessitated by the limit of cost is to put up a scullery by the side of the pantry to hold brooms, etc.

Doorway

When the pantry is put outside the main line of the house the passage from the dining room to the kitchen is often made through the pantry. This makes it necessary to go through two doors, but helps to keep kitchen odors and heat from the main part of the house. The most direct way is to put the door between the two rooms in the separating partition and make it swing both ways, and also arrange it so that it will stay shut. This plan has some drawbacks, however. In a narrow dining room, with people seated on both sides of the table, the door may strike against the chair. One method of getting a straight connection between the two rooms is to put in a single sliding door, but this means a double partition.

Sink

When the entrance is made directly from the dining room to the pantry a small sink is often put in the work table, so that the finer dishes need never be mixed with the others in the kitchen. Another common plan, when the house is large enough, is to keep the pantry inside the line of the main wall between the kitchen and the dining room and walk through two doors as before.

Refrigerator

In all cases the ice should be fed to the box from the outside. This simple expedient is often neglected, and icemen with muddy feet spoil the looks of the kitchen floor and make unnecessary work. With the proper arrangement an ordinary refrigerator can be placed either in the pantry or entrance hall, and the ice fed through a small door in the outside wall. All that is necessary is to order a new refrigerator made with an opening in the end instead of the top, at an extra cost of probably five dollars for the common sizes and styles. Any of the regular companies make refrigerators to suit special requirements.

The door in the wall is opened from the outside, the ice dropped in, and everything is then handled from the inside of the pantry or hall. A drain-pipe can easily be attached to throw the water outside of the house and make drip-pans unnecessary. If a connection is made with the sewer a trap and water-seal must be used to keep the sewer gas out of the ice chest. The pipe from the chest should never be directly connected to the one leading from the sewer, but should be cut off a little above the funnel receiver which rises from the trap with the water-seal. This allows the fresh air to enter the ice-chest pipe, and the water-seal keeps the gas from rising. If the lot drains to the rear about the safest and cheapest plan is to let the pipe hang loose, and then nothing but fresh air can possibly enter. Even water-seal traps sometimes run dry; and although no direct connection is made the air that rises from the sewer can enter the ice-chest pipe as well as the fresh air.

(To be Continued.)

THE JOBBING CARPENTER AND SOME OF HIS WORK*—XIII

By Edward H. Crussell

A miter-cutting appliance that is capable of doing good work if carefully made is shown in plan, end view and side elevation in Figs. 86, 87 and 88. The regular stiff-backed miter-box saw should be used in it and the saw guides A A should be of such a hight that the back of the saw rides on them when it is down and is thus prevented from cutting the base of the machine. The sketches here presented are drawn to scale and any one wishing to make an appliance of this kind should experience no difficulty in doing so. There is only one thing wrong with it and that is it is too clumsy to carry around and takes up a lot of room. The writer has seen it fitted with screw clamps, so that frames could be nailed up in it; that, however, made it still more clumsy and it made a poor cramp, any way.

The jobbing carpenter may at some time be called upon to hang pictures or fasten cabinets, shelving, etc., on the walls. This does not often happen when there is picture molding or other easily found means of support for them. It is only when the lady of the house has decided that some heavy article of wall furniture must go in a certain spot and after the other members of the household have tried that spot and the wall all around it the jobbing carpenter is called in, so that they may see how he does it. If he is able to do what is required they all look at each other and give expression to some such remark as "Ah! every one to his trade." If he is not able to do it, they make remarks to each other concerning the matter of how much better the old-time mechanics were than are those of the present day.

The writer was once called upon to hang a large clock in a room in a new office building. The clock was of the regulator variety about 6 ft. high and weighed more than 100 lb. Upon reaching the scene the writer was pointed out by the tenant of the office the place where the clock was to be located, the tenant also tendering the information that by the terms of his lease no nails or screws might be driven into the walls or woodwork. Upon his being asked how he thought a clock of that size and weight was going to be hung on the wall without something to support it, he replied that he did not know; he thought that was a carpenter's business and had hired one for the purpose and was now waiting to see him go ahead and do it. "Of course," said he with pompous dignity, "if it had just been the matter of driving in a nail I wouldn't have needed your help, I could have done that myself."

"And, of course," said the carpenter, "if I was able to perform miracles I wouldn't be at the beck and call of such people as you; I could get a better job." How the clock was finally hung may be described as follows: The chair rail and picture molding in this room had a projection of about 2 in. They were of hardwood and were firmly fastened in place. Two pieces of 2 x 3-in. pine were carefully scribed in a vertical position between these two moldings and fixed to them with five screws. The distance from outside to outside of the pine pieces was just the width of the clock. The screws were run into the quirks of the moldings, where they would not be noticeable, and the clock was then fastened to the pine strips in any manner desired. As the weight of the clock acted on the strips almost entirely in a vertical direction and as the careful fitting of the strips to the chair rail and picture molding helped some, two No. 8 screws in the top and one in the bottom of each strip held everything safe. The job was finished by staining the pine strips walnut, the same color as the clock.

We will next speak of the matter of hanging a picture in a certain place. Where there is no picture molding the difficulty can sometimes be overcome by using double lines on the picture and hanging it from two studs instead of one. Failing this, in a room that has no plaster cornice please remember that there is always one place where you can fix a nail and that is right up under the ceiling in the plate of the partition. A brick wall or partition without furring strips would seem to present considerably more difficulties than a stud partition. In reality this is not so. Having decided where the nail is to go, take a ⅜ or ½ in. twist drill and bore right into the wall with it for a depth of 2½ or 3 in.; fit a wooden plug tightly in this hole and use for hanging the picture a nail or screw with an ornamental head that will hide the plug. If these are not obtainable take a picture hook, punch a hole in it and fasten it to the plug with either nail or screw.

Most buildings at the present day, however, have picture moldings in the several rooms, but where they are absent it is usually possible to persuade the owners or occupants to have them fitted. The putting up of picture molding does not present any difficulty except perhaps where it has to go on a brick wall without furring strips previously mentioned. In a case of this kind snap a chalk line along the wall showing the lower edge of the molding and then take the brace and twist drill as before described and bore and plug the wall every 18 or 20 in. If you can strike one of the horizontal joints in

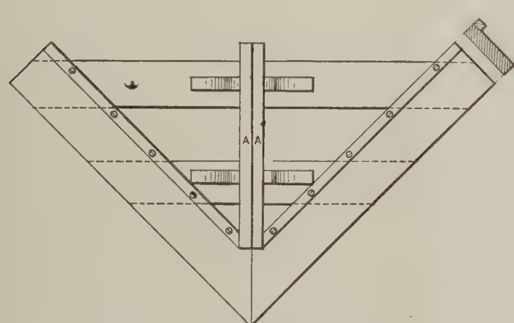


Fig. 86.—Plan View of Miter-Cutting Appliance.

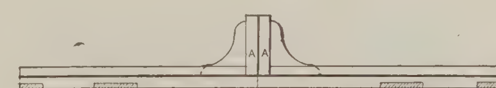


Fig. 87.—End View of the Apparatus.

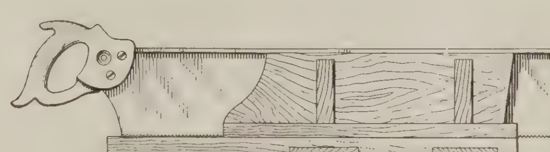


Fig. 88.—Side Elevation, Showing Saw in Position.

The Jobbing Carpenter and Some of His Work.—XIII.

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* The author of these articles will be glad to discuss any phase of work in the line of jobbing carpentry that the reader may suggest.—Editor *The Building Age.*

the brick work it will be easier boring and the plugs will hold as well, so long as you are careful to make them fit tightly between the bricks. Take care not to break more of the wall surface than you can cover with the molding, and if the building is occupied try and catch your borings in a cardboard box or something similar, so as to avoid making a mess and spoiling the furnishings—especially the carpets. A wall cabinet can usually be fixed in place by first marking where it is to go and then tapping the wall lightly with a hammer to ascertain the position of the studs. The location of the stud or studs is then marked on the cabinet and holes bored in the back of it, through which to pass the screws for fastening it to the wall.

Where a shelf is to be supported by brackets it is sometimes impossible to place the latter on the studs in the wall and still have them symmetrical. If this is a matter of any consequence a back may be fixed to the shelf as shown in Fig. 89. The brackets can then be fastened to the shelf in their proper places and of course screws can be passed through the back of it at whatever point they will strike the studs in the wall.

When making brackets for shelving there is always a question of the style best adapted for the purpose. Of the two shown in Figs. 90 and 91, which will the average reader select? Five men out of every six will use that shown in Fig. 90, although Fig. 91 is just as easy to make, looks better and can be fastened more easily in place. It is made of ⅞ x 1½ or 2 in. material and the cuts are made in a miter box. This style of bracket if intelligently nailed is plenty strong enough

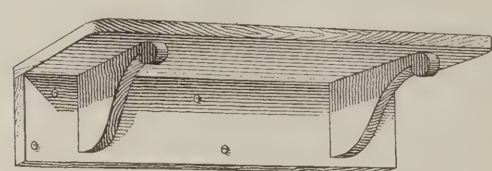
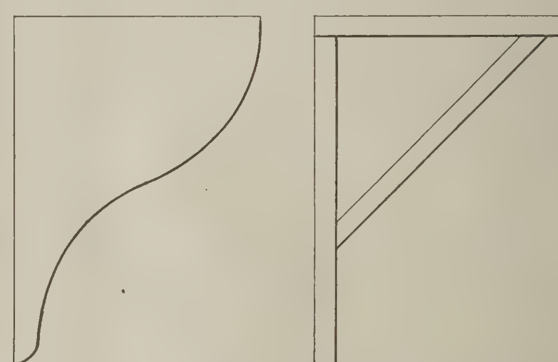


Fig. 89.—View of Shelf Supported by Brackets.



Figs. 90 and 91.—Side Elevations of Two Styles of Brackets for Shelving.

The Jobbing Carpenter and Some of His Work.—XIII.

for a shelf up to 12 in. in width, but for anything larger than that the brace should be "toed" in.

Of course where a shelf is made as indicated in Fig. 89 the bracket can be fastened through the back of it before it is put up, but where this style of bracket has to be fastened to a wall, the only way in which the upper part can be fixed is by toe-nailing, a method which is not always satisfactory; hence the superiority of Fig. 91, which can be nailed straight through.

Electric Wiring and Equipment

The electric wiring and equipment of buildings at present is a subject which does not seem to receive its proper share of attention by the architect and builder. The owner, as a rule, being ignorant of the subject leaves it to the architect and builder, and as the architect is sometimes no better posted than the owner, he leaves it in turn to the builder, who is trying to make all he can on the job and cuts the wiring, etc., down to a minimum, says E. M. Raetz in a recent issue of the *Improvement Bulletin*. At a recent general contractors' meeting the electrical contract was referred to as one of the "insignificant trades." This seems to be the attitude of architects and builders in general, but as methods of building construction progress the importance of this work is being brought out and the necessity of careful planning is becoming more evident. In the large modern structures in the bigger cities, with a well-planned equipment, even illuminating engineers are employed to secure the best results from artificial illumination.

Poorly-drawn specifications (or sometimes the subject is not even mentioned) are responsible for many inefficient and defective installations. A rigid specification will not only secure for the owner a better job, but will put all bidders on the same basis so far as requirements are concerned, and the general tendency would be toward a higher standard of construction instead of "cheap" work, as the present tendency is to let the job to the lowest bidder, where there is a loosely-drawn specification which allows of deviation in figuring.

There are even cases where contractors submit their own specifications and base their bid on same, claiming to reduce the cost to the owner. Such proceedings are always open to question and should not be considered by the architect and owner.

In specifying a certain make or brand of article "or equal," it would be better to name several makes of such articles to allow of fullest competition and leave out the words "or equal," as the question always arises who shall decide whether or not the article to be substituted is the equal of the one named, as the architect is often incompetent to judge (and could hardly be reasonably expected to know) as to the merits of all modern devices, of which there are so many being put on the market.

The real necessity seems to be to have a competent engineer draw up a specification, the cost of which would be moderate, and thus secure for the owner a satisfactory and proper installation of electrical equipment.

The above is the writer's conclusion at the end of 10 years' experience in the electrical construction business, and to this I might add that the best results are obtained by the fullest co-operation of the architect, builder and electrical contractor.

Finishing Hardwood Floors

For finishing oak, maple, and other hardwood floors in the natural, so that they will not darken, an English publication presents the following suggestions:

Oak floors require a filler if good smooth finish is desired in the natural, no matter what material is used. Maple does not require filling.

For oak floors, a good mineral paste filler and two light coats of grain-alcohol shellac varnish, or, in place of the latter, waxing frequently with a good floor wax, will keep the floor from darkening.

Ordinary floor varnishes or linseed oil will produce darkening. Mineral oils tend less to darkening of wood than linseed oil, but are not to be thought of for use in dwelling houses or public halls on floors, because of the tendency to soil the ladies' dresses.

For maple floors, three coats of grain-alcohol, white shellac varnish, or repeated treatment with floor wax will not darken the wood.

NOTES ON PLAIN AND REINFORCED CONCRETE CONSTRUCTION

BY PAUL T. LESHER.

WITHOUT doubt the most efficient and logical construction for buildings where permanence and fireproof qualities are required is reinforced concrete. It is generally conceded that concrete is one of the best fire-retardants known. It is strong under compression, but when subjected to tensile stress it is weak, soon cracks and fails, for which reason it is necessary to reinforce it with some material that is strong under tension, as steel or iron. The reliability of reinforced concrete depends in large measure upon the workmanship employed; that is, reinforced concrete constructed under thorough and conscientious supervision will prove as safe as any other form of construction, while if the work is carelessly executed there is great liability of its falling when least expected.

The Steel Reinforcement

The only perishable element—the steel reinforcement—is so thoroughly embedded and surrounded by the concrete that it assumes imperishable properties. As structural work by way of example is subject to corrosion and electrolysis and as lumber has tremendously increased in cost during the past decade, the use of reinforced concrete has grown to enormous proportions in more recent years. A few examples of its application are factories, dwelling houses, grain elevators, warehouses, tanks, sewers, retaining walls, tunnels, railroad ties, telegraph poles, dams, etc. The writer recently noted where a flywheel was made of reinforced concrete.

The advantages of reinforced concrete work may be briefly pointed out as follows:

1. Use of local labor and materials.
2. The best of fire and water resisting properties.
3. The rapid construction.
4. Low insurance rates.
5. Low first cost.

That reinforced concrete construction can be erected with considerable speed has been developed in several building operations of magnitude. In the instance of a building 50 ft. wide, 160 ft. long and having a basement and four stories, the concrete construction of the entire building was completed in 12 weeks; the plastering was finished in one month and the structure finished in 4½ months from the time operations were commenced, which was 34 days ahead of the date given in the contract. As the concrete work included the laying of about 35,000 sq. ft. of floor and roof, in addition to the columns, girders, etc., the record was somewhat remarkable.

Steel reinforcement is nearly always used because it is cheaper and easier to secure than iron reinforcement and at the same time it is better. In connection with most of the important work using reinforced concrete, steel rods or square twisted rods are employed. On some work old steel ropes or cables can be utilized to advantage.

It was demonstrated by the great Baltimore fire that reinforced concrete can at least partially withstand the severe destructive effects of a raging conflagration. A survey of the United States Fidelity and Guaranty Building of that city, which was composed of floor systems carried by reinforced concrete columns and girders, showed that though the cast iron front and the brick party wall of the building had been destroyed the concrete floor systems and their supporting columns remained in place.

Reinforced concrete construction is very rigid, as there are no joints such as column and girder connections used in structural steel work, which sometimes prove inefficient. The structure is practically a monolith, and consequently extremely rigid. This form of construction is desirable for buildings in which machinery is to be installed, especially any machinery that would be likely to produce vibration in buildings as ordinarily constructed.

Reinforced Concrete Design

The general data and information here given are practically in accordance with the regulations of the Bureau of Building Inspection of the City of Philadelphia, and are in general accord with the best engineering practice to date. The ratio of the modulus of elasticity of concrete to that of steel should be as follows:

Stone or gravel concrete	1 to 12
Slag concrete	1 to 15
Cinder concrete	1 to 30

The allowable unit transverse stress upon the concrete in the compression part of a beam or girder should be as follows:

Stone or gravel concrete	600 lb. per sq. in.
Slag concrete	400 lb. per sq. in.
Cinder concrete	250 lb. per sq. in.

The allowable unit transverse stress in the tension part of a beam or girder should be as follows:

Wrought iron	12,000 lb. per sq. in.
Steel	16,000 lb. per sq. in.

(Concrete not to be used in tension.)

The allowable unit shearing stress, so called, upon concrete should be as follows:

Stone or gravel concrete	75 lb. per sq. in.
Slag concrete	50 lb. per sq. in.
Cinder concrete	25 lb. per sq. in.

The allowable unit adhesive stress between the concrete and the surface of contact of the iron or steel, for plain bars or rods, should be as follows:

Stone or gravel concrete	50 lb. per sq. in.
Slag concrete	40 lb. per sq. in.
Cinder concrete	15 lb. per sq. in.

The allowable unit stress upon concrete in direct compression in columns should be as follows:

Stone or gravel concrete	500 lb. per sq. in.
Slag concrete	300 lb. per sq. in.
Cinder concrete	150 lb. per sq. in.

The allowable unit stress upon hoop columns of stone or gravel concrete should not be over 1000 pounds per square inch in figuring the net area as the circle within the hooping.

When steel or iron is used in compression (that is, in the compression flanges of beams or girders), the proportion of stress taken by the steel or iron should not be more than the ratio of the modulus of elasticity of the steel or iron to that of the concrete.

Columns

Columns for buildings should generally be made of a 1:2:4 mixture; that is, one part of Portland cement, two parts of sand and four parts of stone and gravel. If a column fails, the entire building is liable to go down, therefore the most important members in a building are its columns.

In plain reinforced concrete columns, the allowable unit stresses on the concrete previously given are to be used, provided the length of the column does not exceed fifteen times the least side. If more than fifteen diameters the allowable stress in the column should be decreased, and in the present state of knowledge on strength of slender reinforced columns, it is practically impossible to give any definite rule covering this decrease.

It is very unusual for the length of a concrete column to be as much as fifteen times its least side, and it would be on the side of safety not to use such a slender column.

Column Reinforcement

It is the practice to reinforce concrete columns with vertical rods and horizontal binders to make the column safe against any probable lateral stresses due to unsymmetrical loading, or other conditions tending to produce lateral flexure. There is no accepted standard for the amount of this reinforcement. A vertical reinforcement of iron or steel equal to one per cent. of the cross section of the column generally gives good results, excepting that when the column is very short in proportion to its diameter, as in the case of a pier, or as the column approaches a pier in its proportions, this percentage is unnecessarily large, or not needed at all.

The horizontal binders are generally ¼ in. wire looped around the vertical reinforcing rods, and are spaced in hight from 8 to 12 in. apart.

The longitudinal reinforcing rods in columns should not be considered as taking any direct compression, as their function is to take care of any lateral flexure stresses. The reinforcement in columns should be 2 in. from the outside face of the concrete of the column.

Problem: Require the size of a reinforced concrete column to sustain a load of 120,000 lb., column built of stone concrete and 16 ft. high.

Solution: From data previously given we find that stone or gravel concrete in compression is good for 500 lb. per square inch. Now, 120,000 lb. divided by 500 lb. will give us the number of square inches required in the cross section of the column, which, therefore, equals 240 sq. in. We will therefore use a 16-in. sq. column, which contains 256 sq. in. in cross section.

Now for our steel reinforcement we require one per cent. of the cross section of the column, and one per cent. of 256 sq. in. equals 2.56 sq. in. steel reinforcement required. Therefore we will use four ¾-in. sq. steel rods. For horizontal binders we will use ¼-in. diameter wire, spaced 12 in. apart and looped around the ¾-in. sq. rods.

Walls

Reinforced concrete walls should not be less for building purposes than two-thirds of the thickness required for plain brick or stone walls under similar conditions. Light reinforcement is required for ordinary concrete walls to prevent shrinkage and give them stiffness while setting. Four to six inch walls require ¼-in. rods spaced 12 to 18 in. apart, horizontally and vertically, according to importance and size of wall. At window and door openings a larger amount of reinforcement is necessary. Brick curtain walls are sometimes used in reinforced concrete buildings.

Beams and Girders

Reinforced concrete girders, beams and slabs are to be designed in accordance with the following assumptions and requirements:

1.—The adhesion or mechanical bond between the concrete and steel must be sufficient to make the two materials work together as a unit.

2.—The common theory of flexure is to be used.

3.—The steel to take all the tensile stresses.

4.—Where the upper flange of a beam or girder is a T-section, with a portion of the slab acting as the flange, the width of this slab flange shall not exceed twenty times the thickness of the slab.

5.—The junction between the beam or girder and the slab must be of sufficient section or strength for the horizontal shearing stresses, or flange increment taken by the slab. If necessary, stirrups or other metal reinforcements may be introduced to accomplish this purpose.

6.—Particular care must be taken so that the slab portion of the T-section of a girder may not be required to act also as a slab, without careful consideration and provision for not exceeding the safe compression on the concrete acting jointly for both purposes.

7.—All concrete beams and girders should be made of stone or gravel concrete. All slabs, excepting those between steel beams or girders, not exceeding 8 ft. center to center should also be made of stone or gravel concrete. Slabs under 8 ft. span between steel beams or girders may be made of cinder or slag concrete.

8.—The concrete for the girders, beams, slabs and columns should be what is known as a "wet mixture" and should be in the proportion of approximately one part Portland cement, two parts sharp sand or gravel and four parts of broken stone or gravel of the proper size. The stone should be of such size that it will all pass through a 1-in. ring and at least 25 per cent. of the stone should pass through a ½-in. ring. The gravel should be of a corresponding size.

9.—The minimum thickness of concrete outside of the reinforcing members of beams and girders should be 2 in. on the bottom and 1½ in. on the sides of the beams or girders. The minimum thickness of concrete under slab rods should be 1 in.

10.—Reinforced concrete girders, beams and slabs should be calculated and designed for upper and lower flange stresses, vertical shear, horizontal shear, and proper adhesion or mechanical bond between the (steel or iron) reinforcement and the concrete. The allowable working stresses have been given previously and these are based on a safe working load equal to about one-quarter of the breaking load; that is, a breaking load of four times the live load plus four times the dead load.

11.—In testing concrete construction it is usual to make the test with twice the live load. That is, if the live load per square foot of floor is 150 lb., it is usually sufficient to test the construction with 300 lb. live load. This keeps the test within the elastic limit of the materials.

12.—The details of reinforced concrete construction are of great importance and care should be exercised in the details and the construction in the field.

(*To be continued.*)

A Novel Elevator for Raising Concrete

A decidedly novel arrangement for elevating concrete to the various points required during the erection of a building has been adopted by the contractors who are executing the reinforced concrete work in connection with an eight-story structure in process of erection in Milwaukee for the Manufacturers' Home Company. The elevator consists of a large V-shaped iron bucket which rests in a vertical truck, the bottom of which lies only a few feet from the concrete mixer. In operation the entire contents of the mixer, which is equivalent to the capacity of about two large trucks, is dumped into the bucket, which is elevated to, say, the fifth or sixth story and there is automatically discharged into a large iron hopper located on the topmost elevator platform. From this hopper the concrete is poured into trucks and wheeled to the "forms."

In this way an amount equal to the capacity of two trucks instead of one is carried up in a single trip and the mixer can be entirely discharged and made ready for another mixing. The work is still further facilitated by reason of the fact that the new building, the contract for which is being executed by the A. Monsted Company, is directly on the bank of the Milwaukee River, so that the crushed rock and sand for the work are unloaded into the street from boats.

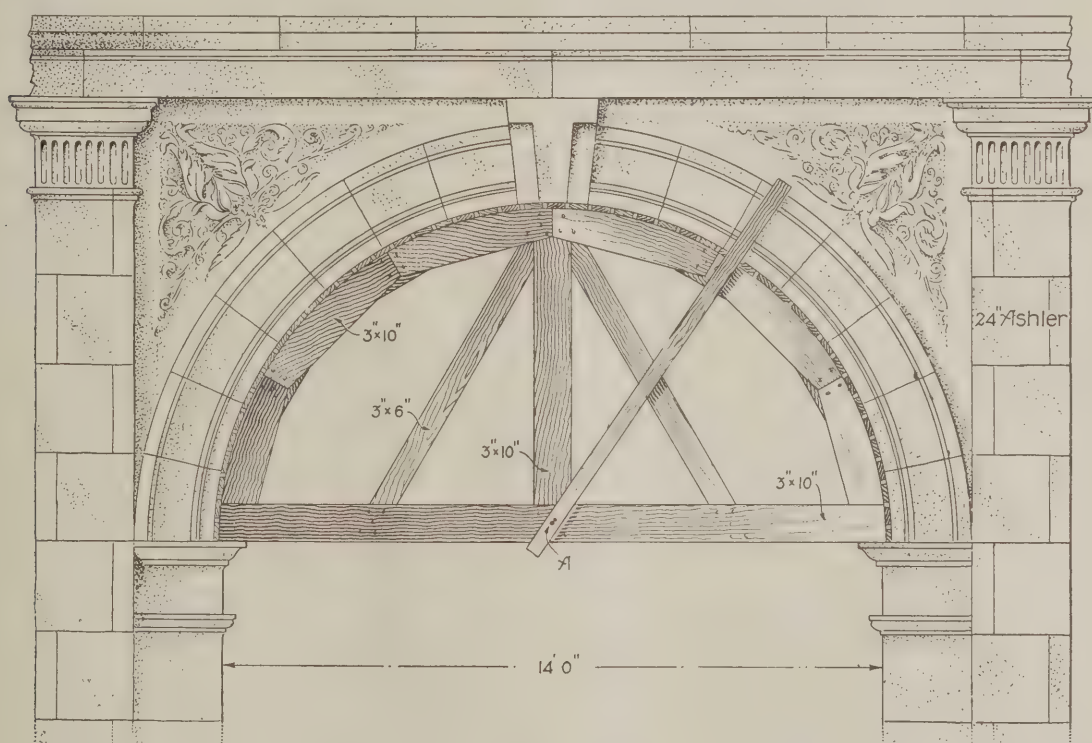
WOODEN CENTER FOR MASONRY ENTRANCE

BY O. B. MAGINNIS

ONE of the best examples of centering which has recently come under the notice of the writer is that employed in the new building for the Woolen Merchants' Exchange, situated at the northeast corner of Eighteenth street and Fourth avenue, in the Borough of Manhattan, N. Y. As the illustration here presented shows, the opening is 14 ft. in the clear of the jambs, the soffit of the arch following this width with a radius of 7 ft.

The center rests on the projecting architraves of the pilasters and consists of four frames spaced 9 in. apart, the whole width of the soffit or concave ring being 3 ft. On this the stone voussoirs of a cut width of 9 in. were set.

The framing and building up of the center was an interesting piece of work, the lines of which were laid down on a temporary platform of tongued and grooved flooring boards leveled and trued. On this the joints, radiating lines and braces were all determined. The battens were not nailed on until the frames, being heavy, were completed, raised to their place with a derrick, leveled and plumbed. As the sizes of the timbers are indicated on the drawing the picture is self-explanatory, although attention should be called to the correcting radius rod marked "A" working on a central nail or pivot. This is used by the stone setters for the purpose of verifying the position of each stone voussoir as set from the spring line up to the keystone, which of course is set last. As an example of false work this center is admirable.



Elevation of Entrance, Showing "Center" in Position.—Scale, ¼ In. to the Foot.

Wooden Center for Masonry Entrance.

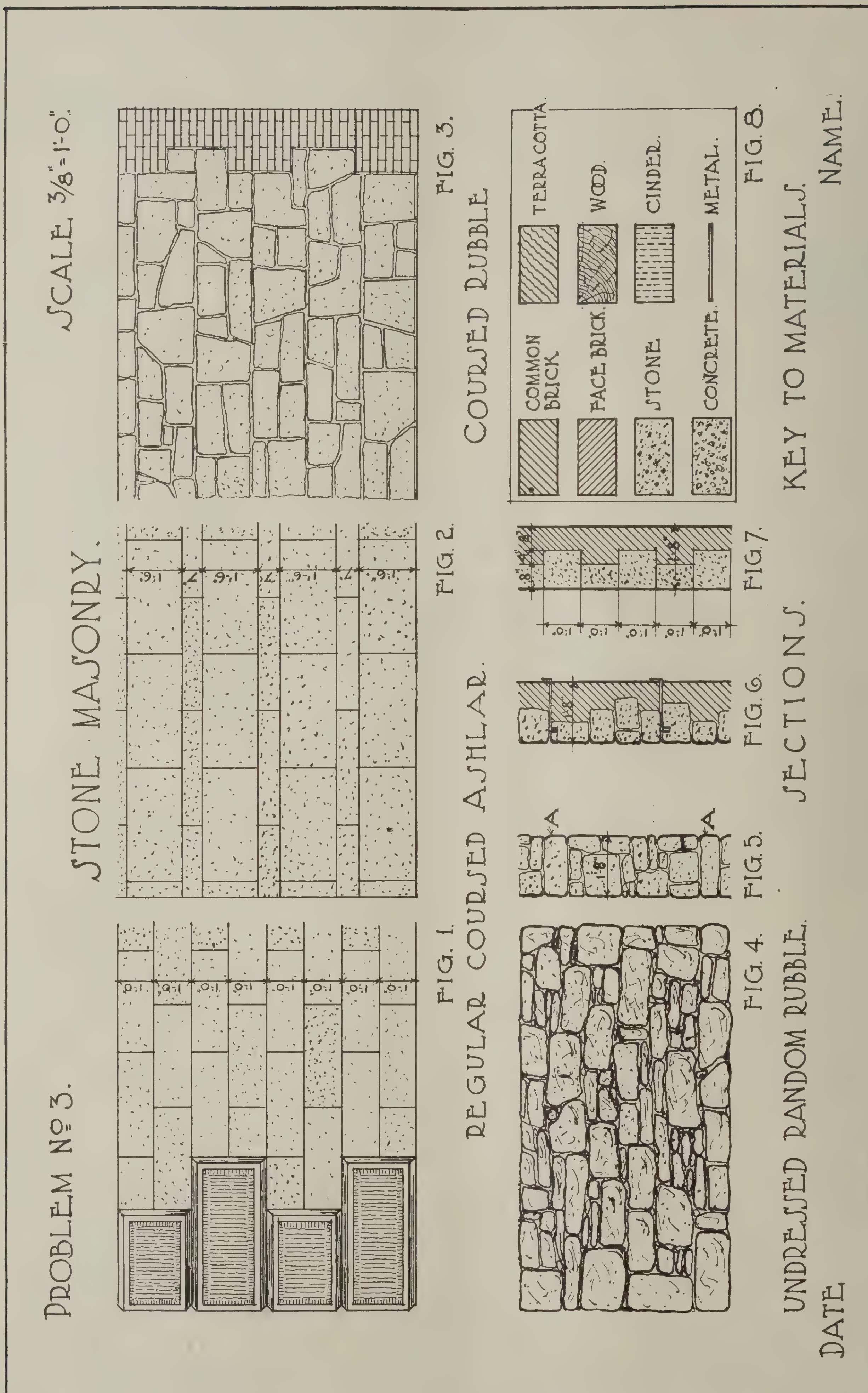
Wooden Block Floors for Factories and Shops

Concrete has been used very extensively for floors in factories and shops, but it possesses certain faults. Wood in the form of boards or blocks has been suggested as a substitute, and a number of plants contain floors of the former type where the under flooring is laid on the concrete floor slab with a diagonal intermediate floor and the finished wearing surface above.

What is probably the first floor of wooden paving blocks was laid in the plant of the Jackson Lumber Company, Lockhart, Ala., about one year ago. These blocks are made from long-leaf yellow pine, and several sizes ranging from 3 x 6 x 4 to 4 x 8 x 8 in. are used. After the blocks are cut to size from the planks they are treated in a creosote solution similar to that employed for ordinary preserved wood. The first installment of this block pavement was completed in April, 1909, and was laid in the passage connecting the dry kilns and the planing mill. The use this pavement receives is severe, as approximately 200,000 ft. of lumber in carts with small cast iron wheels are drawn over it by mules every week. Notwithstanding this heavy traffic, it is stated that there has been absolutely no wear during the nine months of constant service, and that more work has been accomplished at less expense than with plank flooring. Beside this saving, the men and mules engaged in hauling the lumber seem to be in better condition than heretofore.

This pavement has since been installed in the lumber sheds, and at the discharge end of the sawmill. This has not only improved the appearance of the plant, but has done away with a large amount of repair work, and, as was previously mentioned, has reduced the expense of handling and improved the condition of the employees. This floor is practically waterproof, noiseless, almost indestructible, sanitary, and easily cleaned, and seems to possess all the qualifications required by surfaces subjected to the heavy wear and tear of trucking.

AN INDUSTRIAL EXPOSITION under the auspices of the Board of Commerce will be held in Detroit, Mich., from June 20 to July 6, for the purpose of stimulating the commerce and industrial trades of the city.



Lessons in Architectural Drawing for Beginners.— Scale of Sheet Three-Quarter Original Size.

LESSONS IN ARCHITECTURAL DRAWING FOR BEGINNERS

By ALFRED AUSLANDER

THE following definitions of the terms used in stone masonry relating to Lesson No. 3 will be found useful: The front of the stone is called the "face," and the vertical joint opposite the face is called its "back." The upper part of the stone is called "top bed" and the lower portion "lower bed." "Headers" and "Stretchers" are used alternately in each course to obtain bond.

Ashlar.—The facing of cut or squared stones on the front of a building is called "Ashlar," regardless of the manner in which the stone is finished. Plain ashlar is when the work is smoothed or rubbed, so as to take out the marks of the tools, by which the stones were cut. "Tooled" ashlar is understood to be that which has the surface cut in some regular way.

Rustification.—When the stones project from the joints and face of wall the stone work is rusticated.

Quoins.—The stones which are frequently placed at the external of a building are called "quoins." This may be done by stone or brick and they may be "rusticated" or not. See Figs. 1 and 3.

Natural Bed.—The surface (plane) of division along which stones are split when obtained from the quarry is called "natural bed," and all stones must be laid on their natural bed, otherwise they may split.

Sizes of Stones.—The length of the blocks should not exceed four or five times, nor the hight more than two or three times the thickness. This general rule, however, should be applied only for harder class of stones. For the softer kind the length should not exceed three times and the hight not more than one and one-half times the thickness.

Joints in cut stone work should be about the same as in brick work, while in other stone work the joints must be a great deal thicker owing to the unevenness of the stones.

Fig. 1 shows part of a wall of regular coursed ashlar bonded at the angles by "quoin" stones having "chamfered" edges and "rusticated faces." For regular coursed ashlar masonry the stone blocks should be at least 12 in. in depth.

Fig. 2 shows a part of a stone wall the same as in Fig. 1, but for producing a better effect the courses are of different hights, the greater hight being 1 ft. 6 in. and is composed of facers only, while the narrower courses are 7 in. high and consist of bonding courses. The facing courses should be 4 in. or 8 in. thick and the bonding courses 4 in. thicker than the facers.

Fig. 3 shows a coursed rubble wall with brick quoins. A coursed rubble wall has continuous horizontal joints at intervals of 18 in. in hight. All joints should be pointed up with mortar. The beds of all stones should be made as nearly parallel and horizontal as possible.

Fig. 4 shows a wall with stones laid up in random rubble. A stone of the full thickness of the wall should be inserted (see section, Fig. 5 at "A") at intervals of 4 to 4½ ft. in length and every 18 in. in hight to insure a good bond. This stone is called "through stone" or "bond stone." Stones of all sizes and shapes are used for this wall.

Fig. 5 shows a section through a random rubble wall 20 in. in thickness.

Fig. 6 shows a section through a rubble wall with brick backing. In this case iron clamps and ties should be inserted, which may run through the wall and turn up behind the brick. A *reglet* is to be cut in the stone to receive the other end of the tie.

Fig. 7 shows a section through a regular coursed ashlar wall 20 in. thick, the ashlar being 8 in. and 12 in. alternately.

Fig. 8 shows how the different materials should be indicated on the drawings. Materials should be indicated on plans and in sections as clearly as possible without using too many notes for this purpose. By this method an estimator will never overlook the kind and amount of material he is to estimate. These indications, however, should be used for plans and sections only. Use the following notes to indicate the various materials on elevations:

Terra Cotta, "T. C."; wood, "W."; cast iron, "C. I."; wrought iron, "W. I.," etc.

Brickwork on elevations is indicated by a *series* of horizontal lines drawn very faint with diluted ink. Stone work the same as in sections, but much lighter.

Laying Out Drawing No. 3

Draw a rectangle measuring 10 in. x 14 in., as explained for drawing No. 1; draw vertical and horizontal center lines. Place the paper horizontal and measure off first from horizontal center line 3½ in. (actual measurement) up and down and 6 in. right and left (actual measurement) from vertical center line. This will give a rectangle of 7 x 12 in., which will represent the outside of Figs. 1 to 8.

Second, measure off ½ in. on either side of horizontal center line and 1¾ in. and 2⅛ in. on either side of the vertical center line. Draw lines through these points, which will divide the inner rectangle in six parts for figures as shown on opposite sheet.

To lay out Fig. 1 start at the upper horizontal line of the inner rectangle. Lay off eight courses of stone each to be 12 in. and use a scale for all these figures ⅜ in. = 1 ft. 0 in. Use the following sizes for the stones for the regular coursed ashlar: length of stones, 2 ft. 9 in.; hight, 12 in.; large quoins, 4 ft. 0 in. long, 2 ft. 0 in. high; small quoins, 2 ft. 8 in. long and 2 ft. 0 in. high.

To lay out Fig. 2 measure off 1 ft. 6 in. and 7 in. alternately from the bottom line, so that there will be four courses 1 ft. 6 in. each and three courses 7 in. each, and draw lines through these points; measure off at left corner 8 in.; draw a vertical line, which will be the joints of the facers at end, and measure off 3 ft. for other vertical joints of the facing stones. The vertical joints of the bonding courses to come in center of the facing stones.

Fig. 3.—Lay off 38 brick courses 2½ in., each beginning at the right-hand corner for the quoins. They are to be 20 in. and 16 in. in width and 8 courses high. Measure off spaces 18 in. wide for horizontal joints of stone courses and sketch in the vertical stone joints.

Fig. 6.—Lay off a rectangle measuring 5 ft. 6 in. high, 10 ft. 0 in. long and draw, free hand, stones of different sizes. Mark on this elevation all bond stones according to description above under this figure.

Follow drawing on opposite side for Figs. 5, 6, 7 and 8.

General Rules

The following general rules for estimating of this work will be found useful:

Stone work is measured by the perch, which is 25 cu. ft.

All angles are measured twice, as the measurements are taken from outside to outside.

All walls under 18 in. are figured 18 in.

One hundred feet of stone rubble work requires 1¼ barrels of lime and one yard of sand, or 1¼ barrels of cement and ¾ yard of sand. One man and one tender will lay 100 ft. in 5¾ hours.

THE BRIDGEPORT ARCHITECTURAL LEAGUE is the name of an organization of architects, draftsmen and sculptors just formed in Bridgeport, Conn., with E. M. Jackson, president; F. H. Beckwith, vice-president; C. W. Walker, secretary, and H. V. O'Hara, treasurer.

The Building Age

Formerly Carpentry and Building

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APRIL, 1910

Destruction of Timber by Forest Fires

One of the contributory causes of the growing scarcity of lumber throughout the country and the consequent high cost of building construction is without doubt the heavy destruction of timber which occurs year by year from forest fires that occasionally burn over extended areas, resulting not only in the loss of millions of feet of timber, but in many instances in the sacrifice of human life as well. While these fires perhaps may not constitute a vital factor in the equation of high cost of frame construction, yet they are not to be lightly passed over when considering the existing conditions as they affect the country's supply of lumber. According to the statistics just issued by the Department of Agriculture, there occurred during the year ended December 31 last, 3138 fires in the forests of this country, burning over an area of 360,000 acres and consuming some 170,000,000 board feet of timber valued in the neighborhood of $300,000. Destructive of our national forests as these figures would seem to indicate, it is gratifying to note that the havoc wrought in the woodlands last year was less than in 1908, when something like 400,000 acres were burned over and 232,191,000 board feet of timber, or .06 per cent. of the stand, was consumed. The damage done to reproduction and forage last year was less than $160,000, but in 1908 it was more than $700,000. When considering these figures, however, it must be remembered that the latter year was one of prolonged drought during the summer and fall and of disastrous forest fires throughout the country. That a considerable amount of timber is destroyed each year through carelessness is evidenced by the fact that of the total number of fires last year 431 were caused by campers, 181 by brush burning, and 97 by incendiaries. The great majority, however, were caused by sparks from locomotives, which are credited with 1136, while sawmills and donkey engines were responsible for 38. The protective work of the Forestry Department is shown in the statement that almost 80 per cent. of the fires last year were extinguished before as much as five acres had been damaged and the amount of damage done to the burned-over area averaged only $1.26 per acre.

Industrial Training in Small Towns

In small communities where it is out of the question to establish completely equipped trade schools for the proper training of the young man, interesting possibilities are suggested by the substitution of the local shop or factory for the class rooms of the trade school. Most towns which owe their existence to local manufacturing industries are large enough to have good schools; but the population being too small to afford the expense of equipping and maintaining an industrial school, the boy must go elsewhere if he is to receive the advantages of a practical education. It is held, however, that the co-operation of local industries with the public schools offers an excellent method of meeting the neighborhood requirements in this respect. The recent establishment of such a relationship at Beverly, Mass., affords a basis upon which to consider the subject. A leading enterprise has equipped a model shop in its works in that small city, where the boys of the local industrial school will receive the shop end of their education. Two divisions of the school will alternate between the schoolroom and the shop. The necessary instruction in the so-called theoretical subjects will be directed by the school teachers, while specialized instructors will direct the training of the shop. The Fitchburg idea is somewhat similar, in placing the shop training of the students in the works of local industries, but under the supervision of a man with a broad experience in this branch of pedagogy.

Dearth of Competent Men

There are many towns which are either built about a great manufacturing plant or have a few large works constituting the chief source of income to the inhabitants. Certain places have some characteristic industry, with a number of concerns manufacturing competing or similar lines, all having sprung directly or indirectly from some common source. With them, as with every other manufacturing enterprise requiring skilled labor, the dearth of available men is becoming a more serious problem with the return of each succeeding prosperous period. Few fail to realize that aggressive measures are necessary to promote the practical

SOME SOUTHERN CALIFORNIA BUNGALOWS

E. W. SHINNING, ARCHITECT

education of boys if the standard of the American workman is to be maintained. Let us suppose that a town of 5000 people is mainly supported by a single class of industry. A local industrial school is too expensive to maintain, but there is a high school. Even without the employment of an expert in industrial training, a very good work could be done if the manufacturers would co-operate with the high school. This can be done by taking the boys who would like an industrial training, affording them the opportunity for the shop end of the work, the remainder of which would be attended to in the high school, a definite co-relation being established. In the beginning the course might be crude, judged from the standards of scientifically worked out industrial education. But, nevertheless, it would serve a useful and important purpose and would develop under intelligent fostering by the owners of works and by the high school teachers, who should be able to adapt themselves to the task. Boys would receive the rudimentary knowledge which, as they become skilled workmen, would be invaluable. They would be under the influence of modern industrial environment, and they would be less inclined to seek the larger centers for their initial employment. The problems of industrial education are being met and solved in one large community after another, but the beginning has hardly been made in the smaller industrial towns. Either the boys must go to the cities for their education or go without it. The migration of thousands of them, as they seek other classes of employment in the great centers, is constantly going on. To check this movement, local manufacturers might interest themselves in the possibilities of some such system as here outlined in their home towns.

Architects for New Allegheny County Court Building

The architects who are to compete for making plans and supervising the construction of the new Allegheny County Common Pleas Court building, which it is intended to erect at Ross and Diamond streets, Pittsburg, Pa., have been selected and embrace the following:

Alden & Harlow, J. L. Beatty, T. E. Billquist, Jansen & Abbott, William Kauffman, Kiehnel & Elliot & H. McGoodwin, Associated, Pierre A. Liesch, MacClure & Spahr, McCollum & Dowler, Rutan & Russell, T. H. Scott, Schwan & Lee, Gabriel Farrand, Associated, James T. Steen & Sons, Edward Stotz, R. M. Trimble.

Th report made to the county commissioners and signed by architects Cass Gilbert and J. Monroe Hewlett, of New York City, and County Engineer J. G. Chalfant, states that the names above were selected from among the architects of Allegheny County, "who by past experience and training appear to have demonstrated their special fitness for architectural work of this character."

In addition to the award of the contract for the architect of the building, there will be a number of awards of money prizes. The first prize, of course, will be the erection of the building; the second prize will consist of $1000; a third prize of $750, and several fourth prizes of $500 each, the number to be determined later.

Convention of Michigan Building Contractors

The annual convention of building contractors in Michigan held in Bay City, February 24, brought together from all parts of the State something over 125 of those practically engaged in the building business. Much routine business was transacted and interesting discussions of various phases of the building business ensued. The election of officers resulted as follows:

President............. John H. Laurie, of Detroit.
First Vice-Pres........ J. M. Felner, of Ann Arbor.
Second Vice-Pres...... A. R. Miller, of Bay City.
Third Vice-Pres....... Moore McQuigg, of Kalamazoo

It was decided to hold the next convention in the city of Kalamazoo, although a strong bid for the honor was made by Saginaw, which had the support of the Bay City delegation.

In the evening the meeting was brought to a close, with a banquet at the Wenonah.

Some Southern California Bungalows

(*With Supplemental Plate.*)

We have taken for the basis of our half-tone supplemental plate this month pictures of two attractive bungalows picturesquely situated in Southern California, which is often referred to as the very heart of the "bungalow idea." The upper picture represents a building of eight rooms and of rather striking exterior, with its massive porch columns and masonry effects erected in accordance with drawings prepared by Architect E. W. Shinning, 94 Del Mar street, Pasadena, Cal.

The lower picture shows a six-room bungalow nestling amid floral surroundings and with rugged mountains for a background, all of which tend to render it an ideal vacation retreat. It was erected for P. J. McNally, at Altadena, Cal.

Meeting of Inter-State Builders and Trades Association of Maryland, Virginia and the District of Columbia

At the third annual meeting of the Inter-State Builders and Trades' Association of Maryland, Virginia and the District of Columbia, recently held in the headquarters of the Builders' Exchange, Washington, D. C., the following officers were elected for the ensuing year:

President......... John Trainor, of Washington.
Vice-President.....E. C. Graham, of Washington.
Treasurer......... W. H. Morrow, of Baltimore.
Secretary......... I. H. Scates, of Baltimore.

The convention closed with a banquet at the Commercial Club, at which Mr. Scates was toastmaster. Among the speakers were: A. Christe, secretary of the Builders' Exchange at Norfolk, Va.; John Trainor, a director of the Baltimore Builders' Exchange; F. S. Chavanes, president of the Builders' Exchange at Baltimore; W. D. Nolan, president of the National Association of Master Plumbers; Charles Langley, president of the Master Builders' Association of Washington; John K. Howe, vice-president of the Builders' Exchange at Baltimore; B. L. Hackenberger, of Wilmington, Del.; John R. Galloway, an electrical contractor of Washington.

Nearly all the speakers made reference to the candidacy of I. H. Scates, secretary of the association, for Collector at the Port of Baltimore and assured him that he would receive the endorsement of practically the entire building industry of that section of the country.

A Memorial Art Building is to be erected by the Mechanics' Institute at Rochester, N. Y., to cost $300,000.00. The building will contain three exhibition galleries—an art library and an assembly hall, seating 700. Plans are being prepared by Architects Claude Bragdon and James B. Arnold, 104 Cutler Bldg. Hendrik Van Ingen, Mechanics' Institute, is consulting architect.

REINFORCED CONCRETE FOR THE SMALL HOUSE

ONE of the most interesting papers presented at the recent convention of the National Association of Cement Users was that by C. R. Knapp, relating to Reinforced Concrete for Small Houses. The subject is one which appeals to so many of our readers that we present copious extracts herewith:

The small and medium priced house in reinforced concrete is to-day a reality and not a theory. It was not so long ago that concrete was considered suitable for the large structures only, and even to-day the big man, in concrete, will tell you that the small house, in concrete, cannot be built in competition with other building materials. They are right, in so far that it cannot be done using their methods, which are only adapted to the large structure. It can be, and is being built successfully, by using any one of a number of systems that are adapted for the small work, which would be just as much out of place in large work as the large methods would be in small work. The small house is the one thing nearest to the masses. Anything that pertains to a home appeals to them. They are watching all concrete work with much more than ordinary interest. No missionary, home or foreign, can do more for the uplifting or bettering of humanity than to give the people of moderate means, or less, an everlasting, sanitary, fireproof and economical building—a home to be a comfort and a pleasure to them all their lives; one where the first cost is the last cost; one that is just as satisfactory for their small outlay as the rich man's for his large expenditure.

Size of Wall for Two-Story House

Not so very long ago, to build less than a 12-in. solid concrete wall for even a one-story building was considered unsafe. Now a 6-in. reinforced wall is found to be of sufficient strength for any two-story house. This saving in labor and materials has greatly reduced the cost and helped very much towards making the small house possible in reinforced concrete. That the 6-in. wall will not show any dampness, if the concrete is properly mixed and placed, is proven by the stable erected for R. E. Griffiths, Haverford, Pa., over two years ago, having 6-in. walls. This stable has never shown any dampness, nor even condensation on the inner wall, although there has been heat in the stable at different times during the two winters. For a summer home, inland or seashore, no plastering is necessary, thus the cost is reduced to a minimum. For an all-the-year house, in a warm climate, plaster directly on the wall, thereby the furring and lathing can be done away with. If the house is in a cold climate, I would advise that furring blocks be used, with the usual brown coat of plaster, as otherwise the wall may be too cold.

The wall that seems best suited for house construction and one which I believe has more advantages than any other is the hollow wall, consisting of two 4-in. walls with a 4-in. air space between. Both walls are reinforced with ⅝ or ½ in. steel rods spaced upright, at least every 18 in., staggered and horizontal about 3 ft. apart. To tie the two walls together, I leave a 3-in. web every 8 ft., and have metal ties every 2½ ft. both ways. The double wall insures against dampness and makes the house cool in summer and warm in winter. The air space may be utilized as a ventilating system, allowing each room to be ventilated without regard to any other room.

In a concrete dairy barn which I erected for the Burn Brae Hospital, Primos, Pa., the past summer, the air space was used as a ventilating system.

On each side of the building, near the floor and in line with the two roof ventilators, are 8-in. by 16-in. openings in the inner wall, with corresponding openings at the top of the wall, and, from there, continued to the roof ventilator, by boxing the rafter. There are a number of like openings in the outside wall, near the ground line, which have their corresponding openings in the inner wall, near the ceilings, thus creating a circulation that guarantees fresh, pure air at all times.

Extra Cost of Double Walls

The extra cost of double walls is more than offset by the saving in being able to plaster directly on the concrete, using only one brown coat or the white putty coat. A beautiful and artistic effect may be had by so erecting the inner walls and partition walls (if of concrete) that they do not require plastering or other covering. Concrete has sufficient merit to be treated frankly as such, instead of being hidden. Now introduce color and decoration by using tiles and mosaic to give the needed life and relieve the monotony, but not for the purpose of hiding the concrete, which is exposed frankly where decorations do not occur. Then decoration will exercise its true function, by emphasizing, instead of hiding structural beauty. It is almost needless to say that, where this effect is sought, concrete, being a plastic material, is admirably adapted for this purpose. In this way we "decorate construction," and we do not "construct decoration." In many instances the effect of the decoration is so great as to at once convince the uninstructed.

To make the air space a system of collapsible cores is generally used. A better way, to my mind, is to make a concrete core, similar to a terra cotta partition tile, which is of course left in the wall. By using this method from one to two inches of concrete may be saved without affecting the strength. The core can be made on the job for about half what the terra cotta partition tile will cost.

The question of what kind of a finish to give a concrete wall is a matter of personal opinion, which is ever changing. The rough casting, or plastering of a wall, which has been the most common, is fast giving away to a more artistic treatment. A wire-brush finish brings the coarser aggregates to the surface and gives a pleasing effect. A scrubbing brush, applied while the concrete is green, will erase the board marks and smooth up the wall to a sand-like finish. A carborundum stone is good for rubbing down a wall and with it you can get almost any texture. The finish that is pleasing to a large number of people, which is really no treatment at all, is to leave the wall just as it comes from the forms, with all the board marks showing.

Damp-Proof Character of 6-Inch Wall

An illustration of not only this simple method of surface treatment, but also the damp-proof character of a thoroughly well-made 6-in. wall, is the seashore house of Mrs. Gaston Daus, at Ocean City, N. J., within a block of the beach. While most of the rooms are furred and plastered, there are several apartments in which the porch floor serves as a ceiling, in which the walls have not been plastered. The house was built during the past summer and not the slightest sign of dampness or condensation has appeared. For weeks a pool of water lay on the porch before the top coat was put on and no dampness appeared underneath. After protracted storms the surface seemed to dry off instantly, while neighboring houses of brick and even frame construction retained evidences of moisture upon the outside, long after the concrete house had assumed its natural color.

The owner and architect are more than pleased with the fact that they did not disturb the thin film of cement which remained after the forms were removed and to which they attribute great waterproofing virtue. They not only saved $200 to $300 for tool dressing, but have what they regard as a more artistic finish, because perfectly simple and natural, as well as indicative of the plastic nature of concrete. The architect, I am told, has said, were he to build another house, he would seek to emphasize this surface by using rough and unmatched lumber. The house is certainly pleasing, with its substantial walls, porch columns and chimneys.

People are demanding fireproof houses to-day. They must, however, be educated to pay a higher first cost, if necessary, for this class of construction, and to realize that it is economy in the end, even at the increased cost. Repairs and insurance are practically eliminated. There is also a saving of 25 per cent. to 40 per cent. in the cost of heating, besides having a house that is thoroughly sanitary.

One of the features of the Burn Brae stable, previously mentioned, was its frame roof on an otherwise-all-concrete building, which seemed wise for stable construction. It was reasoned that with a fireproof covering on the roof it was fireproof from without. With this construction, should a fire start in the loft, it would merely burn through the roof. This would give vent for the heat, making high temperature in the building impossible. No damage would result other than the loss of the roof and the contents of the loft. This method insures protection to the cattle on the first floor.

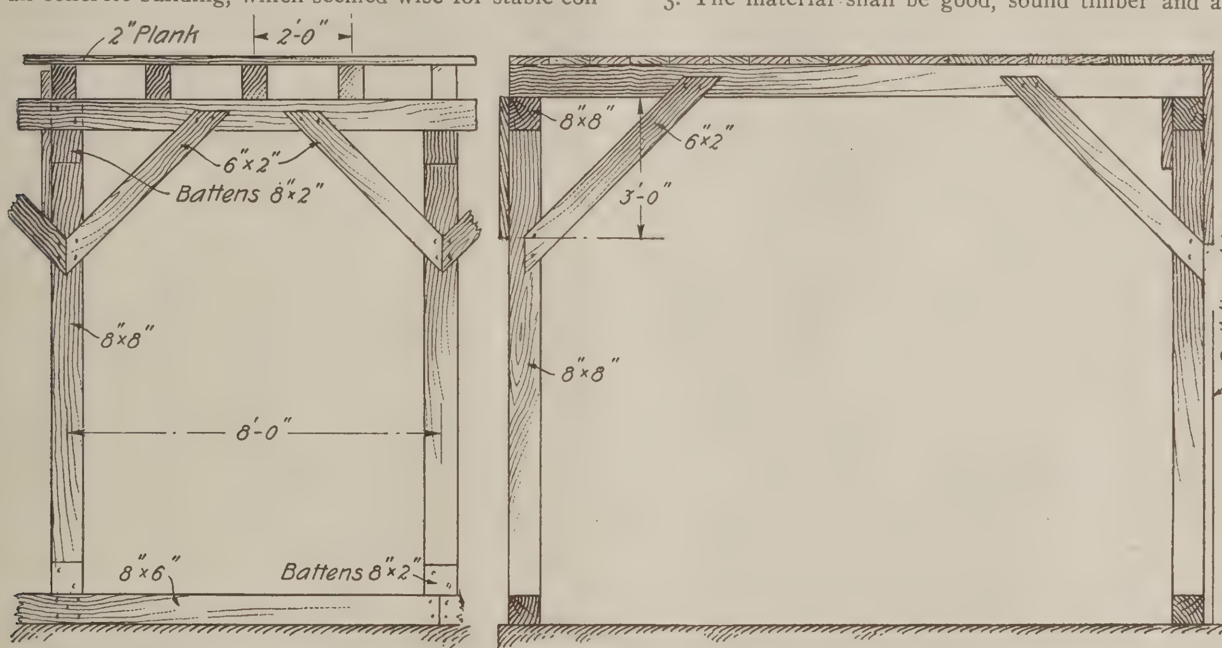
In the matter of cost we constantly see unfair comparisons made between concrete and other materials. For example, you and I, as cement workers, build a dwelling of reinforced concrete from cellar to roof. This type of house is expensive and immediately somebody exclaims "My, your concrete house cost more than my brick house!" As a matter of fact our critic has not a brick house, in the sense that our house is concrete, he merely has a house with brick walls. Suppose he were to introduce the durable and fire-resisting features of the all-concrete house, by having his floors, stairways and other features in brick. What would become of his theory as to excessive cost of concrete? It is in this way that the two materials should be compared. We can easily hold our own when it comes to mere wall construction, and more than hold it when our opponents seek materials of like durability for interiors and roofs.

One of the first things to do in building a concrete house is to get a concrete design, for, of all building material, concrete requires the most individual treatment. Many houses are built of concrete, after being drafted for brick, stone or frame and this is the reason, some people say, they do not like the looks of a concrete house. The houses they have in mind probably would not appeal to us any more than they do to them.

Sheds over Sidewalks During the Erection of Buildings

The following special order in regard to the construction of sheds over sidewalks called for by Section 80 of the Building Code has recently been promulgated by Superintendent of Buildings Rudolph P. Miller, of the Borough of Manhattan, New York City, N. Y.:

1. The shed shall extend from building line to curb.
2. The shed shall be erected as soon as practicable after the building operation has started, and must be completed before any part of the construction is carried more than 35 ft. above the curb.
3. The material shall be good, sound timber and all work shall be done in a substantial manner and shall be securely bolted and spiked.
4. The girders and sills shall be fastened to the posts by means of battens not less than 2 in. thick and with not less than two 20d. spikes in each member connected.
5. The structure shall be braced by means of knee braces both longitudinally and across at every post.
6. The flooring shall be spiked to the cross beams by sufficient 20d. spikes to hold the flooring securely in place.
7. For buildings exceeding 100 ft. in hight and where the sidewalks are 10 ft. or less in width, cross beams shall be not less than 10 x 3 in. and spaced not exceeding 2 ft. center to center; girders not less than 8 x 8 in.; posts not less than 8 x 8 in., and spaced not exceeding 8 ft. center to center; sills not less than 8 x 6 in. and flooring not less than 2 in. in thickness.
8. For buildings exceeding 100 ft. in hight, cross beams shall not be less than 10 x 4 in.
9. For buildings exceeding 65 ft. and less than 100 ft. in hight and where sidewalks are 10 ft. or less in width, beams shall not be less than 8 x 3 in.
10. For buildings exceeding 65 ft. and less than 100 ft. in hight, and where sidewalks are over 10 ft. in width, beams shall not be less than 10 x 3 in. and spaced not exceeding 2 ft. center to center.



Partial Elevation and Cross Section.—Scale, ¼ In. to the Foot.

Sheds over Sidewalks in New York City During the Erection of Buildings.

MEETING OF NORTHWESTERN CEMENT PRODUCTS ASSOCIATION

In spite of many discouragements in the way of severe weather which greatly impeded traffic, blocking trains and preventing travelers from promptly reaching their destinations, the sixth annual meeting of the Northwestern Cement Products Association, which had been transferred from St. Paul to Chicago for reasons stated in a previous issue of this journal, began its sessions on February 18 with an attendance which, all things considered, was very satisfactory.

The members were called to order by W. S. Kingsley, of Faribault, Minn., who was delegated to act as president pro tem., while W. C. Berry, of Minneapolis, filled the office of secretary pro tem. The members were welcomed to the city by E. M. Hagar, prominently identified with the Cement Show, which opened in the city named on that day, and in the course of his remarks he credited the organization with having encouraged the Cement Show from its inception as much as any other single organization had done. He felt that the use of cement was still far from developed, especially in the Eastern States, and as a means of spreading the knowledge of cement and its uses he stated that Madison Square Garden, New York City, had been leased for a Cement Show to be given December 11 to 20 of the present year. He felt that if this exhibit should prove equally as successful as the first show held in Chicago, it would have a marked effect upon the future use of cement throughout the eastern section of the country.

Mr. Hagar was followed by O. U. Miracle, of Minneapolis, who dwelt at some length upon the advance which had been made in the use of cement sewer pipe and urged manufacturers to produce only the very best goods possible upon careful specifications, assuring them that they would have nothing to fear from competing lines. A. W. Menk, of Minneapolis, related some interesting experiences which he had had in connection with the construction of country elevators in which concrete was the prime material.

A considerable portion of the session of February 19 was devoted to a discussion of methods of stripping machine plates from the concrete blocks without injuring the face or appearance of the blocks. Various expedients had been resorted to, some of the members pointing out that oils or paraffine had been used to good advantage. One of the most interesting talks was that by J. V. Godfrey, in the course of which he described a concrete cattle barn which he had constructed in the vicinity of Moorehead, Minn. It was pointed out that while the first cost of frame barns had been found to be cheaper than concrete, the latter was the more economical in the end by reason of the freedom from repairs. He recommended rough finish for driveways to prevent stock from slipping and very wide deep gutters to facilitate thorough cleansing with water under pressure.

At the final session of the meeting a number of excellent papers were presented and the discussion which ensued brought out much information of suggestive value. A. H. Laughlin, Lisbon, N. D., outlined the condition of the cement industry in the Northwest, pointing out how it had made progress against the hostile and indifferent attitude of architects and public generally until it has come to be recognized as a material entitled to due consideration. J. H. Chubb, of the Universal Portland Cement Company, spoke on surface finish for concrete work, illustrating the points made with lantern slides, and holding throughout the deep attention of his audience.

Another interesting talk was by J. K. Hoppin on steel sheet piling, in the course of which he outlined the development of concrete piling, its history and the different forms used in the work. There was also some remarks by President R. L. Humphrey, of the National Association of Cement Users.

The committee on nominations presented its report as to future officers and recommended that A. H. Laughlin, Lisbon, N. D., serve as president until the time for the regular election of officers, the first Monday in October, when the following list of officials are recommended for election, the secretary being directed to cast the ballot for them:

President.......... H. E. Murphy, Manitowoc, Wis.
First Vice-Pres..... Martin T. Roche, St. Paul, Minn.
Second Vice-Pres... A. H. Laughlin, Lisbon, N. D.
Third Vice-Pres.... R. K. Hafsos, Aberdeen, S. D.
Fourth Vice-Pres... C. K. Anderson, Owatonna, Minn.
Fifth Vice-Pres..... J. V. Godfrey, Moorehead, Minn.
Treasurer.......... J. M. Hazen, Minneapolis, Minn.
Secretary.......... H. B. Smith, Minneapolis, Minn.

After the transaction of some other matters of business of lesser importance the meeting adjourned.

Test of Non-Combustible Roofing Material

A short time ago a striking demonstration of non-combustible roofing material was given on the city field in Somerville, Mass., before a gathering of about 75 builders, city officials and others interested in fireproof construction. The demonstration was conducted by Walter F. Turner, of Highland road, for the H. W. Johns-Manville Company's asbestos roofing and siding material.

Two small houses 6 ft. square were built, one covered with the asbestos roofing, and the other with felt material. Brush fires were lighted behind each building at the same time. In fifteen minutes the felt roofing and siding were destroyed, while the building covered with asbestos was simply discolored by smoke from the fire, and in no way seriously damaged.

Wooden Shingles Not a Roof Covering

The Board of Trade of the city of Worcester had on the evening of December 30 what was designated as a "Smoke Talk," and the guest of the evening was F. H. Wentworth, secretary of the National Fire Protection Association, who in the course of his remarks discussed the subject of the shingle roof. In his opinion the wooden shingle is not a roof covering but is a crime. "Except that they are not placed with malicious intent, wooden shingles," he stated, "have all the dire qualities of fagots piled about the victim to be burned at the stake. Any one who witnessed the Chelsea conflagration cannot be other than the enemy of the shingle roof.

"If the roofs of a city are incombustible any conflagration in it will have a distinct fire line, and this fire line will of course extend itself as the conflagration advances. In Chelsea after the first hour there was no fire line; the whole city was afire from different centers; caught from shingle roofs. The belated citizens who tried to save their goods knew not where to flee. Horses, dogs, men, women, children, cats and swarms of rats ran in the streets together, the live coals dropping upon them as they sought avenues of escape. They were impoverished victims of the shingle roof, but for which half the household goods in Chelsea might have been saved. You have great shingled roof areas in Worcester, and I could not leave with you to-night any more valuable admonition than that the Board of Trade should urge the citizens of Worcester to replace such roofs as rapidly as they shall need repair. If slate is too expensive, then choose some one of the many proprietary roofings which have been tested. They are vastly better than having a city covered with tinder."

CORRESPONDENCE

More Trouble with a Fireplace

From G. H. D., Philadelphia, Pa.—The advice of the readers of this paper is sought in reference to the fireplace trouble we have found in the house of one of our customers. The house being finished and occupied, there is little opportunity to do any experimenting, and it is for this reason that we would like to have different opinions as to the cause of the trouble and how to overcome it before undertaking to apply a remedy.

The accompanying photograph shows the location of the house and its surroundings. The house faces the west and the chimney is on the library extension on the south side marked X. The difficulty arises when the wind is blowing northeast and causes a down draft in the chimney, forcing a large volume of smoke into the library. This brought the complaint. The next day, when the test was made, the wind having changed, the chimney showed an excellent draft, with none of the symptoms which caused the complaint of the previous day. The plan of the library shows the location of the fireplace and the flue used in connection with it, which is 13 x 18 in. In the second sketch is an elevation showing how the flue is drawn over, and also a side elevation showing the construction of the chimney at the point where it connects with the throat leading into the fireplace opening.

More Trouble with a Fireplace.—Fig. 1.—House with Troublesome Fireplace and Its Surroundings.

Note.—No doubt the comments of experienced men will be fully appreciated by this correspondent, and they are invited. In the meantime we would suggest that it is probable that the man who had supervision and jurisdiction over the flue, its capacity and its direction should not leave it to the man who furnished the grate linings to see that the fireplace operates properly. It would seem as if the construction at the base of the chimney at the point of connection of the fireplace proper is the cause of the trouble, as it is materially different from the construction generally adopted at this point. It is also notable that fireplaces which have the front opening higher than 30 in. are apt to give trouble if care is not taken to follow approved construction and provide the right dimensions in all particulars.

In the early issues of the current year sketches were presented showing a more approved method of constructing the chimney at the point where the flue unites with the fireplace. A suggestion was also given for placing a hood at the front of a fireplace opening to prevent the discharge of smoke. An explanation of the principles involving construction to insure correct operation was also given. One correspondent recommended that 13 sq. in. of opening of the throat be provided for every square foot of opening in front of the fireplace. Another opinion was that the area of the flue should be one-fifteenth of the area in square inches of the fireplace opening. Possibly with these rules and the sketches which were previously presented the solution of the trouble may be found and a remedy for it devised. On the basis of providing 13 sq. in. of area in the throat for every square foot of opening in the fireplace, the front of the throat should have an area of 156 sq. in., and as it is seldom desirable to make the throat more than 4 in. wide, the throat should be 4 x 39, and it is possible that where the flue is drawn over so abruptly, as is shown in the sketch, that some trouble may be experienced on this account.

Opportunities for an Ambitious Carpenter

From C. J. W., Norfolk, Va.—Answering the letter of "F. S. B.," White Plains, N. Y., I would say that there is every opportunity in the world for a young man in this branch of industry. I do not think there are in any business more independent men than first-class competent carpenters. I say this after a long experience and in three different countries. I must also say that I have never come to the pass where "F. S. B." evidently is.

There is no royal road to success; only fighting and plodding, but onward all the time—no retrograde movement whatever. I will not say that there will be a big fortune in the end, but there will be a competence and a great satisfaction in things accomplished. The amount of experience that "F. S. B." has had is not really very much, but he must strive all the harder to make up for this deficiency. If he will accept the following advice in the spirit in which it is given—that of

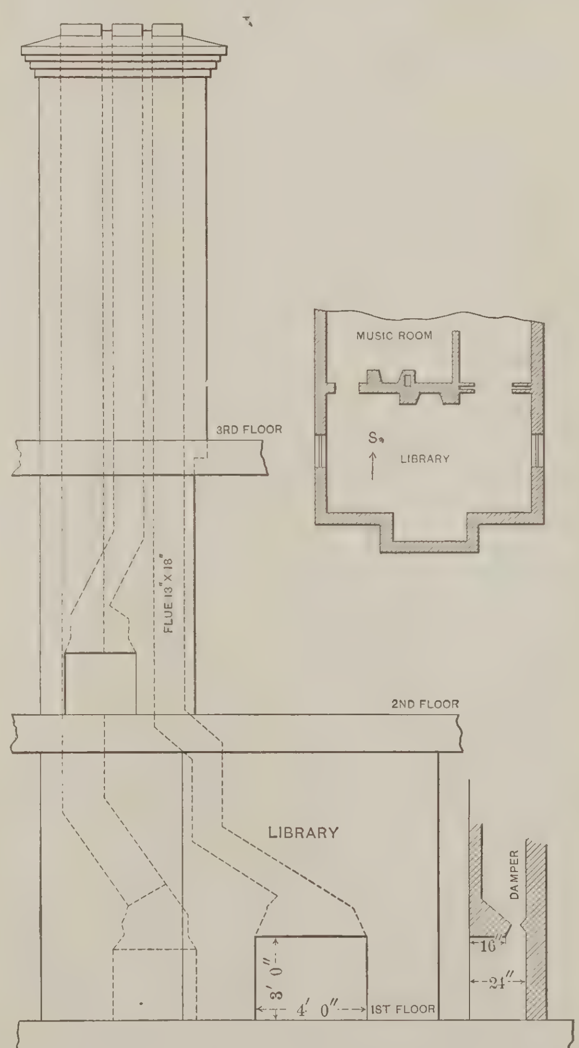


Fig. 2.—Elevations Showing Construction of Flue and Fireplace; also Partial Plan Indicating Position of Chimney.

helping him to form his course of life—there is no doubt but in the future he will laugh to think how easily he was discouraged.

You say you love to do a piece of work the very best that you can. That in itself is very laudable, but can you so handle the work as to give your employer a first-class job and costing him no more than if he had employed those men with the few tools in a basket that you mentioned in your query? From an employer's point of view most jobs resolve themselves into a matter of dollars and cents. A competent man is always put into competition with the incompetent.

Technical works are very good, but can you use them so as to enable you to deliver the work at a less cost than those who are unacquainted with their contents? If so, well and good; otherwise they will be of little use. Do not for a moment think that it is my desire to discourage you in your studies, for such is not the fact; my desire is that you should study your technical works so as to be enabled to compete with those who are not familiar with them.

It matters not how many technical works you have studied nor how much you know unless your knowledge can be put to practical purposes. Another thing; you must be prepared to fight, not with fists, but you will find obstacles placed in your path no matter what you do or where you go; fight, but fight square; do not hit below the belt and disqualify yourself. Look into yourself, find out your proper value and do not under any circumstances lower that estimate. Be sure, however, that the estimate is correct. Do not make a practice of blowing your own horn, especially if it means the placing of your fellow workmen in an unfavorable light. Be true to yourself and others will be more likely to be true to you. Do not concern yourself with any idle stories of your fellow workmen. Do not carry tales to your employer nor in any way try to influence either him or his foreman in your favor. Never truckle to them, either. Be independent; do your work in the best and quickest manner possible and let them understand that you are intending to have your dues and that without fear or favor. Never listen to any tales or tattle either of or from your fellow workmen. If under circumstances which you cannot control you do hear ill of your fellow workmen, forget it at once and under no circumstances repeat it. Such things are only for small minds; show yourself above any petty abuse and if at any time you can help a fellow workman with his work do so and in so doing you may gain a friend. Even if you should not gain a friend, you will at least have the satisfaction of having an enemy who will be less troublesome.

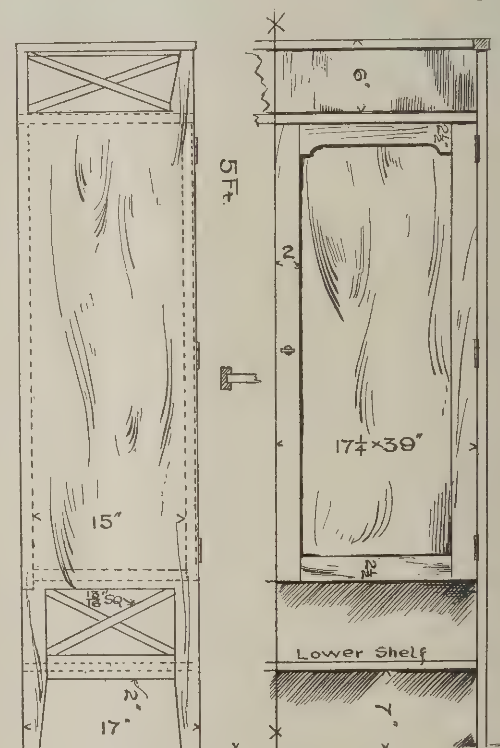
Now all these "don'ts" are not intended to convey the impression that you are to act in any way supercilious either to your employer or your fellow workmen, but that all is to be done in a gentlemanly manner. It can be done. You yourself will feel better and your employers and fellow workmen will appreciate your influence, making affairs better for all concerned. Another thing; get a grip upon yourself and do not let these petty jealousies trouble you. There is a vein of that all through your letter. Be above such things. There is in reality no foundation in fact for any such course. Another thing; they are obstacles to a man's advancement and of no utility whatever.

Let your work speak its own story. No matter what the work is, those who are competent can read the tale, whether it is a fence, sidewalk or a fine piece of cabinet work. The story is always there, capable of being read. As an old brother chip I would suggest that you familiarize yourself with all kinds of hardwood trim, learn to make moldings by hand with hollows and rounds; doors of all kinds; sash, any and all kinds of carpenters', joiners' and cabinet work, wood finishing of all kinds; learn anything and everything pertaining to the building trades. This looks like a large order, but in reality it is not and need not delay your working time, as all can be learned at odd times and at night after your day's work is done.

Another thing to which it is desirable to call your attention is that you will during your business life make mistakes; no man who ever amounted to anything but what makes mistakes at some time or another. However, when you do make a mistake do not try either to excuse yourself or to bluff it out; take your medicine like a man and at the same time take the lesson to heart and do not repeat the same mistake.

Design for Music Cabinet

From Paul D. Otter, Chicago, Ill.—Looking over recent issues of the paper I notice in the November number an inquiry from "H. C. L.," Salt Lake City, regarding the drawings of a music cabinet. I present herewith a few suggestions which may be of advantage to him. The music cabinet indicated in the half front and end views is of simple Mission type without the usual four-post construction. The back filling consists of a paneled frame 33 x 39½ in., having a middle tile if desired. To this the sides as shown are fastened with the three shelf boards previously fitted and brought into



Design for Music Cabinet.

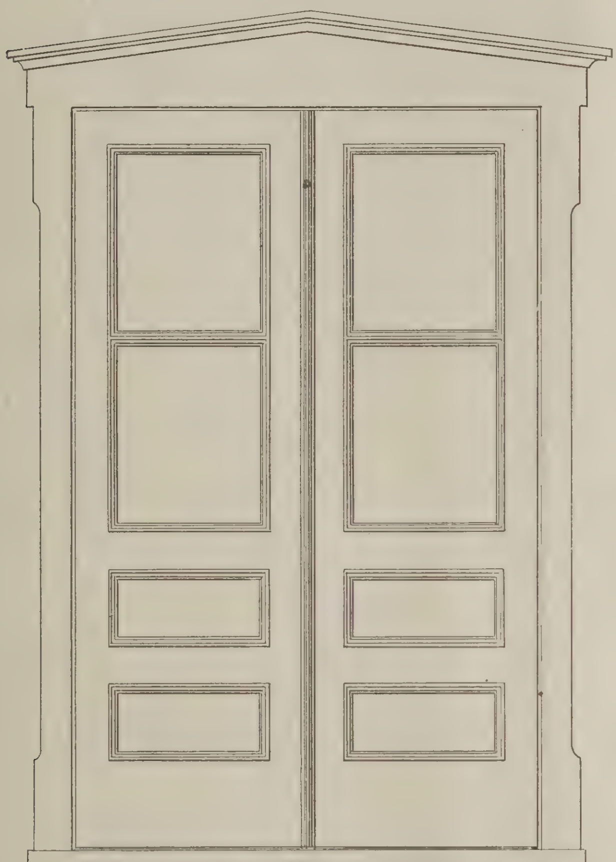
place and secured by screws counterbored and afterwards flush plugged smooth with the surface. On a line with the projecting top the back top board and cap rail is fitted with the criss cross filling of ¾-in. squares. The criss cross at the bottom is fitted in after the side rail is secured by long dowels passings through legs and across the closely fitted joint, the joint being brought up in glue with a bar clamp. The board sides instead of square posts and panel sides permit of the six equal divisions. The boards slide in and out easily on grooved runs as shown in Fig. 1. Two panel doors close in the front, being set a little off of flush with the ends. One-inch lumber should be used for this size of cabinet.

Some Front Entrance Doors

From Matt Riley, Sturgeon Bay, Wis.—I am sending herewith blue prints showing several elevations of front doors, which may possibly be of interest to readers of *The Building Age*. The elevation in Fig. 1

represents an old-fashioned heavily-molded double door that was not quite modern enough to suit the owner, so he called upon me to contrive something different. After I had considered the matter I produced the door shown in Fig. 2, the various sections clearly indicating the construction.

It will be noted that no sash has been used in the transom or side lights, as I consider a more presentable job can be made without, especially when the openings are as narrow as those here shown. The old



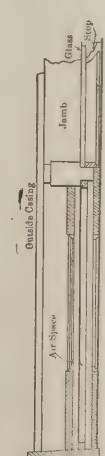
Front Entrance Before It Was Remodeled.

door frame and casings were used, the door jambs and outside casings being pine, painted.

The new door panels, jambs and casings are of oak, light finish. The door posts and transom-bar casings were finished flush with the outside edges of the painted jambs, so that the old, original painted casings stood out their own thickness outside the new work.

In Fig. 3 is presented a somewhat more elaborate design as regards the doors and art glass, while Fig. 4 is of the French order. The doors should be made of selected white pine, with heavy sash bars to be painted white or cream color.

In Fig. 5 is represented another leaded art glass affair somewhat on the order of that shown in Fig. 3, but it will be noticed that curved pieces of wood are shown in the side lights and transom opening. These should be about 7/16 in. thick and set against the rabbets to show on the outside of the glass. Duplicates of them should go on the inside of the glass. These pieces should have a slight bevel.



Section on line B-B of Elevation.

A door on the "Craftsman" or "Mission" order with art glass is represented in Fig. 6. The door should be of oak finished natural, with copper or brass hardware.

The same door frame has been shown on all these doors, but Figs. 3, 5 and 6 could be improved by making use of frames of a heavier order; that is, with more of a cornice, with straight side casings and with a wood scroll on each to show a pilaster effect.

and the craft.

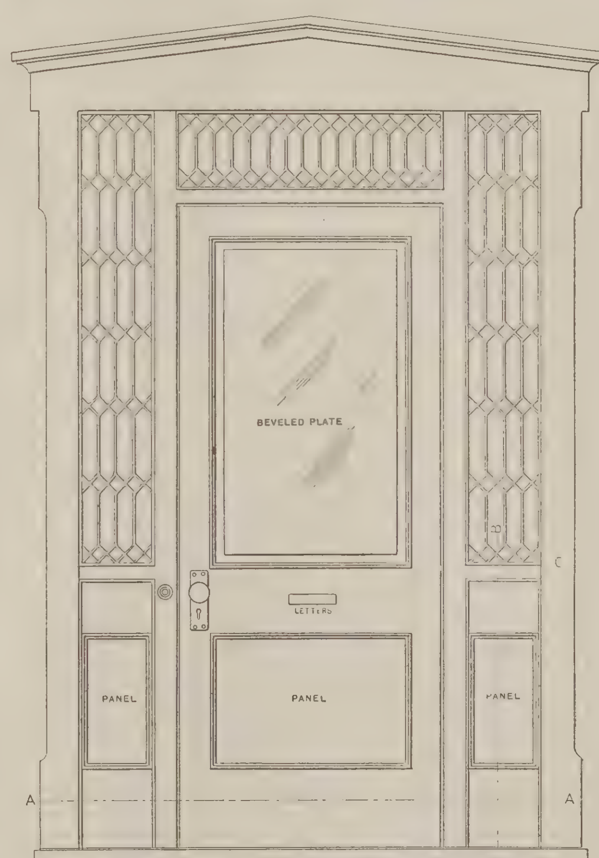
Preventing Plaster from Cracking on Yellow Pine Lath

From H. E. D., Sharon, Pa.—If "G. B. S.," Montgomery City, Mo., will dip or spray the yellow pine plaster lath with water before nailing it up he will have no trouble. I have had the same experience as he describes and it is caused from using very dry sap lath, which expands so much from the moisture in the already set plaster that the latter will break in long horizontal cracks at each lath.

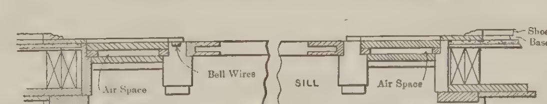
I greatly enjoy reading *The Building Age*. I take several trade journals, but in current slang, which is sometimes more expressive than elegant, *"The Building Age* has them all skinned a mile."

A Question in Rafters

From Parallelogram, Mount Carmel, Ill.—Referring to my communication in the March issue of the paper, I notice an error (or what at least was not intended) in the eleventh line from the top of page 115. The



Elevation of Entrance After Remodeling.



Section on Line A-A of the Elevation.

Some Front Entrance Doors.—Scale, ½-in. to the foot.

word "not" should be eliminated, as the directly opposite meaning was intended. Square, one-third or any other pitch makes no difference if the plan of the roof is *square;* the run of hip rafter is the same as the length of common rafter. Towards the close of the letter 14.42 ft. is the run of the hip rafter and the length of the common rafter in one-third pitch, and not 16.49 ft., as might be inferred from the manner in which it is stated, 16.49 ft. being the length of the hip rafter.

I ask the indulgence of the editor in this further use of valuable space in the columns of the paper, as I do

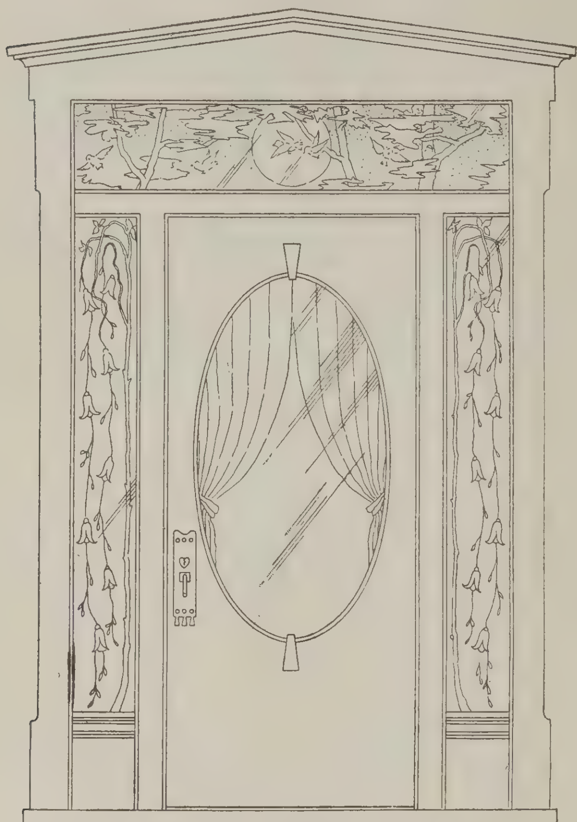


Fig. 3.—A More Elaborate Design.

Fig. 4.—Design of the French Order.

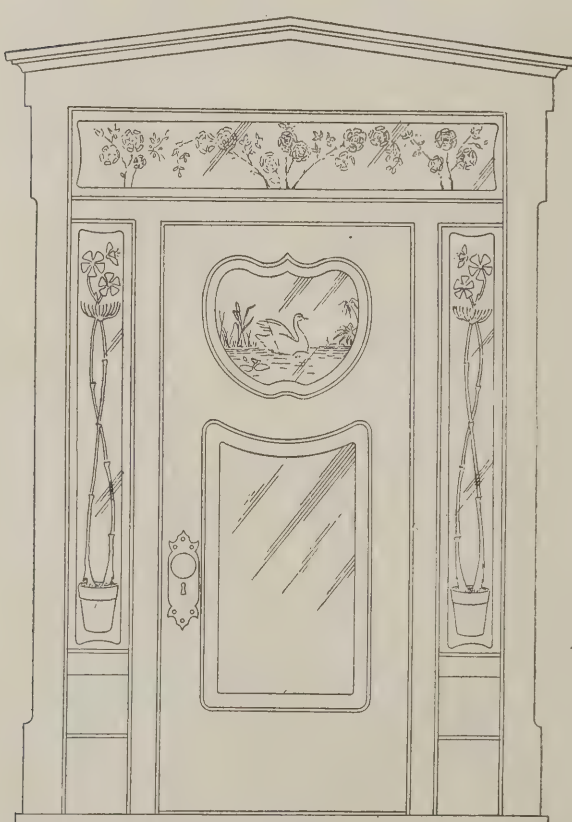


Fig. 5.—A Leaded Glass Design.

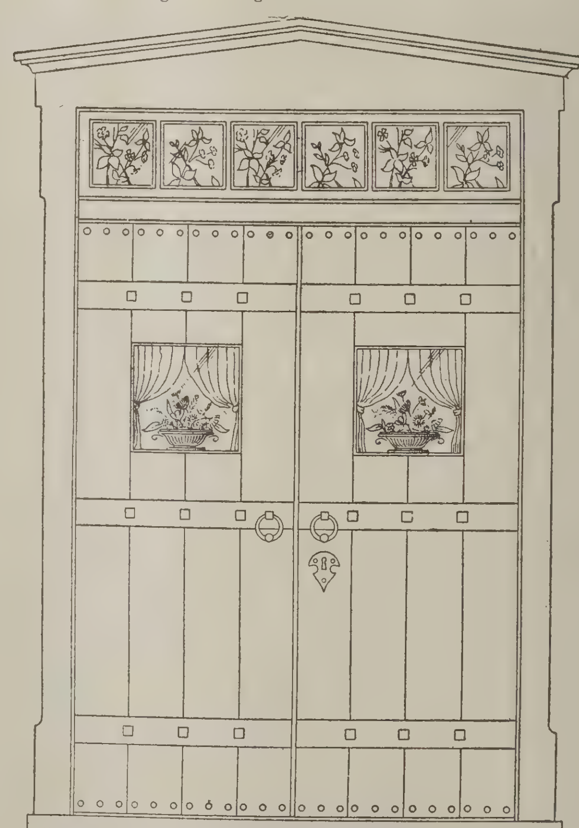


Fig. 6.—A Design on the "Mission" Order.

Some Front Entrance Doors.—Contributed by Matt Riley, Sturgeon Bay, Wis.

not wish to be misunderstood in a matter that is so plain that any carpenter should easily see if he understands what is desired.

I notice an improvement in the current issue of *The Building Age* over its two predecessors, and would like to say at this time to "W. W. B.," of Kansas City, Mo., I "see him" on his 72d-year play and go him five years better, and am still able to do much work if I can get it to do.

Now I want to say, back yonder 60 years, "when I learned the trade" (havn't learned it yet), every board that went into a building had to be ripped and dressed by hand, and in hard, dry ash and oak for flooring we had to "double team" on the match plane. We also had to make all our own doors and sash. There was not much style in the houses, and all sills, girders, corner posts and plates were hewn out in the woods. But enough of this; yours for success of *The Building Age*

Veneering Round Columns

From S. A. T., Boyne City, Mich.—Will some of the readers of *The Building Age* who have had experience in veneering round columns—straight or swelling—tell me through the Correspondence columns how such work should be done? I had occasion not long since to do some work of this kind and when I started in I thought I knew all about it, basing my knowledge on which I had read in various books on the subject. When I got through with the work I made up my mind I did not know the first thing about it. I used a piece of tin with cleats nailed on the edges and clamped it together with hand screws, but the trouble was the cleats would pull off. Any information on this subject from the readers of the paper will be greatly appreciated.

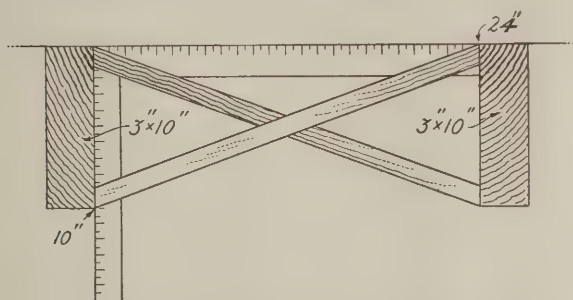


Fig. 1.—Sketch Accompanying Letter of "R. R. S."

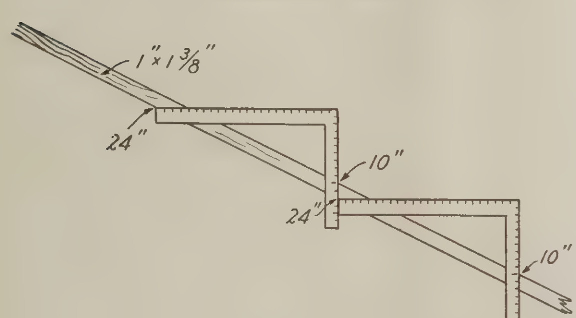


Fig. 2.—Method Suggested by "P. W. F."

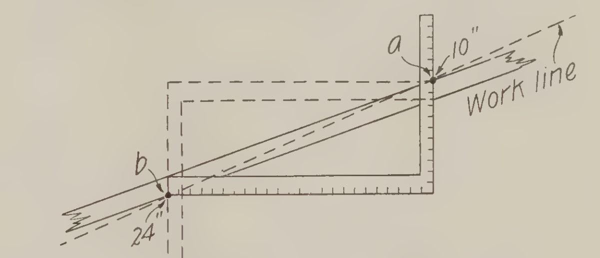


Fig. 3.—Plan Suggested by "Mill-rite" for Applying the Square.

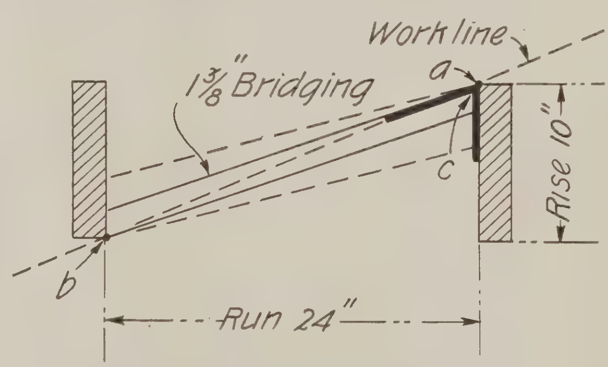


Fig. 4.—Showing Relative Position of the Floor Joist.

Cutting Bridging for Floors.—Methods Suggested by Various Correspondents.

Cutting Bridging for Floors

From R. R. S., Lebanon, Pa.—In looking through the Correspondence Department of the March issue of *The Building Age* I notice that "E. B.," Farmingdale, N. Y., desires to know how to lay off bridging with the steel square for joists 10 in. deep and 24 in. apart in the clear. As the joists are 3 x 10, take 10 in. or the depth of the joist, on the tongue of the square, and 24 in. or the space between the joists on the blade, marking along the tongue gives the bevel.

I think the sketch Fig. 1, which I send, renders my meaning so clear that extended explanation is unnecessary.

From P. W. F., Plainfield, N. J.—I have before me the March issue of *The Building Age* and looking over the Correspondence columns I find the letter of "E. B.," of Farmingdale, N. Y., in which he expresses a desire to know through the Correspondence Department what is the proper and practical way to cut bridging for floors, making use of the steel square. Taking the example which he presents—floor beams 10 in. deep and 24 in. apart—I would say place the steel square on the timber it is desired to cut up for bridging with 10 in. on the tongue on one side of the stick and 24 in. on the blade on the opposite side, all as shown in the accompanying sketch Fig. 2. Mark along the 10-in. side of the tongue and also mark the edge at the point where the 24-in. mark of the blade of the square touches the stick. Move the square along on the stick as one would in laying out a string of stairs until you come to the point where you made the last mark over the 24-in. side of the square, stop there with the tongue of the square and then proceed as before. Continue this operation until the stick is used up, or, if one prefers after the first piece of bridging has been cut, use it for a pattern or template by which to cut the others.

From Mill-Rite, Washington, D. C.—I submit the following for the consideration of "E. B.," of Farmingdale, N. Y., in reply to his query in the March issue of *The Building Age*. Referring to Fig. 3 of the sketches, place the square so that the 10-in. mark on the tongue representing the rise will coincide with any point, as for example *"a"* on one edge of the material worked. Move the square about the point *"a"* until 24 in. on the blade—the corresponding run—will fall at some point as *"b"* on the opposite edge of the material. A line scribed through the points *"a"* and *"b"* diagonally across the piece may be considered as the work line, hence the distance *a b* or 26 in. in this case represents the length required with respect to this work line. The tongue will give the required cut and since the cuts are alike at each end—being parallel—apply the square as shown for the opposite end.

It is understood of course that any set of figures can be used on the square so long as they are in the same proportion, say 5 on the tongue and 12 on the blade applied to the work line as above. Cutting by the tongue will yield the same result.

An inspection of Fig. 3 will show that the length *a b* in any given case remains constant regardless of the thickness of the material; also the cutting angle C, Fig. 4, in any given case remains constant whatever the thickness of the material. Therefore the above is applicable in any case. The only difference between this and cutting an ordinary common rafter is that here you make your working line run diagonally across the piece worked, whereas in the case of a common rafter it is parallel to the edges.

From L. H. S., Philadelphia, Pa.—In answering the inquiry of "E. B.," in the March issue, I would say no matter what may be the thickness of the material for bridging, take the distance between joists on one side of the stick and the depth of joist on the other side; cut on depth. Reverse the square, make the same measurements and cut on the depth.

Note.—We also have replies of a somewhat similar nature to those above presented from "P. J. L.," Pittsburg, Pa.; "A. D. H.," North Yakima, Wash.; "G. L. McM.," Tacoma, Wash., and "H. B.," Justin, Ohio.

From J. McC., Camden, N. J.—As a new reader of your valuable paper I desire to say that I am very much interested in the Correspondence columns and would like to become better acquainted with the readers by trying to help some of those making inquiries. Referring to the letter of "E. B." in the March number, if his joists are 10 in. deep and spaced 24 in. on centers he can take 10 in. on the tongue of his steel square and 22 in. on the blade and hold them on opposite edges of his stuff regardless of thickness. Marking on the tongue will give his first cut; then if he will reverse his square, holding the 22-in. mark on his long point and the 10 in. where it will on the opposite edge, gives him both length and last cut. The rule should apply to any depth or spacing.

These figures are based on 2-in. joists. If 3-in. are used the figures would be 21 in. and 10 in., or the actual distance between the joists and the depth.

Is the Contractor Liable to the Owner?

From M. K., Newark, N. J.—I am a constant reader of the paper and very seldom miss looking over the various paragraphs appearing under the title "Law in the Building Trades." Like our friend in Lowell, Mass., I have a question somewhat similar to ask, but it differs in detail.

A contractor enters into contract with the owner for a new building, no mention being made in the contract as to the time of completion. A few days later the contractor in the presence of a witness promises the owner, verbally, that he would have the building completed at a set time or partially completed, such as having the building under lock and key. The owner demanded of the contractor when he would complete the building, so he could make agreements with his customers.

It was seen by both the owner and the superintendent of construction from the way the contractor was progressing with the work that he could not possibly complete the building on time. The contractor's attention was called to his verbal promise, but he still insisted he would complete the building on time.

The owner no longer would hold faith in the contractor in regard to his promise, so the contractor agreed to sign the following note, which was written by hand on a sheet of legal cap and signed by the contractor: (Copy:)

Mr. Owner, Newark, N. J., Sept. 8, 1909.
Newark, N. J.

Dear Sir:—I will agree to complete all work temporarily or permanently by placing sash and doors, so as to keep same enclosed and under lock and key for the new garage building to be erected on —— address, Newark, N. J., so that you will be able to do business by Monday A. M., Sept. 13, 1909.

Should I fail to fulfil the above said agreement, I will forfeit ten dollars ($10) for every day over time of the above said date of completion time, and, besides, the forfeiture shall take effect from this day, Sept. 8, 1909, inclusive.

I hereby place my signature in the presence of the undersigned witness.

Contractor's name ....
Address in full......................
Witness name................................

P. S.—This agreement is submitted to you under the following conditions, that you remit a payment of three hundred dollars ($300) to us not later than Saturday noon, Sept. 11, 1909.

If payment is not remitted, this entire agreement is void.

Yours respectfully,
Contractor's name......................

I might say that the payment of $300 mentioned is the payment due the contractor from the owner, as part of his contract.

The contractor's payments were paid by the owner, a certain percentage of monthly requisitional basis, the monthly retainer to be paid with the final payment.

Through the failure of the contractor in not having the building completed on time as per his agreement, the owner suffered a loss in business of several times the amount of the forfeiture to be paid by the contractor. Again, the owner threatened the contractor that he would hold up the said payment of $300, which was the only way the owner could get the contractor to guarantee his promises, by the forfeiture clause.

I might also mention that there was more than one contractor in connection with the execution of the building, but they did not delay the contractor mentioned, as the other contractors had their work completed several weeks before the contractor spoken of had started his work.

Now I would like to know in particular, is the contractor liable for the forfeiture to the owner?

Answer.—In commenting upon the questions raised by our correspondent, A. L. S. Street, who furnishes the legal decisions published elsewhere in our journal under the heading "Law in the Building Trades," says:

A correct answer to the question of the correspondent depends upon the following conditions, which do not clearly appear from the foregoing statement: Whether it was understood, when the original written contract was made though not expressed therein, that the work should be completed by September 13; and, if no such time was agreed upon, whether the $300 payment was due on or before September 11 under the original agreement. Whether the forfeiture agreed upon was excessively disproportionate to the loss sustained by the owner through the delayed completion of the work.

If there was no such understanding and the $300 was due by September 11, the contractor would not be legally bound by his agreements made after the original contract was executed, since they would not be supported by any consideration moving from the owner to the contractor. To be enforceable, every agreement to do or not to do an act must be sustained by a reciprocal agreement by the other party to do or not to do some act he is not already bound to do or not to do. But if the contractor's agreements respecting the time for completion of the work were made to supply something that was understood when the original contract was made but omitted from the writing, or if the owner, to induce the agreements, promised to pay the $300 before it was due under the original contract, the contractor would be liable for the forfeit agreed upon, unless it was excessively disproportionate to the loss sustained by the owner, in which case the liability would be measured by the actual loss.

Square Balusters in Stair Construction

From Morris Williams, Pennsylvania.—Referring to the letter of "P. F. E." in the February issue, page 70, of *The Building Age*, I would say that it may be some satisfaction to the correspondent to know that a few years ago in this section it was almost a craze to use only square newels and square balusters and all over the country such constructions are now to be seen, but always in the better class of residences. If the correspondent will refer to some of the previous numbers of *Carpentry and Building* he will find details of such construction accompanying plans of buildings designed by architects of national repute. It seems, therefore, that it would not be poor taste to use them. However, it is only a matter of taste, as also is the cross section size of the balusters and newels.

In the city where I reside the most common size for a square baluster in a good job is 1 in., the balusters being fixed 1 in. apart. The work when finished rarely fails to suit the public taste, which of course is the object desired in all constructions. The cross section size of the balusters being 1⅜ x 1⅜ in. does not materially alter the ornamental effect, but rather gives it a more stable aspect.

What should be carefully considered, as it appears to me, when larger size balusters are used are the relative proportions of the other members, such as the newel and the rail. A little attention to this matter, whatever may be the size of baluster, will surely produce a stairway worthy of the times.

Finding Lengths of Jack Rafters

From James Bremner, Portland, Ore.—Being a constant purchaser of your very valuable publication, I take this occasion to reply to "Constant Reader," who in the February issue asked about the jack rafters 6-in. and 10-in. pitch placed 20 in. on centers. I would say to him first get the length of the common rafter. Suppose the span of the roof is 36 ft., the run would then be 18 ft. to a feather edge ridge. As he wants a 10-in. pitch given to an end-hip roof, multiply 18 x 10 and divide by 12, or take 5/6 of 18 and the result is 15 ft. as the "rise" or hight of the roof. As the run to the hight of a 6-in. pitch is 2 to 1, double 15 and we get 30 ft., which equals the side run of the roof.

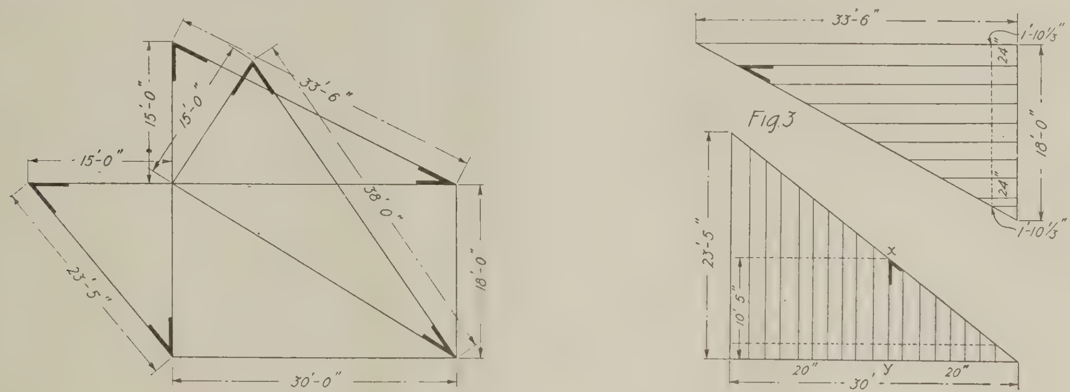
The plan now of the jack rectangle for one hip is 30 x 18 ft. and the hight 15 ft. Take the diagonal of 15 and 18—that is, the hight and run—from the steel square and we get at once the length of the end common rafter 23 ft. 5 in. Double a diagonal of 15 and 7½ and we get 33½ ft., the length of the common rafter on the other side.

The diagonal of the two runs give the run of the hip and the diagonal of the hip, run and hight, 15 ft., gives the length, 38 ft., of the hip.

For "backing" or edge bevel of jacks take the length of the common rafter on 10-in. pitch and the run of the common rafter on 6-in. pitch and the length gives the cut for 10-in. pitch. Conversely the length on 6-in. pitch and run on 10-in. pitch gives out for 6-in. pitch. Combine the plumb cut of their respective common rafters and we get the complete cut of the jacks.

Referring to Fig. 1 of the accompanying diagrams, which are drawn to a scale of 1/20 in. to the foot, divide the long run of 360 in. by 20 and thereby obtain 18 jack divisions spaced 20 in. center to center, as shown in the diagram Fig. 2. Now divide the length of that common rafter 23 ft. 5 in. by 18 and we get 1 ft. 3 11/18 in. as the length of the shortest jack on that side. As each successive jack is increased by the length of the shortest one longer than its immediate predecessor, the best way is to space off with a pair of large compass dividers 18 equal divisions on the common rafter.

For example, the eighth jack is 8 times 1 ft. 3 11/18 in. equal to 10 ft. 5 in. long, as seen by the dotted line in Fig. 2. It meets the hip and plate at x and y. In the same way take the 18th of 33½ ft. and we get 1 ft. 10⅓ in., the length of the shortest jack on the other side. Then the whole 17 couple of jack rafters will be found to meet together on the hip, but the spaces on the short wall plate will only be 12 in. on centers, or 24 in. if half the number be spaced as shown in Fig. 3. Of course we could space them 20 in. on the short plate also, but in that case they would not meet the opposite jacks as couples.



Finding Lengths of Jack Rafters.—Figs. 1, 2 and 3.—Diagrams Accompanying Letter of James Bremner.

For speed and convenience take off on two sides of a rod the lengths of the jacks and use a box pattern for edge and plumb cuts and wall plate notch. The dimensions of the corresponding portions of the other half of jack area are exactly equal.

In the three skeleton diagrams I have given every length and cut required for the construction of the roof.

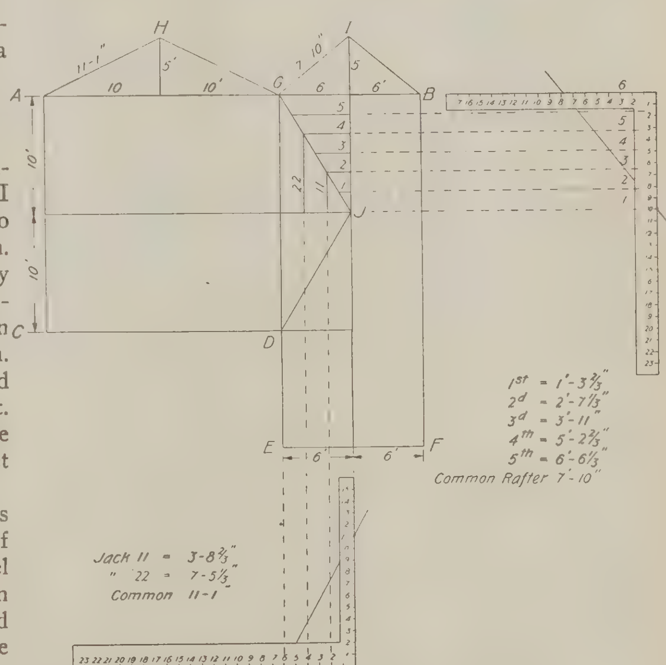


Fig. 4.—Diagram sent by R. W. McDowell.

From R. W. McDowell, Uniontown, Pa.—In the February number "Constant Reader" wants to know how to get the lengths of jack rafters on a roof having two pitches and refers to an explanation which appeared in *Carpentry and Building* many years ago. I do not recall just the method which he evidently has in mind, as I do not happen to have the volume he mentions. It is, however, not a hard matter to find the lengths of jack rafters whether the two roofs are of the same pitch or not.

Referring to the accompanying diagram Fig. 4, assume that the gable end A C is of 20 ft. span, with a rise of 5 ft. or 6-in. rise to each foot of run. The gable end E F is of 12-ft. span, with a rise of 5 ft. or 10-in. rise to each foot of run. The common rafter on this side is 7 ft. 10 in. As the run of the other side of the roof is 10 ft. and the jacks are spaced 20 in., there will be five of them or six rafters altogether, including the common rafter.

Divide 7 ft. 10 in. or 94 in. by 6 and you have the length of the first jack, 15⅔ in. Multiply this by 2 and we have the length of the second; by 3 and we have the length of the third and so on.

If it is desired to get this by the square and at the same time get the side cuts, take 10 in. on the blade and 7 10/12 in. on the tongue; apply to a straight-edged board, mark along the blade and divide this line into spaces 1 8/12 in. apart. Slide the square along to each of these spaces in turn and the tongue will give the lengths of the jacks and the cuts to fit along the valley. The diagram shows the application quite clearly.

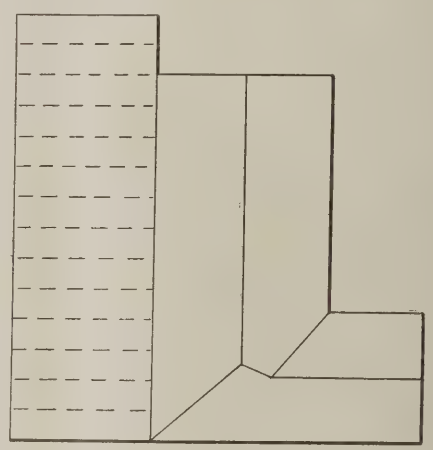
Frank G. Odell made a good point in a letter published a couple of years ago when he advised any one in doubt about the proper manner of obtaining lengths of cuts of any rafter to go upon a roof before the sheathing is put on and just imagine a square with a 24-ft. blade and a 16-ft. tongue applied to the various jacks, hips and valleys, as the case may be. The proper way to handle the ordinary square will thus be readily understood. In this connection permit me to remark that a good square is worth a whole kit of patent framing tools and is easier to handle provided a person just takes time enough to figure out how to apply it intelligently.

Raising the Roof of an Addition to a Building

From J. H. B., Caledonia, Can.—Will some of the practical readers of the paper be kind enough to give me a little hint as to the best and cheapest method of railing the roof of a one-story extension, so that it will be two stories in hight and correspond with the main structure? The extension at present is in the nature of a lean-to, the roof of which is 12 x 36 ft. This is the part that I want to raise to two stories in hight.

One of the sketches which I send represents an end view of the building, while the plan represents the roof of the main building and lean-to, the latter being indicated by dotted lines. Any information that may be vouchsafed will be greatly appreciated.

End Elevation of House.



Plan of Roof Showing "Lean-to" in Dotted Lines.

Raising the Roof of an Addition to a Building.

What is Meant by "Rift Sawing"?

From R. R., Tremont, N. Y.—Will you kindly inform me through the columns of the Correspondence Department the meaning of "rift sawing" and where is it used?

Answer.—The term rift sawing is sometimes used in place of "quarter sawing" and signifies that the log is cut into quarters before being reduced to boards. In genuine quarter sawing the cuts are as nearly as possible at right angles with the circles of growth or parallel with what are termed the medullary rays. The expressions quarter sawed, rift sawed, vertical grained, straight grained and edge grained as applied to boards mean practically the same thing. Quarter-sawed lumber is used for a variety of purposes, the finest furniture being made from it, as well as the finest finish, clapboarding, flooring, etc.

What Old Subscribers Say of "Carpentry and Building" and "The Building Age."

From J. R. M., Oregon.—I am especially well impressed with the auspicious beginning of *The Building Age*, but am still better pleased to learn that there will be retained the characteristic features which have for so many years made it an ever welcome and always indispensable visitor to the homes of the rank and file of the craft. But time changes and men and institutions change with it, and it is well; but however much it may be expanded, whatever may be its future attraction, I am sure it cannot erase the memory of that friend of apprentice days—*Carpentry and Building.* Peace be to its memory! Reluctantly we lay aside the old to take up the new.

From F. W., St. Charles, Minn.—In connection with the oldest subscribers to the paper mentioned in the February number, I would like to add my name to the list, as I possess bound volumes of *Carpentry and Building* from January, 1884 (Vol. VI., No. 1) and I received the volume for 1909 from the bookbinder a few days ago. I have a uniform binding for all the volumes, making it an excellent reference library, of which I am proud. I first subscribed for *Carpentry and Building* in June, 1883, but did not begin to save the copies until January, 1884, so I think I am one of the oldest subscribers.

From C. H. S., State College, Pa.—I have been taking *Carpentry and Building* for twenty years and during that entire period was very much interested in it. I am, however, more than pleased with *The Building Age* and hope it may still further improve.

Concrete Cottages for Workingmen

More or less reference has recently been made in the daily press to the use of concrete in the construction of a number of cottages for workingmen at Mineville, N. Y., at which place the mining company has thousands of acres of timber lands and until recently lumber was the cheapest material for building purposes. Since lumber, however, began to be a scarce article, so to speak, nearly all the important buildings, including more than 50 workingmen's cottages, have been constructed of concrete. The tailings from the concentrating plant make an excellent aggregate when cement is used in the ratio of 1:5, with no sand or gravel; the result is said to be an unusually strong concrete block. In the picture which we present herewith we show a row of these concrete cottages with their immediate surroundings.

While the cost of these concrete cottages is said to be nearly the same as if built of wood, the much lower cost of maintenance and the fact of being practically indestructible by fire make a pronounced ultimate economy. It is intimated as probable that no more permanent structures of wood will be built at Mineville, and thus in time as wooden buildings are displaced it will be practically given over to concrete construction.

Retaining walls have been made from cement and tailings in the ratio of 1:20, while excellent roads have been built of mixtures of 1:9. Shipments of the tailings have been made to other points for concrete work in view of the excellent results secured with them. It is said that the analysis of the tailings shows 13.14 per cent. iron; 3.47 per cent. alumina; 68.40 per cent. silica, and 7.02 per cent. lime.

Concrete Cottages for Workingmen.

Novel Exhibition Buildings

What will be known when completed as the Merchants and Manufacturers' Exchange, and will probably be the greatest mercantile show place in the world, is about to be constructed on two city blocks each 200 x 275 ft., between Lexington avenue and Depew place from Forty-sixth to Forty-eighth streets, New York City. There will be two structures of twelve stories each and, according to the plans of Reed & Stem, architects, the estimated cost will be $2,000,000 each. They will be joined by a five-storied bridge from the third floor of the buildings over Forty-seventh street. The proposed buildings will form part of the $20,000,000 terminal improvements which are being effected by the New York Central Railroad Company. It is expected to have the buildings ready for occupancy late in the spring or early in the summer of next year.

Building Laws of London in 1712

We have received, through the courtesy of W. J. Hydon, Phelps, N. Y., the following relating to the building laws of the city of London in the year 1712, copied from "Mortimer's Husbandry" of that year. Our correspondent states that if the readers would find it interesting he will send the whole cost of a brick house of that time, beginning with the cost of digging the trench and running through the various materials, with contract prices per square for doing the work. There were no saw mills, and the timber was cut by hand at so much per hundred feet. The building laws referred to, read as follows:

BUILDING LAWS OF LONDON BY ACT OF PARLIAMENT, 1712.

General Rules

1st.—In every foundation within the ground add one brick in thickness to the thickness of the wall next above the foundation, to be set off in three courses equally on both sides.

2nd.—That no timber be laid within 12 in. of the foreside of the chimney jambs, and that all joist on back of any chimney be laid with a trimmer 6 in. distant from the back.

3rd.—That no timber be laid within the funnel of any chimney upon penalty to the workman of 10 shillings, and 10 shillings per week for every week it continues unreformed.

4th.—That no joist or rafters be laid at a greater distance apart than 12 in.

5th.—That no joist bear at larger length than 10 foot, and no single rafters at more in length than nine foot.

6th.—That all roofs, window frames and cellar floors be of oak.

7th.—That the tile pins be of oak.

8th.—That no girders do lie less than 10 in. into the wall nor joist less than 8 in., to be laid in loam, because mortar is apt to rot all timber.

9th.—That no girders do lie over the head of door or windows.

10th.—That good oak timber be laid over doors and windows and good arches be turned over them.

Foundations

Where a house is set on moist ground dig the earth 2 ft. deep and, having beaten it well, lay a bed of mortar or cement from either side to the channel, then lay a bed of cinders upon the mortar, beat well and cover it well with another cement of lime, sand

and ashes, and this will drink up the moisture and make it dry.

But if the earth you build on is very soft, as in moorish (swampy) ground, you must get good pieces of oak whose length must be the breadth of the trench, or about two foot longer than the breadth of the wall, and, being well rammed down, lay long planks upon them 4 in. wider on a side than the basis or foot of the wall, and to be well pinned or spiked down to the pieces of oak on which they lie.

But if the ground is so very bad that this will not do, you must provide good piles of oak of such a length as will reach good ground and whose diameter must be about one-twelfth part of their length, well driven down with an engine, and then lay long planks upon them, pinning them fast.

But if the earth is only faulty in some places and good in others, you may turn arches over those places which will discharge them of the weight.

SPAN OF GIRDER.	SIZE.
14 ft. to 16 ft.	8 in. x 11 in.
18 ft. to 20 ft.	9 in. x 13 in.
20 ft. to 23 ft.	10 in. x 14 in.
23 ft. to 26 ft.	12 in. x 16 in.
26 ft. to 28 ft.	14 in. x 17 in.
SPAN OF JOIST.	SIZE.
10½ to 11½ ft.	3 x 6. 3 x 8.
LENGTH OF RAFTERS.	SIZE.
6 ft. 6.	3½ x 6.
9 ft. 6.	4 x 5.

Architectural Exhibition of T-Square Club

The Sixteenth Annual Architectural Exhibition of the T-Square Club and the Philadelphia Chapter of the American Institute of Architects will be held April 9 to May 8 inclusive, under the patronage and at the galleries of the Pennsylvania Academy of Fine Arts in Broad street above Arch street, Philadelphia, Pa. The aim of the club is to have the exhibition thoroughly representative of the best in American domestic architecture, and to make a success of the project the hearty co-operation of architects who have made a special study of the various problems involved is of course essential. In connection with the exhibition a "Year Book and Catalogue" will be issued in the form of an illustrated work on Domestic Architecture, the scope of which will not be limited, as the intention is to represent as far as possible each section of the United States.

Dwellings of Terra Cotta Tile in Brooklyn

The gradually increasing popularity of terra cotta tile for use in connection with dwelling construction is observable in the cases becoming public where operations involving this material are being undertaken. In the last week in February the Department of Buildings in Brooklyn approved the plans for the first dwelling of terra cotta in that borough. The building is to be erected at Avenue I and East Ninth street, in accordance with drawings prepared by Architects Squires & Wynkoop, of 44 Cortlandt street, New York City. The walls, floors and partitions are to be hollow terra cotta blocks and the exterior surface will be covered with stucco, something after the style of the building involved in an operation recently described in these columns. In the walls the blocks are to be of vitrified clay and their thickness for the basement and first floor must be 10 in., while for the second floor and gables it will be 8 in. The blocks in the floors will also be 8 in. thick.

The engineers of the building department of the borough studied the question very carefully and looked up the record of "past performances," so to speak, before the plans were approved. The decision is important to suburban builders and prospective houseowners because it paves the way for use within the corporate city limits of a fireproof material, which is made available through the steadily increasing cost of lumber. Local builders had been awaiting the decision of the Brooklyn Borough with great interest, as it is the outlying districts that will be largely affected by it; that is, the sections of the city where detached houses prevail.

Dull Finish for Rough Plastered Walls

A contractor in Pennsylvania who had several rooms in a school building to paint where the walls were rough plastered and the finish was to be a dull one, wrote to *The Painters' Magazine* to know what size to use on the walls and how to mix the paint in order to obtain the result desired. The journal in question replied as follows:

For cheap work size the walls with a wall or suction varnish, then apply one coat of oil paint, a mixture of equal parts pure lead and pure zinc in oil, thinned with three parts raw linseed oil and one part turpentine and dryer in equal portions. Have this mixture tinted with oil colors, same as the finish desired.

For the finish use zinc white ground in oil, tinted to suit, and thin with one part raw oil and three parts turpentine with sufficient japan dryer. Have this paint stout and stipple it, as in this way you will have the best, most uniform effect.

Another method is to thin down pure white lead in oil with raw oil, not over ten pounds lead to one gallon of oil, adding a trifle japan, applying this direct to the plaster. When dry apply a coat of glue size prepared as follows: One pound good white glue dissolved in one-half gallon of boiling water, one pound good bar soap dissolved in one quart boiling water and two pounds of alum dissolved in one quart of boiling water. Add these solutions, while still warm, together, stirring in the meantime. The alum water should be added last, and slowly. When all is smooth add enough cold water to make it of the consistency of heavy varnish.

Apply the size with a large wall brush, and, if it does not work free enough, warm it some. Follow this with two coats of paint, as described above for the first method.

Shingle Effects in House Construction

In commenting upon the fact that the outside walls of bungalows are occasionally covered with cypress shingles which are split or rived instead of sawn, a writer makes the point that while the cost is very much greater than where other kinds of shingles are used the expense is justified by reason of the more attractive effects produced. "The sawn shingle," he says, "is apt to get a dingy, weather-beaten look under the action of sun and wind, unless some treatment such as oil or stain is given to it in the beginning. But the rived shingle has exactly the surface of the growing tree from which the bark has been peeled, or, to be more exact, of the split surface of a trunk from which a bough has been torn, leaving the wood exposed.

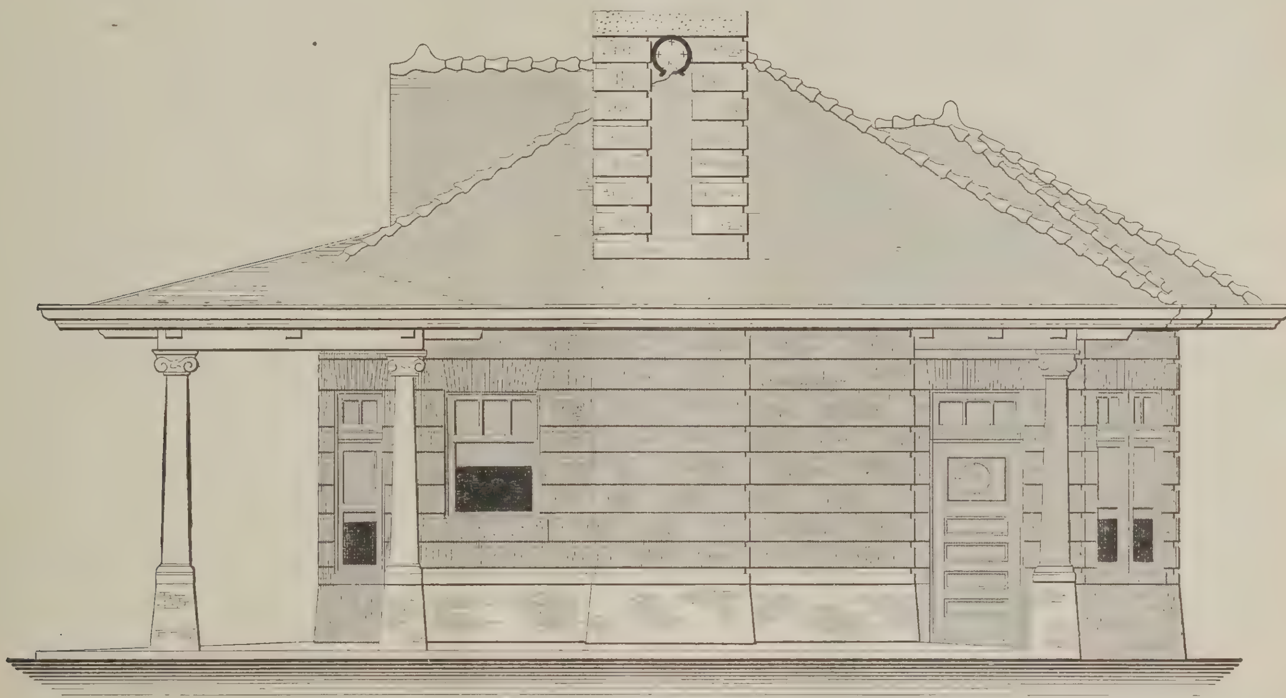
"This smooth natural surface takes on a beautiful color quality under the action of the weather, as the color of the wood itself deepens and shows as an undertone below the smooth, silvery sheen of the surface, an effect which is entirely lost when this natural glint is covered with the 'fuzz' left by the saw."

WHAT IS SAID TO BE THE LARGEST BLUESTONE FLAGS ever used in a pavement have just been quarried near Mill Rift, Pa., for the sidewalk in front of the residence of a wealthy New Yorker. The stones, of which three have already been quarried, are 22 ft. long, 12 ft. wide and 10 ft. thick.

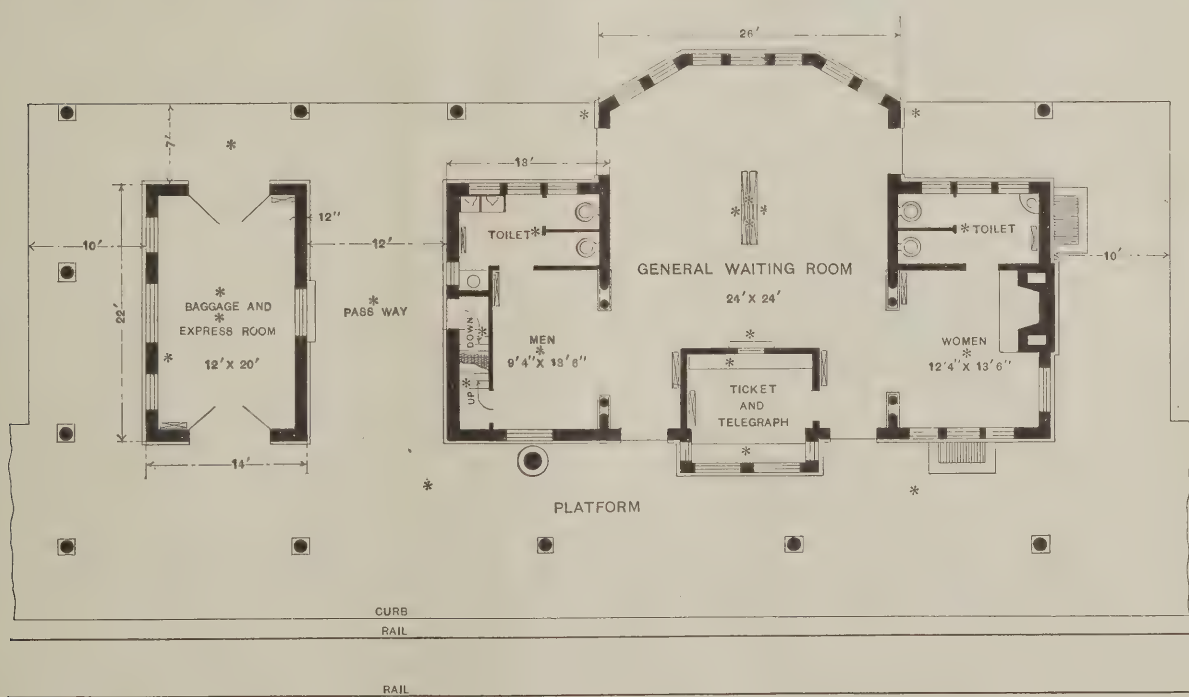
DESIGN FOR A SUBURBAN RAILROAD STATION

MANY of the practical readers are likely to be interested in the design which we present herewith, relating to the design of a railroad station well adapted to meet the requirements of suburban traffic, more especially in the neighborhood of some of the larger cities of the country. The floor plan shows a large open fireplace. A passageway 12 ft. wide separates the main building from the baggage and express room, which measures 12 x 20 ft.

The station is of red brick, the roof being covered with Ludowici tile of the same shade as the brick. All outside woodwork, as well as ceilings, columns, etc., is



End Elevation.—Tracks to the Left.—Scale, 1/16 In. to the Foot.



Main-Floor Plan.—Scale, 1/16 In. to the Foot.

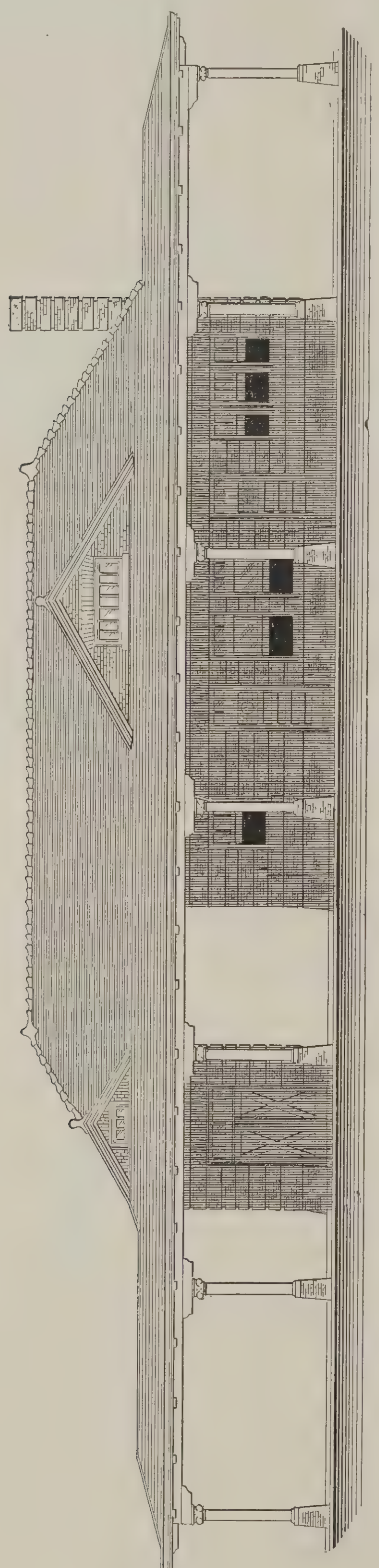
Design for a Suburban Railroad Station.—William S. Babcock, Architect, New York City.

well-considered arrangement of the interior, the general waiting room measuring 24 x 24 ft. in area, not including the spaces at the right and left of the ticket and telegraph office. There is a smoking room for the men at the left and a retiring room for women at the right, while out of each open well-equipped toilet rooms. A feature of the retiring room for women is a painted ivory white. The doors are oak, with glass panels and wrought iron grilles. No colored glass is used. The building has hardwood floors, is arranged for lighting by electricity and is heated by hot water.

The station here shown was designed for the New York, New Haven and Hartford Railroad Company by William S. Babcock, 17 Battery place, New York City.

Longitudinal Reinforcement in Concrete Columns

At the convention of the National Association of Cement Users, held in Chicago the last week in February, a paper on the above subject was read by Sanford E. Thompson, consulting engineer, from which we take the following:



Design for a Suburban Railroad Station.—Track Elevation.—Scale, 1/16-in. to the Foot.

Of the three common methods of strengthening concrete columns, so as to reduce the size below that which would be required by an ordinary mixture of plain concrete—namely, a rich mixture, longitudinal reinforcement and hooping—each has its advantages and limitations.

By increasing the percentage of cement there is an increase in the strength of the concrete per square inch of section. By inserting vertical steel, this receives a share of the compression and thus permits heavier loading. By hooping or banding, the ultimate strength is increased and the column is rendered more ductile.

The writer has presented on previous occasions the limitations of hooping, which, although very effective, is increasing the ultimate strength of the column, does not greatly advance the point of the first beginning of the failure, because the hoops do not get into action until the concrete begins to crush and expand laterally, so as to put tension on the hoops. Columns with longitudinal reinforcement imbedded in them to reduce their size are apt to be more expensive than plain concrete columns of equal strength, but the occasional criticisms that vertical bars do not add to the strength of the column are absolutely unfounded by either theory or text. On the contrary, both theory and experiments show that the longitudinal reinforcement properly placed does actually increase the strength of the column.

The principle is very simple. When a load is placed on a column of any material whatever it is shortened by a small amount, but this shortening within working limits is substantially in proportion to the load placed upon it; that is, with a column of any homogeneous material if the working load is doubled, the amount of shortening is also doubled. Now, if vertical steel bars are imbedded in concrete, they also must shorten with the concrete when the load is applied, and therefore they relieve the concrete of a portion of its load. It is physically impossible to prevent such vertical steel taking a part of the load unless the steel slips or buckles, and since the power of resistance of the steel bars to shortening is greater than that of the concrete, the load necessary to shorten them is proportionally greater than would be required for concrete of the same area. The action of structural steel reinforcement is similar, provided the bond between the steel and the concrete is perfect. This bond is more difficult to obtain with vertical structural steel than with vertical bars, and tests with latticed angle-bar reinforcement have indicated a less effective increase of strength with this structural steel than with vertical bars.

Considering then only columns with bar reinforcement, the question is whether these vertical steel bars do slip or buckle. Evidently they cannot slip if the ends are securely held by the concrete, and this is always the case if they are properly butted or lapped for a sufficient length. As to buckling, tests have proved conclusively that vertical bars, such as are used in columns, when imbedded in concrete will not buckle until the elastic limit of the steel is reached, and beyond this point of course no steel or other material is expected to do any service. Many of the tests at the Watertown Arsenal, for example, were made with vertical bars imbedded in columns 12 in. square and 8 ft. long, with absolutely no loops or horizontal steel of any kind placed around these vertical bars to hold them in place; that is, the bars 8 ft. in length were placed in the four corners of the columns—in some tests only 2 in. from the surface, and simply held in place by the 2 in. of concrete itself. There was no sign whatever of buckling until the compression was so great that the elastic limit of the steel was passed, when of course nothing further could be expected of it.

These tests at the Watertown Arsenal and, so far as the writer has been able to discover by examining all the experiments on record, all other tests of full size columns made in this country further bear out the fact that vertical steel bars imbedded in concrete increase the strength of the column, and it can be further shown that these tests bear out the theory by which the strength of the combination of steel and concrete may be computed and is computed in practice.

WHAT BUILDERS ARE DOING

THE influence of severe mid-winter conditions is strongly reflected in the reports of a lessened volume of projected building improvements in the leading cities of the country for the month of February as contrasted with the corresponding period of a year ago. When considering the figures now at hand it must be remembered that the early portion of last year witnessed a rather unusual degree of activity in the building line, and that the value of the improvements for which permits were issued aggregated a very respectable total, so that the present falling off is not altogether significant. Outside of the very unfavorable weather conditions, however, the shrinkage in building improvements may be traceable to a variety of causes, some of which are general and some local. There is more or less a feeling of unrest in many branches of the trade as the first of May looms into view, and builders are pursuing a rather more conservative course perhaps than might otherwise be the case.

A bird's-eye view of the country shows many important cities to be far behind in the estimated cost of its building improvements in February as compared with a year ago. Among these mention may be made of New York, Pittsburg, Milwaukee, San Francisco, Denver, Atlanta, Rochester, Harrisburg, Toledo, Omaha and Pueblo, while on the other hand notable increases are shown in the figures from Newark, Washington, D. C., Minneapolis, St. Paul, Kansas City, Salt Lake City, Los Angeles, Grand Rapids, Des Moines and Portland, Ore. Locally much of the decrease represented by the February figures, as compared with a year ago, is due to the reduction in the number and value of the apartment houses for which permits were taken out in the Borough of Manhattan.

Buffalo, N. Y.

The report of the Buffalo Bureau of Buildings for the month of February shows that 166 permits were issued for new buildings and alterations at an estimated cost of $536,000, as against 204 permits involving an estimated expense of $389,000 for the corresponding month of 1909, an increase of 38 per cent.

The aggregate of building operations for March will largely exceed those of February, as indicated by Bureau of Building statistics so far compiled, and include a number of important building enterprises. The Buffalo Cereal Company will erect a new cereal mill and elevator of reinforced construction to cost about $200,000. The New York State Steel Company will add to 65-ton open-hearth steel furnace with necessary buildings to its plant at the Abbott Road and the Delaware, Lackawanna & Western Railroad. The Pierce-Arrow Motor Company will build another large four-story factory building of reinforced concrete supplementing extensive additions to its plant now under construction; the Acme Steel & Malleable Iron Works a one and two-story foundry, 147 x 260 ft., $30,000; the Superior Motor Vehicle Company, a drop-forge shop, 300 x 140 ft., on Grote street. A six-story and basement paper warehouse, 60 x 150 ft., with wing 30 x 130 ft., is to be built at Elm and South Division streets by the Alling & Corey Company, and construction work will soon be started on two theaters, one at Broadway and Fillmore avenue, 60 x 135 ft., to cost $60,000, and one at Pearl and West Genesee streets, to cost $75,000. Plans have been completed for a new church edifice of stone and brick, to be erected at Potomac and Bird avenues, by the Riverside Methodist Episcopal Church, at a cost of $40,000.

Chicago, Ill.

Building permits issued during February in Chicago called for an estimated outlay of $5,678,600, exceeding the figures for the same month last year as well as the previous ten years with the single exception of February, 1902. The permits for February this year cover 688 buildings, with a frontage of 19,473 ft., compared with 828 buildings, covering 22,873 ft. in February, 1909.

Several new bank buildings will be erected during the coming year for which permits have not yet been asked, and a good year is expected in building operations.

John J. Reilly, formerly connected with the Building Department of the city, has been elected secretary of the Builders and Traders' Exchange, succeeding J. Daggett, who died February 20.

The Builders' Club, of Chicago, held its fifteenth annual banquet in the Congress Hotel on the evening of March 15, there being present about 260 members. T. Frank O'Connell was toastmaster, and prominent among the speakers was Congressman Martin B. Madden, whose talk on the Panama Canal was illustrated by moving pictures. Col. J. H. Lewis gave a talk on building in general from the foundation of the world up to the present time, which was also a very interesting feature of the occasion.

Cleveland, Ohio

Building permits issued in this city during February show considerable increase over January and a fair increase over the corresponding month a year ago. During February there were issued by the city building inspectors' office 255 permits aggregating $590,020. Of the total permits 108 were for for frame structures amounting to $219,915, 34 were for brick, stone and steel buildings aggregating $234,400, and 113 were for additions amounting to $143,705.

New work has come out rather slow, because unusually severe winter weather prevented nearly all outdoor work until early in March. Architects and contractors, however, are figuring on a large amount of new work, considerable of which it is expected will be started shortly, and everything indicates that building operations in this city during the present year will be very heavy.

Denver, Col.

The lull in building operations which set in a short time ago still continues to be reflected by the figures covering building operations for February as compared with the corresponding period a year ago. The feature of the work projected during last month was the permits issued for housing accommodations, these including 96 brick residences to cost $257,000; 11 apartment houses to cost $72,000; two terraces to cost $12,000, and six frame residences to cost $5,000. Permits were also taken out for 19 business buildings to cost $120,000, a gymnasium to cost $25,000, and two power houses to cost $22,000. In addition to these were 14 barns and sheds to cost $15,600. The total for February shows 198 permits to have been issued calling for an aggregate expenditure of $592,590.

In February last year there were 273 permits issued by the department of buildings for improvements involving an estimated outlay of $819,948, so that last month's operations show a decrease of $227,358 as compared with February the year before.

Los Angeles, Cal.

The excellent weather of the last few weeks has inaugurated the new building season with unusual activity. During February there was a total of nearly 800 permits issued for all sorts of buildings, to cost $1,672,000. This is nearly twice as many permits as were issued in the same month last year, and the valuation is nearly three times as large. The greatest gain is in the item of public buildings, of which permits were issued for five to cost $262,610. Aside from these the record for the month shows: Two class "A" steel frame buildings to cost $110,717; a class "A" reinforced concrete to cost $13,200, with 17 class "C" brick to cost $214,710. There were also 316 one-story frame to cost $402,753, and 40 1½-story frame to cost $99,075, and 60 two-story frame to cost $287,403.

Among the larger jobs planned for the present season are the Polytechnic High School, at Washington and Hope streets, to cost $80,000, and for which bids have already been received, and the F. C. Finkle hotel building, at the corner of Sixth and Flower streets. According to H. M. Patterson, the architect, the hotel is to be eight stories high and to cover a lot 50 x 75 ft.

Minneapolis, Minn.

A marked increase in the amount of new work detected is shown by the figures for February, when 216 permits were issued for new buildings, alterations, repairs, etc., costing $485,980, as against 203 permits for building improvements costing $300,745 in the same month last year.

The Builders' Exchange formally opened a new café in connection with its rooms on Tuesday, March 8, when the regular monthly meeting was held. A large number of members were in attendance, and as the prospects for an active spring season are most promising, this afforded opportunity for the members to talk over business matters as well as to meet in a social way. The café is open to the general public as well as to the members of the Exchange, and affords an excellent opportunity for builders and dealers in building materials to lunch at a satisfactory café where good service is assured. The café is also a great convenience as a time saver for contractors and others while figuring on plans, in that they can obtain a good lunch without the necessity of leaving the building.

New York, N. Y.

Much of interest in the local building situation the past month has centered in the conditions growing out of the steam fitters' strike, which has now been in progress for more than three months. At the time of going to press (March 21) the secretary of the strike committee of the Steam Fitters' Local Union has announced that a general strike of the building trades will be called on March 28 unless the differences at present existing have been settled by that time. It is to be hoped that some understanding can be reached so as to prevent any serious interference with building operations the present season, the outlook for which, labor conditions aside, is of a most encouraging nature.

The tremendous activity in the building lines the early part of last year makes the figures for February, 1910, show a heavy shrinkage as compared with that period, although they are somewhat in excess of the figures for January this year. The greatest shrinkage is in the Borough of Manhattan, due to the falling off in apartment house construction. The statistics available show that in February 49 new buildings were projected in this borough estimated to cost $6,941,900, while in the same month last year 131 buildings were projected to cost $15,480,800.

In the Borough of the Bronx permits were issued last month for 121 new buildings to cost $2,435,105, while in the same month of 1909 there were 196 permits issued calling for an outlay of $4,275,540.

Brooklyn makes a shade better showing in that permits were issued for 372 builings in February to cost $2,319,125, while in February last year 429 permits were issued calling for an outlay of $2,313,055.

This heavy shrinkage in projected building improvements may be traceable in part at least to the very severe winter weather which has prevailed and also to the fact that current figures are comparable with a period of somewhat unusual activity a year ago.

Commissioner Murphy, of the Tenement House Department, has issued a notice that hereafter "If any building now in course of erection, or erected in the future, shall be occupied illegally without a certificate" he will demand the maximum penalty and will proceed to promptly vacate the premises. Tenants may be evicted from houses not built in accordance with the law.

Omaha, Neb.

The unfavorable weather which has prevailed has interfered to a considerable extent with building operations, and the record for last month makes a very poor showing when compared with February a year ago. Building Inspector Charles Withnell states that in addition to unfavorable weather conditions there are many projects under way for which permits were not taken out, and that he intends to stop all jobs of this nature. He intends to make the report for March show all the building that is being done, and will file complaints in the police court against persons who do not take out permits for their building operations.

The value of the improvements for which permits were issued last month was $150,825, while in February a year ago the building improvements were estimated to cost $240,740.

Philadelphia, Pa.

Continued unfavorable weather conditions, which prevailed during the greater part of the month of February, interrupted the progress of outside work to a considerable extent, and also retarded the beginning of many operations which builders contemplated. This was particularly noticeable in dwelling-house operations, plans for a great number of which were arranged, but work deferred until more favorable conditions prevailed. Statistics compiled by the Bureau of Building Inspection show that 495 permits for 843 operations, at an estimated cost of $2,045,075, were issued. This total falls nearly $100,000 below that for the same month in 1909, and $86,700 behind the month of January of this year.

Work was begun on 354 two-story dwellings, the estimated value of which was $795,150, an increase of about 75 per cent. as compared with the previous month, but a decline of about 25 per cent. as compared with February, 1909. Thirty-nine three-story dwelling houses were started during the month, the estimated cost of which was $180,500. Next to dwelling houses the most important item on building schedule was for apartment houses, permits being taken for eight, the cost of which will be about $377,500. The aggregate value of work started on manufactories, workshops and warehouses was small, this character of work being largely deferred, as in the case of dwelling operations, until more favorable weather conditions prevailed.

There is considerable activity shown in suburban building. Schools, churches and dwellings, many of the latter of an elaborate nature, are to built during the coming spring, and from indications this class of work will be quite extensive during the coming year. While the past month has been rather dull, it is expected that the deficiency will be more than made up by the increased volume of work undertaken during the month of March. The only unfavorable factor, however, outside of weather conditions, which may defer the expected activity, is the general strike of union labor in this city, which was called on March 5, in sympathy with the striking car men of the Philadelphia Rapid Transit Company. The building and allied trade unions participated extensively in this sympathetic strike and work generally is suspended. At this writing practically a week after the walkout of the men, it is too early to measure the effect of the sympathetic strike. Employers have not taken definite steps in the resumption of business, as it is generally thought that the effort would fall of its own weight. An early and permanent adjustment of the difficulties is, however, hoped for.

The Wayne Contracting Company proposes to erect 198 two-story houses on a block bounded by Tenth, Eleventh, Pike and Luzerne streets, at an estimated cost of $280,000.

John T. Windrim, architect, has been taking bids on a seven-story brick and fireproof hotel to be built in Reading, Pa. The estimated cost is close to $500,000.

Henry Schmitt has taken out permits for an operation of 50 two-story houses on Elkins avenue, in Olney, work on which is to be started at an early date.

John Megraw, builder, Land Title building, is about to break ground for 180 two-story and three-story dwellings, to be erected in the vicinity of Fifty-third and Springfield avenue, at an estimated cost of $785,000.

Clarence R. Seigel, Fifty-second and Chestnut streets, has let most of the contracts for the erection of 44 attractive dwellings on Hazel avenue, between Forty-sixth and Forty-seventh streets.

James J. Harnett is receiving bids for the construction of 52 two-story brick dwellings and two stores and dwellings, which he proposes to erect on Twenty-fifth street above Somerset street.

E. Allen Wilson, architect, Land Title building, has prepared preliminary plans for a four-story brick and stone apartment house to be built at Fifty-second and Walnut streets. Plans have also been completed for 88 houses to be erected at Fifty-seventh and Pine streets, and for seven two-story houses to be erected by John H. McClatchy at Thirteenth and Westmoreland streets. Plans for a residence at Fifty-sixth and Spruce streets, to cost about $25,000, are also in a preliminary stage. Plans are also in preparation for several pairs of flat buildings for erection in this city, as well as at several seashore resorts. The same architect has completed plans for 80 two-story dwellings, and has others in course of preparation for a number of stores and apartments to be erected in West Philadelphia.

Portland, Ore.

Building has been rather slow in the city during the past month, the slackness being particularly noticeable in the securing of permits for large buildings in the business sections. The weather has been rather discouraging for the early resumption of activity in this line, but builders report that they see no reason why the figures of the present year should fall behind those of 1909, either in the number of permits issued or in the aggregate value of the work undertaken. During the month just closed there were 422 permits issued—an increase of 100 over the permits of the same month in 1909—but the value reached only $1,008,000, a drop of $320,000 from the figures of February, 1909, and of about half a million from the figures of the best months of last year.

Claussen & Claussen, architects for Mrs. C. H. Brown, have drawn plans for a four-story red pressed brick and stone apartment house, with accommodations for 41 families, and to cost $50,000.

A $30,000 contract has been let for a two-story reinforced concrete building to be erected by William Reidt on Union near Killingsworth avenue.

St. Paul, Minn.

With a slight falling off in the number of permits issued, as compared with the corresponding period a year ago, February shows a marked increase in the amount of capital involved. According to the figures compiled in the office of Building Inspector Cunningham, there were 143 permits issued in February for improvements estimated to cost $543,706, while in the same month of last year there were 184 permits issued for building improvements estimated to cost $375,022.

Salt Lake City, Utah

During the month of February, Building Inspector Hirth issued 51 permits for building improvements representing a total valuation of $334,100, which is a very marked increase over the corresponding month of last year, when 47 permits were issued for new work, alterations and repairs representing a valuation of $202,200. In considering the figures for last month it must be borne in mind, however, that had it not been for the permit for the new Daly Hotel, which will cost $200,000, the record for this February would have been less than that of a year ago.

San Francisco, Cal.

The building situation has not changed materially within the last month. The building permits reached a total valuation of $1,676,240, a rather small showing for February. It is claimed that this was considerably smaller than it would have been but for a tendency to hold off because of some uncertainty as to the operations of the new building law. It is regarded as certain that the spring months will show up well, especially in the matter of brick construction; in fact, the foundation work is now under way for more brick buildings than have been in progress for the past two years. The forced removal of all of the temporary buildings erected immediately after the fire of 1906 has made way for the construction of a large number of new structures within the fire limits, and almost without exception the owners of the property have had plans drawn for permanent brick or concrete buildings.

All sorts of materials are plentiful, and though lumber is advancing, and some other materials are expected to advance soon, the general range of prices is still very low as compared with past years. Lumber is the strongest item in the list, and, in view of higher freight rates and an advance in the price of logs in Oregon and Washington, it looks as though the spring and summer would see a very steady market for lumber, especially for pine. Redwood is still rather weak. There has been no change in brick since last month, the expected increase in the demand not having yet occurred. The prospective demand for brick is better than for many months past, but as the supply is very large, it is not believed that any great advance in prices is probable. Cement and lime are rather firmer, without a quotable increase in prices. Stone is being used more largely in the finer buildings of the city than at any time since the great San Francisco fire. This is partly due to the passing away of the prejudice against stone as a building material, caused by the disastrous experience of some of the stone buildings at that time, and partly to the fact that a number of costly and highly ornamental buildings are now under way. Some large contracts for sandstone and granite for exterior work have been let and are being figured on, and considerable interior marble is being used.

Adjuster E. J. Jolly has just made a complete and detailed report to the San Francisco Board of Public Works, showing the amount and character of the construction work done in San Francisco since the great fire. His report shows that a total of $138,754,000 has been spent on new buildings since that time, and a total of 16,330 new buildings have been erected. Of these, 14,534 were frame, erected at a cost of $59,959,000; there were 96 of class "A" buildings, erected at a cost of $21,547,000, also 1,115 class "B" structures erected at a cost of $8,473,000, and 1,585 were class "C" structures costing $48,776,000. These figures show that the 1,706 buildings of "slow-burning" construction erected since the fire cost $78,795,000, or an average of $438,726 per building. There were 29,188 buildings destroyed in the fire, 16,330 have been built since, 386 have been torn down since the fire, and there are now 11,958 fewer buildings in the city than before the fire. In the first year after the fire 3,258 frame buildings, 42 class "A" buildings, 59 class "B" buildings and 553 class "C" buildings were erected. Of the buildings destroyed in the fire 24,671 were frame and 3,517 "slow-burning."

Notwithstanding the fact that the present season has been rather slow in opening, a considerable number of fair-sized contracts have been let within the last week or two. These include: Contracts for the west wing of the new Southern Pacific Railroad Company's hospital at Hayes and Baker streets; a contract for a large one-story brick building to be erected at Market street, Turk street and Golden Gate avenue, by James D. Phelan, at a cost of $33,900; a three-story and basement brick building to be erected at Kearny and Bush streets by S. Hyman; a five-story brick and steel apartment house on Sutter street near Van Ness avenue to cost $100,000; a three-story and basement building, 80 x 104 ft. in ground dimensions, to be erected by the Pacific Coast Syrup Company at the corner of Sansome and Gold streets, and a four-story and basement brick apartment house on Eddy street near Larkin.

Seattle, Wash.

The average cost of the buildings which were projected last month in this city was somewhat in excess of that of the same month a year ago, thus indicating that a somewhat more pretentious class of work is in progress. The statistical report of Francis W. Grant, superintendent of the Department of Buildings, covering the month of February, shows that 885 permits were issued calling for an outlay of $1,353,415, while in the corresponding month last year 1,022 permits were taken out for new work estimated to cost $1,152,155.

Going back for a period of six years the nearest approach of any February to last month's figures was in 1907, when the value of the improvements for which permits was issued was $1,300,413.

Of the totals for last month, 13 permits were for flats and apartment houses costing $110,250, while 246 permits were for frame dwellings involving an estimated outlay of $352,365. There were also 134 permits for frame business buildings, costing $169,925, and for three reinforced concrete buildings, one of which is estimated to cost $275,000.

The totals for the first two months of the current year show 1,871 permits to have been issued, involving an outlay of $2,628,390, while in the first two months of last year 1,940 permits were taken out for improvements estimated to cost $3,224,620.

The Architectural League of the Pacific Coast has about completed plans for the first architectural exhibit ever held in the city. The show will be held April 16 to 30, inclusive, in the Exhibition Galleries of the Washington State Art Association in the Public Library building. The purpose of the exhibition is to show the general public what architects in various parts of the world as well as in Seattle are doing to improve the appearance of public and private buildings.

The exhibition committee is composed of the following gentlemen: Carl F. Gould, chairman; Charles H. Alden, C. G. Badgley, F. L. Baker, C. E. Conrad, W. H. Fey, D. R. Huntington, H. A. Moldenhour, W. K. Macumber, P. D. Richardson, J. H. Schack, W. M. Somervell, J. C. Stanley, E. Soninchson, L. Sartz, J. Wilson, E. R. Williams, J. S. Warner.

Plans have been drawn for the proposed 18-story L. C. Smith building at the corner of Second avenue and Yesler Way, which will be of reinforced concrete and will be the tallest building in the State. Other buildings which are to be erected during the next few months include: A three-story brick and stone store and warehouse building at Western avenue and Seneca Way, to be erected by J. B. Agen; the six-story Chappell Hotel, 105 x 120 ft. in plan, at Maynard avenue and Jackson streets, to contain 300 rooms, and, according to the architects, Spalding & Umbrecht, will cost $125,000; a group of one-story brick and tile buildings, by the same architects, to be erected by the Seattle Lighting Company, at a cost of $20,000, at West Genesse street and California avenue, and a six-story store and hotel building, Graham & Myers, architects, to be erected at Maynard avenue and King streets, to contain 126 rooms and to cost $70,000.

Washington, D. C.

The monthly report of Building Inspector Hackett shows that 479 permits for building improvements were issued in February, calling for an expenditure of $1,311,279. Of this total 152 permits were for brick dwellings costing $421,700, and six were for brick apartment houses costing $155,000. There was also one brick theater costing $49,000, a brick warehouse costing $50,000, a brick hotel costing $28,000, a brick factory costing $20,000, and 32 frame dwellings costing $68,000.

A great wave of prosperity was predicted by the majority of the speakers at the sixth annual banquet of the Building Material Exchange, of Washington, held at the St. James Hotel on the evening of February 19. The outlook was regarded as indicating an unusually large and prosperous year in building operations, both in business and residence properties.

After the dinner, President T. E. Clark, as toastmaster, introduced the speakers. S. D. Lincoln discussed "The Effect of the Cement Combine on the Dealer"; R. H. Moler, "Our Organization from a Social Standpoint"; S. Swindell, "The Results Obtained by Our Organization"; J. W. Tolson, "The Comparison of Cost of Delivery with Previous years."

The committee having the banquet in charge consisted of D. C. Chesterman, B. L. Grove and A. F. Harlan.

LAW IN THE BUILDING TRADES

By A. L. H. Street

LIABILITY OF SURETY ON CONTRACTOR'S BOND

A bond of a building contractor which creates no liability against him additional to that created by his contract is valid as against the sureties who signed and delivered the bond with the intention of being bound by it, though the contractor did not sign it. (Texas Court of Civil Appeals, Wright *vs.* Jones, 120 Southwestern Reporter 1,139.)

LIABILITY FOR INJURY TO EMPLOYEE

A competent and experienced carpenter was injured while assisting in placing a beam in a building by being struck by the beam when it swung. The work was comparatively simple in its nature, and he knew that the beams, which were not large, were liable to swing. He knew the facts, including the location of the derrick and its relation to the column, the wooden horse on which he stood, the wall, etc. He knew of a position, perhaps safe, which he might have taken to avoid the accident which happened. Held, as a matter of law, not to show any negligent failure of duty on part of the employer's superintendent in failing to change the location of the derrick, or in failing to give the employee any warning as to his conduct. (Massachusetts Supreme Judicial Court, Lanoue *vs.* Nelson, 89 Northeastern Reporter 95.)

PROOF REQUIRED TO ESTABLISH MECHANIC'S LIEN

One seeking to establish a lien for materials and labor furnished to a contractor must make a definite showing as to value in order to recover. (Oregon Supreme Court, Laughlin *vs.* Connors, 102 Pacific Reporter 793.)

LIABILITIES UNDER BUILDING CONTRACTS AND BUILDERS' BONDS

A stipulation in a building contract that the architect's decision as to the construction of the drawings and specifications shall be final does not submit to his decision the contract rights of the parties to the exclusion of the courts. A contractor, who agreed to construct a building according to the specifications, containing the statement, "The floors and beams and columns supporting the same, ceilings, roof and stairways * * * to be of reinforced concrete," employed a sub-contractor to construct the reinforced concrete; that is, columns, beams, floor and roof slabs, etc., as shown in the specifications made a part of the contract. Parol evidence showed that the phrases "floor slab" and "roof slab" designated not merely the floor or roof but also the ceiling below it. Held that the sub-contractor was bound to erect a ceiling dependent on a roof as called for in the specifications. The intention of the parties to a building contract containing general words of description of the work followed by a mention of its several items, and incorporating the specifications by special reference, must be gathered from a consideration of the contract and specifications, taken together in the light of the purpose which their contents show they were intended to serve. A surety in a bond of a building contractor, requiring the obligee to give immediate notice of acts of the contractor likely to result in loss for which the surety will be responsible, is not discharged from liability because of the obligee's failure to notify it of delays in the pregress of the work and slight failures to comply with the specifications. A surety in a building contractor's bond, stipulating that alterations in the specifications calling for a $13,000 building must be consented to by the surety, is not discharged by reason of an alteration involving $30 made without his consent. (Maryland Court of Appeals, Ætna Indemnity Company *vs.* Waters, 73 Atlantic Reporter 712.)

RIGHTS OF ASSIGNEES OF ARCHITECT'S CERTIFICATES

An assignee of architect's certificates for money due for work done by the assignor under building contracts with a city took them subject to the city's right to recoup for damages from a possible breach by the assignor of his contracts, which right existed at the making of the contracts, and of which the assignee had notice, though no fault of the assignor had occurred when notice of the assignment was given to the city. Even if the sums evidenced by the certificates were due when notice of assignment thereof was given the city, in an action on the certificates brought by the assignee thereafter, and after the assignor's default, which occurred after the notice, the city could recoup for damages from the assignor's default; the assignee standing in no better position than the assignor. (Massachusetts Supreme Judicial Court, American Bridge Company, of New York, *vs.* City of Boston, 88 Northeastern Reporter 1,089.)

LIABILITY FOR SCAFFOLD ACCIDENTS

The scaffold, erected by carpenters for their work upon a building, is not an "appliance" within the rule making it the duty of the employer to furnish workmen safe appliances with which to work, as the employer's duty is to perform when he has employed competent men and furnished them with proper tools and lumber and materials with which to erect the scaffold. A foreman in charge of the construction of a building is a "fellow employee" of the carpenters employed on the building, in the construction of a scaffold under his direction, to be used in their work on the building, as the employer's responsibility in case of an accident is not fixed by the grade of service, but the character of the act and the act to furnish a safe scaffold was not a part of the employer's duty. (California Court of Appeals, First District, McDonald *vs.* Hoffman, 102 Pacific Reporter 673.)

REQUIREMENTS TO EFFECT MECHANIC'S LIEN

Under the Texas statute requiring service of written notice on the owner or his agent or representative of each item of the account for materials furnished as a condition precedent to the attaching of a lien, service by the material man on the owner of a copy of the contract with the contractor to furnish the materials and of a copy of the account filed with the county clerk, was not a sufficient compliance with the statute to effect a lien on the property. (Texas Court of Civil Appeals, Spann *vs.* King, 121 Southwestern Reporter 207.)

BUILDING CONTRACT WHEN NOT COMPLETED

Where the painting, which was included in a contract to build a house, was not finished when such house was destroyed by fire, the contract was not completed, and the house was not ready for delivery, so as to render the owner liable on the contract. (Rhode Island Supreme Court, Annis *vs.* Saugy, 74 Atlantic Reporter 81.)

Effects of Wind on Ventilation

The effect of wind on ventilation and heating was the subject of a paper read by H. W. Whitten before the summer meeting of the American Society of Heating and Ventilating Engineers. The most apparent effect, Mr. Whitten states, is the inleakage of air through crevices, while the least apparent but nevertheless important effect is the outflow of warmed air through crevices in the sheltered side of the building, caused by an area of low pressure in the lee of the building, which acts as a partial vacuum. As the pressure of the inside warm air is naturally outward, the combination of this pressure with the partial vacuum outside produces a greater loss than is sustained on account of inleakage, assuming the aggregate amount of crevices on each side to be equal. The author then describes a few typical tests made by him and others in this connection, some of which are given here. A room situated on the east side of a rectangular school building, with a northwest wind blowing 14.5 to 15 miles per hour and an outside temperature of 33 degrees, showed an average rate of supply velocity of 817 ft. per minute and a vent velocity of 340 ft. per minute, giving a loss of 477 ft. per minute. The inlet was 8 ft. above the floor and the outlet at the floor, both being of equal size and on side of the room opposite the windows. An air test showed 10 parts of carbon dioxide in 10,000. A test of another school building with wind at 18 miles per hour and outside temperature of 30 degrees, the building being heated and ventilated by the gravity indirect system, showed an average loss of 20 per cent. from the supply ducts and an addition of 60 per cent. to the vent velocity in rooms on the windward side. Rooms on the leeward side of the building showed an addition of 30 per cent. to the supply velocity and a reduction of 62 per cent. of the vent velocity. Another test was performed in a high school building. After shutting down the fan the supply ducts were closed in the rooms on the exposed side of the building and, with all doors and windows closed, it was found that as much air was being removed from the vent ducts as the fan system was supposed to supply. During this test the outside wind was of moderate velocity.

BRIDGING A RUNNING STREAM WITH CONCRETE IN A BUILDING FOUNDATION

MANY interesting problems develop from time to time in connection with building operations in a large city and these often involve in their solution methods of a rather unique character. There has recently come to our notice a case which well illustrates this point. A site for a new building was being excavated and after going down to a depth of 10 ft. below the curb line the soil was found to be soft and spongy, with characteristics such as would betoken the presence of water. Continuing the excavation a couple of feet further down a running stream of water averaging 3 ft. in width from a natural spring was revealed. Strange to say, the stream ran on a hard bottom of good black sand, flowing southwest from a northeasterly direction and passing under the concrete footings of two five-story tenement houses on the north and south lots adjoining.

In Fig. 1 of the sketches is shown a plan of the general arrangement. On one side, the south, is a 24-in. stone wall resting on concrete footings, while on the other or north side is a 24-in. brick wall resting on stone footings 3 ft. 6 in. wide. The site of the new building, it will be noticed, has a frontage of 18 ft. between these two structures, while the running stream extends diagonally across the site and under the foundations of the buildings as stated.

The problem naturally arose what was best to be done, and it was solved by the builders as follows:

When the trenches had been excavated for the footings of the foundation walls a segmental wooden center 5 ft. in span, built of 1 x 2-in. wall furrings and 1-in. frames, was made 6 ft. wide and placed upon stones high enough to clear the running water. This center was then smeared with kerosene oil and covered over with tar paper, so as to make it inflammable.

On top of this a concrete mixture in the proportion of 1:2:5 was poured and then were placed four 10-in. I-beams bolted together with the necessary separators, the general arrangement being as indicated in Fig. 2 of the sketches.

When the concrete arch had set and hardened the wooden center was burned out and any pieces of wood that remained were removed, thus permitting the stream to continue to flow under the footings, as it is still doing, without in any way impairing the stability of the new building.

After this operation had been completed, the intended new building was proceeded with, this being, as the plans and specifications denoted, a seven-story store and loft building. The main walls were of the following dimensions and materials, as called for according to law:

Foundation walls 24 in. rubble stone work thoroughly bonded and anchored. First story walls 16 in. thick and laid in Portland cement by first-class mechanics, each sixth course a heading course.

Front set on two 12 x 12 in. on ends of north and south gable walls properly anchored and filled in with brickwork.

Second story front wall to be carried on a brestsummer girder made up of three 4 x 12-in. steel beams, bolted together and painted three coats before being set.

All upper wall 12 in. thick up to roof level laid in Rosendale cement mortar. Parapet wall to 8 in. thick laid in Portland cement mortar and coped throughout with good blue stone on terra cotta approved copings.

Boiler flue at rear as indicated on plans, first three stories to be lined with fire bricks and fully bonded into north side and rear wall course.

All floor beams from first story up to seventh story to be 3 x 14-in. yellow pine framed to suit stair and elevator openings; trimmers and headers to be hung in bridle or stirrup irons of legal size, etc.

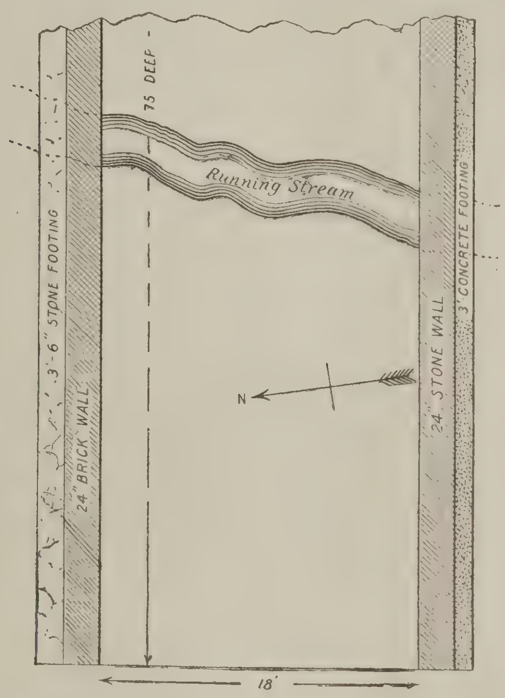


Fig. 1.—Plan of Site, Showing the Running Stream of Water.

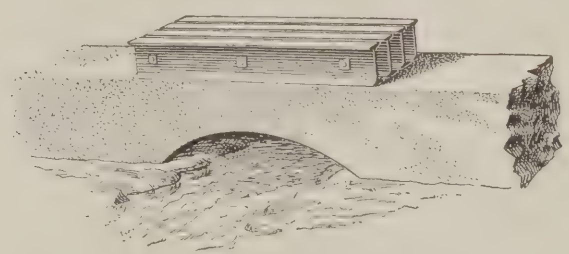


Fig. 2.—The Concrete Bridge with the I-Beams on Top.

Bridging a Running Stream with Concrete in a Building Foundation.

Rendering Interior Walls of Buildings Damp-Proof

In regard to an effective method for impregnating walls in the interior of buildings such as basements, ground floors, subterranean passages, etc., against dampness and fungus growth, a recent issue of *The Painters' Magazine* contains the following in reply to a correspondent of that journal:

A washable coating for this purpose that may be applied to any surface previously cleaned by scrub brushing to remove dirt, loose mortar, etc., is prepared by dissolving 100 lb. of a special soap produced by the saponification of stearic acid with soda in 6 lb. of 66 per cent. alcohol. Where first coat is no object this coating will produce the most durable results, as it will give a very hard surface that may be cleansed from dust, etc., by brooming or brushing and may be washed with hot or cold water frequently without disintegrating the constituents of the soap, as would be the case with an aqueous solution. The use of the alcohol permits a greater penetration of the soap, and it is not necessary to confine the use to 66 per cent. alcohol, for the stronger the spirit the better the result.

This foregoing formula is to be highly recommended for walls of living rooms where dampness is liable to exist. For cellars, subcellars, basements, stables, etc., the ordinary soaps, made from any kind of fat or oil, with or without rosin, may be employed and the cost very much reduced thereby, but the stronger the spirit used the better. The proportion of soap and spirit is best determined by trial on a small scale. Unless soft soap is used the soap should be sliced very thin and placed in warm spirit, which is best heated on a sand bath or on a radiator. The kettle in which the solution is made should be well covered and the contents stirred occasionally. High heat is not necessary.

Either solution may be colored by spirituous solutions of aniline colors or by directly mixing with mineral colors such as are unaffected by alkalies, such as yellow ochre, Venetian red, ultramarine blue or green, oxide of chromium green, etc., whereby at little extra cost some attempt at decoration may be had. A very important feature is the fact that to these spirituous solutions may be added liquid disinfecting chemicals for hygienic purposes, as in stables for sick animals, etc. These coatings may be applied to raw woodwork, brick or stonework, cement or concrete plastered walls or whitewashed surfaces. On calcimined coatings it will not answer, unless the latter is fixed with a 5 per cent. aqueous solution of chrome alum, but on oil paint the spirituous soap solutions will not hold. In order to make operation more simple it is best, when the surfaces to be impregnated consist of lime or of stone containing lime or of rough cast, to coat them first with baryta water or waterglass, and, after permitting these to become dry, to wash off the excess with hot water.

Competition for Concrete House and Garage

The competition in designs of concrete residence construction and garage conducted by the Pittsburg Architectural Club, and announced in our issue for February, closed on the 18th of that month and the jury made awards as follows:

First prize—Geo. R. Klinkhardt, Brooklyn, N. Y.
Second prize—H. Hepbum, Boston, Mass.
Third prize—Wm. Holford, Brooklyn, N. Y.
Fourth prize—Edwin F. Campbell, Carnegie Technical School, Pittsburg, Pa.
Fifth prize—Henry W. Peebles, Pittsburg, Pa.
Sixth prize—Harry B. and Fred B. O'Connor, Pittsburg, Pa.
First mention—John Ingram, Wilkinsburg, Pa.
Second mention—Ed J. Hargenroeber, Pittsburg, Pa.

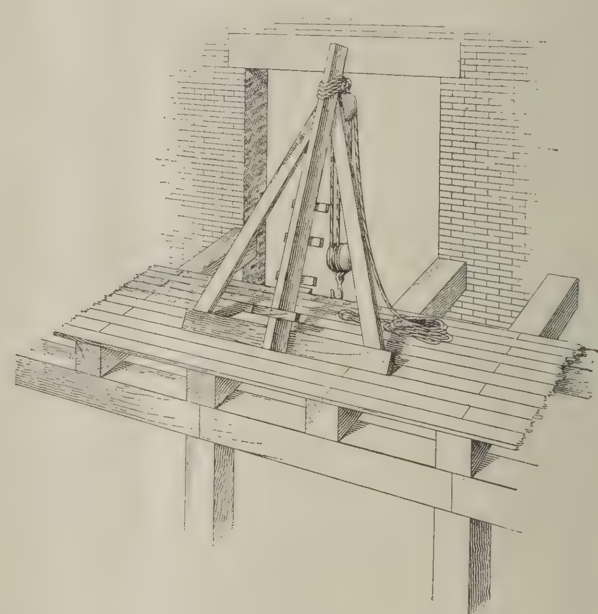
The design which won the first prize is a drawing of a large two story and a half concrete house built in the form of an "L." The house is built upon a long narrow terrace, at one end of which is a large formal garden, with a pergola covered walk extending along one side, and a concrete wall and benches at the further end. Back of the house is a neat garage, with an automobile "turn" in front of it. A high concrete wall surrounds the garage and "turn." A concrete drive leads from the "turn" to the road, and concrete walks surround the house and the formal garden.

Extension Work by Columbia University

Announcement has just been made of an important extension of the work of Columbia University, which will begin in September next. It is proposed to extend the operation of the principles which have been so successful in the case of the summer session so as to provide classes and laboratory work in the evening at the University, and both in the evening and during the day in other parts of the city, as well as in Northern New Jersey and Westchester County, for the benefit of those who are not able to avail themselves of the regular courses of instruction at the University. Evening classes in particular will be organized, where wage workers, as well as those who are engaged professionally or otherwise during the day, may obtain the best instruction which the University can offer. For the work a large staff of professors and lecturers will be appointed, the whole undertaking being under the supervision of Professor James C. Egbert, who, as director of the Summer Session, has brought this branch of the University's activity to a high degree of excellence.

An Improvised Builders' Derrick

There are times—and rather frequently, too—when it becomes necessary to hastily lower into or raise from basement or cellar, or from one story of a building to another, great weights, such, for example, as safes, machinery, wooden cases, etc., and for this purpose some extemporized means must be devised in order to accomplish the work quickly and satisfactorily. An appliance



An Improvised Builders' Derrick.

for such a purpose is illustrated in the sketch shown herewith, the apparatus being rapidly put together by a builder for lowering a boiler, elevator machinery and dynamos from the street into the basement of a recently erected building.

Virtually it might be stated that the drawing explains itself. Still, for the benefit of those interested, we might state that, as shown, the derrick is placed on a platform or bridge extending over the sidewalk, this bridge being not only for the purpose of providing a protection for pedestrians passing underneath against materials and scraps falling from the new building while in process of construction, but also, fully as important, affording a clear working space for the mechanics and the materials with which they are concerned.

The derrick is built up of a 2 x 8-in. or 3 x 12-in. timber, which is set on edge. Square to one end a piece of 1 x 8-in. flooring is solidly nailed and then on each side the derrick plank or timber, as it may be termed, is braced with two 1 x 6-in. strips or pieces securely nailed as indicated in the sketch. The derrick slopes at an angle of about 60 deg. when placed against a wall or lintel of a window opening, for example, and is provided with climbing cleats and tackle. Its construction is but the work of a few minutes and it is most useful when a job of this nature is to be done in a hurry.

The Brick Mantle and Fireplace in the Modern Dwelling

The importance of the brick mantel and fireplace in the modern dwelling house, whether it be of the cozy cottage type of structure or the pretentious mansion of the wealthy is discussed by a writer in a recent issue of *The Clay Worker*, and what he has to say is of such general interest that we present the following extracts:

The revival of the old brick fireplace is now popular among architects and builders. We have had wood mantels and marble and stone mantels until people are tired of their monotonous finish. Wood mantels, unless done in hard woods and expensively carved, are very unsatisfactory. They have a cheap appearance and their durability is questionable. The heat of the fireplace or chimney invariably causes them to warp and crack within a short time. Hard woods, hand carved, are almost too expensive a luxury. Marble mantelpieces have the same disadvantage of cost, and also that of unpopularity.

The old-fashioned brick fireplaces were pretty in their way and are being imitated in some instances. But the rough bricks used in them are not satisfactory for modern work. Variety and effectiveness are the keynote in these fireplaces. To obtain this the manufacturer of fireplace bricks should employ all the colors, shades and sizes within his means. Architects generally draw the designs they need for mantels and fireplaces, and experience has shown that these designs can be worked out better with bricks than any other material. The different sizes of bricks lend themselves better to such artistic development than any other articles. But it is a mistake to suppose that all has been accomplished in this direction. A short time ago our bircks and terra cotta were limited to a few plain colors, but to-day we have them produced in a great variety of shades. The first essential to the manufacture of fancy pressed bricks is the right kind of clay. A good many manufacturers have found clay beds of such striking color that their bricks have become popular from the outset. Just now there is a pretty thorough searching of the different parts of the country for clay beds which will show other new colors. Nearly every month the report of some new discovery of remarkable clay deposits is received, and new plants are established to work the deposits. A delicately tinted clay product that shows unusual colors of a durable nature when made in bricks is sure to have a commercial success.

But a feature of this work which has been neglected is the combination of various clays and mineral elements for the production of bricks of special beauty. This work is entirely in its infancy and requires skillful working. It is only occasionally that a clay bed of great extent can be found which yields a uniform color for fancy pressed brick. As an illustration, a New Jersey concern which popularized a fancy creamy-white brick with a delicate shade of light blue running through it had all it could do to fill orders at high prices. The bricks were used for inside finishing of mantelpieces and fireplaces of Colonial houses. Architects ordered the bricks so freely that the concern made money rapidly. Then the clay bed gave out and the color of the surrounding deposits was not nearly so effective. Complaints began to be received that the new bricks were not up to specifications. The coloring was not as ordered, and a fancy grade of bricks began to lose standing. It was impossible to substitute other bricks for the old ones. The company looked in vain for other similar deposits, and then, in desperation, it sought to manufacture similar bricks out of a composition of several clays. This did not answer, and a chemist was called in who, after analyzing the composition of the old clay, proceeded to specify the mixing of clays and mineral ores. After considerable rather costly experiment, desirable results were obtained. Once more the company produced the right sort of bricks, and to-day they are used freely for interior fireplace construction.

What proved the salvation of that manufacturer could be made the secret of success of many another concern. To depend entirely upon the natural clay products of one region for fancy bricks is a mistake. Another New Jersey concern, that had an enormous deposit of a light clay, constructed a laboratory as a part of its plant and proceeded to experiment with various ingredients. First it mixed certain mineral ores with the clay to produce different shade effects. Some of these ores proved effectual in the making, but when subjected to weather conditions they run and caused streaks of colors. This would not do, and for the sake of its own reputation no new kind of bricks was placed on the market until after they had been exposed to weather for one year. Outside of the laboratory there is a yard where experimental brick walls are constructed. The bricks placed in these walls are exposed to all sorts of weather, winter and summer. When samples of bricks are put in them a record of the date is taken and carefully kept. At certain intervals they are examined and the bricks tested to see if they have deteriorated. Naturally, any which show signs of color running are rejected. Through this simple method of testing the company has been enabled to place half a dozen different kinds of fancy pressed bricks on the market in the past two years which have proved abundantly satisfactory.

Such experimental tests for bricks used in exterior walls do not apply to those for interior finish. A different sort of test is required for these. The severest test that can be applied to them is excessive heat followed by dampness and moisture. Bricks used in a fireplace must be subjected to great heat, and later when the house is closed for a period to dampness and moisture; they must be able to withstand both of these extremes without changing their surface coloring. Some fancy colored bricks which will withstand outside exposure do not do well in the fireplace. Their surface tends to get soft and sooty under great heat, and when washed streaks of mineral ores are left. An experimental test of them for this work is, therefore, almost as essential as for exposed bricks.

Bricks used in a fireplace of a modern home are frequently employed as the central point of decorative furnishing. In other words, the color scheme of the whole interior is made to harmonize with those of the bricks. For making the bricks the keynote of the decoration there must be something striking in their composition. In reds, blues, buff and cream whites, the bricks for fireplaces have already scored a great success. But the color scheme is still far from exhausted. There are modifications of these shades which manufacturers can obtain by a little experiment with different clays and mineral ingredients. A large manufacturer of fancy bricks has upward of fifty color schemes for fireplaces made out by an expert architect and exhibited in his office. A builder or house owner looking for appropriate fireplace designs could find here suggestions for his use. The different colored bricks manufactured for these various designs range in price all the way from \$40 to \$100 per thousand. But even at the latter price a beautiful mantelpiece can be produced in harmony with the interior surroundings at prices within the reach of most builders.

The ordinary carpenter and builder who does not call in the architect rarely recommends a fireplace constructed of bricks. To him the wooden mantelpiece obtained from the stock of some large manufacturer seems more appropriate because it is easier installed and at little cost of time and labor to him. The cheap effect of the mantelpiece after being put in position does not materially change his point of view. It may be hopeless to convince such builders of their error, but the manufacturers of fancy brick can appeal direct to the architects and secure their attention. In the present campaign to induce the public to use bricks for fireplaces advertising must be made in such a way as to attract attention. The working out of harmonious designs in brick fireplaces may seem to be the work of architects, but the progressive manufacturers who have anticipated this work in the effort to secure attention to their products have not labored without good results. Many an architect in his anxiety to find some new ready-to-hand design to help him in his work will show his appreciation of such efforts on the part of brick makers.

Good Plumbing a Paying Investment

If the average property owner will only take time to consider the question he cannot do other than admit that the plumbing outfit of the ordinary dwelling or flat is, after all, the most difficult to maintain in proper sanitary condition and repair. This will become all the more apparent if the person interested will but examine his pile of repair bills for cleaning out traps, installing new supply pipes, closets, basins and innumerable small parts so important to the successful operation of the plant. It is no broad statement to assert, says a writer in the *Record and Guide,* that not infrequently the cost for replacements and labor in such cases exceeds the maintenance charge of other equipment.

Usually the tenant is blamed for such a state of affairs, although in many instances the real fault may be traced to defective installation and the employment of light materials, which are unfit to properly withstand the wear and tear caused by the elements. It has often been pointed out that the method of conveying water through a building is a simple problem, requiring no especial ability on the part of the mechanic, while, on the other hand, the disposal of excrement without unnecessary odor or the violation of established plumbing regulations is an entirely different matter.

Providing the rough work has been installed in a proper manner, and heavy material is used, little trouble is likely to follow; but often an error is committed in finishing with seconds, or an inferior grade of materials, such as thin traps, pitted closets and basins or other weak or damaged parts. Under such circumstances there is but one sensible thing to do, and that is to rip them out and have the job done right and by an experienced plumber. If the building affected is an apartment the expense of a proceeding of this kind will doubtlesss foot up into the hundreds, although the saving in the end will justify the outlay.

New Home for Women Art Students

The new building to be known as the Art Students' Inn, the purpose for which is to furnish a comfortable home for women art students in New York City, will be a handsome addition to the college buildings, halls of learning and dormitories, which are now clustered in the vicinity of Columbia University. The building as designed by the architect, Emery Roth, contains several novel and interesting features. The structure will cover a plot 55 x 127 ft. in size and will be 13 stories in hight. The first three stories will be of Indiana limestone, above which will be a light-colored brick laid in pattern and trimmed with polychromatic terra cotta and Moravian tiles. The roof will be of red Spanish tiles. A fine roof garden will surmount the building. The style of the structure is purely modern, a simple expression of the steel structure amply pierced with windows in order to provide light and ventilation for the rooms, reliance for artistic effects being in the harmonious color scheme and the simplicity of lines. The cost of the building exclusive of its furnishings will be $425,000.

The various stories will have what is known as magansite sanitary flooring with a cove sanitary base. The same class of flooring will form the base of all the furniture in the rooms, the furniture being built in and specially designed. Each room will contain a bed couch, a built-in bureau, a stationary wash basin, a large built-in wardrobe with mirrored doors and a writing desk. On each floor will also be a well-appointed kitchenette, which will be known as the "fudge" room. There will also be a large sewing room where sewing machines may be rented by the hour, a laundry equipped with electric irons, a gymnasium with a running track and plunge on the top floor and an isolated medical ward. One of the novel features will be a number of sound-proof rooms on the second floor for piano practice.

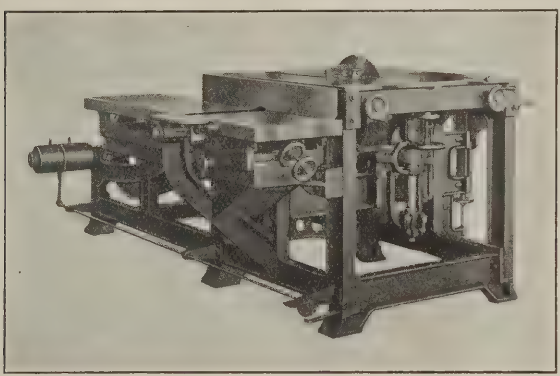
Frank K. Thomson, well known to many of our older readers in connection with examples of the work of Barrett & Thomson, published in these columns some years ago, has just opened an office in the Masonic Temple, Raleigh, N. C., for the practice of architecture. Particular attention will be given to reinforced and structural concrete design.

CONTENTS.

NOVELTIES.

The Economy Woodworking Machine

A machine which, by reason of its many features of convenience and utility, cannot fail to be appreciated by the building contractor operating either a large or small shop, is that which has just been brought out by the Economy Woodworking Machinery Co., 309 Broadway, New York City, and which is illustrated herewith. Fig. 1 represents a general view of the machine ready for sawing, while Fig. 2 shows the machine with table raised in order to give access to the saw mandrel. The point is made that this combination machine will enable the woodworker to operate it in limited space and with a minimum of power. In this way he can equip his shop quickly and economi-



Economy Woodworking Machine.—Fig. 1.—General View of Machine Ready for Use.

cally, and at the same time be sure that his over-head expenses will not prove embarrassing. Among the points of superiority claimed for this machine is the saving of time in changing from one class of work to another. This delay is almost eliminated, owing to the general design of the machine, which provides individual tools for each separate operation. The construction is so substantial that the machine does work with the speed and accuracy of the highest type of individual machines. There are three mandrels, one perpendicular and two horizontal. The perpendicular mandrel is so constructed that it is instantly convertible into either a shaper, tenoner, mortiser or a router. The different operations are performed by attaching specially constructed bits, any of which can be put in place ready for work as quickly as though the setting up was done on a machine designed throughout for that special operation. One of the horizontal mandrels carries a rip saw, cross-cut saw and boring tools, while the other is a heavily constructed planer and jointer cylinder made throughout of a one-piece crucible steel forging. It is slotted on all four sides and so arranged as to receive any bit or tools common to jointer or planer heads. The total

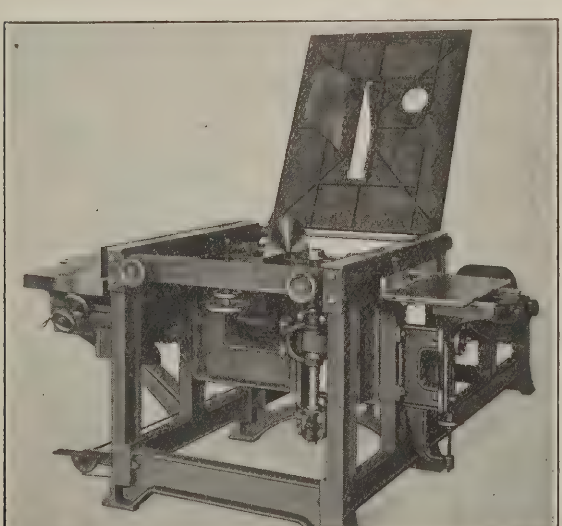


Fig. 2.—Machine with Table Raised, Exposing Saw Mandrel.

weight is about 2300 lb. The countershaft is permanently secured to the main frame, making the entire machine capable of being placed on a wagon, carried to and set up on a job temporarily, thus giving a portable planing mill to the contractor or builder. There are no overhead belts, shafts or countershafts to be installed, driven or given space. The power is applied directly, so that from 4 to 6 hp. is sufficient to operate the machine. All the mandrels can be operated in unison or one at a time, as only one tool or machine is consuming power unless others are used at the same time.

A 1910 Metal Ceiling Catalogue

A metal ceiling catalogue for 1910, in which are embodied illustrations of the latest designs, has been issued by the S. Keighley Metal Ceiling & Manufacturing Co., 819 Locust street, Pittsburg, Pa. In addition to the new designs the standard patterns are also profusely shown, and there is a view presented of a large theatre, in which the metal ceiling and sidewalls, including the boxes, proscenium arch and balcony fronts, were furnished by the company. An idea of the variety of the patterns may be gained when it is stated that the book comprises 144 pages, 10 x 12 in., the greater number of which are devoted to the ceiling designs. There are also illustrated many patterns of wainscoting, borders, corners, fillers, cornices, moldings, mitres, ventilating centers, capitals, etc. Steel lockers which the corporation makes are also shown. Full explanation is presented of the construction of the company's lock-joint system of ceilings, which is said to be dust-proof. It is also said to overcome difficulty from settling of the building causing the joints to open.

Nicholls New Mortise Guide

A new low-cost, yet practical mortise guide, which is well adapted for use in mortising locks in doors of all kinds, is excellent for making screens, or in connection with anything that has to be mortised, is being introduced to the trade by the Nicholls Manufacturing Co., Ottumwa, Iowa. The point is made that the construction is such that the device cannot get out of order, and that it can be operated by an inexperienced mechanic as well as a skilled one. It cuts true, and the auger always comes central on the door or piece to be mortised, there being necessary no change or adjusting in order to get the center. The device has one guide block, which will take in ½, ¾ and 15/16-in. auger, or the company can furnish a guide block to fit any size

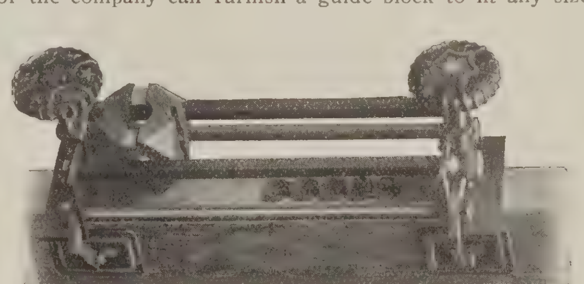


Fig. 3.—Nicholls New Mortise Guide.

auger up to 15/16 in. The guide block can be instantly changed to fit all the different sizes of holes. The mortise guide is made of steel and is always ready for instant use. The guide block holds the bit square with the work and true to the gauge lines. In order to change the guide block for different sizes of holes, it is only necessary to loosen the thumb-nut on the top of the right-hand guide bar, then spring the bar out in the slot, slide the block to the top plate and remove it. When this is done, change to the size desired and replace it on the bars, push the rod back and tighten the thumb-nut. An idea of the construction of the guide may be readily understood from an inspection of Fig. 3 of the illustrations presented herewith.

Tiles for the Kitchen and Laundry

Under the above suggestive title the Associated Tile Manufacturers, Beaver Falls, Pa., are distributing a very neat and attractive pamphlet in which the merits of tiles for the walls and floors of a kitchen and laundry are set forth at some length. Dainty illustrations appropriate to the place are scattered through the pamphlet and the entire make-up is such as to invite inspection. The object of the little book is to enlist on the part of the recipient a consideration of tiles for kitchen and laundry, the point being made that if it is insisted upon that tiles for these purposes be used, it will result in a very good investment. The whole idea of a house is a place in which to live, and a most important part of the house is the kitchen, where the food is prepared. It is not enough to provide a good range, a first-class refrigerator, and modern cooking utensils, but the kitchen itself must be good. Tiled floors and walls are scientifically clean; they are germ-proof and are impervious; they can be kept clean with little difficulty, and while the first cost may be more than in the case of wood and plaster, yet in the long run it is claimed to be less than any other treatment. Tiles offer an infinite number of color schemes and decorations to please every taste, and they harmonize with every kind of architectural construction. Roughly speaking, a tiled kitchen costs from 40 cents upwards per square foot for floors, and from 50 cents upwards per square foot for walls. Any one who is interested in the use of tiles for the purposes named will receive a copy of this little pamphlet on application to the address above given.

The Drouvè "Straight-Push" Sash Operator

One of the latest candidates for popular favor in the way of a sash-operating device is that which is being brought to the attention of the trade by the G. Drouvè Co., Bridgeport, Conn. This concern has been manufacturing and installing sash-operating devices for a number of years, and its experience has been of great advantage in the designing of the new device, which is known as the "Straight Push" operator, some idea of the arrangement of which may be gathered from an inspection of the accompanying illustrations. Fig. 4 represents a plan view, showing the sash open, while Fig. 5 represents a plan, showing the sash closed. In referring to the new device the company points out that the direct pushing outward of the sash with two ½ in. steel rods by leverage, one arm being fastened to each side of the sash at the lower part of the side rail insures an opening of the window. These two arms are adjustable to give a 30 degree or 45-degree opening. A line of ¾-in. pipe shaft to which is fastened the main lever at each sash, with an open coupling, is moved backwards and forwards between spool roller brackets secured at each interval between windows. A rack and pinion with geared wheel controlled by chain from the floor gives the forward and return movement. A guide lever is secured to the top of each bracket, and in turn is fastened to the main lever. The unattached end of the main lever has a U-chair riveted to it, which supports the shaft connecting the two steel arms. While the arms bind to the connecting shaft, it works freely in the U-chair support, thus allowing the arms to follow the inclination of the sash. The movement back or forth of the main sash operates the levers at each window, and as all arms work simultaneously, the arms being directed straight at each side of the sash, the windows open or close quickly and surely as desired. As no lost motion occurs, the claim is made that the farthest window on the line operates in unison with the first. Several different sizes of wheels are made, which gives the increased power required, as the number of sash to be operated is increased. The operating parts, which are few in number, cannot rust together, as the connections are phosphor bronze-to-iron, the same principle being carried out as is applied to the pipe unions for steam service. The point is made that the device is also adapted to meet unusual conditions, which sometimes occur, as, for example, where the crane, while not interfering with the hinged or pivoted sash when opened, does interfere with the placing of any brackets or parts of an operating device at the normal position of such. Instead of pushing the sash outward from the bottom, they are pulled inward from the top and are pushed closed. In a Monitor or Lantern construction the operating wheel can be placted at the end of the building, the chain coming down the end wall, thus giving a direct control from the floor. The sash can be opened as much as may be required for proper ventilation and held in any position, the straight arms acting as a brace against wind pressure. The safety valve of this operator, the company points out, is the chain which controls the operating wheel. It is heavy enough to operate any number of sash that may be put on the line and withstand a reasonable strain, yet will part under an abnormal weight. The point is made that around foundries and other buildings where much dust and dirt, as well as gas or acid fumes are present, the device will prove its efficiency and have a very much longer life on account of the heavy materials of which it is composed.

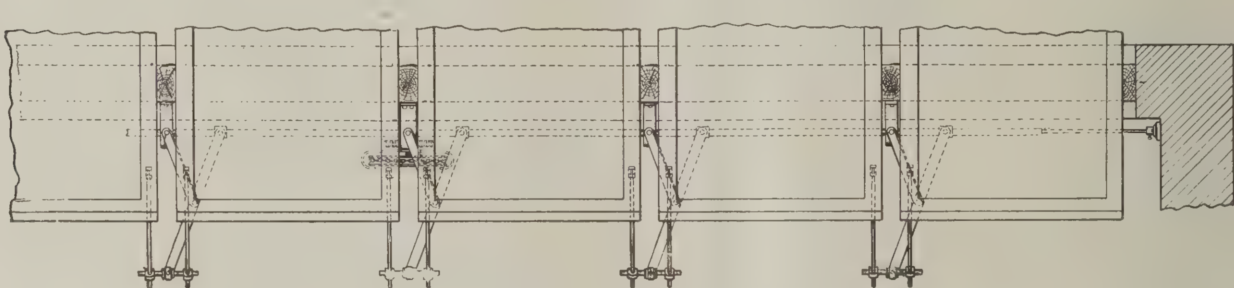


Fig. 4.—Plan Showing Position of Apparatus When Sash Are Open.

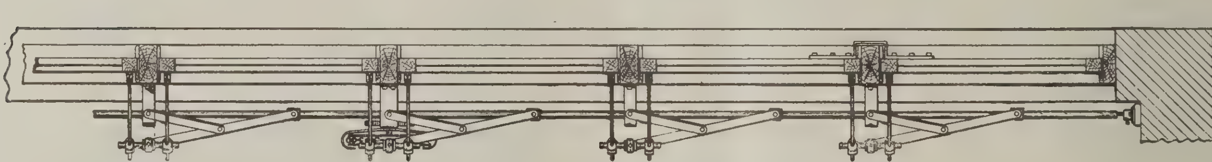


Fig. 5.—Plan View, Showing Position of Operating Device When Sash Are Closed.

Novelties.—Drouve "Straight-Push" Sash Operator.

Marbleized Slate Mantels, Wainscoting, Etc.

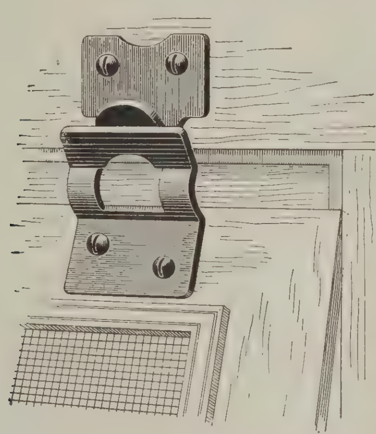
We have before us a copy of a very attractive catalogue of 64 pages carrying an extended assortment of designs of marbleized slate mantels, wainscoting, shelves, etc., manufactured by Keenan Structural Slate Co., Bangor, Pa. The printing of the designs is such as to suggest the appearance of the finished mantels, these involving in several instances the use of a variety of colors. The entire make up is such as to render the catalogue of unusual interest and value to architects and builders, as it will be found by them a very convenient work of reference. In connection with the illustrations are dimensions with an indication of the styles of finish. The company points out that all of its designs, patterns and color schemes are interchangeable; that is, they can be furnished for any style mantel or parts thereof shown in the catalogue. Among the closing pages of the catalogue are interesting remarks concerning colors, slate goods, finish of marbleized slate, suggestions about ordering, etc., etc.

Fire Clay Hollow Terra Cotta Tile

The Pennsylvania Fireproofing Company, with general offices at Erie, Pa., has just sent out to its friends in the trade a very attractive catalogue calling attention to hollow terra cotta tile, which it manufactures in various forms for use in building construction. Special reference is made to segmental arches, book tile for roofs, shoe tile for girders, split tile furring, partition tile, building blocks and column covering. The material is used as indicated by the above in the construction of floors, partitions and roofs, and the furring of walls in office buildings, theaters, factories and warehouses in connection with steel beams and girders. It is also employed in the construction of fine residences where the outer walls are built of tile, with keyed surfaces for the direct application of cement stucco and plaster, also in the construction of homes of moderate cost and other small buildings, such as barns, garages, creameries, and in fact any place where a fine, strong fire and water-resisting material is desired. The company points out that there is an exaggerated idea as to the cost of a fireproof building, probably due to the fact that most people are prone to associate the idea of fireproofing under its methods with the largest and most elaborate buildings of which they have knowledge, with the consequent assumption that fireproofing can only be profitable and economical when used in buildings of that class. It is also pointed out that, owing to the constantly increasing cost of lumber, the margin between combustible and fireproof construction has been constantly narrowing, and it may be safely stated that the average difference on all classes of buildings to-day does not exceed 10 per cent., and there are frequent cases, it is stated, where fireproof construction is as low as the ordinary combustible construction. It is pointed out that the air space in walls of hollow tile furnish complete insulation against atmospheric conditions, thereby reducing the cost of heating to a minimum, and in addition to this the buildings are moisture, sound and vermin proof. Interesting tables are presented in the catalogue, showing the cost of hollow tile walls as compared with solid brick walls, together with comments on "Concrete versus Hollow Tile," and particulars relating to the special line of product turned out by the company in question. Numerous illustrations are presented, some of which are half-tone reproductions from photographs of buildings in connection with which the company's product has been used. The entire make-up is neat and attractive, and the catalogue will be found of value to the architect, the builder, the contractor and the houseowner.

National Screen and Storm Sash Hanger

The latest candidate for popular favor in the way of a screen and storm sash hanger is the construction illustrated herewith and which is being introduced to the attention of architects, builders, contractors and houseowners generally by the National Manufacturing Co., Sterling, Ill. The hangers are of such a nature that they latch automatically and the screen or sash can be easily hung from the inside of the room. The construction is so clearly indicated that little comment would seem to be necessary. In Fig. 6 the first position of the hanger in properly attaching a window screen or storm sash is clearly indicated, while in Fig. 7 the hanger is shown in the second position, the operation being completed by simply allowing the sash to assume a vertical position. It will be seen from an inspection of Fig. 6 that the top of the screen rests against the blind stop instead of the casing, which serves as a guide when sliding the hanger up to engage the hook on the casing at the top. In the second position the bottom of the screen or sash is pushed out until the frame on the screen or sash slides over the hook on the casing and latches automatically. The claim is made that the hangers are so constructed as to hold the screen or sash firmly in position and prevent rattling.



Novelties.—National Screen and Storm Sash Hanger.—Fig. 6.—First Position of Hanger When Attaching a Window Screen or Sash.

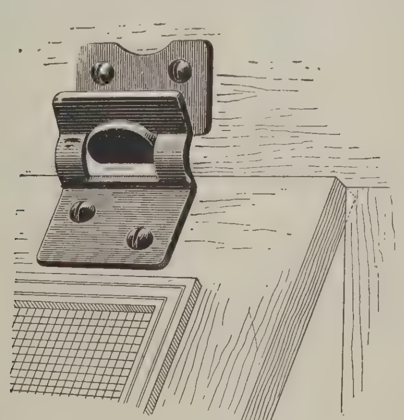


Fig. 7.—Second Position of the Hanger.

Flexible Metallic Weather Strip

The Diamond Metal Stamping Co., 115 Vine street, Columbus, Ohio, has just issued from the press a very attractive catalogue setting for the merits of the Flexible metallic weather strip, which it manufactures in connection with other sheet metal specialties and the Diamond rewirable metal window screens. The weather strip, it is pointed out, is made entirely of a rustless and non-corrosive metal, thus rendering it practically indestructible. The top and bottom three-ply reinforced rigid strip is constructed of separate parts of metal securely joined together, thus giving to it unusual strength. The claim is made that the weather strip can be used on old as well as new buildings, and that it can be used without changing the sash cord, fasteners, locks or marring the woodwork. The construction consists of a fixed base strip secured in the sash runway, which supports a free interlocking seal flange which extends into a groove in the sash and bears with a light cushioned pressure against one side of the groove. Attached to the inside of the front cover of the catalogue are suggestions for architects when preparing estimates for the use of the Flexible metallic weather strip in buildings.

Taintor Positive Adjustable Handle Saw Set

The Taintor Manufacturing Co., 113 Chambers street, New York City, has just made an important addition to its line of Taintor positive saw sets possessing special features, which cannot fail to be appreciated by those mechanics who are often called upon to set a number of saws in the course of a day, and who have to change frequently from coarse to fine, and fine to coarse. The new tool is provided with an adjustable handle and with double plunger, these features being clearly indicated in Fig. 8 of the engravings, which represents the tool with a portion of the handles broken away. It is a well-known fact that the hands of men vary in size, and the adjustable feature of the tool here shown is such as to accommodate the handles of it to any size of hand, thus permitting the mechanic to do his work with less effort and fatigue than would otherwise be the case. It is also true that where he has a considerable amount of work to do in a day, as, for example, the setting of a number of 28-in. saws having 10 points to the inch, and calling for the setting of 280 teeth, he will experience great relief by occasionally slightly changing the with of the handles. Another feature of this tool is the double plunger, which permits of fine and coarse setting, and is held in place by a screw instead of a rivet, thus readily permitting of the changing from one setting point to the other. The tool is provided with hardened ears that will glide over the teeth, while a spring with screw is used to adjust the tension. The point is made that the plungers, either single or double, can be used in either frame of tool, although the double one removes the liability of losing the one not in use. The general construction of the adjustable handle saw set here shown is the same as the regular Taintor positive saw set, an illustrated description of which appeared in these columns at the time it was introduced to the trade.

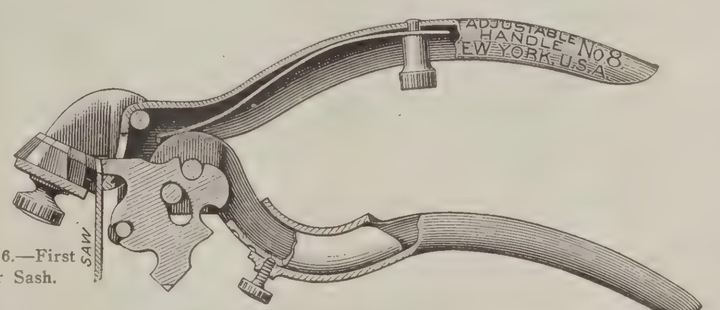


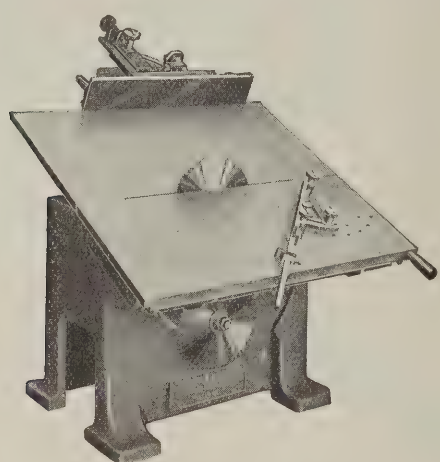
Fig. 8.—Taintor Positive Adjustable Handle Saw Set.

New Departure in Water-Closet Seats and Tanks

Many have been the schemes tried by manufacturers of closet seats and tanks to make them hold together, but with results which were not always in every respect satisfactory. In some cases the sections of wooden seats have been fastened with bolts, while in other cases a hoop has been run around the outside for the purpose of holding the sections together. With all this, however, there is the trouble resulting from dampness, moisture and heat, causing the wood to shrink, swell, warp and crack. With a view to overcoming the objectionable features of wooden seats and tanks the H. W. Johns-Manville Company, 100 William street, New York City, has recently placed on the market a line called "Sanitor." These seats and tanks are molded in one piece from indurated fibre, a material which is claimed to be non-porous and cannot absorb water, therefore no lining is required in tanks made of it. This material, it is said, will neither swell, shrink, warp, crack nor sweat. By a clever mechanical process the grain of mahogany and oak is transferred to these seats and tanks, this being done, it is pointed out, so perfectly that few are able to distinguish them from wood. A little pamphlet which the company is distributing to those who make application for it describes the new line at some length.

Fay & Egan's Double Circular Saw

A combined ripping and cross-cutting machine, which is constructed on somewhat distinctive lines, has just been brought out by the J. A. Fay & Egan Co., 221 to 241 West Front street, Cincinnati, Ohio, and we present in Fig. 9 of the engravings a general view of it, with the table shown in a tilted position. The table is made in two sections—one measuring 44 x 16 in., moving easily on frictionless rollers, and the other a stationary section, 44 x 20½ in., and having an extension so that the material up to 20 in. in width can be ripped. The moving section of the



Novelties.—Fig. 9.—Fay & Egan's Double Circular Saw.

table has sufficient movement to edge or cut off material up to 35 in. and will open to permit the use of a 2-in. grooving head. The entire table can be tilted to an angle of 45 degrees from the saw by means of a hand wheel. A gauge registers the angle to which the table is tilted. Both saw arbors are carried on a revolving frame, and the point is made that it is easy to take off or put on saws without disarranging the table. Another point is, that two saws, up to 16 in. in diameter, one on each arbor, can be carried at the same time, and the frame revolved, or, if only one saw is used, it may be as much as 20 in. in diameter. The ripping fence may be set to take stock up to 20 in. in width, and can be used on either the right or left section of the table. On this fence a micrometer adjustment is provided, the idea being to make use of it when adjustments wanted are too fine to be made by hand. The miter cut-off fence is used on the sliding table and covers a range from 45 degrees back of the fence, to 60 degrees in front of it. This is furnished with a stop-rod, to be used for stock of various lengths.

The Boss Floor Scraper

Among the candidates for popular favor in the way of floor surfacing devices is the scraper manufactured by George J. Kepplinger, Dwight, Ill. The device is known as the Boss Floor Scraper, and is so constructed that the blade extends entirely across the front of the machine, being held securely in place by three bolts, two on the outer edge and one in the center. The scraper is provided with a tilting table, it being only necessary to loosen two bolts to allow the machine to be set to any pitch desired for the work that is being done. The manufacturer states that in working the scraper it is pulled toward the operator and a thick or thin shaving can be made by simply raising or lowering the handle bar according to the requirements of the case. The edge of the scraper blade, it is pointed out, should be slightly turned in steeling in order to insure a good clean shaving. There are furnished with each scraper six blades 3⅜ x 9 in. and six blades 3¼ x 6 in. The scraperweight complete is 90 lb. In addition to the dozen blades mentioned above, the manufacturer furnishes with each machine a blade sharpener, a vise, a wrench, one steel and one file.

Flat-X Metal Fabric

A material which is claimed to be readily applicable in the architectural, ornamental iron and sheet metal field, and which can be easily fabricated into bank and office railings, elevator enclosures, culinary baskets, dish drainers, radiator screens, lattice-work lockers, window guards, refrigerator shelves, signs for office and factory buildings, as well as for a great variety of other purposes, is the Flat-X Metal Fabric, which is being introduced to the trade by the National Metal Fabric Company, Plainville, Conn., and with New York office at 84 Chambers street. It is of diamond shaped mesh, with the tension members diagonal and in long lengths. It is manufactured in gauges ranging from No. 26 to No. 4; in widths up to 4 ft. and in lengths up to 400 ft., arranged in coils for shipment. The company points out that it is not an assembled or woven product and is not dependent upon a weld or other mechanical connection between strands, but is in one piece, being integral from start to finish throughout its width and length. It is said to present absolutely no cutting edges and can be made up from any metal commercially used.

The Patten Double Platform Builders' Hoist

The Patten Manufacturing Co., Chattanooga, Tenn., is bringing to the attention of building contractors an electric hoist, by means of which two platforms running side by side between guides may be operated, one platform ascending loaded as the other descends empty. The hoisting cable is wound around the driving sheaves of the hoist, then around and over guiding sheaves and the ends fastened one to each platform, all as clearly indicated in Fig. 10 of the engravings, which represents what is known as type No. 19, a standard arrangement of cap-timber and sheave wheels. The point is made that this arrangement makes the platforms balance, so that power is necessary and used only to lift the material on the ascending platform. Once started, the hoist runs continually in one direction, the cable being started, stopped and reversed by throwing the upright hand lever forward or backward from the center. The platforms are held in position by brake bands applied by a conveniently arranged automatic locking foot lever. The claim is made that the Patten hoist has no clutches, as the control is obtained by the two brake bands referred to. The driving mechanism, which gives a variable speed, consists of three heavy durable parts, is completely enclosed and is claimed to require no attention, excepting oiling. At the left of the hoist the shaft is slightly extended, and from it can be driven a concrete mixer or other auxiliary apparatus entirely independent of the platforms. This feature cannot fail to be appreciated by builders having

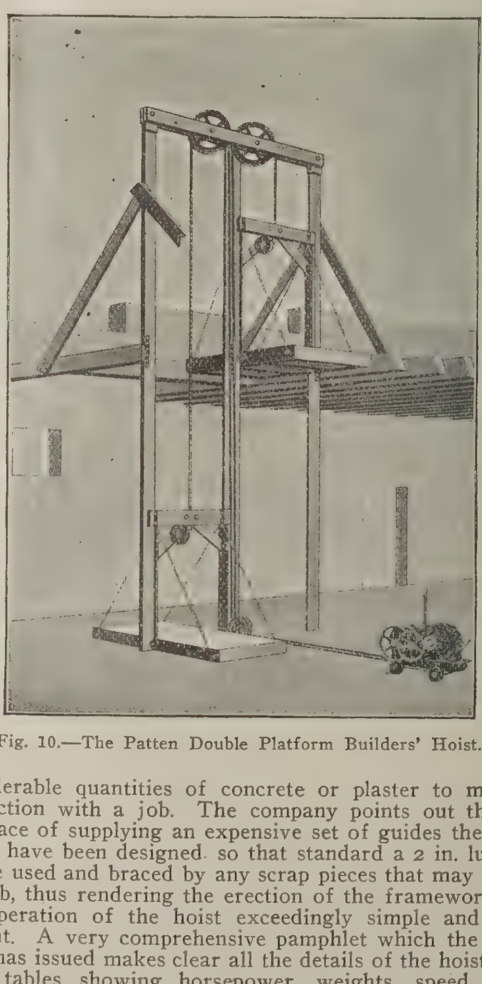


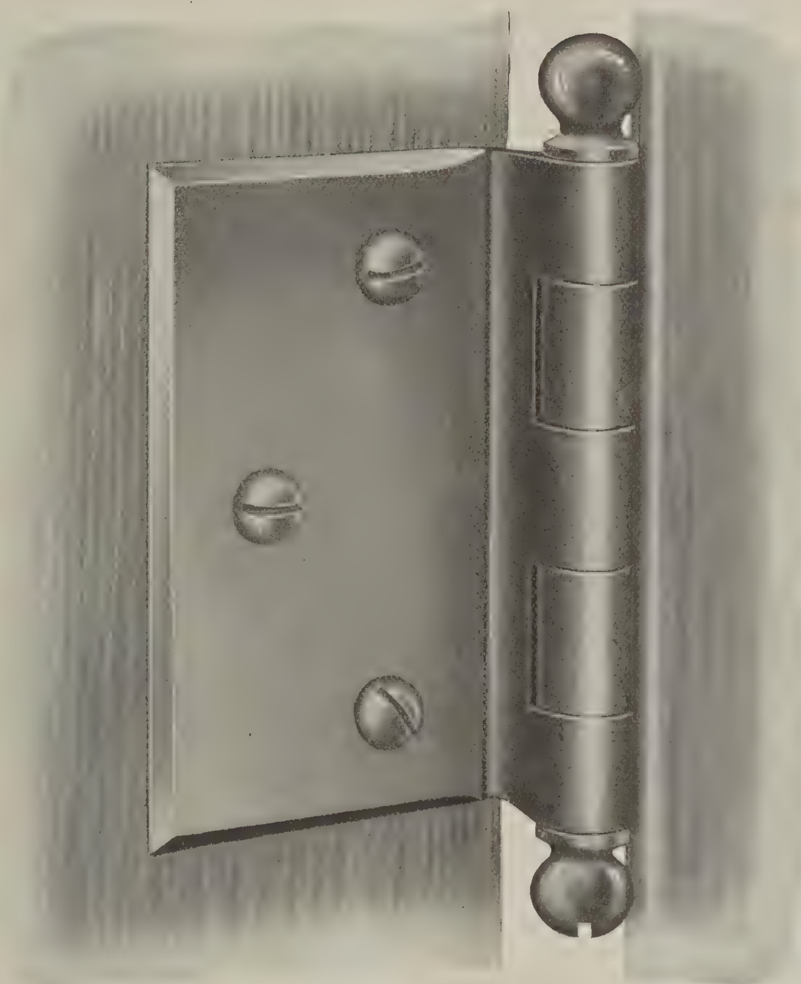
Fig. 10.—The Patten Double Platform Builders' Hoist.

considerable quantities of concrete or plaster to mix in connection with a job. The company points out that in the place of supplying an expensive set of guides the platforms have been designed so that standard a 2 in. lumber can be used and braced by any scrap pieces that may be on the job, thus rendering the erection of the framework for the operation of the hoist exceedingly simple and convenient. A very comprehensive pamphlet which the company has issued makes clear all the details of the hoist, and gives tables showing horsepower, weights, speed, code words, etc., etc.

(For Trade Notes, see second page following

WE INITIATE -- NEVER IMITATE

A-BIG-HIT



No. 450B

Is the new tip with which **"National"** Butts are now equipped, both common and ornamental.

The **Tip** is threaded and screws into the butt in both the Japanned and Plated finishes.

It is also **Slotted** for a screwdriver, making it easy to remove the tip and affords ready access to the pin.

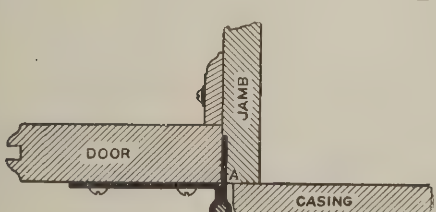
The **Slot** also indicates which is the bottom of the butt—a point greatly appreciated by the carpenter.

These are Exclusive "National" Features

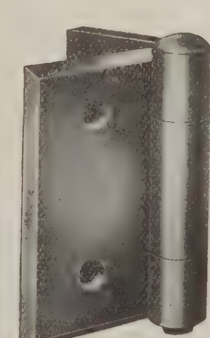
Style No. 450B

here illustrated is a very popular design and can be furnished in all sizes from $1\frac{1}{2}$" to 4" inclusive. These Butts are highly polished, have beveled edges and are double plated. They match the escutcheon plates with beveled edges.

Ask for "Catalog B," and give us your dealer's name.



Directions—Attach butt part "A" to jamb first, then set and wedge door into position and attach Ornamental Leaf to surface of the door. Simple, isn't it?



NATIONAL MFG.CO.

Trade-Mark

Be sure to look for the flag—it's stamped on all "National" Butts.—It stands for quality.

National Manufacturing Co.

STERLING, ILL.

Trade Notes.

The Wheelwright Construction Company, Ogden, Utah, is said to have been among the first large users of Portland cement in that section of the country. The organization is somewhat unique in that it consists of the eight sons of M. B. Wheelwright, one of Utah's pioneers.

The Fuller All-Steel Adjustable Scaffolding is the subject of an interesting catalogue, which is being sent out to architects, builders and contractors generally, by H. B. Fuller, 186 to 190 West Third street, St. Paul, Minn. The scaffolding is composed essentially of two parts: trestles and beams, which are made of sheet steel. The trestles or standards are made in the form of telescoping and folding tripods which support the beams and platform planks. The beams are telescoping shells, thus permitting of ready adjustment and rendering it possible to use the scaffold in all difficult situations. When folded and stored away the scaffolding occupies very little space. The catalogue also calls attention to the Fuller all-steel step ladder, which is claimed to be superior to others by reason of its strength, durability, light weight, rigidity, safety and economy. Any reader who may be interested in these goods can secure a copy of the catalogue in question on application to the company.

Majestic Furnace & Foundry Company, Huntington, Ind., is distributing an illustrated folder in which are set forth the merits of the various lines of coal, wood or vegetable chutes made by it. Prominent among these may be mentioned the "Majestic," the "Model," and the "Pittsburgh." The point is made that the "Majestic" coal and wood chute is designed to be placed in the cellar wall the same as a window, and is of such construction that the hopper is easily removed if it is desired to put in very coarse coal or wood or if a wagon chute is used. The body is made of heavy steel thoroughly painted, and the door and frame of grey cast iron. The door is made to lock when opened upward and can only be released when closed. The "Model" is referred to as filling the demands for a fuel chute, which not only furnishes ample protection to the building, but acts as a window as well. Rubber glass is used to permit of light penetrating the cellar. The steel shield protects the glass when putting in fuel, and when not in use lays in the bottom of the hopper, allowing full rays of light to enter the basement. If desired, the glass can be removed and a wire screen substituted. The "Pittsburgh" fills the demand for a steel chute where very coarse coal or wood is used for a fuel. The body is made of No. 16 sheet steel and the door of No. 10 boiler plate.

The Pullman Manufacturing Company, Rochester, N. Y., makes announcement that George J. MacLoughlin, formerly one of the proprietors of the Century Camera Co. of that city, will have entire charge of the selling end of its business. The Pullman Co. states that it is adding new facilities to its equipment in order to take care of its rapidly increasing business.

The David Lupton's Sons Company, Philadelphia, Pa., has appointed Geo. P. Heinz & Co., Colorado Building, Denver, Colo., Western selling agent, with headquarters at Denver, for the territory west of the Missouri River. They will look after the sale of the company's factory specialties, which are the Lupton steel sash, Lupton rolled steel skylight, Pond operating device and Pond continuous sash.

The Cole Manufacturing Company, Chicago, Ill., will soon erect a four-story reinforced concrete factory building of about 40,000 sq. ft. of floor space. This material enlargement of their capacity, Mr. Cole states, is due entirely to the popularity of their hot blast heaters.

The Hurley Machine Company, 25 to 39 South Clinton street, Chicago, Ill., gives notice to the effect that it has opened a retail store and show room at 31 East Monroe street, between State and Wabash streets, Chicago, for the display of its Thor electric home power laundry machines.

The construction of a reinforced concrete power house and coal bunkers, 90 x 60 ft. in plan, will soon be commenced at the Garwood plant of the Æolian Co., the architects being Balch & Moatz, of New York City, and the Turner Construction Co., 11 Broadway, New York, the general contractors.

Standard Screen Company, 1840 West Fourteenth street, Chicago, Ill., suggests to carpenters, builders and contractors that they write for a free copy of its 1910 illustrated catalogue relating to fly screens and screen doors for residences, apartment houses, schools, hotels, hospitals, and in fact all places requiring ventilation. The point is made that the company makes use of the best grades of wire, black enamel, galvanized and copper bronze, etc., fastened by the most improved standard shoulder-strip method. The claim is made that by this arrangement the construction cannot sag or pull away and the wire is always taut and firm.

At the regular meeting of the Thompson-Sterrett Company, New York City, held March 21, the directors elected Louis J. Horowitz, formerly vice-president and general manager, to succeed Albert B. Boardman, who resigns the presidency, to become chairman of the board of directors. Mr. Boardman has filled the office of president for three years, and under his administration the company has been unusually prosperous. During the last two years the Thompson-Starrett Company has obtained more than $35,000,000 worth of contracts, and is at present engaged on fifty building operations in more than twenty cities.

The Century Cement Machine Company, 118 West Main street, Rochester, N. Y., describes in a little pamphlet which it has issued how to make artificial stone. It is stated that in order to produce perfect cement stone, the first essential is a good machine, so built as to turn out blocks of the proper sizes and designs, true to measure, and with faces that are sharp and clean cut. A high-grade Portland cement should be used; great care should be exercised in the selection of the sand, which should be sharp and clean, and the aggregate should be either of crushed stone or gravel. The proportions to use would depend entirely on the class of construction for which the blocks are intended. In connection with this matter the point is made that the Hercules machine turned out by the company meets the requirements of the case, and in the pamphlet in question many interesting particulars concerning its use and product are given.

"The Hydrolithic System of Waterproofing" is the title of an interesting pamphlet, which reaches us from the Hydrolithic Cement Company, 138 Jackson Boulevard, Chicago, Ill. Emphasis is laid upon the fact that Hydrolithic cement gives an absolutely effective and permanent method of waterproofing, and that it may be used in two ways: First, as a cement for making a waterproof cement mortar coating to lay up on the walls of a structure, either on the inside or the outside, and to lay over a floor where it acts as a wearing surface; second, it may be used as a cement for mixing with proper aggregate for the purpose of producing a waterproof concrete. Reference is made to the great economy of the waterproofing when used in concrete, and figures are presented showing a comparison of costs. Several illustrations are given of buildings in connection with which the company's system has been used.

The "Sharon" Silo is the subject of a neat folder distributed by the Sharon Steel Hoop Company, Commercial National Bank Building, Chicago, Ill., the object being to describe in detail the construction of a silo made of steel and concrete so designed as to provide for every essential feature for the preservation of silage. Illustrations are given clearly indicating the method of construction, with photographic reproductions indicating different stages of the work.

Municipal Engineering & Contracting Company, Railway Exchange Building, Chicago, Ill., has issued an exceedingly neat and attractive little pamphlet of a size convenient to carry in the pocket, illustrating and describing what is known as the Chicago improved tube concrete mixer. The construction and operation of the machine are set forth in a way to appeal to the contractor having occasion to make use of large quantities of concrete in connection with the job upon which he may be engaged. One of the features of the pamphlet is a table showing the material required per yard of concrete at various mixtures, another gives the sizes and capacities of cube mixers, while another shows the approximate shipping weights of regular equipments.

Fisher Hydraulic Stone & Machinery Company, Builders Exchange Building, Baltimore, Md., is distributing among its friends in the trade an attractive catalogue setting forth the merits of Fisher hydraulic stone machinery, which is referred to as "the result of the recognized necessity for a perfected power system for the manufacture of genuine stone." The Fisher machinery is referred to as a distinct and radical improvement over former methods, the point being made that it has been perfected in every important particular, and that the machinery is simple, durable and effective. A general description of the machinery is presented in the catalogue, and the statement made that the company carries in stock two standard outfits, one of which includes a 200-ton hydraulic press, while the smaller one includes a 60-ton press. Not only is the machinery illustrated and described, but the manner of its operation is shown, together with illustrations of its product. There are numerous half-tone engravings of buildings of various kinds in the erection of which hydraulic pressed stone has been used.

The Easton Slate Vault Company, Easton, Pa., directs attention to the quality of the roofing slate and slate blackboards, which it is prepared to supply, and suggests that architects and builders who may be interested send for prices.

The Building Age

NEW YORK, MAY, 1910.

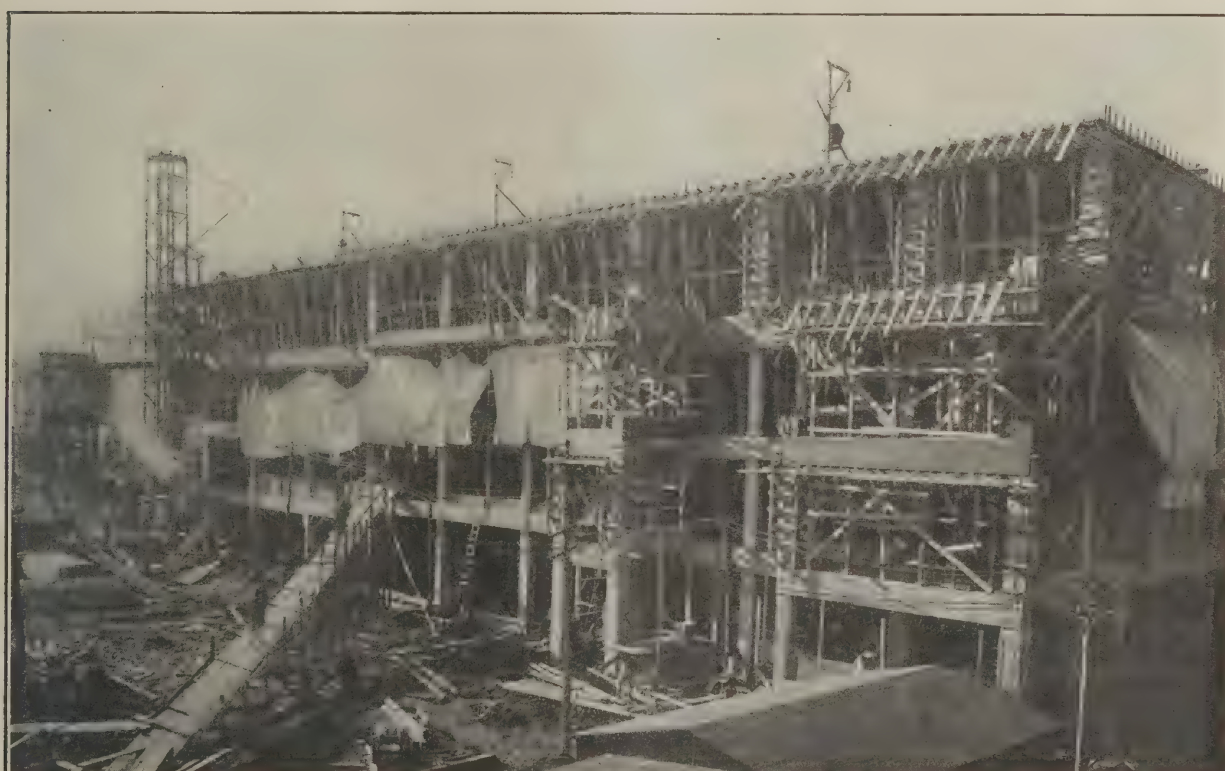
Rapid Construction of a Reinforced Concrete Storehouse

A RECENT example of rapid work in the construction of a large reinforced concrete building intended for storage purposes is found in the addition just made to the plant of the Pierce-Arrow Motor Car Company at Buffalo, N. Y. A four-story reinforced concrete structure containing 107,500 square feet of floor space was finished and delivered to the owners in three months from the time work was started. The building covers an area 308 x 62 ft. in plan, with a wing 105 x 51 ft., and has one-story connections between it and the old building. It has a skeleton reinforced concrete frame, with brick curtain walls and "mushroom" floors and roof. The columns are spaced 20 ft. 6 in. on centers each way and the floors are designed to carry 150 lb. per square foot live loads.

The actual work of construction began on October 15 of last year and by the first of November the foundations had been completed, all the first story and about half of the second story "forms" had been erected and the concreting of the first story nearly finished. Two weeks later the "forms" for the third story were nearly completed, the second story concreted and some of the "forms" stripped from the first story. By the first of December practically all of the "forms" were in place and on December 7 the concreting of the roof was finished. The building was closed in by the first of the current year and was ready for occupancy on the 15th of January, just three months after operations were commenced. The three half-tone illustrations presented herewith show the work in various stages of its progress. The first picture shows the appearance of the building at the sixth week after work had been commenced; the second picture, which is presented upon a following page, shows the stage of operations the second week, while the third represents the building ten weeks after work had been commenced.

The reinforcing of the mushroom column head consists of eight 1-in. round steel bars extending down in the columns 4 ft. below the bottom of the floor slab. These are bent at right angles over a 5/8 x 2-in. band placed just above the bottom of the floor slab. The rods flare radially into the slab from this band and extend outward for a distance of 3 ft. 9 in., while two circles of steel rods 8 ft. 4 in. and 4 ft. 6 in. in diameter rest on the radial bars and are wired to them. The floor reinforcing bars extend well over each column head and run parallel and diagonal to the lines of columns. A good idea of the construction may be gathered from an inspection of the details presented upon another page. These clearly indicate the reinforcing of the column head and also the floor reinforcement. The partial plan view shows the openings for the two elevators and one of the two stairways with which the building is provided. The elevators and one stairway are in a fireproof tower in a corner adjacent to the assembly building, while the other stairway is in an exterior tower in the other end of the building.

Through the center of each bay and extending the full length of the building inverted U-bolts are placed at frequent intervals over the reinforcing rods of the floor slab of the story above and extend 4 in. below the ceiling line. Each bolt spans three reinforcing rods,



Appearance of the Building the Sixth Week After Operations had been Commenced.

Rapid Construction of a Reinforced Concrete Storehouse.—Lockwood, Greene & Co., Architects; Aberthaw Construction Company, Contractors, Boston, Mass.

the exposed ends of which are threaded their entire length. For the present these bolts are to support trolley tracks, but shafting can be supported very readily should it ever be necessary. The first and second stories have granolithic finished floors and the two top floors No. 1 maple on a 1-in. rough under floor. An idea of the general construction of the several floors may be gained from an inspection of the section of the building on another page.

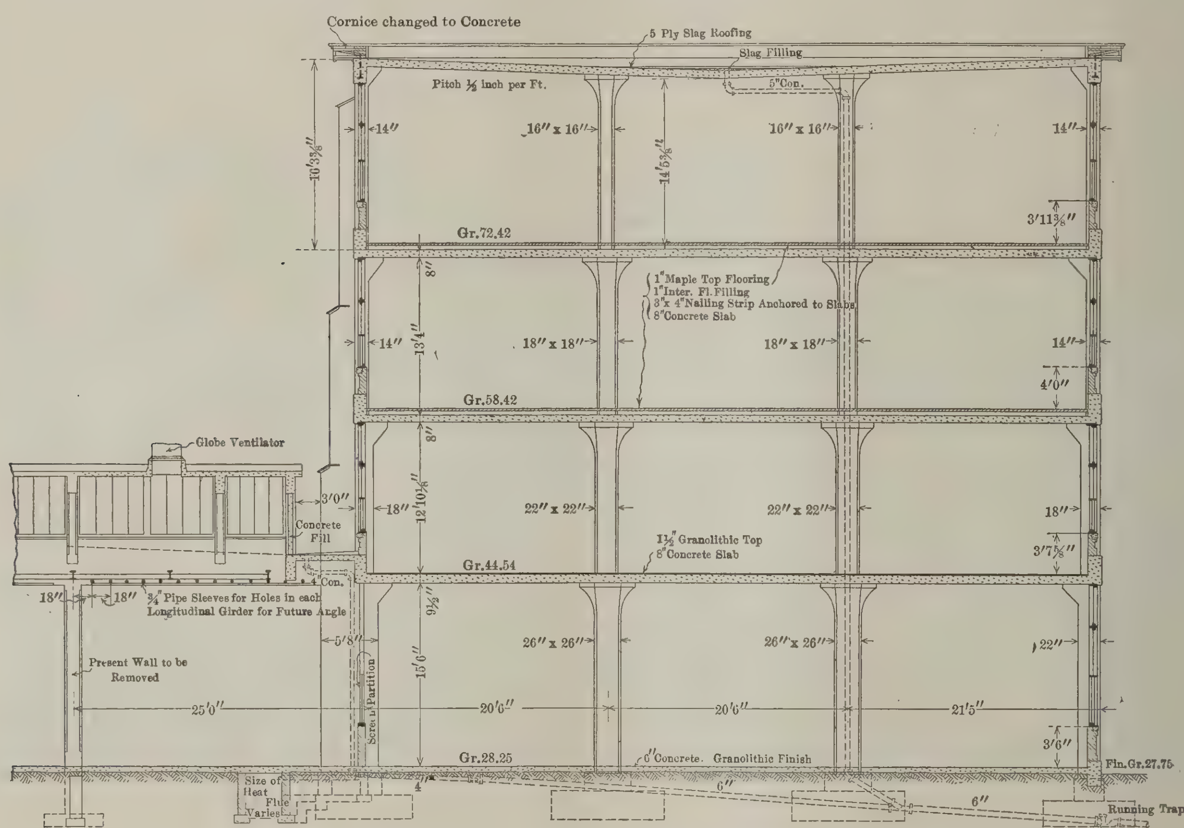
The top floors are firmly locked down by 3 or 4 in. sleepers with beveled edges which have 1/16 x 2 x 12-in. steel bands fastened to their under-side every 12 in. The structural concrete was cleaned with a sand blast, the sleepers placed on 16-in. centers running across the building and the space between filled with a 1:3:6 mixture of gravel concrete. The toilet rooms are placed in exterior stacks so located on the outside of the building that they will form part of the future extensions and thus be able to serve these wings as well as the main building. As the structure may be used at some

paralleled by an industrial track carried on trestles about the hight of the car body. Except for stock piles of aggregate for use in case of car shortage, all sand, gravel and stone were unloaded from freight cars directly into Koppel dump cars running in the industrial track to a switch which turned into the platform above the mixer mouth.

An elevator tower was located on one side of the building about 130 ft. from the wing end and a Smith mixer, with a capacity of 46 cu. yds. per hour, was placed at the bottom.

The cement shed was located between the elevator and the railroad siding, the cement being unloaded directly from the cars into the shed at one end and taken out of the other and onto the mixer platform. The aggregate was dumped from the Koppel cars directly into the mixer mouth along with the cement. A tipping barrel was used to put in the water.

The mixer discharged into an automatic dump bucket designed by the contractor and this was hoisted to the



Vertical Section Through Storehouse, with Present Manufacturing Building at the Extreme Left.—Scale, 1/16 In. to the Foot.

Rapid Construction of a Reinforced Concrete Storehouse.

future date for manufacturing purposes the question of machinery installation also received careful consideration. The absence of girders makes it possible to run over-head trolley tracks, heating pipes or shafting in any direction desired.

One of the novel features which should be noticed is the construction of the pilaster flues which distribute the hot air of the indirect blower heating system from the tunnel underneath the ground floor to the second, third and fourth stories.

The exterior concrete columns on one side of the building are cast with a channel-shaped cross section. The vertical risers leading to each floor are formed by bricking up the outside of these pilasters. Communication is had with each floor by means of registers and dampers.

The arrangement of the construction plant and the methods of handling materials are of considerable interest.

A spur track from the main line of the railroad was

desired level and automatically dumped into steel V-shaped concrete carts, thence hauled by hand to point of placement.

The steel was unloaded into stock piles, sorted as to size and separated as to position in the building. When wanted this was carried to the foot of the elevator tower, hoisted to the proper floor level by a derrick seated on the elevator tower. The bars were then dragged into place by hand, spaced evenly and wired together into sections, so as to remain rigidly in place when concreting.

The "forms" were of very simple design and made in units that could readily be handled by two men. The units were made of a few boards cleated together and they were intended to remain as a unit and to be transferred to the corresponding position vertically above. Cutting and fitting for special work were of course necessary, but as little loose timber as possible was used around the job.

In freezing weather the stone and gravel were heated by live steam at low pressure from the central power plant. There was a flexible steam connection with outlet, which was buried in the material and the steam al-

Lehigh cement was used throughout and the aggregate was largely dredged gravel, which proved exceptionally good concrete material. When the proportion

View of the Site Two Weeks After Work had been Commenced, Showing the Manufacturing Building at the Right.

Stage of Operations at the End of Ten Weeks After Work Was Begun.

Rapid Construction of a Reinforced Concrete Storehouse.—Views Showing Different Stages of the Work.

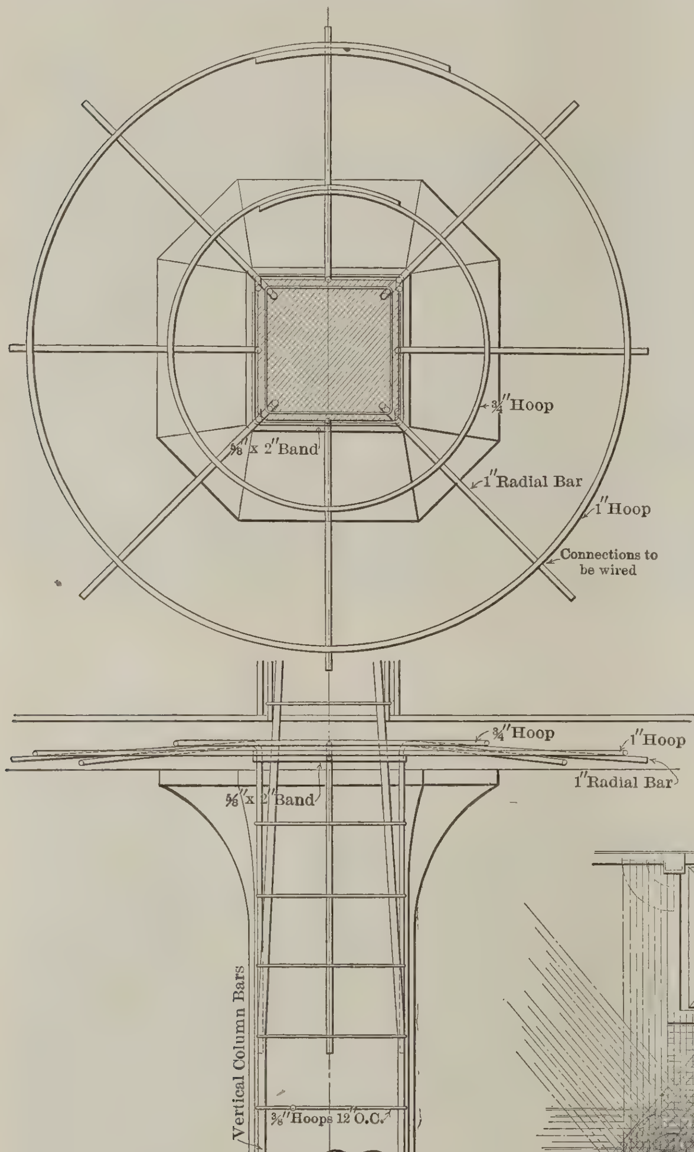
lowed to percolate through until it was hot enough to use. The water for mixing the concrete was heated by passing through pipes coiled in a salamander.

of sand was excessive, it was mixed with some crushed stone.

The contract for the erection of the building was placed with the Aberthaw Construction Company, Boston, Mass., and the steel reinforcing material was furnished by the Corrugated Bar Company, St. Louis, Mo. The architects of the building were Lockwood, Greene & Co., Boston, Mass.

Architectural Treatment of Stone Work

The architectural treatment of stone work is a subject to which architects do not appear to have given as



Plan and Elevation of Column-Head Reinforcement.—Scale, ⅜ In. to the Foot.

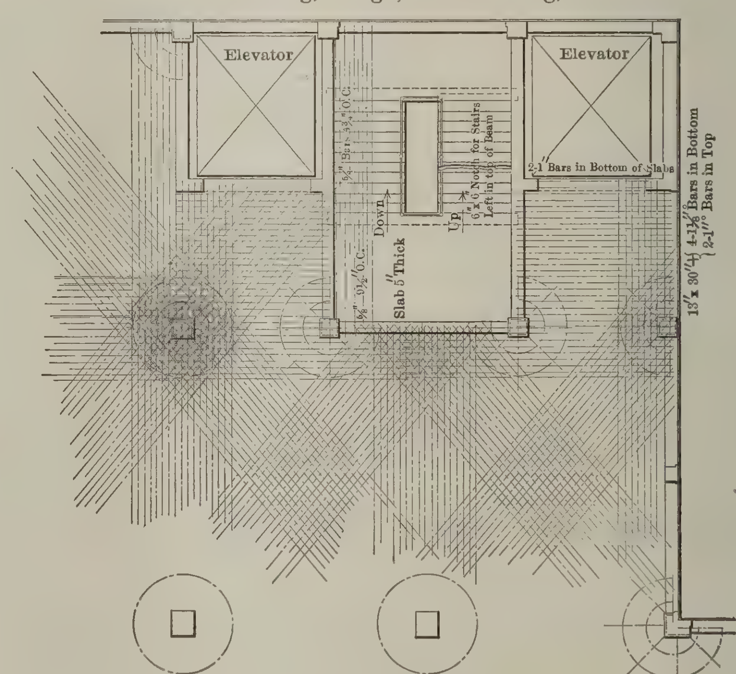
much attention in all cases as its importance would seem to warrant, but in a public address some time ago an English architect, W. J. Hale by name, of Sheffield, offered some suggestions which are of interest along this line. Among other things he said:

Two characteristics which make stone useful as a building material are its weight and its power to resist a crushing force. One of the charms of stonework lies in its capacity to receive the impress of the individual man's power and thought. Its surface can be made to reflect his mind by the manual labor he expends upon it, and the monotony of a modeled and cast material is avoided. Although stone is granular, it is generally more or less laminated, and care should be taken to place the blocks in the building so that the edges only may be exposed to the weather, otherwise the stone will more easily decay and the surface peel off. Jointings should be carefully considered, acute angles avoided and right angles used where possible.

The arch utilizes in its shape and design the prominent characteristics of stone, its weight and its power to resist crushing force, and the introduction of this feature causes one of the greatest changes in architecture. A further development of the arch is the groined or vaulted ceiling, which relies for stability upon the same qualities, and has also certain fire-resisting powers. One method of beautifying the stone is by mouldings, i. e., the working of surfaces or edges of the stone with ridges and hollows of various forms, in order to obtain parallel lines of light and shadow, and, as variety is the object here, it is well to get variety also in the size of the light and dark strips.

One of the problems of the day with regard to architecture in stone is the modern street front. Surely the craze for carrying tons of stone on sheets of plate glass has gone far enough. Any building, to be satisfactory, must not only have supports strong enough to carry the superimposed weight, but the supports must look strong enough for their burden. Any treatment of stone should, in the first place, be examined as to whether or not it takes advantage of the inherent qualities of the material, and secondly, as to whether it satisfies man's trained artistic perceptions. If it stands these tests, then, although the particular feature may not be capable of defense on strictly utilitarian grounds, still it has justified its existence.

A SERIES OF EVENING CLASSES, by which young men who have technical ability in such trades as woodworking or machine-shop work, has recently been inaugurated in the School of Industrial Arts of Teachers' College, Columbia University, New York City. The courses cover drafting, design, woodworking, industrial chemistry, industrial history, machine-shop work and methods of teaching industrial arts. A three years' course of night work will enable an expert mechanic otherwise qualified to gain a diploma as teacher of industrial arts.



Partial Plan of Floor, Showing Position of Elevators and Stairway, with Arrangement of Reinforcing Material.—Scale, 1/16 In. to the Foot.

Rapid Construction of a Reinforced Concrete Storehouse.

DETAILS OF WOODEN CORNICE CONSTRUCTION

By J. Gordon Dempsey.

In competitive bidding on houses, stables and buildings of any description the contractor seeks to keep his bid as low as possible, still making a certain percentage of profit. The bidder takes into consideration after the skeleton part of the construction the details which are needed to finish the building, their construction and the time which will be consumed in the labor. Among these are the cornices or gutters, some of which are made very elaborate and others are made plainer, till the Yankee gutter and overhang is reached. Of course this is all taken into consideration in regard to the kind of buildings in which it is to be used. The more elaborate cornice is used where it is best adapted, as on churches, large dwellings, etc., and this whether the architect has described it in his specifications or gives the contractor a large size scale detail. The plainer cornices, including Yankee and overhang gutters, are used more on two-family houses, cottages, stables, sheds of every description, etc.

Where the cornice is shown only on the small scale drawings and is not specified, the contractor constructs it his own way, keeping the cost down as much as possible, but still giving to it the necessary strength and neat appearance. Each contractor has his own way of constructing the cornice, so that it is not necessary to give him a large scale detail or specify it in the specifications for ordinary cornices, but in some cases where the owner is not satisfied with the construction and appearance of the cornice, as the building is being erected, he sometimes has it changed, although it adds a small sum to the original cost. In all probabilities it is better to give the contractor a large scale detail of such things.

In his own construction the contractor seeks to eliminate the cutting of large timbers or rafters, which may weaken them and also consumes a great deal of time in the cutting. He also refrains from putting in unnecessary pieces of timber which, as the building is being erected, are often added for looks alone and do not strengthen the gutter in any way. As most cornices are constructed of white pine, the less put in the less will be the cost.

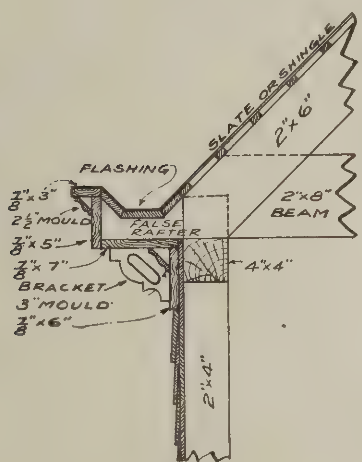


Fig. 1.

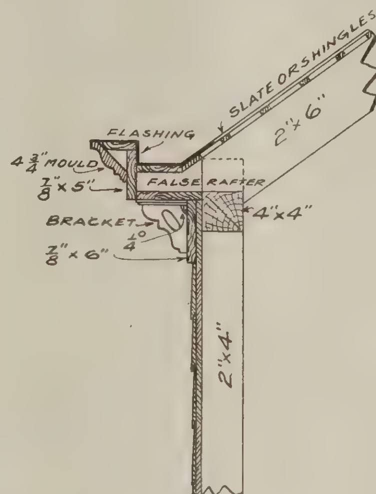
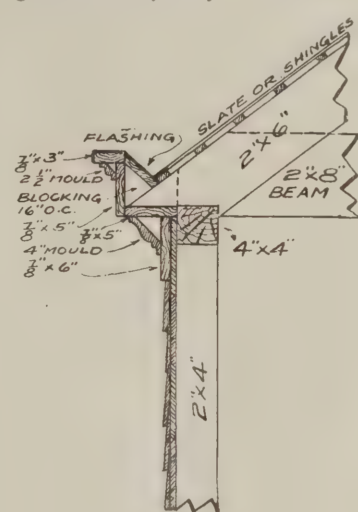


Fig. 3.



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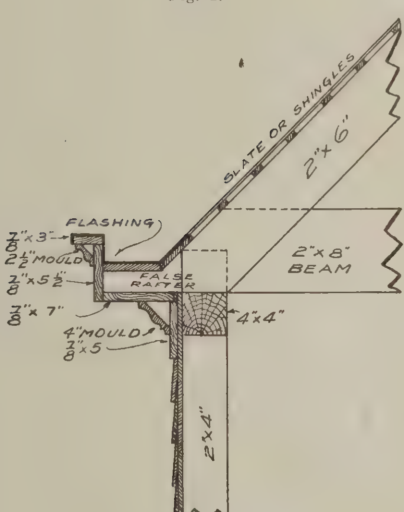


Fig. 2.

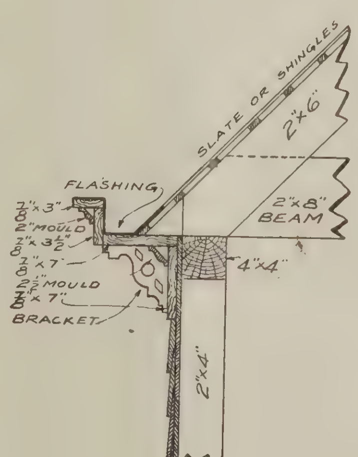


Fig. 4.

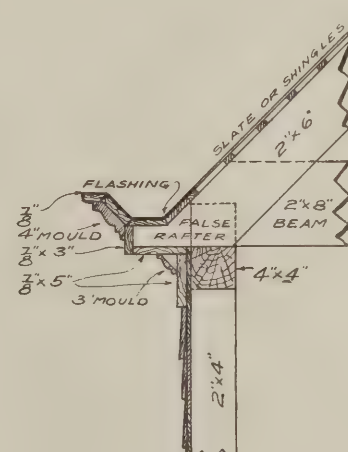


Fig. 6.

Details of Cornice Construction.—Various Styles of Wooden Cornices for Frame Buildings.

The cornices which are here shown afford the reader a general idea of the sizes which are used. The size of the gutter is generally determined by the architect or builder according to the size of the building and the amount of water it will have to carry off. The flashings shown are put on by the tinsmith or plumber. They are generally made of tin, copper or galvanized iron. The mouldings which are placed on the cornices are of stock pattern, which can be easily procured by the contractor, with little or no delay. The brackets also can be procured out of stock, as a large variety is always on hand.

In Fig. 1 is represented one of the most common gutters in use. It can be shaped by cutting the beam or, as more frequently done, by using a false rafter. The false rafter can be cut from most any size timber found at the building. The thickness of the rafter is generally 2 in. This cornice is very strong for resisting loads which may come upon it. The brackets shown can be put on or left off, as may be desired. They are generally put on for appearances only and do not serve to act as braces unless very strongly made.

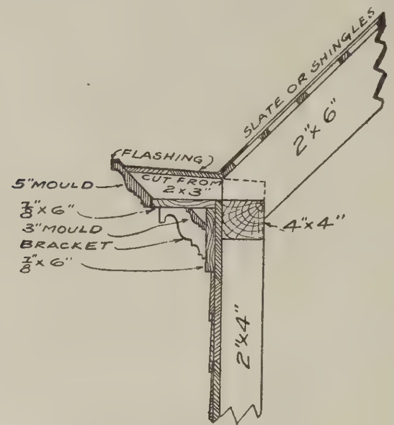


Fig. 7.

The cornices shown in Figs. 2 and 3 are similar in construction, except as to the finish of the trim, and a bracket has been shown on one. These gutters are also made by cutting the beam to the shape required or by using a false rafter. The brackets may be put on or left off as desired.

The cornice, Fig. 4, while used by a great many contractors, is not as strong as the former ones, but gives a very good result. In this construction it is a very good idea to put strong brackets underneath the cornice, which would then serve to strengthen the gutter and also keep its shape. The brackets should be placed about every 16 to 24 in. on centers.

A very strong cornice is that shown in Fig. 5, as it is well fastened to or connected with the larger timbers. The small overhang can be cut from either the beam or rafter as may be desired. The small pieces of blocking, 2 in. thick, which can be cut from almost any size pieces of timber, should be well fastened to the piece which has been cut to make the overhang. The finish of the cornice can be made as shown or can be changed to suit any requirements.

The construction, Fig. 6, meets the requirements generally met by most gutters. Too much weight, such as painters' tackle, etc., should not be placed on the trim, as it can be seen that it would be very likely to get out of shape. This construction is also used a great deal on verandas, where the beam is cut to shape on the end and no great weight comes upon it.

The gutters, Figs. 7 and 8, are used more and more every day in the construction of wooden buildings. The idea of the use of this style of cornice is that the snow will not find a lodging place where the sun will not melt it very quickly. The top of the cornice is pitched according to the steepness and size of the roof, so that the water will not run off it.

In Fig. 9 the shape of the gutter is cut from the rafter. The depth of the gutter is made in accordance with the rain water which it will have to carry off. This is a sort of overhang gutter, which is used a great deal. It is very neat in appearance, strong and easily made.

A one-piece wood gutter is shown in Fig. 10. It is generally made of cypress, looks very neat and gives good results. There is an advantage in this kind of gutter in that no flashing is necessary, as the shingles

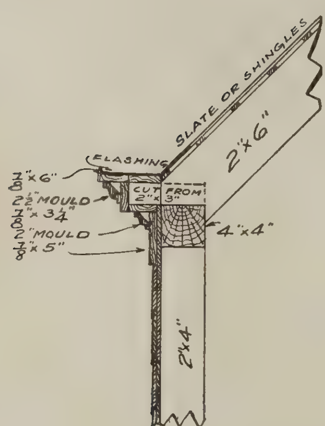


Fig. 8.

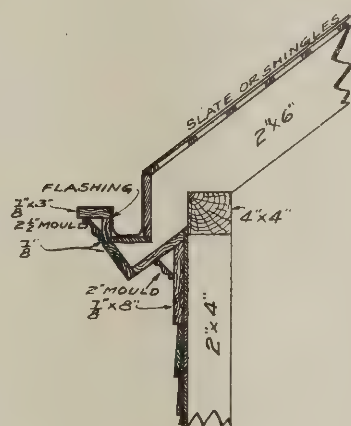


Fig. 9.

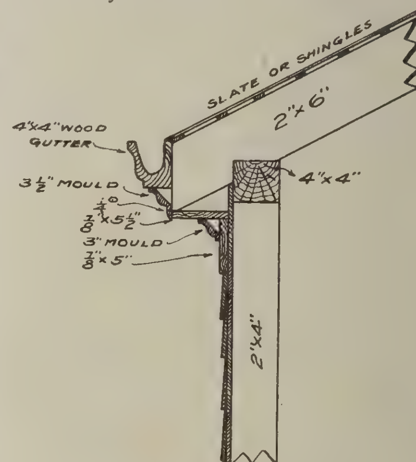


Fig. 10.

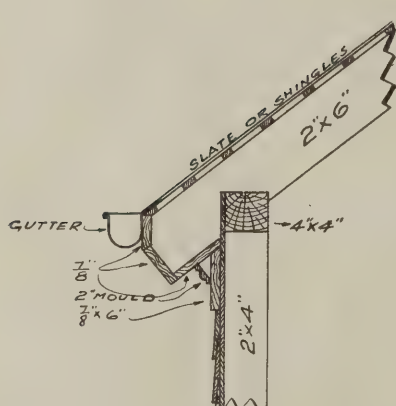


Fig. 11.

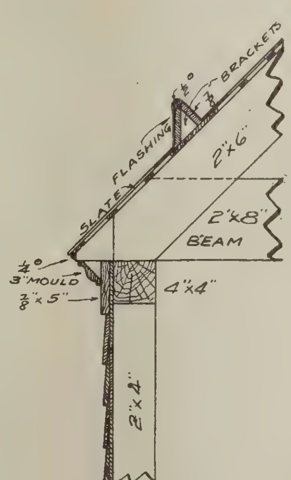


Fig. 12.

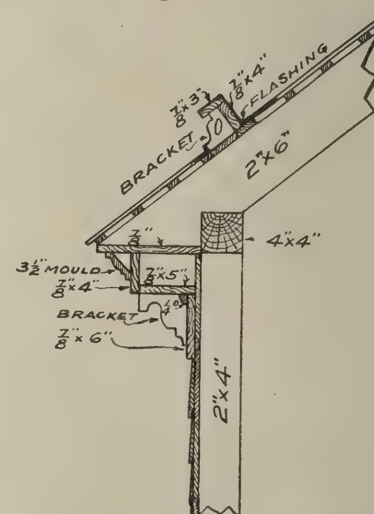


Fig. 13.

Details of Cornice Construction.—Various Styles of Wooden Cornices for Frame Buildings.

or slate are allowed to extend about an eighth of an inch over the inside of the gutter, thus allowing the rain to drip into it.

In Fig. 11 is shown a semi-circular hanging gutter. Any style hanging gutter can be put on in place of this. By leaving the gutter off and extending the slate or shingles over half an inch this can be made into an overhang.

A Yankee gutter which is very cheap and can be used in almost any kind of construction is represented in of the roof. In this detail the gutter is held in place by brackets spaced about every 16 to 24 in. This style of overhang and gutter is most used on churches, dwellings, etc.

Cornices which are used on mill buildings, stables, large sheds, etc., and all kinds of heavy wood buildings are shown in Figs. 14 to 19 inclusive. The gravel strips shown are put on all roofs which are covered with slag or gravel. The idea of the gravel strip is to keep the slag or gravel from rolling or being washed off the roof

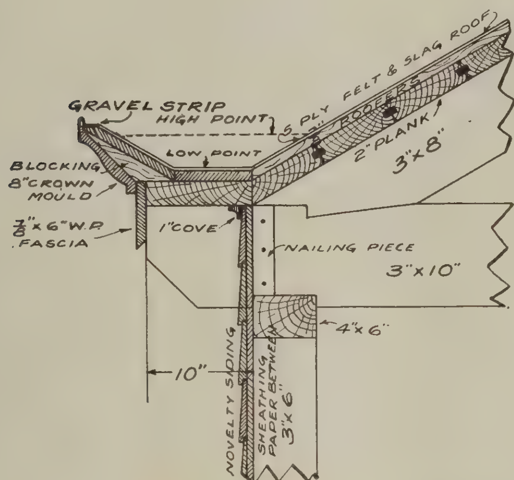


Fig. 14.

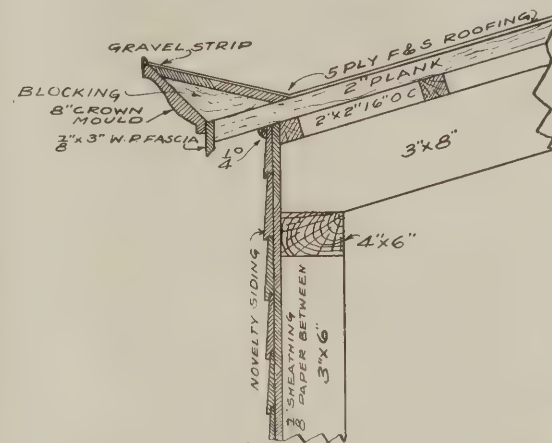


Fig. 15.

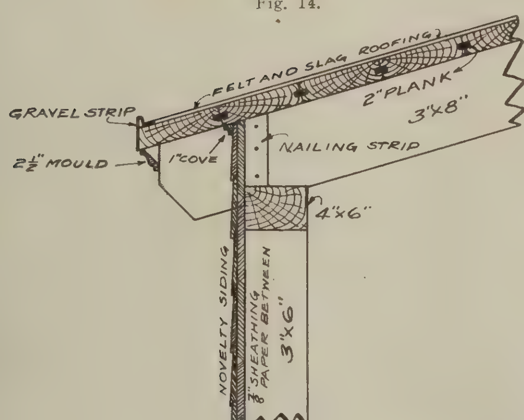


Fig. 16.

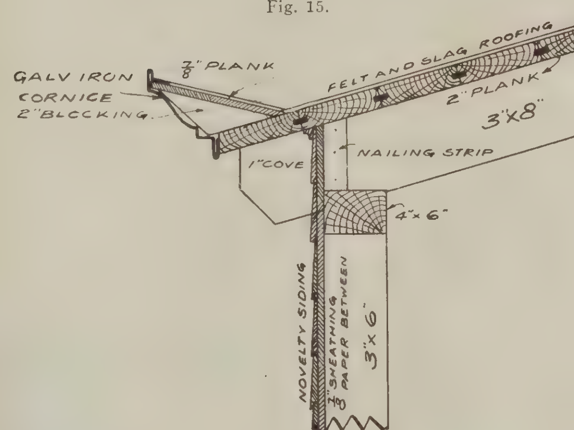


Fig. 18.

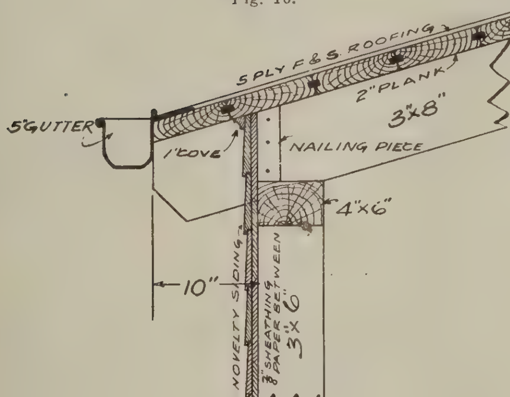


Fig. 17.

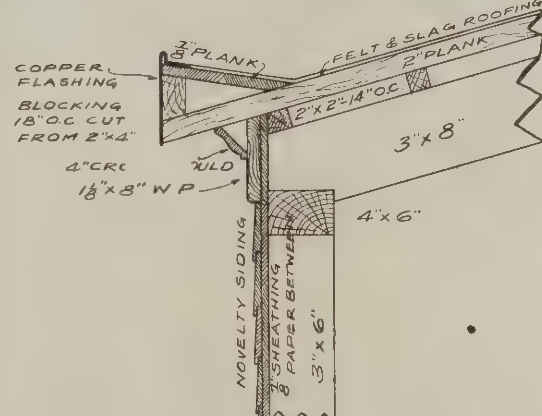


Fig. 19.

Details of Cornice Construction.—Various Styles of Wooden Cornices for Frame Buildings.

Fig. 12. Small pieces of blocking are placed about 16 to 24 in. on centers and can be covered with almost any size plank which may be on hand at the building. A piece of one-half round is nailed on the top, which gives the gutter a curve on top. The flashing is placed over the entire gutter, which adds a great deal to the strength. The size of this gutter should be made in accordance with the amount of water it will have to carry off.

Fig. 13 shows a more elaborate finish to the overhang by the rain. They are made of copper, galvanized iron, tin or any other metal as may be desired. The high point of the gutters, as is generally understood, is at one end of the building and slopes down toward the low point of the gutter at the other end of the building, or, in other words, inclines toward the leader which carries the water from the gutter. The width of the rafter and bottom chord as shown are about the sizes generally used and will convey to the reader the idea for which they are used.

A REFUSE DESTRUCTOR OF REINFORCED CONCRETE

BY WILLIAM MACDONALD.

AS illustrating the universal adaptability of reinforced concrete to any and every kind of structure, we take pleasure in presenting herewith an interesting example of its use in the construction of a refuse destructor in one of the boroughs constituting Greater New York. At the consolidation of the municipalities surrounding the then New York City in 1898, the whole island lying south of Manhattan and across New York Bay—known as Staten Island—had its various village and town governments consolidated into a borough of Greater New York, which was then created. It has an area of 57 square miles and a population of 80,000 people. Street cleaning was put under the charge of the President of the Borough, and the subject of refuse destruction was taken in hand by a trained engineer—J. T. Fetherston, member of the the general view, Fig. 1, that can be obtained even in a garbage destructor where these points are considered as well as the utilitarian features of the building itself. An examination of the site, Fig. 2, and a section showing the borings will show that the foundations for a heavy structure of this character constitute a problem in itself. It was finally decided to use the Simplex concrete pile, which consists of a steel shell driven to a hard foundation, in which is placed another shell and which is filled with concrete, reinforced with three vertical rods. There were 107 concrete piles, which averaged about 26 ft. in length. Two piles were each loaded with 45 tons of pig iron, with a view to ascertaining their ability to carry the loads required, the results being entirely satisfactory.

Fig. 2 represents the pile driver at work upon the site

Fig. 1.—General View of the Completed Building, Showing Runway and Chimney.

Refuse Destructor of Reinforced Concrete.—Designed by J. T. Fetherston, C. E.

American Society of Civil Engineers—who was sent to Europe to study the most interesting and up-to-date plants there in use for refuse disposal. As a result of his investigations he adapted the English system to suit local conditions in West New Brighton, and it has been widely studied by authorities in various parts of the country as a most promising solution of a question which is vital in all large cities—the disposal of its refuse.

That which will probably most interest the readers of *The Building Age* is the application of reinforced concrete to a building carrying heavy loads in the shape of furnaces and tons of refuse dumped on the floors from the street cleaning carts, also the erection of a heavy building of this character in a swamp, for, of course, we do not put these plants in the principal squares of the city. Then, again, the readers are likely to be interested in the artistic and aesthetic effects, as shown in of the building with a number of piles shown in position, the steel reinforcing rods projecting above the surface. It may be interesting to state that the site of the building is a marsh containing from 18 to 20 ft. of soft mud, overlying a firm sand foundation. In order to provide a working platform for the pile driver a mattress of mixed ashes and rubbish was placed over the marsh, this serving the purpose admirably. In Fig. 3 is shown the manner of depositing the concrete in one of the shells, while Fig. 4 is a general view of the building under construction, the wooden "forms" being in position. At the right is seen the beginning of the chimney. A detail of the foundation of the chimney, together with sections through the shaft at various points, are presented upon another page, also a plan and section of the chimney itself. One of the details clearly indicates the manner of reinforcing the walls, while another represents the beam and girder construction.

The concrete used in the construction of the building was mixed in the proportion of one of cement, two of sand and four of coarse aggregates. The broken stone was of a size to readily pass through a 2-in. ring where used for footings, walls, columns and large size girders, and through a ¾-in. ring where used for floor slabs and other work. In order to determine the tensile strength of the cement six briquettes were made and tested, three being for the neat test and three for the sand test. The neat briquettes were to sustain without rupture after 24 hours set in moist air a tensile strain of 125 lb. per square inch, and after one day in air and six days in water to sustain without rupture 500 lb. per square inch, and after 27 days in water, 600 lb. per square inch. When mixed three parts of sand to one part cement, after one day in air and six days in water, they were to sustain 175 lb. without rupture, and after 27 days in water, 250 lb. per square inch of section. These tests the material sustained.

Refuse Destructor of Reinforced Concrete. Fig. 2.—Site of the Building, Showing Some of the Foundation Piles in Place with Vertical Reinforcing Rods Projecting.

The steel called for an ultimate tensile strength of from 54,000 to 64,000 lb. per square inch, and a bar should bend when cold around its own diameter through an angle of 180 deg. and close upon itself without cracking. These conditions also were fulfilled.

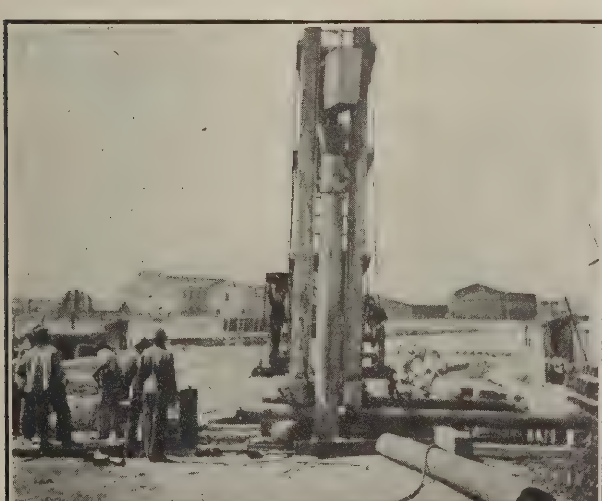


Fig. 3.—Depositing the Concrete in One of the Steel Shells to Form a "Pile."

All reinforcing steel was completely enclosed by the concrete and placed nowhere nearer to the surface of the concrete than the diameter of the reinforcing steel bar. The steel in the beams, girders and floor slabs is so disposed that there is not less than one and a half times the thickness of the steel in the concrete between the reinforcing material. In the walls the steel is so disposed that there is not less than 1 in. of concrete between the reinforcing rods or bars and either face of the wall. In the columns the steel is so disposed that there is not less than 2 in. of concrete between the rods and the surface of the column.

The vertical bars in the walls are spliced together by winding with iron wire, while the horizontal bars are wired to the columns. The curtain wall is 6 in. thick.

The chimney rests upon a concrete-pile foundation and is of reinforced concrete with tile ornamental inserts. It is reinforced with vertical and horizontal steel bars, as indicated in the detail on another page. The vertical reinforcement consists of ¾-in. round bars, while the horizontal rings are of ⅝-in. round bars, the rings being spaced 16 in. on centers. The horizontal bars in the foundation are ¾ in. in diameter, placed 2 ft. on centers, while the diagonal bars are of the same size placed 12 in. on centers. The chimney is 136 ft. 6 in. high and has an inside diameter of 5 ft. 6 in. It is lined inside for a distance of 30 ft. above the base with fire brick and has an air space between it and the concrete, all as clearly indicated in the detail. It is designed to resist a wind pressure of 50 lb. per square foot surface, acting on one-half the area of the vertical section of the stack in addition to the dead load of the material.

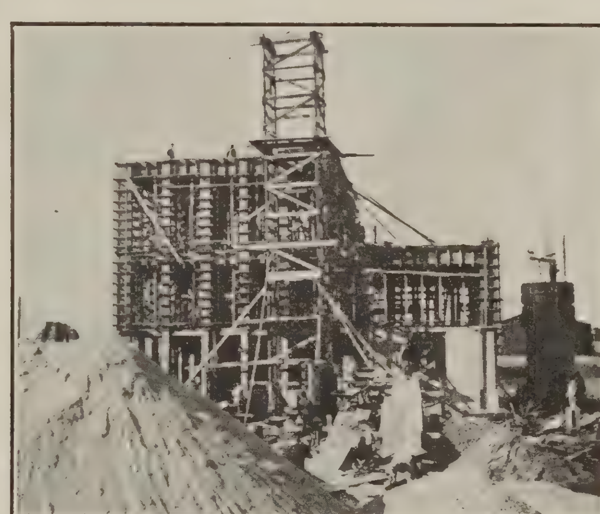


Fig. 4.—View of Building During Progress of the Work.

The runway is of reinforced concrete supported by piling, the piles being tied together transversely at the ground level by reinforced concrete beams. The open space under the runway has been enclosed to form a testing laboratory, especially for paving brick by what is known as a "rattler," which gives an artificial test of the wear and tear of brick.

How Many Pieces in a House

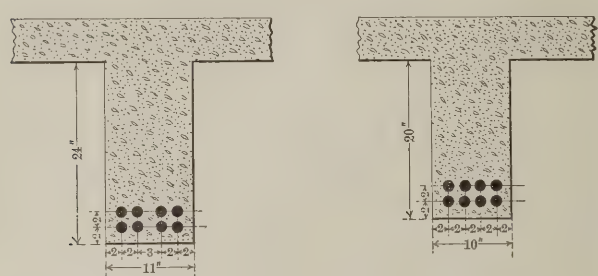
It is fair to assume that there are comparatively few people engaged in the building business who have an adequate idea of the number of pieces of lumber required to construct an ordinary dwelling costing in the neighborhood, say, of $2,500 or $3,000. In an attempt to approximate an answer to this question, Charles Cloukey contributed an article some time ago to the *St. Louis Lumberman,* in which he presented figures that are of special interest in this connection. It is possible that a reproduction of the article at this time may provoke some discussion, and if so, a good purpose will be served:

"The contractor will make his lumber bill for dimensions and have 160 pieces of joists, including porches;

280 pieces for studding; 60 pieces for rafters; 80 pieces for plates; 20 pieces for trimmers.

"This would make the total number of dimension pieces on the bill 600, and according to common practice and the best economy of cutting, the number of pieces resulting from these and used in the house would be not less than 900. The joists would nearly all be used in one piece, but the rafters, inside studding and porch dimension would be cut up to the amount indicated.

"To continue with the bill, we would have: 4000 ft. shiplap, 500 pieces; 20,000 shingles, 20,000 pieces; 15,000 lath, 18,000 pieces; 1500 ft. siding, 2250 pieces; 5000 ft. flooring, 1400 pieces; 600 ft. ceiling, 200 pieces; 1000 ft. outside finish, 200 pieces.



Details Showing Beam and Girder Construction.

"Of course, no account is taken of the great number of small waste pieces of wood made in the construction of the building, but only of those utilized in the actual putting together of the work.

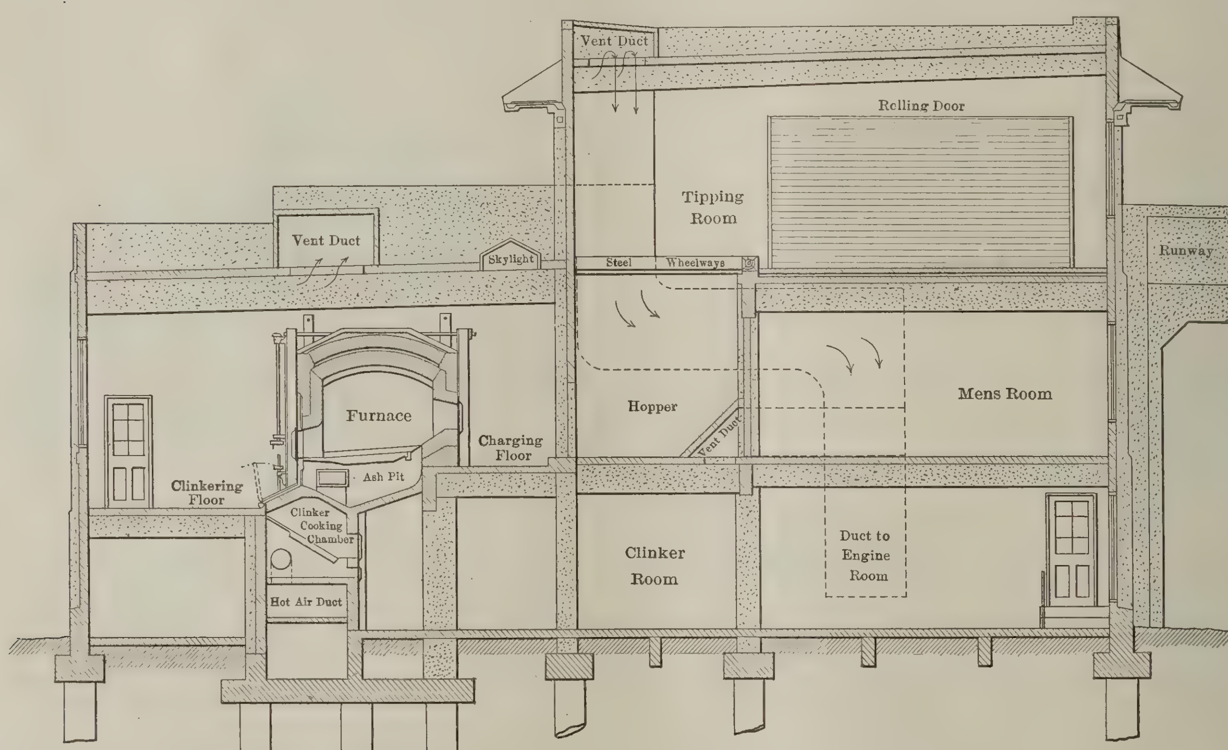
"A door frame complete requires somewhat less of an outlay in variety of pieces, but the number is deceivingly large, after all; 3 pieces jambs; 3 pieces outside casing; 3 pieces moulding; 1 piece cap; 1 piece sill; 1 piece threshold; 3 pieces stops; 3 pieces inside casing; 2 pieces base or plinth blocks; 1 piece fillet; 3 pieces cap; 3 pieces moulding; 12 pieces in outside door; total, 39 pieces, in outside door and frame. As three of the four outside doors have an extra panel, the total number of pieces would be 160.

"Each inside door and frame will aggregate 42 pieces, and as there are 15 inside doors in this house, there will be 630 pieces in this item.

"The base, base shoe, base mould and picture moulding will make 300 pieces more, while the stairs will require 400 pieces, including newels, balustrade and glue wedges.

"The columns and pedestals will take up 150 pieces, the panel work 250, kitchen and pantry cupboards 300, china closet 150, closets, shelves and wardrobe 200.

"The outside mouldings, with all their mitres and returns, will require 200 pieces. The porch columns and balustrades will take up 1000 pieces more, as the columns are staved up and the caps and bases mitred together out of 4 pieces to each member.



Section Through Building and Furnace, Showing Interior Arrangement.

Miscellaneous Details of Refuse Destructor of Reinforced Concrete.

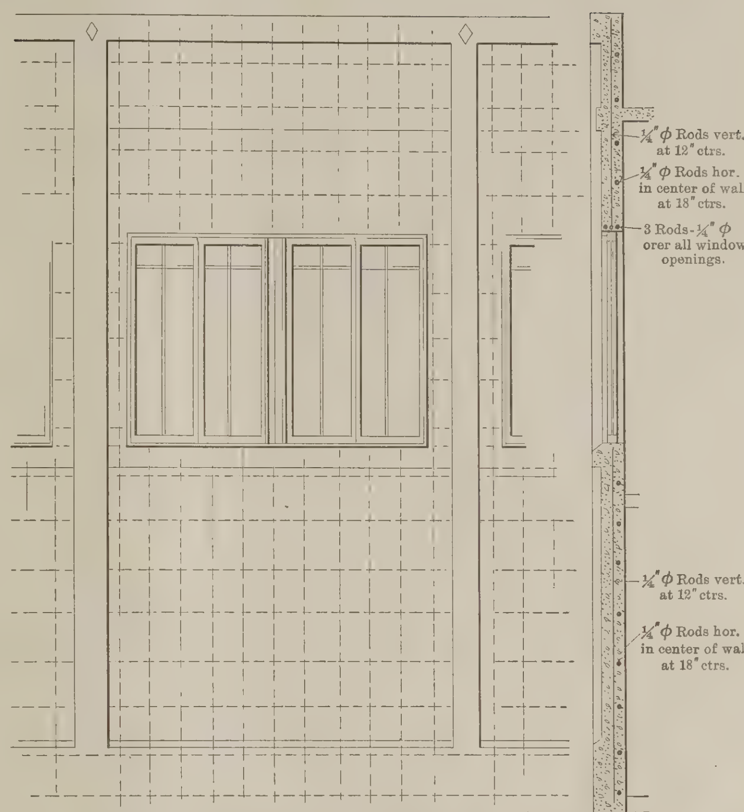
"Leaving the outside dimension part of the work, we come to the millwork, which is much more deceptive in regard to number of pieces than is the part already mentioned. For instance, an ordinary window, with its frame and inside finish, is made up of about 50 pieces, as follows: 8 pieces sash; 5 pieces jambs, including pocket pieces; 1 piece sill, 1 piece sub-sill; 3 pieces outside casing; I piece cap; 3 pieces moulding, including returns; 9 pieces stops, including blind, parting and ogee; 1 piece stool; 1 piece apron; 1 piece fillet; 3 pieces casing; 3 pieces cap, including returns; 3 pieces mould, including returns; 1 piece mould under stool; total, 44 pieces. And as part of the windows are marginal light style, the total number of pieces to the opening would average to 50, and so the 20 windows and frames complete would require 1000 pieces of finished lumber.

"Footing up the total number of pieces indicated, we have the significant sum of 45,440 pieces of lumber in a moderate-sized house with plain exterior finish. It would be an easy matter to increase the number of pieces by 1000 to 1500 without increasing the size of the house, depending upon the intricacy of detail. For instance, a dental cornice on a good-sized house might require the 1000 pieces in that item alone, so that it would be safe to say that a $2,500 house would require between 45,000 and 50,000 pieces of wood to complete it.

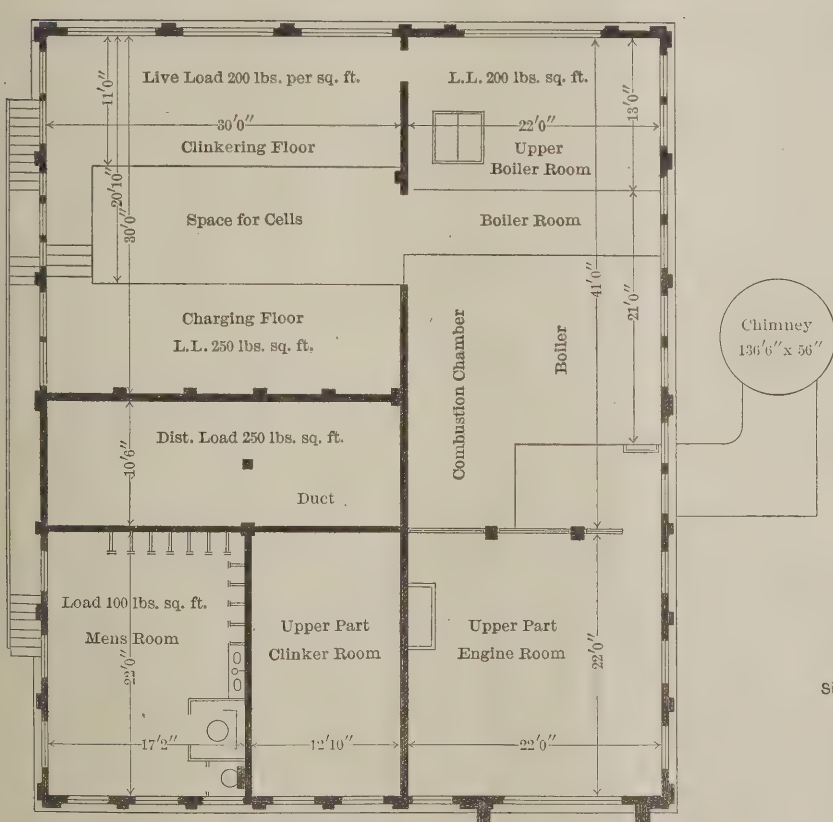
"Another significant fact in regard to the pieces in a house is that, with the exception of some of the lath and shingles, every piece has to be trimmed to length from one or both ends, and many of them two or three times before they are left to occupy their permanent position in the building. Many of them are sized in width one or more times, and all are sized in some thickness or other. Some of them are planed on one side and some two, while many are resurfaced and sandpapered, scraped and polished.

"It is also a curious fact that one thoroughly familiar with mill work and building construction could sort out the various pieces that go to make up a house if the whole were piled together promiscuously. If he were to take sufficient time he could sort out the pieces of flooring, siding, sheathing, lath, etc., for each particular space of surface, supposing that they had been cut and fitted but not nailed up. He could find the pieces for the windows, even to the little bars that go to make up the marginal lights, even if they were mixed up with the thousands of lath and shingles. He could sort out the stuff for doors, panel work, china closets and cupboards, the staves and many parts which go to make up the colonnades, pedestals and newels. In short, he could fit the house together like a box of blocks, provided it had been got out strictly according to a fixed plan and set of details.

"While the statement that a house contains 50,000 separate pieces of wood does not necessarily convey the idea of the practical number, one can imagine what would be the result of mixing the whole up in the same heap, the smallest pieces of windows and doors alongside of the heaviest joists and the smallest corners of shingle with the longest rafters."

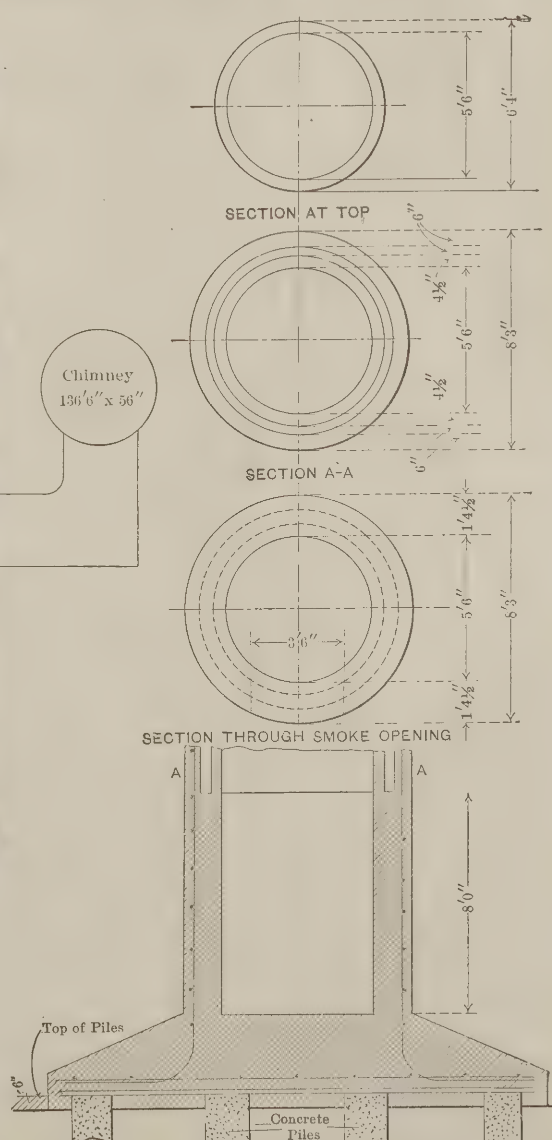


Elevation and Section of Panel, Showing Wall Reinforcement.

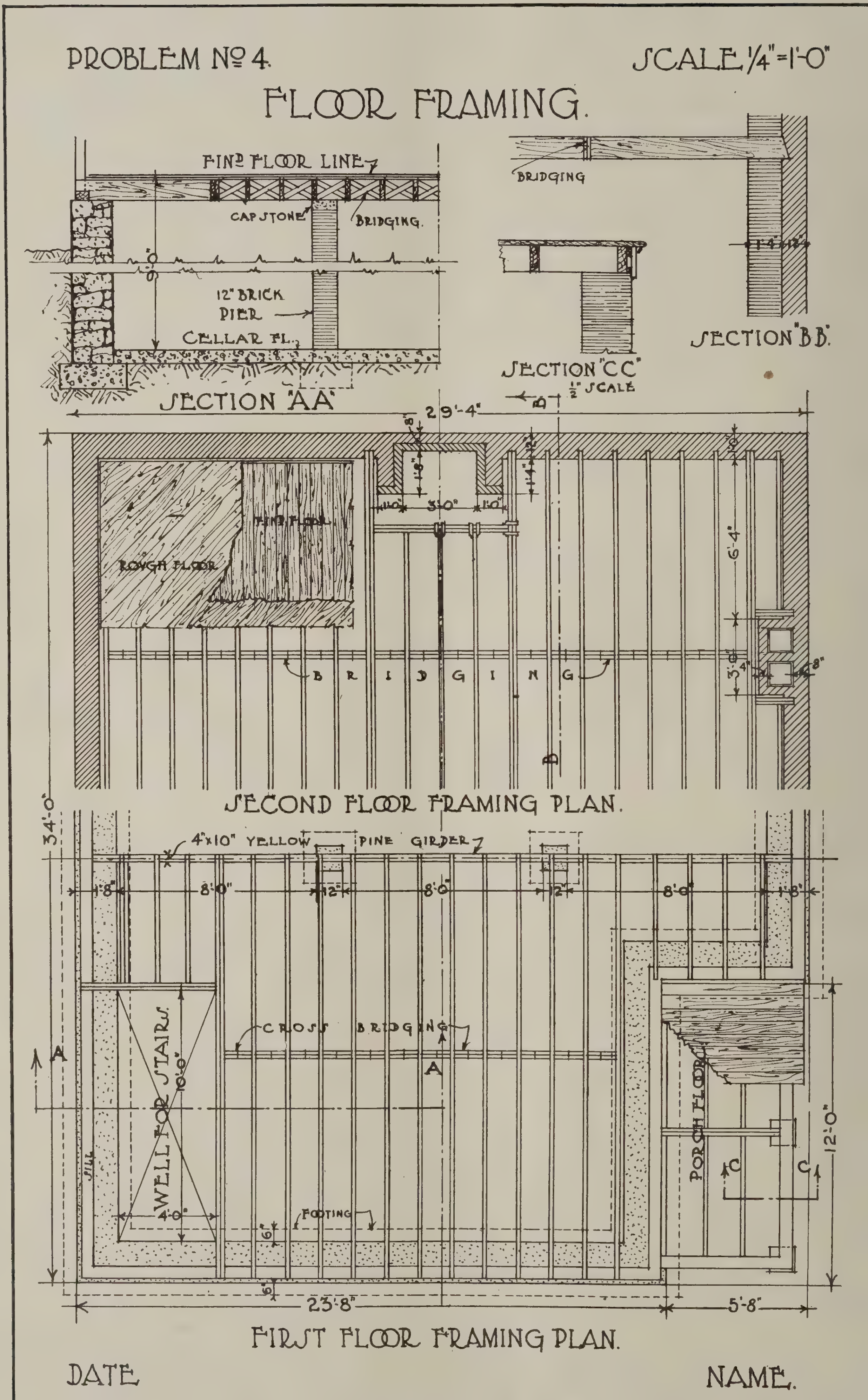


Plan of Floor.—Scale, 1/16 In. to the Foot.

Miscellaneous Details of Refuse Destructor of Reinforced Concrete Construction.



Details of Concrete Chimney, With Cross Sections at Various Points.



Lessons in Architectural Drawing for Beginners.—Scale of Sheet Three-Quarter Original Size.

LESSONS IN ARCHITECTURAL DRAWING FOR BEGINNERS

BY ALFRED AUSLANDER.

THE following definitions and terms relating to the fourth lesson of the series will be found useful:

Footings.—The projecting course or the spreading course used as a base to the wall above in order to insure uniform settlement is called a footing. The footing course may be built of brick, stone or concrete and is for ordinary buildings 12 in. wider than the wall above; that is, 6 in. projection on each side of the wall. This is clearly indicated by the dotted lines around the walls and piers, also shown in the section A A.

Span.—The clear distance between the two walls on which the girder or the beams rest (the distance between the bearing points) is called the span.

Floor.—The portion of the building separating or dividing it into stories is called "the floor." The floor above and nearest the street level is called ground or first floor, the floors above this are known as second, third floors, etc.

The most important point to consider in a building is not the floor boarding or the portion of the building on which the foot rests (although in itself a subject for which a good deal of consideration is needed), but the frame work underneath the boards is what requires the greatest amount of attention.

In the lower part of the plan (see drawing on opposite sheet) we show the cellar walls built of stone 1 ft. 8 in. thick, with footings 12 in. wider than the wall, indicated by the dotted lines, also the first floor framing plan for a frame house. The upper part of the plan shows the first floor walls built of brick 12 in. thick and the second floor framing plan.

Joists.—A horizontal row of parallel timbers equally spaced is called joists. If the floor is to be laid on them they are called floor joists. If the joists have to carry the ceiling only, they are called ceiling joists. Floor joints vary in size according to the weight they have to carry, their length, the kind of material of which they are built, etc.

The following rule should be used for figuring the sizes of beams for small houses like the one shown on the opposite page:

$$S = \frac{8 \times b \times d^3 \times Z}{5 \times l^2} =$$

S = safe load.
b = thickness of beam in inches.
d = depth or hight of beam.
d^3 = cube or d
Z = a figure allowing a deflection of not more than 1/40 of an inch per foot span.
l = length of beam, between bearing points in feet.
l^2 = square of l.

Substitute the following figures for Z in formula: 62 for white pine; 103 for yellow pine; 75 for spruce, and 59.5 for hemlock.

From the above formula we will figure out the sizes of girder and beams for drawing on opposite side, assuming that the floor carries 65 lb. per square foot.

Inside length of building = 30 ft. 8 in. = $30\frac{2}{3}$ ft.
Inside width of building = 26 ft.
Total load = $30\frac{2}{3} \times 26 \times 50 = 39{,}850$ lb.

The girder being supported by two piers and dividing the floor into three panels 30 ft. 8 in. long and 8 ft. wide, which is the clear span between the girders, will have to carry the load of one-half of such panel; that is,

$$\frac{30 \text{ ft. } 8 \text{ in.} \times 8 \text{ ft.} \times 50 \text{ lb.}}{2} = 6133 \text{ lb.}$$

We will assume now that the girder is 6 x 8 in. in section and of yellow pine. Substituting figures for above formula we get

$$S = \frac{8 \times 6 \times 512 \times 103}{5 \times 64} = 7910 \text{ lb.},$$

which the girder can carry, while it has only to carry 6133 lb.

The floor beams are assumed to be 2 x 10 in. spruce placed 1 ft. 4 in. on centers. The load on one beam 15 ft. 8 in. x 1 ft. 4 in. x 50 lb. = $15\frac{2}{3} \times 1\frac{1}{3} \times 50 =$ 1044 lb.

$$S = \frac{8 \times 2 \times 1000 \times 75}{5 \times 15 \text{ ft. } 8 \text{ in.} \times 15 \text{ ft. } 8 \text{ in.}} = \frac{1{,}200{,}000}{1227} = 978 \text{ lb.}$$

against 1044 lb., which the beam can carry.

Bridging.—For the purpose of preventing beams or studs approaching towards each other, pieces of wood are nailed between them. These pieces of wood are called bridging. For stud walls, horizontal pieces of wood the full thickness of the studs are used. For flooring, two pieces of wood crossing each other and nailed to the beams every 8 ft. apart are used. This kind of bridging is called cross-bridging.

In the lower left-hand corner we show an opening left for a stairway. The beams around the opening are usually doubled. The beams right and left of the opening are called the trimmer. The short pieces are the header. The header beams are supported by stirrup irons, also the tail beams. If a double thick joist is used thus, 4 x 10 instead of two 2 x 10 in., a tusk and tenon joint may be used in place of iron hangers.

On the right lower corner we show the porch framing. The beams for a porch floor must run parallel to the wall, so that the boarding above will run perpendicular to it. Only single flooring is used for porches and a pitch of ⅛ in. to ¼ in. to 1 ft. is given to the floor, so that the water will be shed off from the wall.

The second floor framing plan shows how the floor beams are to be framed out for a chimney or fire place. First when they run parallel to the beams as at A or perpendicular to beams as at B, where we show a fireplace and the framing out for the hearth of it. At the left side upper corner we show the under and finished floor above the beams, also the finished floor of part of the porch.

It is expected that the student shall draw complete framing plans for the first and second floors, each on a separate sheet, and also draw one longitudinal and one cross section.

To lay out drawing No. 4 proceed as follows:

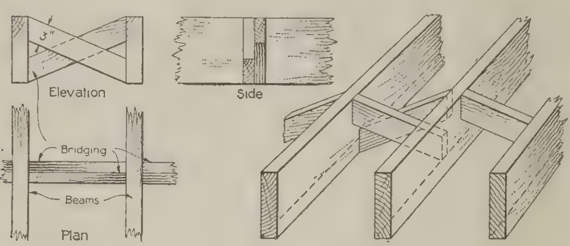
First draw the margin lines 10 x 14 in. and draw a vertical center line. Use paper vertical. Measure off right and left of vertical center line 14 ft. 8 in. to a scale ¼ in. = 1 ft. and draw lines through these points. Draw a horizontal line 1½ in. (actual size) from bottom margin line and a line parallel to this 34 ft. from this line. This will give a rectangle measuring 29 ft. 4 in. wide and 34 ft. long, representing the outside line of the cellar walls, on which we will show the first floor framing. Measure off 1 ft. 8 in. for the thickness of the cellar walls and 1 ft. for the thickness of walls showing the second floor framing. Show a sill 6 in. wide and 2 in. away from outside line of wall all the way around the building. Draw the girder dividing the plan just in two equal halves and indicate the two brick piers 12 x 12 in., dividing the girder into three equal spans. Place the first floor joists 1 in. away from inside line of walls. Draw trimmer beams of stair well 4 ft. away from inside wall as shown on opposite sheet. The rest of the space to be divided in equal spaces not exceeding 16 in. Draw framing of porch same as drawing. Then draw line of cross bridging. Show footings around walls and piers projecting 6 in. on each side of them.

Second floor framing plan to be laid out as follows: First place trimmer beams at chimney A 2 in. away from it. Then the trimmer beams at fireplace B, also 2 in. away, and finally beam at left side wall. Divide the spaces into equal parts not exceeding 16 in. Place headers as figured on drawing. The student shall note if a partition above this floor is to run parallel to the beams below. The beams must be doubled underneath. The section is to be laid out as follows:

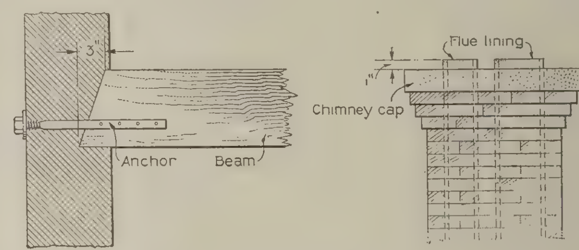
Draw a line representing the finished cellar floor and measure 9 ft. to a line above representing the first floor, and line 10 ft. above, this representing the second floor. Show thickness of walls as on plan and draw all beams, cross bridging, etc., always projecting the lines from the plans. Cross hatch all walls where they appear in section and show horizontal lines indicating brick work appearing in elevation. The drawing on opposite sheet shows walls of section broken. The student should, however, show the full hight according to the figures. Mark all dimensions and lines for this with the arrows at end very clearly.

The student will note that the flues of chimney at right-hand upper corner are shown by double lines. These indicate a lining which is usually made of terra cotta, sometimes of cast iron, and is about 1 in. thick. All flues should be lined with terra cotta lining and should project 1 in. above chimney cap, as shown by sketch below.

The section through the second floor shows the beams cut off beveled. This bevel is called "fire-cut" and should, according to the New York building law, be 3 in. in the hight of the beam. All anchors should be fastened to the beams at lower end as shown by the sketch.



Details of Floor Bridging.



Showing Method of Anchoring a Floor Beam to a Wall; also Chimney-Flue Arrangement.

Architectural Drawing for Beginners.—Various Details of Construction Work.

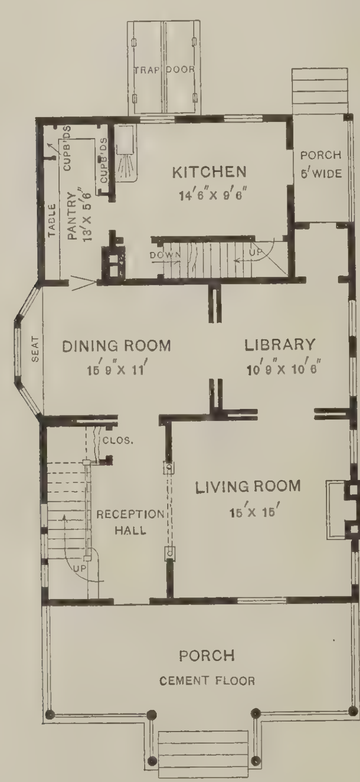
A HOUSE AT ROCHESTER, N. Y.

(With Supplemental Plate.)

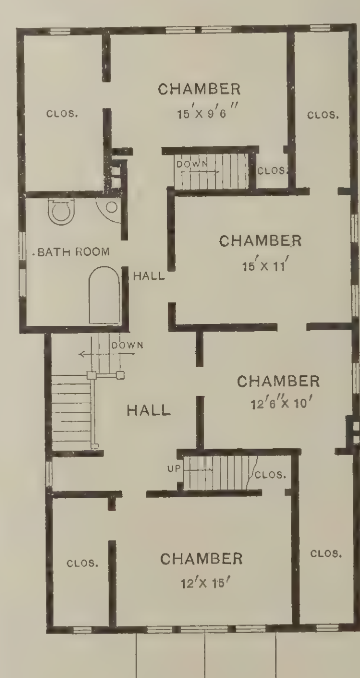
WE have taken for the subject of our half-tone supplemental plate this month the very attractive frame residence recently erected for William A. Landers, at Rochester, N. Y. The floor plans show the general arrangement of the rooms upon the two floors, while the pictures on the supplemental plate clearly indicate the appearance of the finished building. The rooms are all good size and the principal ones upon the main floor, together with the reception hall, are finished in chestnut. The kitchen is finished in Georgia pine with a floor of maple, the finish of the large pantry being the same. The second floor rooms are finished in cypress.

The house is heated by hot-water, direct radiation, with an old-fashioned brick fireplace for burning wood in the living room. The house is lighted throughout by electricity, a light being provided in each closet. The large closets at the front and rear of the house are also provided with windows as shown.

The drawings for this dwelling were prepared by architects J. H. Daverman & Son, Grand Rapids, Mich.



First Floor.



Second Floor.

A House at Rochester, N. Y.—Floor Plans.—Scale, One-Sixteenth Inch to the Foot.

NOTES ON PLAIN AND REINFORCED CONCRETE CONSTRUCTION

By Paul T. Lesher.

THE usual method of calculation for reinforced concrete girders, beams and slabs is as follows: Let Fig. 1 represent a beam with any system of loading, the bending moment being of course obtained in the usual manner as for any beam.

Let the modulus of elasticity of the concrete to that of the steel be one to twelve, as previously given. This means that for a section one square inch of cross section, the steel will stretch one-twelfth as much as an equal sectional area of concrete.

If the safe stress for steel is taken at 16,000 lb. per square inch of cross section, then the stress on concrete to produce the same stretch or shortening would be 16,000 lb. divided by 12, or 1333 lb. per square inch of cross section. If the concrete would be safe for this stress the neutral axis would be midway between the extreme fibres of the upper and lower flanges, just as in the ordinary case of a wooden or rolled-steel beam. This is because the shortening or change of length of the upper flange would be the same as the stretch or change of length of the lower flange.

Compression of Concrete

However, since the allowable compressive stress on the concrete is assumed to be 600 lb. per square inch of section, the concrete under this condition will not compress or shorten in the same proportion as the steel in the tension part stretches. That is, the compression or shortening of the concrete will only be 600 divided by 1333 of the steel, or say 45/100. This at once fixes the location of the neutral axis for such a composite beam, as it must under this condition be located so that the compression of the fiber above the neutral axis is 45/100 of the length of the stretch of the fiber below the neutral axis. That is to say, the distance *a* is 45/100 of the distance *b*, in which *a* plus *b* equals *d*, *d* being the distance from the upper edge of the beam to the outer edge of the lower flange steel reinforcement. Only with the neutral axis so located will the shortening or change of length above the neutral axis be 45 per cent. of the stretch or change of length below the neutral axis.

An inspection of the triangles shown in Fig. 1, representing by the solid lines the fibers of a section before loading and by the dotted lines the fibers of the same section after loading, will prove this, as with no other location of the neutral axis will the shortening of the upper fibers be 45 per cent. of the lower fibers.

The foregoing is of course based on the common theory of beams, which assumes that the stress either in compression or tension is proportional to the distance from the neutral axis and that therefore the shortening or stretch is proportional to the distance from the neutral axis.

If *a* is 45/100 of *b* and *a* plus *b* equals *d*, then we have (45/100 *b*) plus *b* equals *d*, or *b* equals *d* divided by 1 45/100 or 69/100 *d*, say 0.7 *d* and *a* would equal 0.3 *d*.

Effective Depth of Beam

The effective depth of a beam is similar to that of a plate girder or other built-up composite girder, and is the distance between the centers of gravity of the flanges. The center of gravity of the lower flange is, of course, the center of gravity of the steel reinforcement, and the center of gravity of the upper flange is the center of gravity of the effective section of the concrete, or 1/3 of the distance *a* from the top of the beam. This makes the effective depth $(.7\,d + .2\,d) - f$.

This being under the condition of 16,000 lb. tension in the steel, 600 lb. compression in the concrete, and and one to twelve ratio of moduli of elasticity.

The bending moment divided by the effective depth gives the flange stress, as in any other type of beam or girder.

The flange stress divided by the 16,000 lb. for steel gives the square inches required in the reinforcing rods in the lower flange, and the flange stress divided by 600 lb. for concrete gives the square inches required in the effective section of the concrete for the upper flange.

As the effectiveness of the concrete varies from zero at the neutral axis to 600 lb. at the outer fibre, a triangle having its point at the neutral axis and its base at the outer fibre represents the effective section of the concrete and therefore the area of this triangle must be at least equal to the flange area required. Hence the area required divided by half the distance *a* gives the width *c* of the flange required for a rectangular section of beam.

This also applies very closely for a T-section, as can be seen by working out a few such problems. The reverse of this operation will, of course, give the safe strength for a beam if its section and make up are known, and provided it has been proportioned in accordance with the data above given.

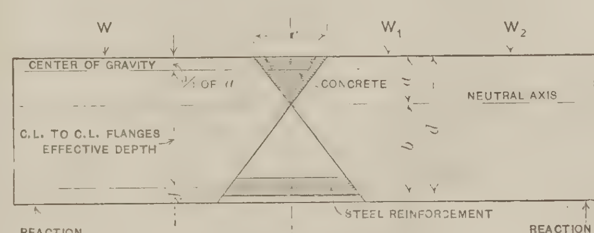


Fig. 1.—Diagram Representing a Beam with any System of Loading.

Notes on Plain and Reinforced Concrete Construction.

The horizontal shear, for all practical purposes, is usually taken as equal per lineal inch of the beam to the vertical shear at that place divided by the effective depth of the beam at that place.

Where the section of the concrete is not sufficient for the horizontal shear, it is necessary to use wrought iron or steel stirrups. It is good practice to always use stirrups, even if they are apparently not theoretically required, as they form a good binder or tie for the concrete.

The vertical shear, for all practical purposes, is calculated and designed as in ordinary beams and girders, bearing in mind that it is the usual practice to allow the shearing values of the rods to be used, as well as that of the concrete. The shearing section is taken as the full cross sectional area of the beam, exclusive of the T-wings or flanges if any.

When the shape of a rod used in a flange gives a proper mechanical bond or grip, so that the rod cannot slip, the adhesion calculation need not be made, as the mechanical bond of the rod makes it unnecessary to rely on adhesion. Where plain rods are used, the adhesion required per lineal inch of the beam is the same in amount as the horizontal shear at the same place, and there must be sufficient surface to the rods to be safe for this amount of required adhesion.

The Philadelphia Bureau of Building Inspection give 50 lb. per square inch of surface for this value. It will be found hard in most cases of beams and girders to get sufficient surface for this value. This means that in such cases the mechanical bond type of bar becomes necessary. Wherever it is practical and can be afforded it is prudent to use such type of bar. Care must be taken even with the mechanical bond type of bar that it is of sufficient length to develop a grip equal to the strength of the bar. A typical beam and slab section is shown in Fig. 2, and the following problem will illustrate the application of the principles given: Suppose a building of mill construction is to have its first floor of reinforced concrete, the mixture being one part cement, two parts sand and four parts stone, the building to be 80 ft. wide inside, with three lines of columns, placed 20 ft. on centers across the width of the structure, and 16 ft. center to center lengthwise of the building. The beams and girders are to be placed as shown in Fig. 3. In this design the basement columns are also made of reinforced concrete. The floor is to be designed for a live load of 120 lb. per square foot.

Referring now to the solution in connection with

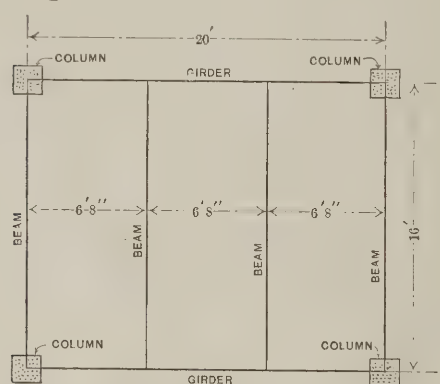


Fig. 3.—Showing How Beams and Girders Are to be Placed.

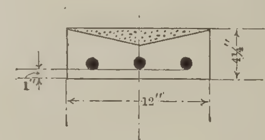


Fig. 4.—Detail of Slab.

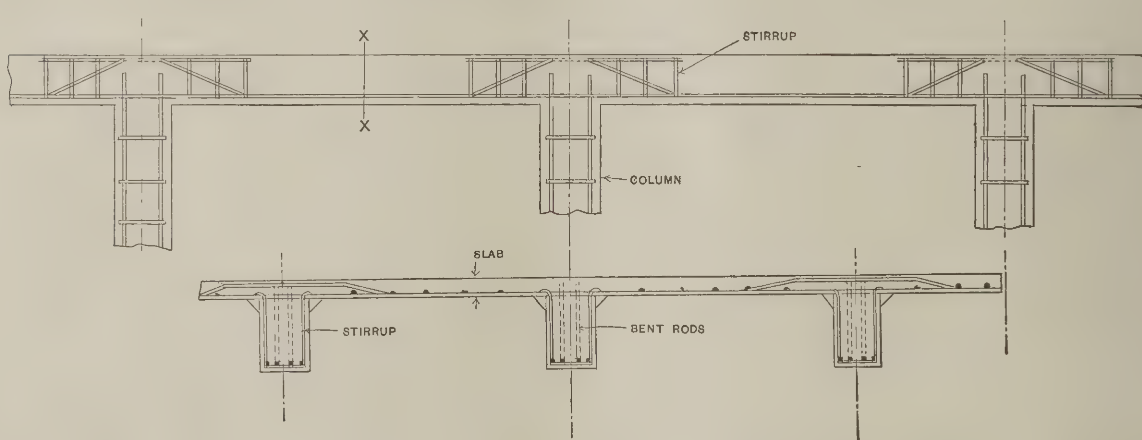


Fig. 2.—A Typical Beam and Slab Section, Showing Arrangement of Reinforcing Material.

Notes on Plain and Reinforced Concrete Construction.

which use will be made of the diagram Fig. 4, we will assume the slab to be 4¼ in. thick. To find the load on the slab it is necessary to ascertain the weight per square foot of floor. Assuming that a square foot of cement, 2 in. thick, weighs 24 lb. and the 4¼-in. slab, 51 lb., and adding the 120 lb. live load, the total load per square foot equals 195 lb.

The distance that the slab spans between beams is about 6⅓ ft., and assuming the slab to be 12 in. wide, for calculation, the total load the slab will be required to sustain is 6⅓ ft. multiplied by 195 lb. or 1234 lb. According to the data previously given our effective depth equals

(9/10 x 3¼") — 3/16" = 2.74 in.,

and our effective area equals

(3/10 x 3¼" x 12), or 5.9 sq. in.

The bending moment in a beam divided by the effective depth gives the flange stress. The flange stress divided by the safe fiber stress for steel, which is taken at 16,000 lb. per square inch, gives the number of square inches required in the reinforcing rods in the lower flange. The flange stress divided by the safe value per square inch for concrete in compression, which is 600 lb. per square inch, gives the number of square inches required in the effective section of the concrete in the upper flange.

We will first find the bending moment, the formula for a beam uniformly loaded being $\frac{w\,l}{8}$, in which "*w*" equals the total load in pounds on the beam, and "*l*" equals the span of the beam in inches. The bending moment in our case would then be 1234 lb. multiplied by (6⅓' x 12") or 76 in., and then dividing this product by 8 we have a bending moment of 11,723 inch-pounds. This value divided by the product of 16,000 lb. by 2.74 in., the fiber stress of the steel and the effective depth of the slab, respectively, gives a quotient of 0.27, which is the number of square inches of steel required in the rods.

We will use 3 rods each of ⅜ in. diameter and spaced 4 in. apart. In addition to these rods we will have ¼ in. diameter rods spaced 24 in. apart, wired on top of the ⅜-in. rods and running at right angles to them.

The bending moment of 11,723 inch-pounds divided by the product of the effective depth of 2.74 in. multiplied by 5.9 sq. in—the effective area of the concrete—gives a compressive stress of 725 lb. per square inch for the concrete. This is rather high, but owing to the strengthening effect of the cement on top of the slab, we can assume this value to be conservative.

The vertical shear equals one-half the total load on the slab, which is $\frac{1234}{2}$ = 617 lb. divided by the cross section of the slab (12 in. x 4¼ in. equals 51 sq. in.), which gives an answer of 12 lb. per square inch.

The horizontal shear equals 617 lb. divided by the product of the effective depth of 2.74 in. multiplied by the assumed width of slab (12 in.), and we get for a result 19 lb. per square inch.

The adhesion value equals 617 lb. divided by the product of the effective depth (2.74 in.) multiplied by 3.53 sq. in. (the circumference of 3⅜ in. diameter rods), which gives a result of 63 lb. per square inch. This is a little high for plain rods, so it would be best to use mechanical bond rods.

(*To be continued.*)

THE JOBBING CARPENTER AND SOME OF HIS WORK*—XIV

PACKING or crating of household goods—furniture, etc.—for removal is not usually classed as carpentry work, but the jobbing shop works up a good reputation for itself by never refusing an order, and therefore looks upon everything pertaining to woodwork and a lot of things that do not pertain to woodwork as legitimate business. Many families that make a practice of moving to suburban homes for the summer months are well able and quite willing to pay for the service of a competent man to do the packing and crating, and what follows constitute a few ideas on the subject of making crates and packing cases.

In making packing cases a very common mistake is to get them much too large. Many people procure large boxes from the dry goods merchant, probably getting a large flimsy case in which millinery, for example, has been packed. They fill this box with crockery, flatirons and preserves in glass jars and then call down maledictions upon the heads of the freight handlers because things get broken. Packing cases should be designed with a view to what is to go into them and made wherever possible of a size that can be easily handled. This, though probably using up a little more material for the job, will save money in the end.

Where dry goods boxes and such like have been procured they can be utilized by cutting them up and making them smaller, or by using the thin material of which they are composed for intermediate slats on the sides of other crates. The best way to take them to pieces is to saw through the sides close to the ends, thus wasting about an inch of each end of the sides, but obviating the chance of splitting, which you are almost certain to do if you try to knock them apart in the usual way. After the sides have been cut the small pieces can be knocked from the ends and the nails withdrawn, with the result that you have all of the boards of the original case in as good condition as ever, excepting that the sides are an inch or so shorter than they originally were.

A packing case is a simple thing to make, but being usually constructed of narrow boards it is often necessary to use cleats at the corners of it. Inexperienced workmen frequently make the mistake of putting these cleats on the inside of the case. The proper way of making the case is shown in Fig. 92. The piece nailed across the cleats at the ends as shown not only serves for a handle, but in many cases prevents the freight handlers standing the package on end. The boards in the bottom of the case are put on the short way of it and the top can be fixed in the same manner, or it may be made up in the form of a lid with the boards running lengthwise and two cleats fastened across them to keep them together. These cleats also should be on the outside.

Packing cases will serve us for all of the smaller household goods, such as crockery, cooking utensils, books, etc., but we must be careful not to mix heavy with light and fragile articles; to wrap all breakables separately with paper, straw, excelsior or something which will answer a similar purpose, and to pack the case so full that no amount of turning end over end will move its contents. The larger pieces of furniture, with the exception of the piano, it will be more economical to crate. A case for the piano can usually be procured from the nearest dealer and this will be a much cheaper operation than making one. With the case secured, the crating of the piano simply amounts to covering it with cloths to keep out the dust and moving it into its case. It is fastened in place with two coach or lag screws, which are passed through holes provided for them in the back of the case. Notice where the screws were formerly fixed in the back of the piano as it came crated from the factory, and if the holes in the case do not suit, bore two new ones.

Although the shapes and sizes of crates vary considerably they are all made on one general principle, which is illustrated in Figs. 93 and 94. If these sketches are carefully studied it will be perceived that Fig. 94 is constructed in the same manner as Fig. 93, but because of its greater depth the ends and sides are made of slats instead of being made solid.

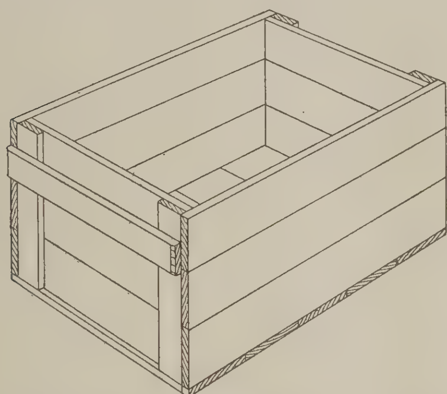


Fig. 92.—Proper Way of Using Cleats at the Corners of Boxes.

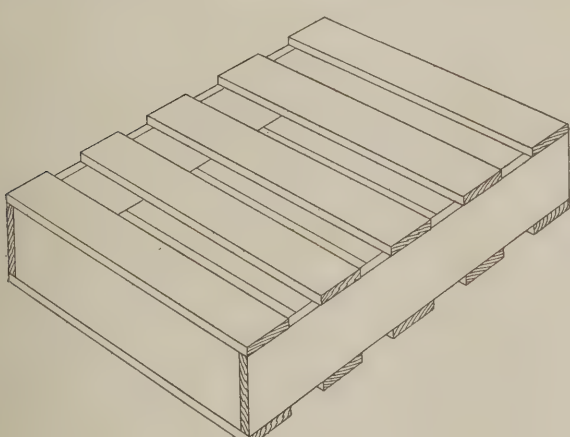


Fig. 93.—One Form of Crate.

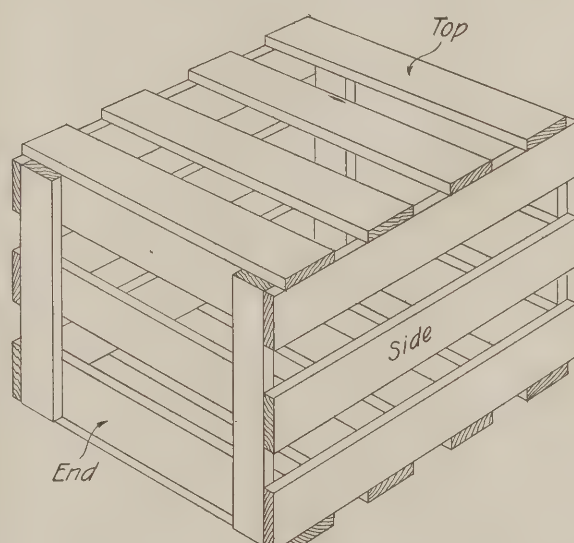


Fig. 94.—Another Style of Crate.

The Jobbing Carpenter and Some of His Work.—XIV.

* The author of these articles will be glad to discuss any phase of work in the line of jobbing carpentry that the reader may suggest.—Editor *The Building Age.*

Material for crating where it is specially ordered should be about ⅞ x 3 in. or ⅞ x 4 in., and crates with solid ends and sides as in Fig. 93 are not usually made more than 4 in. deep. They are used for packing flat articles such as pictures or the heavy glass shelves now commonly found in the more expensive china closets of the modern dining room. Bass wood was at one time the wood par excellence for crating purposes, but it has now become too scarce and expensive and a common grade of spruce generally takes its place.

The most important thing about making a crate to fit a given package or article is to know exactly what you are going to do before commencing to cut your material. With the idea of Fig. 94 in your mind's eye this would be easy. Make the ends of the crate first and note that they must be just as high and just as wide as the package, with perhaps a small allowance for a wad of paper or burlap to prevent chafing. After the ends are made cut the sides four times the thickness of the material longer than the package; that is, suppose the package is 3 ft. 10 in. and the crating material ⅞ in. thick, cut the sides of the crate 3 ft. 10 in. + 3½ in. = 4 ft. 1½ in. Nail the sides on to the ends and then cut the top and bottom slats twice the thickness of the material longer than the package is wide, or so that they will nail on flush with the side slats as shown in the sketches. End, top and side have been marked on the crate in Fig. 94, so as to give the reader every help to

crated separately. The dressers can be crated in a modification of Fig. 94, while two of the mirrors could be crated together in a box like that shown in Fig. 93. They should be placed in the crate with the glass side in and should be held in position with screws passed through the slats of the crate into the back of them as indicated in Fig. 95. The crate should be deep enough to allow of a space of at least an inch between the two mirrors. The top portions of sideboards and buffets are also removable, but it is sometimes more economical to crate them in their entirety than to take them to pieces and to make two crates for them. This is something the packer must decide for himself, being governed altogether by conditions.

Wooden bedsteads can be crated, two headboards in one crate and two foot boards in another. Iron and brass bedsteads can be wrapped and crated or simply wrapped, care being taken that the wrappings are heavy and properly done. Mattresses can be rolled, covered with burlap and tied with cord. Bed springs do not require either wrapping or crating.

Pictures can be placed two in a crate as described

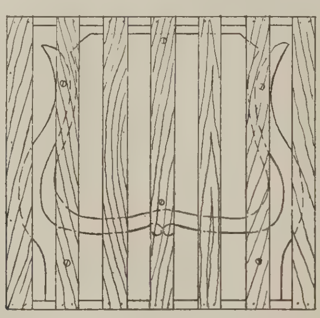


Fig. 95.—Crate for Mirrors.

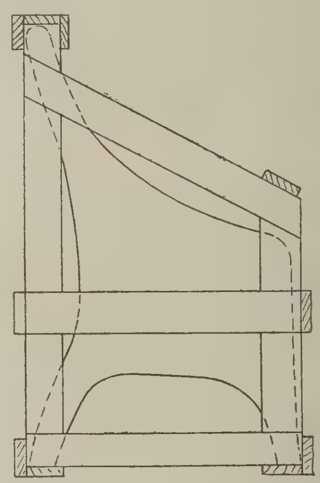


Fig. 96.—Crate for an Easy Chair.

The Jobbing Carpenter and Some of His Work.—XIV.

understand the foregoing instructions. Braces are sometimes added to the crate shown in Fig. 94, but only when it is unusually large or when it is to contain some extra heavy article, such as a stove.

Having discussed the making of the crates and packing cases, we will now endeavor to give some hints as to how they should be used. Much of our present-day furniture is made "knock down"; that is, so that it may be easily taken to pieces, which style takes a lower freight rate when shipping it from the factory to the retailer, and though the householder seldom makes any attempt to take his furniture to pieces the carpenter need not be so timid. He therefore looks over the various articles of furniture and takes to pieces those that will permit of it, putting the legs and top of the dining-room table in separate crates and so on. Right here is a good place to remark that practically all furniture castors are fitted loose and should be removed. They should be packed in a small box along with the picture hooks and other removable hardware, such as the screws for holding the furniture parts together, etc. Where there are different sizes and shapes of castors they are best tied in sets and marked with a tag showing to which article they belong. The screws for each separate article can be sealed in an envelope and the latter marked, showing to which article the screws belong. These precautions are taken not because of the intrinsic value of the screws, but because of the time this method will save when putting the furniture together again.

The mirrors of the dressers should be removed and

for the mirrors of dressers, while small ones can be fixed face to face and back to back in a packing case with a wad of filling material between them at each corner. Be sure to fix them firmly and allow for the case being turned end over end. Afterwards you may mark it

"THIS SIDE UP WITH CARE"

if you choose, but fix it so that turning it over will not affect its contents. Books should be packed in boxes: and in this connection remember that books are heavy things and lie close together. A box 12 in. deep, 16 in. wide and 34 in. long, inside measurement, when properly filled with books will weigh close to 200 lb.

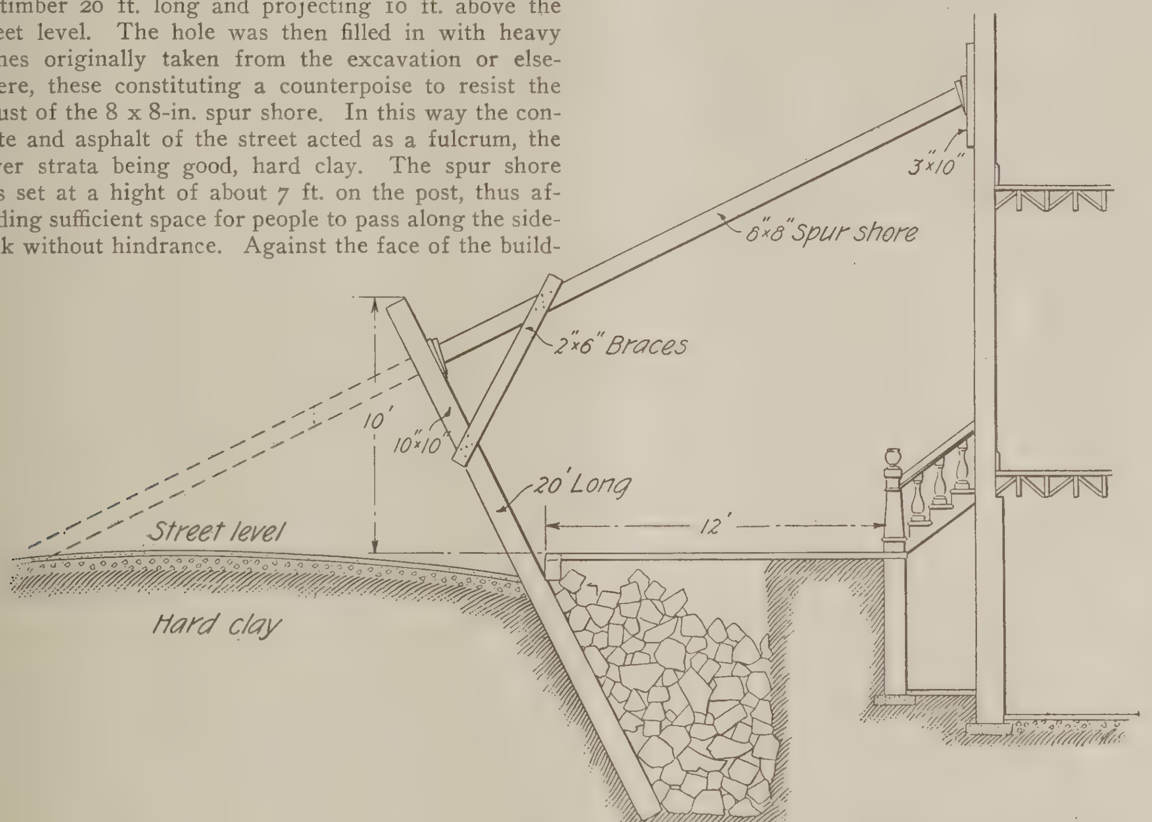
Barrels make the best packages for crockery and glassware. Use plenty of straw, excelsior or other filling material. Pack the barrel tight and full and do it up in a proper way. To do this loosen the top hoops until the head can be dropped into place, then as the hoops are tightened again lap the head one way or the other until it fits correctly in the groove provided for it. The ease or difficulty of this operation will depend somewhat on the skill which has been shown in correctly filling a barrel.

We have attempted to show in Fig. 96 how an irregularly shaped article, such as an easy chair, for example, can be crated. The chair should be well covered with burlap and the crate for it does not need, as made, side slats, as for some other articles of furniture. In this direction there is an opportunity for the packer to show his judgment.

LEVER SHORING OF BUILDINGS

THE strict rules and ordinances which are in force in the larger cities of the country frequently compel builders to resort to somewhat unusual methods in their operations and an interesting example of one of these expedients is clearly shown in the sketch presented herewith. The object was to shore up the front wall of a three-story brick building, pending excavations adjoining the structure and without impeding in any way the vehicle and pedestrian traffic along the street and sidewalk.

The manner in which this was accomplished is clearly explained in the picture mentioned. In the first place the builder dug a hole about 10 ft. deep just about at the curb line, the street side of the hole being battered or sloped to an angle of about 70 deg. In this hole he inserted a 10 x 10-in. yellow pine post or stick of timber 20 ft. long and projecting 10 ft. above the street level. The hole was then filled in with heavy stones originally taken from the excavation or elsewhere, these constituting a counterpoise to resist the thrust of the 8 x 8-in. spur shore. In this way the concrete and asphalt of the street acted as a fulcrum, the lower strata being good, hard clay. The spur shore was set at a hight of about 7 ft. on the post, thus affording sufficient space for people to pass along the sidewalk without hindrance. Against the face of the building was placed a piece of 3 x 10, against which one end of the spur shore was placed and then everything was made tight by driving up the wedges. After it was in place it was retained in position by tacking on a 2 x 6-in. brace on each side, all as shown in the sketch.



An Interesting Example of Lever Shoring, Showing the Arrangement of the Various Timbers.

Lever Shoring of Buildings.

It will be obvious to critical readers that the bottom end of the spur shore would by virtue of necessity extend out into the middle of the street, as indicated by the dotted lines, had not this expedient been resorted to, and the only alternative left the builder would have been to shore and needle the wall, which would of course mean disturbing the tenants of the building with subsequent loss of rent. For lack of a better term this example of a builder's expedient might be properly termed "lever shoring."

Bars for Concrete Reinforcement

A paper read before the Engineers' Society of Pennsylvania by J. H. Toupet, chief engineer of the Electric Welding Company, McKees Rocks, Pa., on "Deformed Bars vs. Round Rods Anchored for Reinforced Concrete," appears in the December proceedings of that society. The advantages and disadvantages of plain and deformed bars were discussed at length. Round rods were first used in reinforced structures in Europe, the speaker said, and are still used there almost exclusively, while the tendency in the United States is toward deformed bars. The speaker thought that most builders had been misled as to the value and effectiveness of deformed bars. The concrete takes the compressive stresses, while the steel takes the tensile stresses. There are also internal or secondary stresses, and the more deformed the bars the more uncertain the secondary stresses. While the deformed bars give greater resistance to slippage than round rods, there is also a greater longitudinal shear. This additional stress is the greatest objection to the use of the deformed bar. With green concrete these additional stresses are very dangerous.

The speaker explained the loop anchorage and other forms of end anchorage of rods. Answering the question why so many deformed bars are sold and why quite a few are commercial successes, he said that advertising often makes a success of an undesirable product; also that contractors are often willing to consider the cheapest as the best, no matter what the final results may be. "Round rods or other plain bars properly anchored will cost probably a little more than deformed bars when the cost of providing the anchorage is added to the nominal cost of the steel rods. Weight for weight, the round rods with the proper anchorage will win without any doubt, if the strength of the structure is taken into consideration. The only way to make as good a structure with deformed bars as with rods is to provide the deformed bars with an end anchorage. In that case there is evidently no use for deformation and the deformed bars will then cost more, weight for weight, for the same efficiency, since their cost is at least $2 to $3 more per ton."

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Formerly Carpentry and Building

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Index to reading matter, page 226.

MAY, 1910

Three Months' Building Operations

There are so many branches of trade throughout the country dependent for their activity upon building operations that the situation as relates to the latter, especially at the opening of a season, is always a matter of keen interest to those engaged in the building and allied industries. The season is now sufficiently advanced to indicate in large measure the prospects for the year in the building line, and it is particularly gratifying to note that with few exceptions the outlook is most promising. Using the permits which have been filed in the leading cities of the country as a basis, it is reasonable to assume that the volume of operations in 1910 will equal, if not exceed, the records of a year ago, thus indicating that building mechanics in every branch are likely to be profitably employed. A noticeable feature of the present situation the country over is the extent to which dwelling-house construction is being carried on, not alone in the rural districts, but in all the smaller cities and towns as well as in many suburban sections where development work is being vigorously prosecuted. Locally the building situation is of a most encouraging nature, and while the figures for the Borough of Manhattan both for March and for the first three months of the current year show a decrease as compared with the corresponding periods of 1909, it is wholly due to the phenomenal activity in the filing of plans for tenement houses which occurred last year at the time of the agitation of the proposed new building code. Excluding the tenement house classification, the first quarter of the present year shows a gratifying increase over the first three months of a year ago, both in the number of buildings for which permits were filed and in the capital investment involved. The department figures are $17,472,570 for 148 new buildings other than tenement houses, as compared with $16,291,750 for 132 buildings embraced in the general schedule of new construction work in the same period last year. In other words, the tenement house construction the first three months this year involves an estimated outlay of $9,380,000, as against $24,903,000 in the first quarter of 1909. The total new construction of all kinds the first quarter of this year was 214 buildings estimated to cost $26,852,750, as against 325 buildings calling for an investment of capital amounting to $41,094,750 in the first quarter of last year. From these figures it will be seen that more than half of the total investment in new construction in the first quarter of last year was represented by the great influx of tenement house plans incidental to the building code agitation and were no doubt put on record to forestall possible legislation prohibiting the six-story semi-fireproof type of multi-family house. This year there is a decided gain in new municipal construction, permits having been issued for four buildings to cost $2,785,000, as against one to cost $165,000 a year ago. For new hotels three permits were issued, involving an outlay of $760,000, as against one to cost $12,000 in the corresponding period last year, while the capital invested in miscellaneous new construction not classified is $243,150, as compared with $56,150 in the first quarter of last year.

Rough and Manufactured Lumber

Just what proportion of the rough lumber output of the sawmills of the country passes through a second process of manufacture before it is ready for the consumer has been made the basis of a careful study by the United States Department of Agriculture, with some exceedingly interesting results. It is demonstrated that the waste in the woods, the mill and the factory is such that two-thirds of what was in the tree is lost on the way to the consumer, the heaviest part of this waste occurring in the sawmills. On the other hand, the waste in the manufacture is small compared with that at the sawmill. The results thus far obtained show that more than five-eighths of the rough lumber sawed should be counted as the raw material for other industries, which convert it into a more highly finished and valuable product. The figures lately compiled by the department covering the wood-using industries of the four States of Massachusetts, Maryland, North Carolina and Wisconsin indicate that of their total sawmill output, 36 per cent. is used in the form of rough lumber and 64 per cent. is made into other forms of output. Should the same ratio hold for the entire country, it may be stated that about 13 billion feet of lumber is used yearly in rough form, and 23½ billion feet is further manufactured. In making up the figures, lumber used as house frames, bridge timbers, trestles, boardwalks, farm fences, walls and similar classes of structures, with only such cutting and fitting as is given it by carpenters, was classed as rough lumber, while that made into flooring, siding, finish, frames, sash, doors, panels, stairs, boats, boxes, baskets, vehicles, furniture, woodenware, musical instruments and like forms was placed in the class of finished lumber. The results are extremely interesting, as this is the first time that detailed figures on the subject have been obtained. The study which has yielded these figures has also in view to ascertain what commodities are used wholly or partly of wood, the various kinds of wood used, their origin and cost, as well as other data of value to the growers of timber and the sellers and buyers of lumber.

Why Cement Does Not Crystallize

In the course of some very interesting comment on the question Why cement does not crystalize, Nels Erickson, of Minneapolis, presents the following views:

"It is essential in the first place for concrete material to be thoroughly saturated with water in the first mix in order to crystalize. Then, in the next place, for the material to be cured in a damp, shady place, which will aid it to cure slowly. Water should be applied as soon as any part of the materials begins to show its natural color, and should be applied daily until the material sheds it.

"The public in general are operating in the damp process in the making of cement blocks. Heretofore there has not been a man able to get crystallization to cement material operating in the damp process. The progress of cement blocks is at present at a standstill, and that is due to the makers having been informed that it is sufficient to put water on the blocks after they have set. This, then, is the great error, as at this stage the cement has taken an air-slack, and lost its power to crystallize, and water then does not aid it. This is what makes a weak, porous, crumbling block.

"The public have rejected such material, and consequently it is now at a standstill. To revive that which is dormant, or to make cement blocks worthy of the name, is, then, to make them waterproof, fire and frost-proof. And that can be accomplished only by using clean material, proper proportions, mixed thoroughly, saturated with water in the first mix, and cured properly.

"A wet material, or the equivalent to a stiff mortar, can be handled only by machines which strip with a gliding movement. For ornamental faces, where the gliding movement must be dispensed with, the rock-faced mold should be made of any uncorrodable metal, such as copper, brass, aluminum, etc.

"When the rock-face blocks are made in the moulds, the face may be made with a half-inch facing 1 to 2 in the damp process.

"The rear of the block being made in the wet process, is thoroughly saturated with water, and so will nourish the face, but in case that the water should not penetrate immediately, a fine spray of water should be applied to the face in two hours after made.

"The latest thing which has been discovered in making cement blocks is to make a waterproof smooth block and apply a rock, ornamental or marble face, with compressed air. With this new process, the aforementioned can be applied to any smooth concrete block or wall or any object made from cement. This face can never be removed and is absolutely waterproof. It is a higher grade material than cast-stone and costs no more than the ordinary cement blocks."

Rules and Provisions Concerning Carpenter Apprentices in Chicago

The following rules and provisions of the Carpenters and Builders' Association of the City of Chicago, concerning apprentices, may not be without interest:

Apprentices shall serve four years.

The applicant for apprenticeship shall not be more than 17 years of age at the time of making application, except under certain conditions. Applicants more than 17 years of age must bring satisfactory proof of having worked at the trade.

The contractor taking an apprentice shall engage to keep him at work in the trade for nine consecutive months in each year, and see that during the remaining three months of the year the apprentice attends school during January, February and March, and a certificate of attendance from the principal of the school must be furnished before the apprentice is allowed to work during the coming year.

A contractor taking an apprentice shall keep him steadily at work or school; failing to do so, he shall pay him the same as if he had worked for him.

In case an apprentice at the end of his term of four years, for want of proper instruction in his trade, is not a proficient workman, and if, after a thorough investigation, the joint arbitration board finds that the contractor to whom he was apprenticed did not give him proper instruction and opportunity to learn the trade, the apprentice may be required to serve another year with whom he and the board may determine, and at a rate of wages less than the minimum in his trade; the difference between said rate and the minimum scale shall be paid him through the board by the contractor to whom he was apprenticed.

A contractor entitled to an apprentice may take one on trial for two weeks, and if after said trial conditions are satisfactory to both parties, they shall be required to sign indentures agreeable to the joint board of arbitration. If not satisfactory the contractor is not bound to indenture the apprentice. No boy will be allowed a trial with more than two contractors, or a contractor with more than two boys, consecutively.

The rate of wages of an apprentice at the time of his indenture shall in no case be less than $312 for the first year, $364 for the second year, $442 for the third year, and $572 for the fourth year, to be paid in weekly installments. All apprentices shall report to the joint arbitration board at its meeting in January and April of each year.

The contractor shall not have more than two apprentices at any one time.

Contractors shall be allowed apprentices on the following basis: Yearly average of four journeymen employed, one apprentice; yearly average of ten journeymen, two apprentices.

All apprentices shall be under the jurisdiction of the arbitration board, which has the authority to control them and protect their interests.

One of the novel uses to which concrete has lately been applied is in the construction of a concrete battleship on a small island constituting a part of the line of defense of Manila Bay. The battleship, or more strictly speaking the fort, which is already in process of construction, is an ellipse about 300 ft. long and 150 ft. wide, the walls of concrete being 40 ft. in hight. Within the enclosure will be two steel turrets of the kind found in battleships and each will house two 14-in. guns.

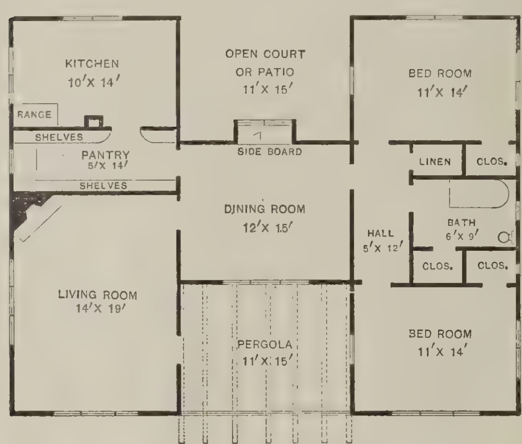
CORRESPONDENCE

Address Wanted

Will "M. L. S.," who furnishes a very interesting answer to the inquiry of "J. H. B.," Caledonia, Can., give us his name and address, so that we may communicate with him regarding details of the method he suggests of doing the work? Correspondents should always sign their letters with full name and address, but in publishing the matter, initials will be used unless otherwise requested.

Floor Plan for Five-Room Bungalow

From J. L. W., Stockton, Cal.—In response to the request of "R. L. C.," Odessa, N. Y., I am sending herewith an original floor plan for a five-room bungalow,



Plan for Five-Room Bungalow, Submitted by "J. L. W."

which I hope will be of some assistance to him. If desired the living room as shown could be converted into another bedroom, and the dining room by being enlarged would answer for both dining room and living room.

From F. B. Crandall, Sturgeon Bay, Wis.—I am sending a blue print showing floor plan of a five-room bungalow, as requested by "R. L. C.," Odessa, N. Y., on page 113 of the March issue of the paper. I infer from his letter that he is looking for something cheap, and it will therefore interest him to know that the contract for this bungalow has been let for $985, without furnace. This includes hard maple floors in vestibule, dining room, kitchen and bath room. The finish for all the rooms is to be of ash, with veneered doors to match.

A Question in Stairbuilding

From W. A. M., Des Moines, Iowa.—I had almost concluded to drop my subscription to the paper for this year, as I do not know at the moment just where I will be located, for I am thinking of going West. I like the paper, however, very much and consider it to be one of the best building papers published to-day, so I have concluded to have it sent to my home here and then my folks can forward it to me until I get settled.

I am not much of a critic, but I can ask questions, so I would like to have Morris Williams explain a little more fully in regard to the stairbuilding construction shown on pages 32 and 33 of the January issue of *The Building Age*. Referring to Fig. 84, he shows a partial plan of a flight of stairs having a 4-in. cylinder connecting with a landing at the top end. He also shows the center line of rail on page 33 to be 4 in.

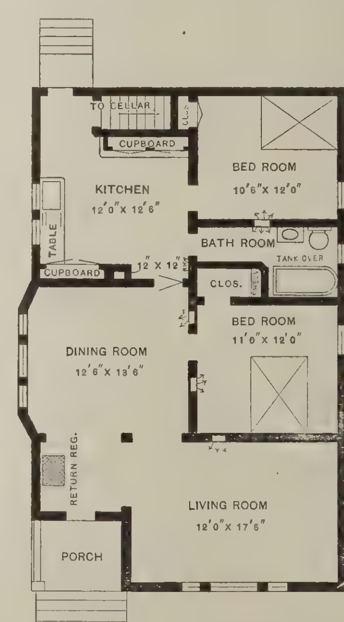
Now, what I would like to know is how he makes a 4-in. wreath fit a 4-in. cylinder, which he shows. It looks to me as if the center line of rail ought to be figured from the size of the balusters over the cylinder, or, at least, I have always found it so. If an amateur undertook to build a flight of stairs over these lines he would find that his rail would be too small to reach around the cylinder, or, in other words, the center line of rail should be larger than the cylinder.

Now if the balusters were 1½ in. square and the cylinder was 4 in., the center line of the rail would be 4¾ in. radius instead of 4 in., as marked in Fig. 84 on page 33 of the January issue. If the author is presenting these problems for the benefit of the carpenter, it seems to me he ought to give very full particulars in connection with them, so as not to confuse the beginner.

Answer.—Commenting on the above, Morris Williams says: If the correspondent will look over my article entitled "Some Problems in Stairbuilding," which appeared in the January issue of the paper, and observe the diagrams and explanation with more careful attention he will readily find that it contains a correct and exhaustive presentation of the subject matter under consideration. The diameter of the cylinder between center line of rail is shown in Figs. 84 and 85 on page 33 to be 4 in., also the following words appear on page 34 in reference to Fig. 91:

"In this diagram we have the same size of cylinder—4 in. diameter between center of rail—etc., etc."

In view of the above it is evident that more explicit and consistent presentation could hardly have been made regarding the size of the cylinder under consideration. The cause of confusion in the mind of the correspondent, as it seems to me, is not what is observable in the diagrams and explanation, but rather in his notion of the meaning of the word "cylinder" in its application to stairway construction, presuming as it appears that the word applies exclusively to the size of the well stringer, whereas in its application to handrailing it always means the curve representing the center line of



Plan of Bungalow, Furnished by F. B. Crandall.

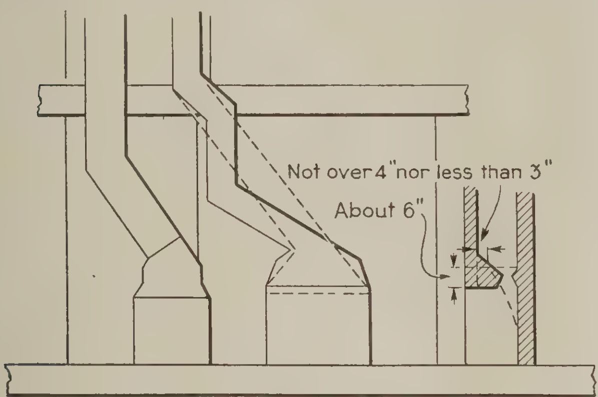
the wreath, as shown in the diagrams on pages 33 and 34 of the January issue.

The tangents of the wreaths are tangents to this curve—not to the concave curve of the stringer—and this, therefore, is what is meant by a cylinder when applied to wreath construction, which is the subject matter represented in diagrams 84, 85 and 91 in the January issue.

The correspondent is correct in his explanation in reference to the size of balusters as a factor in determining the relative size of the cylindric central curve of the rail to that of the cylindric curve of the stringer. I explained this matter very fully not long since in the columns of *Carpentry and Building* in answer to another correspondent.

More Trouble with the Fireplace

From L. S. K., Cragsmoor, N. Y.—In answer to the communication of "G. H. D.," Philadelphia, Pa., in the April issue, I am sorry to say that I do not believe the fireplace in question can be entirely remedied without



More Trouble with the Fireplace—Remedy Suggested by "L. S. K."

cutting away either the entire front or back and building it over again. The lines of the fireplace are very poor and I was somewhat surprised to read that it did actually draw well when the wind was favorable.

If the fireplace is reconstructed as shown by the dotted lines in the accompanying sketch I think it will be found to give entire satisfaction. It is suggested in the comments following the correspondent's communication that the arch may be too high. Under ordinary conditions it would be, but as the fireplace is 4 ft. wide and about 4 in. deeper than is usual for the width, an opening 3 ft. high may be permitted. However, it would be better if the arch was one brick lower.

If the chimney is at least 2 ft. higher than the highest part of the roof, there is nothing more to be said and "G. H. D." can go ahead and be sure of good results.

How to Make Tar Concrete

From J. E. N., Morris, Ill.—My health is such that I have been compelled to quit my trade of carpenter, and as I have boys large enough to help me some I have decided to take up farming as my future vocation, and I want to build a barn as soon as possible. I would therefore like to have the practical readers of the paper tell me how to make tar concrete. Paul T. Lesher tells of it in his article describing a reinforced concrete workshop published in the December issue of *Carpentry and Building,* but he does not tell how to make it.

Answer.—Referring to the inquiry of the correspondent above the following specifications for tar concrete floors are contained in some circulars issued several years since by the Boston Manufacturers' Mutual Fire Insurance Company:

"The floors are to be 6 in. thick, and to be put down as follows: The lower 5 in. are to be of clean, coarse gravel or broken stone, with sufficient fine gravel to nearly fill the voids, thoroughly coated with coal tar and well rammed into place. On this place a layer 1 in. thick of clean, fine gravel and sand heated and thoroughly coated with a mixture of coal tar and coal tar pitch in the proportions of one part of pitch and two parts of tar. This layer is to be rolled with a heavy roller and brought to a true and level surface ready to receive the floor plank. No sand or gravel is to be used while wet.

"A floor of the kind above specified should always be protected by a floor of wood over it, and the plank should be laid and bedded in the top surface while it is warm and before it becomes hard.

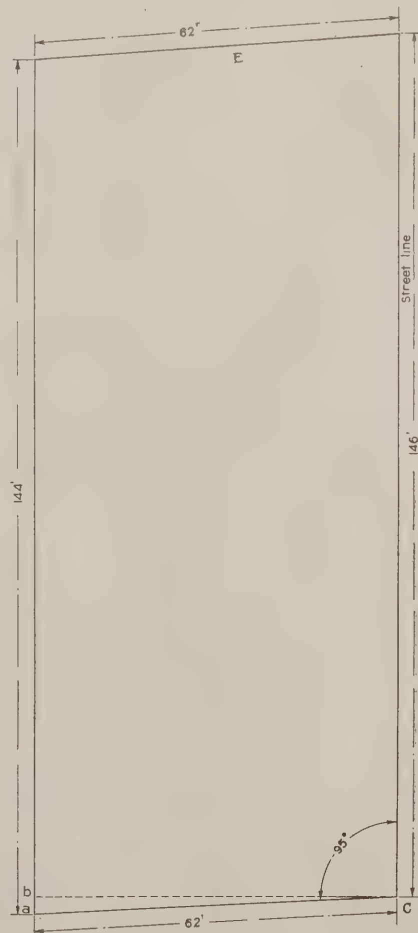
"For light work the thickness of the lower layer of concrete may be reduced one or more inches if upon a dry, gravelly or sandy soil. For storage purposes where the articles stored are light and trucks are little used, the following specification has been found to give a satisfactory floor:

"The lower layer being mixed and put down as above specified, the top layer will be of fine gravel and sand, heated and thoroughly mixed with a mixture of equal parts of coal tar, coal-tar pitch and paving cement, so that each particle of sand and gravel is completely coated with the mixture, using not less than one gallon of the mixture to each cubic foot of sand and gravel.

"This layer should be well rolled with a heavy roller and allowed to harden several days before being used."

Problem in Mensuration

From C. J. M., St. Johns, N. F.—Here is a problem in mensuration which I would like some of the readers of the paper to solve for me. The accompanying diagram represents a building lot, the two long sides of which are parallel to each other but the two short sides are not



Problem in Mensuration—Diagram Accompanying Letter of "C. J. M."

parallel, being at different angles to the sides, as the measurements show. The measurements of the four sides are given on the diagram and the number of degrees in one of the angles.

As there are no diagonal measurements given, however, it presents somewhat of a difficulty in laying it out at the site without the help of surveying instruments, other than a measuring tape.

Supposing the dotted line to be at right angles to the long sides of the plot, what calculations are to be made to determine the distance from *a* to *b* and the width between the long sides or the length of the dotted line?

I would also like to know if the long sides are parallel is the measurement at E correct?

There are no boundaries given except the "straight line" and a peg at the angle C.

Cleaning a Grindstone

From J. H., Jersey City, N. J.—I would ask some of the practical contributors to the Correspondence Department of the paper if they can give me any information as to how I may keep my grindstone from getting steel coated. I find that the grindstone cuts slowly and does not seem to take hold as it ought. I have used a piece of steel in an effort to rub or grind off the steel coating, but it does not do much good. Any information which the practical readers may furnish on this point will be greatly appreciated.

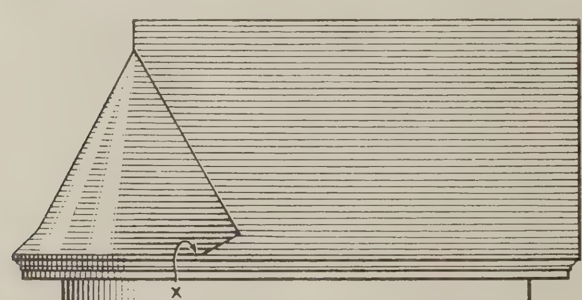
Building an Over-shot Water Wheel

From J. H. H., Tacoma, Wash.—Will some of the readers of the paper who have had experience in building water wheels kindly give me some information through the Correspondence Department as to the best way to construct an over-shot wheel for power. I would especially like to see a sketch showing the best way of arranging the paddles or buckets.

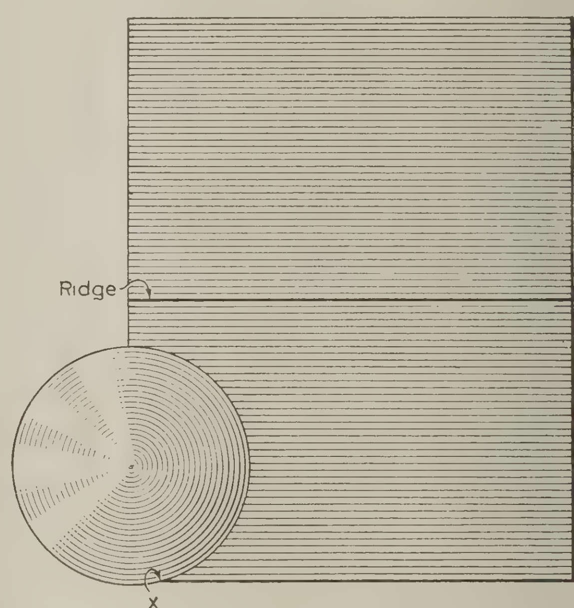
Circular Tower Intersecting a Main Roof

From L. H., West Sayville, N. Y.—I have been a reader of *Carpentry and Building* since 1903 and consider it the best of its kind I have ever read. I particularly note the value of the Correspondence columns and I come to the readers for the solution of a problem which perplexes me. I enclose sketches showing a circular tower intersecting a main roof and would like very much to have some of the older and more experienced readers illustrate and describe their method of intersecting the shingles of the tower with those of the main roof, beginning at the point marked "X" on the sketches.

The pitch of the main roof is to be 10 in. rise to the foot run, while that of the tower is to be 1 ft. 6 in. rise to the foot run.



Elevation, Showing the Two Intersecting Roofs.



Plan of the Two Roofs.

Circular Tower Intersecting a Main Roof.—Contributed by "L. H."

Opportunities for an Ambitious Carpenter

From J. S. H., Atchison, Kan.—I notice in the March issue of *The Building Age* that "F. S. B.," White Plains, N. Y., wants to know if there is anything in the building business for a young carpenter like himself, who has given his best time and study to it for the last eight years. I may state that I have been building houses, elevators, barns, etc., in Kansas for 30 years and I started out exactly as he says he has done. It was slow plodding at first, but finally the bosses noticed that I knew what I was doing and wherever there was difficult work to do I generally got it to do, and to-day, although I am 60 years old, I have all the building I can look after and it comes without any effort, because I make my work advertise me. I have not made a fortune in the business, but I am living on "Easy Street," as they say here, and have enough to keep me if I wished to quit. I own my own house of eight rooms, with an acre of ground. My three boys are all carpenters, one of whom is in San Francisco getting $5 a day. He is 27 years old and has saved $5,000 in seven years and lived well besides.

I know that the curse of the building trade is the "saw and hatchet men," but we are looking for competent men all the time and good men are hard to find. They never have to hunt much for work. We are always on the lookout for them and when we find them we try to keep them, so don't be discouraged; you are perhaps too ambitious for a young man. Honor and fame come slowly, but don't give up if you like the work. There is more need for intelligent work, brain and muscle, in erecting a first-class dwelling than any other business I know of; besides there is the healthy open air in which to work; no sitting in steam-heated offices with impure air. I have been building, superintending, etc., for 30 years, winter and summer, and never had a week's disability in all that time.

From L. C. S., Spencer, Ohio.—After reading the letter from "F. S. B.," White Plains, N. Y., I thought he ought not to feel so discouraged, because there are others who are up against the same strenuous circumstances that he describes. I am a young man like himself. I have been studying architecture through correspondence, working on it evenings and odd moments, while the basket tool men "F. S. B." mentions were loafing in some saloon.

I have had a plan in view for some time to enter into a partnership with some practical young man or form a company, as an Architectural and Construction Company. It can be done successfully by two or more parties who have the staying qualities, some horse sense and plenty of energy. Small contracts could be executed at first and if necessary the men at the head of such company could take an active part with the tools themselves. One very favorable point would be that it would not require much capital to start such a business. There is no question about construction work as a calling. It offers as good opportunities as the best and is especially desirable for those who find some pleasure with or in the work. I have investigated special lines of architectural work, but I will refrain from going into detail now. The proposition I outlined is the best and surest way of which I have knowledge.

I will be pleased to hear from "F. S. B." at once and any others who have faith in their own ability and wish to rise above the common herd.

From J. Irving Maxson, Westerly, R. I.—A correspondent from White Plains asks in the March issue if employers of building mechanics will state their views on what the building trades have to offer a young man and what is there for one of intelligence and ambition to spend his life in the business. If I should conform literally to the request and reply briefly I should do so by one word—nothing. This, however, should not be taken to mean just that and nothing more, yet I fear it comes nearer the real facts than a good many believe who are not in a position to know. There are so many things entering into a question of this kind that I will take the space to name only a few that occur to me. So much depends upon the young man himself, his personality, education, training, health, ambition, etc., that the "personal" element enters very largely into it.

To the average young man of limited education and ambition, my first answer—nothing—will apply pretty well, as the business is now conducted, but to the ambitious fellow who really means business and is willing to fit himself for it as a life work, it presents most excellent opportunities. It is becoming a question of "the survival of the fittest." In fact, the business is approaching that point where it should be classed as a profession rather than a trade or occupation merely. I am arguing on the assumption that the young man intends to get beyond the mere use of tools, and to a position of trust and responsibility. There is lots of room at the top, and a fellow well equipped for responsible positions never has any trouble in getting one, but is sought after, and usually, if he makes good, is quite apt to get an interest in the business. The ordinary fellow cuts very little figure nowadays in the eyes of a contractor, as there are lots of them to be had, while a capable man is always sought after and kept when once secured. But, as I said above, preparation is everything.

So much is now required of a foreman or superintendent that good preparation is essential. This preparation should consist of a technical as well as a practical training. A knowledge of drafting, construction, calculations, figuring of strains and stresses, architecture, estimating, etc., is essential. The elementary studies should be practically the same as those of a student fitting for the profession of architect. They diverge at the point where the architect student begins to go deeply into the study of architecture, and the other lines especially necessary for him to know, and the building student goes into the lines more essential for his chosen profession. In my own case, I was put into a New York architect's office for the technical part of my preparation and into the "gang" at home, the mill, the office, etc., for the practical end of it, but as I recall it now I think it was not the best course to pursue; at least, I sent my own boy to Pratt's Institute to get the elements of the architectural course and then in conjunction with it the practical and technical course leading more into the building line, with the intention of later putting him into the "gang" also for a more practical fitting than it is possible to get in any institution of learning.

The more technical knowledge a boy possesses, the easier for him to acquire the practical end, and *vice versa.* I am not sure which it is best to take first, but I rather incline to the practical training first. It is not necessary to become a journeyman in the full sense, but a pretty good idea of the trade is desirable. I think a year for an ambitious boy will do all right, but he should also study all he can, too, as it will help him wonderfully when he starts in on his technical course.

I recall that I had not been in the architect's office a week before he found my practical knowledge of value to him, and I got a good show at once. He used to send me out to inspect work for him and report on it. This fitting in the architect's office has been of untold value to me in my business. It helps us very much with architects, inspires confidence in us, and our ability to execute their work and gives us a standing which is of value. Especially is this ability to draw and to design of value in alteration work and in securing new work. Many the plan we have made for which an architect received credit and pay.

If a young man is so situated that he cannot fit himself as outlined above, I recommend a good trade school, of which there are now quite a number—some established by the employers of the building trades, from necessity.

The worst things with which a young man has to contend are labor unions. One would naturally suppose that every man would seek the perfection of his own craft and would want his own boy better trained than himself, but experience does not confirm this. On the contrary, several unions have passed resolutions condemning trade schools, and everybody knows that most unions endeavor to limit the number of apprentices, notwithstanding the scarcity of capable men constantly being sought after. The contract which my own firm makes with an apprentice binds him an additional year over the usual period, or practically a year after finishing his trade, but at specified wages, and at such rate as he is worth. This additional year is for his protection from the unions, as apprentices usually do not have to join unions.

The extent of one's fitting governs his value. I have one foreman who attended the Massachusetts Institute of Technology and after years of work as a foreman attended recently the evening classes of a Y. M. C. A. course in New York City, on steel and reinforced concrete construction, in order that he might be up to date and capable of handling any kind of a job. His capabilities enable us to put him in charge of large jobs at remote points where we do not go ourselves real often, nor do we need to. When his sketches are received with the measurements for the various items of house finish, mantels, stairs, cabinet work, fireplaces, etc., there is no doubt attached to them. The shop foreman feels an assurance that if he gets his work out according to the sketches and measurements received, there will be "no hereafter," that the work will fit, and it generally does. His plans and sketches are as finely drawn and as accurate as any I ever saw from an architect's office. At times we have called this man in to work in our drafting room on designing work. You can readily see how valuable a man he is. We have several just such men. They are too valuable to lose. There is an accuracy accompanying their work that is positively refreshing, and a satisfaction derived from having the work go together good; no expense of refitting, etc.

There is so much to be said on this subject that it is difficult to be brief—impossible, in fact. I earnestly urge any ambitious young fellow considering any line of building, as life work, not to rest content with an ordinary fitting, but to aim high; fit thoroughly, both practically and technically; adhere to a high standard of workmanship and accept nothing else. Don't be too anxious for the quitting hour; be always on time yourself and require it of those under you.

From Hee H. See, Sacramento, Cal.—Some very pertinent questions are contained in the communication from "F. S. B.," White Plains, which appeared in the March issue of the paper. Among other things he asks "What incentive is there for a young man of intelligence and ambition to spend his life in the business," and then he says that "a few men will come on a job with a few tools in a basket and that the boss will keep them in preference to his abler men, because they work cheaper." Right here I wish to say that, as far as my experience goes, there is no one in the building trades who receives a dollar of wages until he has earned it. This statement applies to the "basket men," the "abler men" and the "foreman," whom "F. S. B." says the basket men treat with beer. As regards this latter item, I would say that I have moved around some in my time and declare right now that there has never yet come under my personal notice a single instance of where a man was able to hold his job by this means, though I have at different times heard of it from others.

It is a long, hard, uphill climb to a position as foreman with a reputable firm and when "F. S. B." rises there he will find that in order to retain the position he must, in the slang of the day, "deliver the goods." Whether he does so with poor mechanics at low wages or with good mechanics at high wages, one thing is certain, he will as far as lies in his power keep those men around him who are most useful to him and the most likely to enable him to hold his job. Compared with this item a glass of beer will not cut much ice.

There is plenty of "real need of expert mechanics in the building industry at the present day," but a man cannot build up a reputation as an expert in a hour—good intentions have no money value—and few people will take his word for it that he is such. He also must "deliver the goods," for even the basket men do a job right once in a while. There are many men going around calling themselves expert mechanics who ought properly to be classed with the basket men and wood butchers—not because they cannot do better work, but because of other serious faults they may have, one of the worst of which is inattention to instructions.

The foreman gives Mr. Expert a piece of work with explicit instructions as to how it is to be done. He has spent some time thinking on the matter and has a particular reason for wanting it done just that way, but Mr. Expert supposes he is merely talking for the sake of hearing himself speak, so pays no attention at all to what the foreman is saying and does the job as he thinks it ought to be done—no not as he *thinks,* but as he *knows* it ought to be done, for the reason that he did a job just like it at the last place where he worked. The foreman having given the job to an expert, tips the matter out of his mind and busies his brain with something else. Nine times out of ten, perhaps, it will not matter very much which way the job is done, or perhaps the foreman will catch it before it gets too far. The tenth time it matters a great deal, and the foreman being busy somewhere else, overlooks it until it is too late. Then Mr. Expert will as likely as not deny that he ever received any special instructions. The foreman can discharge him, of course, but that will not mend the matter. Mr. Expert gets another job in a day or so and for him the incident is closed, but the foreman will be worrying night and day about it until the job is finished and even afterward.

From the foregoing "F. S. B." must not think that I am in favor of poor workmen and low wages. I am merely trying to point out to him that to obtain increased wages a man must have something more than a full "kit" of tools and a knowledge of roof framing. He must be thoroughly reliable in every respect—a man of whom the foreman without seeing the job at all can say, "I know that job is done right because I sent So-and-So to do it." This pattern of man is scarce. It takes him some little time to work up his reputation, but once he is known he is never out of a job and commands the highest wages.

In conclusion I would advise "F. S. B." to continue as he is doing, to read the best books he can obtain and especially to practice writing to the Correspondence pages of *The Building Age.* As he says he works at carpentry because he likes it, he will probably do better at it than at any other branch of the building business. He will find his incentive not so much in the matter of extra wages—these will come in due time—as in the knowledge of the fact that he is becoming a finished workman in his chosen calling.

Every one wants to obtain good wages, of course, for the comfort and happiness that the money will bring, but the only real thrill one gets out of it is the feeling of the envelope on pay-day, whilst a knowledge of the fact that one is competent to handle anything in the line of his trade in a way that shall be a credit to him, is a source of satisfaction every minute of the day and every day in the year. If "F. S. B." does not think this sufficient incentive he should quit his studying and take his place with the basket men, for there are very few men who will admit that they are repaid for the time and money spent in the studies that made them better than the average—by the few cents an hour that they get more than the duffer. All work is drudgery if one does not know how to do it. All work is easy if one does know how to do it, but all work is a pleasure and delight when one is able to do it just a little better than those around him.

Cutting Bridging for Floors

From M. R., Sturgeon Bay, Wis.—Enclosed find a tracing and answer to the bridging query of "E. B." in the March issue. Fig. 1 shows just what was asked for, with the square in position for marking both ends of the bridging ready for cutting—all in one operation. Fig. 2 shows the first operation to be performed to make bridging for joist 14 in. in depth and 14 in. between. As indicated, the square is placed on a piece of bridging material, with the tongue at the left of the operator. The 14-in. mark on the outside of the tongue is kept at the top or farthest side of the bridging, while the 14-in. mark on the outside of the blade is kept even with the lower or nearest edge. A mark is then made across the bridging along the outside of the tongue and a slight mark made at the lower or nearer edge where the blade crosses.

Now turn the square end for end and when placed in position, as shown in Fig. 3, mark across the bridging along the outside edge of the tongue. This leaves one piece of bridging ready marked for cutting and if it is desired to use the square for marking the rest to be used the square should be moved toward the right and kept in the same position on the bridging. One shift of the square only is made for the marking of each piece until the end of the stick is reached.

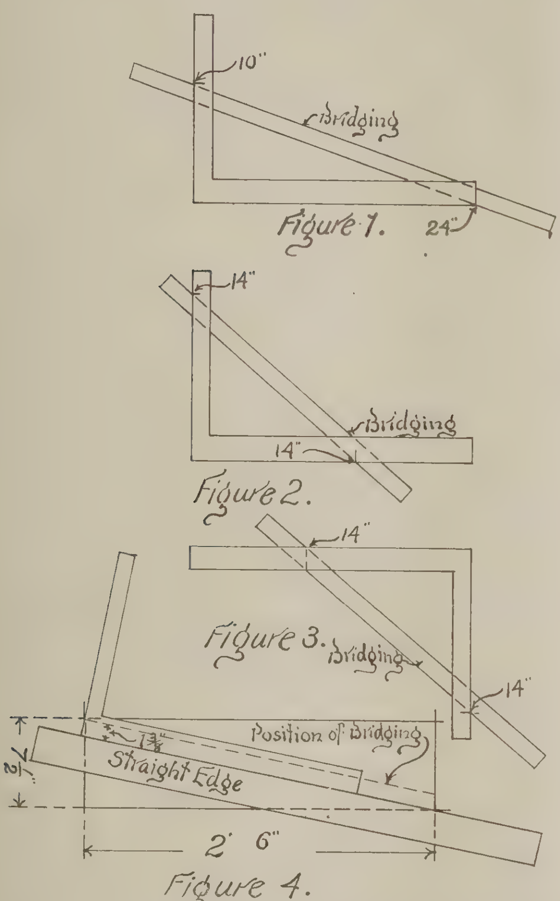
Fig. 4 shows a space of 2 ft. 6 in. between the bridging joist beyond the ridge of the blade. For this lay off a rectangle the depth and distance between the joist. Then with the straight edge and the square placed in the position shown, the thickness of bridging as located on the tongue determines the distance for the straight edge to be kept below the upper or left-hand corner of the rectangle. The square may now be moved and a line drawn along the upper edge of the straight edge, the length of this line being the length of bridging on the upper or lower edge. The cut can now be found with the square by using the base line of the rectangle and the line made along the upper edge of the straight edge.

A more simple way is to have the materials themselves determine all this; that is, by using a piece of joist that has been squared at one end with the distance from this squared end marked on the end of the joist. Lay a short piece of bridging stock diagonally across the joist in the position it is to occupy, then by using the square end of the joist as a guide, draw a pencil mark across the under side of the bridging. Saw along this mark, then reverse the piece just as we have done with the square in previous operations and mark again on the under side; saw off and use the piece as a pattern for the rest of the bridging pieces, or if quite a number are to be used a cutting box should be made. A box with one side usually answers on most jobs. A strip should be nailed on the bottom of the box, using the pattern to locate the place it should occupy.

In my practice I am obliged to make use of numbers of fourth-rate carpenters on work that should be done by more competent workmen, such, for example, as the building of summer cottages out of town at a time of year when it is hard to get good men to leave home, so that I have to contrive simple ways to get respectable work done. The upper joist on most of these buildings are left exposed and bad joints in bridging would always be in evidence. With joist spaced perhaps three or four different distances apart over the same room, the joists are straightened through and stay laths tacked on the under side of the joists. The bridging line is then struck on the top edges of the joist and then another line is struck through to the right or left of the bridging line, the distance between the two being the depth of the joist. A straight edge is used and the chalk lines penciled so as not to be rubbed away, then by placing the bridging stock diagonally from line to line and using the sides of the joist to guide the pencil when marking, fair results are obtained.

The same method could be used in a different way; that is, by starting, say, at one end of the building and taking the different spaces designated, for example, as Nos. 1, 2, 3, etc., then by using a piece of joist stock square on one end with the distance of the first space, measure and mark on the edge as before described. A piece of bridging is then laid across and finished up as already described and then, with this for a pattern, the other one for the same space is made and numbered. This can be continued for the entire stretch by putting a mark on the edge of the joist for each space. When too many marks accumulate they should be dressed off to avoid confusion.

If much bridging is to be done on a job where joists have been spaced the same throughout, the man in the mill can do the work cheaper than it can be done on the job.



Figs. 1, 2, 3 and 4.—Sketches Accompanying Letter of "M. R."

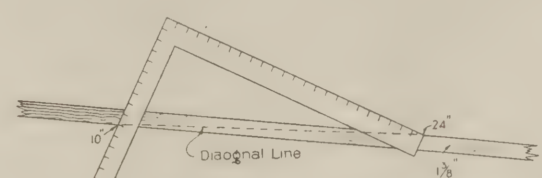


Fig. 5.—Method Suggested by "Alburnum."

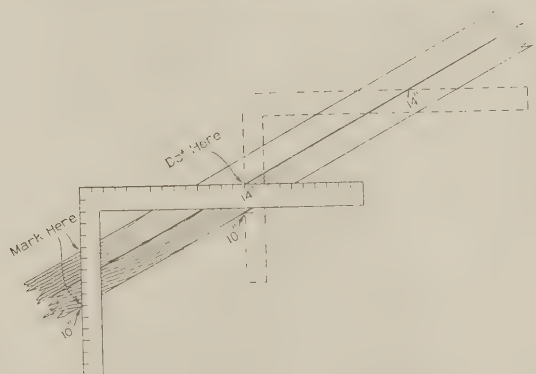


Fig. 6.—Two Pieces of Bridging Stock Tacked Together to Save Extra Handling, as Recommended by "J. F.,,

Cutting Bridging for Floors.—Solutions Contributed by Various Correspondents.

From Alburnum, Walden, N. Y.—Answering the inquiry of "E. B.," Farmingdale, N. Y., in the March issue, regarding a method of cutting bridging for floors, I would take the hight of the floor joists on the tongue of the square and the distance between the joists on the blade of the square and place the square on the edge of the bridging stock with the point on the tongue even with the edge nearest to you. Then move the point on the blade of the square even with the edge of the material farthest away, so that a line drawn from the point on the tongue to the point on the blade will run diagonally across the material, as shown in Fig. 5. This will be the distance from the top edge of one floor joist to the bottom edge of the next joist. After placing the square as directed, mark along the edge of the tongue, which will give the proper level, and where the points on the square rest on the edge of the material will give the length of the piece.

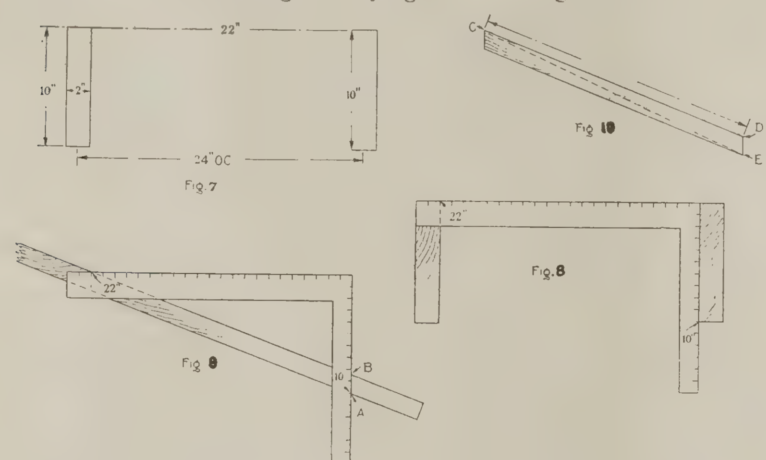
In cutting bridging for all the regular spaces on a building the writer always lays out one piece to proper size and bevel and then makes a box-like affair for a miter box, but makes the cut in the box to fit the bevel on the bridging. By this means all can be cut alike for the even spaces. The odd spaces are laid out afterward.

From J. F., Van Nest, N. Y.—Having been a reader of your valuable magazine for three years and obtained a great deal of information from its pages, I wish to join the ranks of those contributing to the Correspondence Department by answering the question of "E. B.," Farmingdale, N. Y., in the March issue relative to cutting bridging for floors.

Take the depth of the beams on the tongue of the square and the distance between the beams on the blade and the results will be those shown in Fig. 6. For example, suppose the floor beams or joists are 2 x 10 in. and placed 16 in. on centers. This would give a clear span between the beams of 14 in. Take 10 in. on the tongue and 14 upon the blade. Then having the stock nailed together or doubled, so as to save extra handling, place the square upon it with the tongue at 10 on the edge of the stock nearest you and the blade at 14 upon the joint made by doubling the two pieces, we mark across both pieces at the tongue, placing a dot in the joint at 14 on the blade; then move up the square until the tongue comes to the dot in the joint and holding the square the same as before mark across the tongue, placing a dot at 14 in the joint and so continue.

If the spacing of beams is not accurately done the distance between the beams must be measured for every space and marked accordingly. For the purpose of allowing for any irregularities 9¾ in. instead of 10 in. may be used.

From A. B., Spokane, Wash.—In the March number of *The Building Age* there is a query in the Correspondence Department from "E. B.," Farmingdale, N. Y., in regard to the proper method of cutting floor or joist bridging with the aid of the steel square. To repeat his words, he "does not want the 'cut and try' method," and that is certainly the correct way to look at it. What we all need is more order and system, more "science" and less cutting and trying and—cussing.



Figs. 7, 8, 9 and 10.—Sketches Accompanying Letter of "A. B."

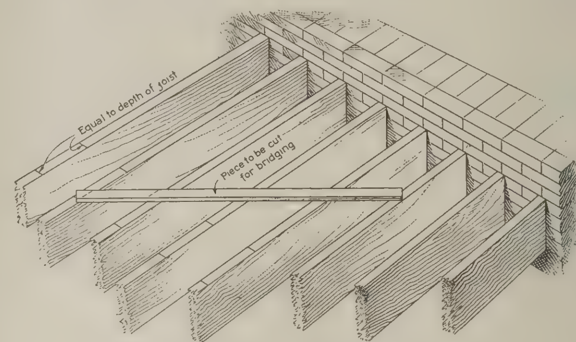


Fig. 12.—Method Suggested by "C. J. M."

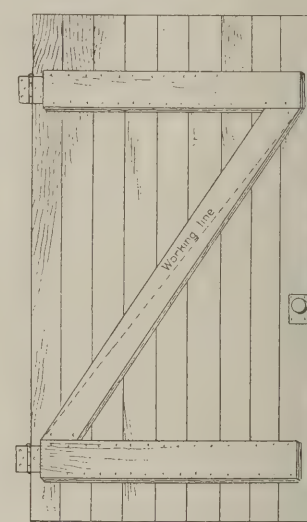


Fig. 11.—Showing How the Principle of Bracing May Be Applied to Barn Doors.

Cutting Bridging for Floors.—Sketches Contributed by "A. B.," Spokane, Wash., and "C. J. M.," St. Johns, N. F.

The point brought up by "E. B." is an interesting one to students in carpentry, and while it is by no means intricate, it seems to have puzzled many a user of the saw and hammer, besides the correspondent in question and the contractor and builder he mentions. As in most cases of this kind the trouble lies in a misunderstanding or lack of knowledge of the principle involved. Once you get "the hang of it" the rest is easy. The particular principle underlying the operation in this case is a valuable one in cutting various kinds of braces and a knowledge of it will often save a great deal of annoyance and time in misdirected labor.

The correspondent wishes in his example to find the length and end bevel for bridging to fit in between 10-in. floor joists spaced 24 in. on centers. By referring to Fig. 7, it will be seen that presuming the joists to be 2 in. thick, the distance apart is 22 in. and the depth of joist 10 in. These, then, are the figures to use on the steel square, as will be understood by an inspection of Fig. 8, where the square is shown applied directly to the joists. All that is necessary, therefore, is to transfer the square to the stuff to be cut, using 22 on the blade and 10 on the tongue.

Now here is where we meet the "catch" that baffles the beginner. The points taken on the square should in all cases be applied on *opposite* edges of the material instead of on the same side as is customary in laying out work with the square. Thus, as explained in Fig. 9, the figure taken on the tongue should be placed at A and not at B. After scribing along the tongue from A to B, reverse the square and mark for the bevel on the opposite end of the pattern, using the same figures of course.

The length of the bridging in this case is as shown in Fig. 10 from C to D. Ordinarily the line C D would be the "working line," but such is not the case in braces of this form, where the true working line is an imaginary line extending diagonally from one extreme tip to the other extreme tip or toe, as along the dotted lines from C to E. With this understanding of the "working line," in this instance, it is as easy to lay out a pattern for bracing or bridging as it is to find the side and plumb cuts of a common rafter.

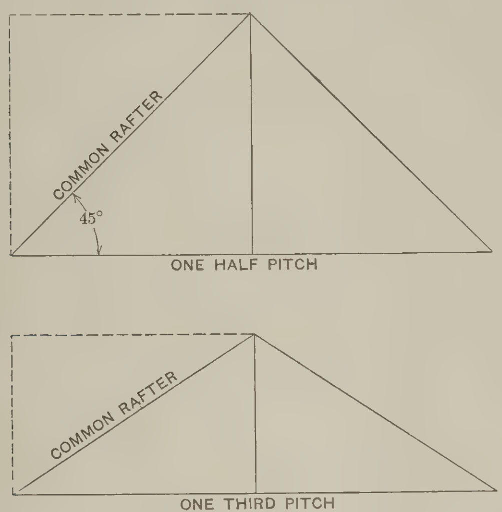
This form of brace is often met in the construction of gates and heavy barn doors, one form of which is given in Fig. 11 of the accompanying sketches.

From C. J. M., St. Johns, Newfoundland.—The general practice in doing work of the kind indicated by "E. B." in the March issue of the paper is to strike two lines across the top of the floor joist parallel to each other and at a distance apart equal to the depth of the joist. Then lay the piece to be cut diagonally across the joist from one line to the other and mark by the side of the joist. By this method the correct length and bevel of the bridging will be obtained, no matter whether the joists are spaced equally or not. An inspection of the sketch Fig. 12 will clearly indicate my meaning.

From J. J. P., Cleveland, Ohio.—Referring to the inquiry of "E. B.," let him spike a piece of 2 x 4, with its flat side flush with the edge of a 2 x 6 to form a one-sided miter box. Lay a steel square on the edge of the bridging to be cut, setting the tongue at the depth of joist minus the diagonal of the cut, and the blade at the width of space between joists, which would give on 1 x 2-in. bridging in a 10 x 24-in. space the figures 8⅞ x 24, then lay out on the edge of miter box for a cut on the figures obtained, square down to the 2 x 4 bottom and saw in the miter cut. Set off the diagonal distance from 8⅞ to 24 on the miter box bottom or side for a gage; nail and do not use the square now at all. Cut them in the miter box and save time and be up with the times. Life is too short to cut bridging with a steel square unless you have a pair of the Improved Hex. Square Guide, for sale at the hardware stores, to clamp on the square at the desired graduations. Even then the miter box is the logical and practical method.

Note.—We have also received replies similar to some of those published from "G. F. K.," Allentown, Pa.; "J. B.," Portland, Ore.; "W. C. J.," Highland Falls, N. Y.; "G. K. C.," Dallas, Ore.; "J. F. C.," Marion, Va.; "A. F.," Hartford, Conn.; "O. F. F.," Houston, Tex., and "B. H. R.," National City, Cal.

A Question in Rafters



A Question in Rafters. Fig. 1.—Diagram Sent with Letter of "M. C. W."

From M. C. W., San Jose, Cal.—Although somewhat late perhaps in answering the question of "W. H. P.," Philadelphia, Pa., I would say the length of a common rafter is the diagonal of a quadrangle and with a roof of 45 deg. this quadrangle is a square, as shown in the upper diagram of Fig. 1. The run of a hip is always the diagonal of a square, the sides of which are equal to half the width of the building, hence only on roofs of 45 deg. or half pitch is the run of the hip the same as the length of the common rafter.

From C. J. M., St. Johns, N. F.—The letter of "Parallelogram" in the March number of the paper has impressed itself so forcibly upon my mind that I cannot refrain from offering a few comments which may possibly interest "W. H. P.," to whose question the letter of "Parallelogram" is intended as an answer. It will be recalled that "W. H. P." raised the question, if the common rafter in a roof of 45 deg. pitch represents the run of the hip rafter, why will not the length of the common rafter in a roof of one-third pitch represent the run of the hip rafter?

I have been somewhat puzzled over "Parallelogram's" explanation of the matter and I am inclined to think he was a little mixed, for he says the run of the hip rafter in a house 24 ft. wide is the diagonal measurement of a square, each of four sides of which is 12 ft. This is quite correct and always the same in all roofs that are of the same pitch on both sides of the hip, no matter what the pitch may be. But he goes on to say, "Now take one-third pitch of the same roof, which is 8 ft.; then the run of the hip rafter would be the diagonal distance from opposite angles of a parallelogram, the two sides of which are 12 ft. and the two ends of which are 8 ft.," and concludes with the words, "This is true of any pitch, the length of the common rafter being equal to the run of the hip if the roof is square in plan."

Now, the correspondents dealing with this question in the issue of *Carpentry and Building* for November last answered it so thoroughly and proved so conclusively that the length of the common rafter in a one-third pitch roof cannot be the run of the hip rafter, that there is very little left for me to say, except express surprise that any man having the most rudimentary knowledge of carpentry could make such statements as those quoted above.

With regard to the first statement, which is to the effect that in a roof 24 ft. wide and one-third pitch, the run of the hip rafter is the diagonal measurement of a parallelogram, etc., such a parallelogram is presented at A B C D of the accompanying diagram Fig. 2, in which is also shown the common rafter for a one-third pitch, which is the diagonal of 12 and 8 ft., the same as the run of the hip rafter. This, however, does not give a one-third pitch on both sides of the hip, the one-third pitch being only on one side and a 45-deg. pitch on the other.

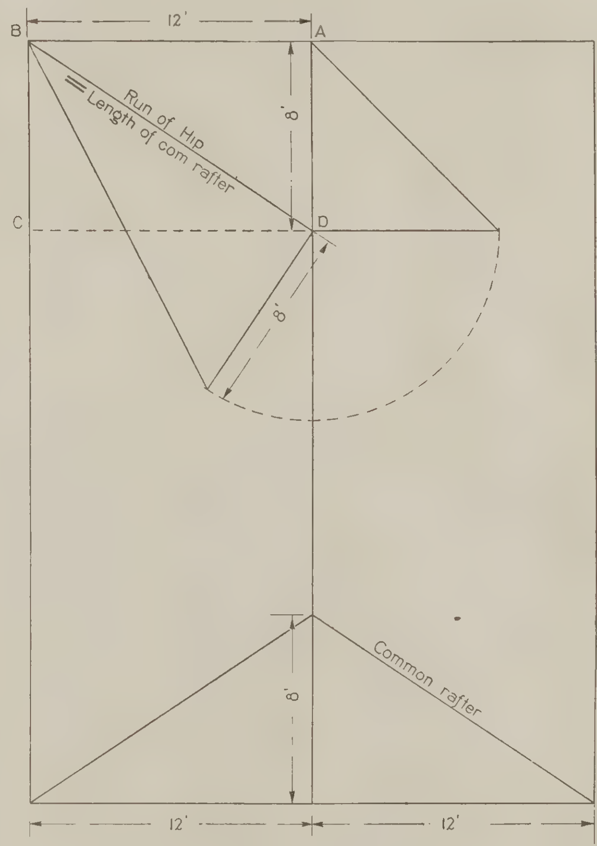


Fig. 2.—Solution Furnished by "C. J. M."

Now the run of hip or valley rafter may be considered as nothing more or less than the intersection or miter of nothing more or less than the intersection or miter of two bodies of triangular section. If the angle made by the base and hypotenuse is the same in both and they intersect each other at right angles, the intersecting line of the base will always make an angle of 45 deg. with the side of the plan. Therefore, the run of a hip or valley rafter in all roofs of rectangular plan and equal pitch on both sides always forms an angle of 45 deg. with the sides of the plan.

Commencement Exercises New York Trade School

The interest which is being manifested in the work of the New York Trade School was strikingly demonstrated by the large and enthusiastic audience which gathered in the auditorium, Sixty-seventh street and First avenue, New York City, on the evening of Wednesday, March 30, when were held the twenty-ninth annual commencement exercises of the school, which was organized many years ago by the late Col. Richard T. Auchmuty. Upon the platform were a number of the trustees of the school, including President R. Fulton Cutting, Treasurer F. Augustus Schermerhorn, Francis C. Huntington, J. Roosevelt Roosevelt and J. Pierpont Morgan, Jr. Representatives of the various trades at the school were also prominently represented.

The exercises were opened by President Cutting extending a welcome to all present, and in the course of his remarks to the young men graduates he expressed the following sentiments:

You are going out to get employment and you will be appreciated neither by those from whom you seek employment nor the men with whom you may work. They both think you have only book learning and do not know much, also that you think that you know it all. You will be underrated and undervalued, and some will be disposed to endeavor to secure your services for the very lowest price. Make the best bargain you can and then show your employer what you can do by work and not by talk. We feel sure that by diligent work you will do the greatest credit to the school. You will show your employer what you are worth and eventually what you are worth is what you will be paid. Keep learning, read the trade papers, do every job the best you can and the next a little better. Such a purpose to improve will equip you for the emergencies that may arise. Aim high, not only in your work, but in your mental, moral and physical equipment, then you will get to the high place that proper habits will qualify you to fill. You will join the union, that is right, but don't go back on the school. The union does not understand the school nor its purposes. I had one of the leaders here the other day and showed him all through. He knew little about us when he came in, but he knew a good deal about us before he went away, and he thought better of us. The best advertisement which our school has is the character of its graduates and the quality of the services they render. You are a good-looking lot of fellows, but it is your work that people will want, and good work will develop interest in the New York Trade School among your fellows wherever you meet them in your work. See to it that the school's reputation benefits from your daily life and work.

The president then introduced William T. Ellis, of the Philadelphia *Public Ledger,* who in part said:

We possess in this country a great combination of superior qualities, yet it is worth while to reflect that it is hard to beat the skillful work of a Frenchman, a German or a Chinese. I have been in parts of China where they do not know of the United States, not even of New York City. As a skillful workman the Chinese leads. A Chinaman who had never seen a bicycle took the broken parts of an old bicycle and with the explanation of the work it was to perform supplied the balls for the ball bearings and made the machine, which was used by an American for several months. That is why I say the Chinese as a skillful workman stands at the top.

After one has traveled and visited all parts of the world, one concludes that the greatest spot in it is New York City, where all kinds of men from everywhere are made over into Americans whom you impersonate, stand for and must perpetuate. The American has destroyed caste, which is gone never to return. People from all parts of the world are athrob with a new purpose, that is to learn the American way. In a vote conducted in Japan—one by a newspaper and one by a college—leaving it free to the people to decide for themselves, you may be surprised to learn that in both instances George Washington was voted to be the greatest man the world had produced.

The problem before the world to-day is to give this idea of acting square to all who live, to put this American idea into the minds of all people.

The president then introduced George H. Mollenkopf, who in behalf of the members of the day class in steam fitting presented to instructor E. L. Bahr a gift, which was a token of the appreciation of the excellent instruction received at his hands. Robert E. Murphy, a son of P. M. Murphy, past-president of the National Association of Master Plumbers, presented, in behalf of the plumbing class, a silver loving cup to the instructor, John Delehanty, with best wishes of the class for his long activity in instructing young men in this important line of sanitary work.

The gold medal awarded by the Master Steam Fitters' Association to the student who had shown the highest proficiency during the course was awarded to George H. Mollenkopf, whose percentage was 97¼, and who a year ago won the gold medal in the plumbing class.

The diplomas to the honor men of the graduating classes were then presented by J. Pierpont Morgan, Jr., while the certificates to the other graduates were presented by Vice-President Cochrane, of the Master Plumbers' Association of Manhattan, and by Willis I. McCullagh, of the General Society of Mechanics and Tradesmen.

The honor men in the carpentry class were Alfons Doppler, New York City, and Elmer H. Stout, Trenton, N. J., the former standing highest and winning the prize of a set of books. In the fresco painting class the honor man was Julius Ella, Brooklyn, N. Y.

The enrollments in the various classes were as follows: Carpentry, 11; bricklaying, 39; sign painting, 26; fresco painting, 16; house painting, 8; pattern making, 10; plumbing, 96; steam and hot-water fitting, 16; cornice and skylight work and sheet metal pattern drafting, 10.

Problems of Cement Manufacturers

A progress report of the Committee on Technical Research of the Association of American Portland Cement Manufacturers shows that the committee has had the problems of the action of oil on concrete and the effect of varying temperatures on the hardening of concrete under consideration. With regard to the first, the report states that, so far as can be ascertained, lubricating oils have no destructive effect on well-hardened concrete. The question of the percolation of oils through concrete is, in the committee's opinion, of vital importance, as, if concrete could be made impervious to oil, it would doubtless be widely used for the construction of storage tanks for petroleum and gasoline.

At the time of making the report the committee was not in a position to make any recommendations on the second problem, but it is planned to carry on a series of tests at laboratories situated near cold storage warehouses where the test pieces can be stored. The committee is also carrying on other investigations. One of these has for its object the finding of a method for determining the percentage of extremely fine dust in cement ground in mills of different kinds. A series of experiments by subsidence in benzine has been conducted, but no satisfactory results have been obtained, as the finest particles subside very rapidly. The committee has therefore come to the conclusion that no useful separation can be accomplished by this method.

The other topic under investigation was the cause of cement becoming quick setting on storage. The commonly accepted explanation of this action is that gypsum is effective in retarding the set when a small amount of free lime is present, as in the case of freshly-ground cement. This trace of free lime is gradually converted into calcium carbonate by long exposure to the air and cannot therefore assist the gypsum. The addition of 1 or 2 per cent. of ordinary hydrated lime just before use is sufficient to make the cement again slow setting. Longer storage of cement allows the aluminate of lime which is the cause of the quick setting to become hydrated or carbonated and the cement therefore becomes in time again slow setting. The experiments of the committee have demonstrated the truth of this explanation.

CONSTRUCTION OF CONCRETE FLOORS AND STALL DIVISIONS FOR SANITARY BARNS

By William Gregory.

It is quite often the case at the present day that small barns for the housing of cows are constructed without giving to the questions of proper sanitation,

light, ventilation, etc.; the consideration which their importance would seem to demand. The barns are often situated between other buildings, with a door at one or both ends as the only means of ventilation, while the stalls are sometimes built with their heads directly against a blank wall, thus necessitating the passing between the animals in order to properly feed them. It is important not only for the health of the cows, but for the quality of the milk produced, that there should be plenty of light and ventilation; that the stalls should be roomy, so as to avoid crowding of the animals, and that the material of which the floors and stalls are constructed should be of a non-absorbing character, which can be readily cleaned by the flushing process.

If no other means are provided air can be obtained by inserting air ducts and vents in the walls and roof.

In Fig. 1 of the illustrations presented in connection herewith a good idea is conveyed of the interior arrangements for a sanitary barn designed to house five cows, although with a little forethought it can be arranged to accommodate any number required. It will be necessary to first excavate the earth to a depth of about 9 in. below the grade, giving it the desired fall from the higher end of the barn to where the drain is situated, say at the end near the door. The leveling points, as well as all falls, are formed by driving wooden stakes into the ground at the most convenient points, the top of the stakes to be the level of the finished surface. It is imperative that the leveling and adjustment of the requisite falls be accurate, as they are an important factor in the making of good floors, allowing the liquid matter and water used in flushing to run off to the gutter and thus to the drain, which in all cases should be trapped.

Should the ground be soft it will be well to wet it by throwing a few pails of water on it and tamping it well with a heavy tamper, for unless the bottom be solid the best made and laid concrete will be a miserable failure.

Having gotten all the stakes into position, cover the entire ground to the desired depth, which will be about 4 in., with good, clean, damp ashes, tamping them well during the process, after which it will be ready for the concrete. The latter should be composed of one part Portland cement, two parts clean, sharp sand and four

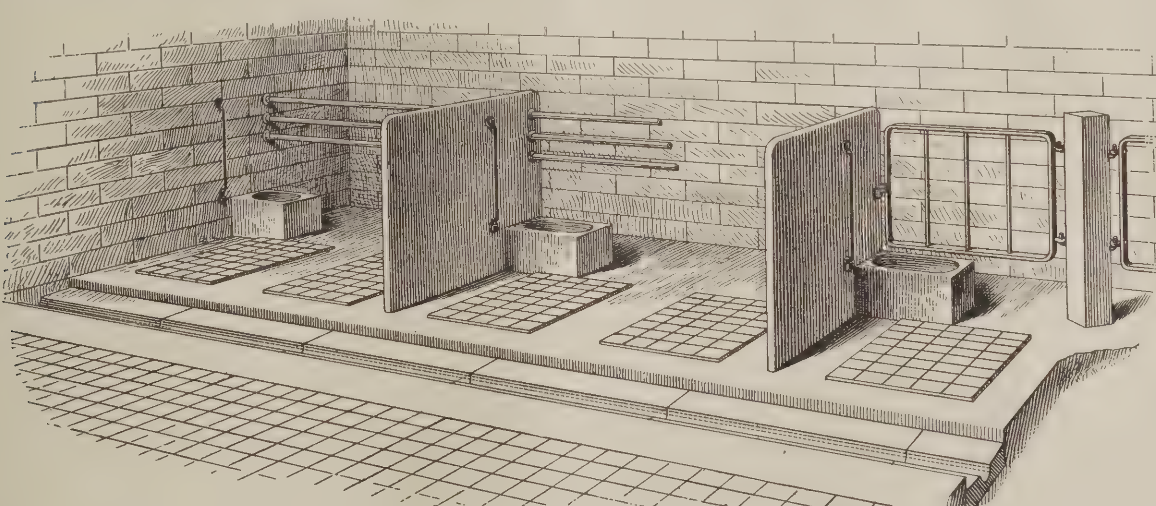


Fig. 1.—Interior View, Showing Arrangement of Stalls with Partition Slabs, Feed Boxes, Railing, Etc.

Construction of Concrete Floors and Stall Divisions for Sanitary Barns.

A passageway at the head of the stalls can be arranged so as to allow of the feeding of the cows being done without passing between them or unnecessarily disturbing them.

The floors of old barns are often made from planks or soft, porous brick, and are a constant source of danger in harboring germs and resulting diseases, as well as vermin, and, all things considered, are totally unsuited for a healthy barn. Since it is generally conceded that cement concrete is an ideal material for sanitary barns and other farm structures, rendering the buildings both cool in summer and warm in winter, there would seem to be no good reason why clean, healthy barns should not exist in connection with all farms and dairies, more especially as on most farms there is plenty of stone lying around and sand which can be had for the digging.

of broken stone. In laying the concrete no more water should be used than will dampen the materials, the concrete being about 4 in. thick. No more should be undertaken at a time than can be topped and finished the same day.

As there are different levels and falls, it will be well to lay the lowest first, which in this case will be the passageway at the head of the stalls. This can be laid right through in one operation and by the time it is laid to the bottom end the top end will be firm enough to receive the finishing coat, consisting of one part best Portland cement and two parts clean, sharp sand gauged to the consistency of "stiff mortar" and laid to a thickness of 1 in., care being taken to give it the desired fall. All slack or hollow places where the water can lodge in pools should be avoided. In order to prevent the hollows forming in laying the topping, spread the cement with a plasterer's laying trowel, after which the surface is ruled off or swept with a long straight-edge, drawing the excess cement toward the worker and filling in any hollow places that may occur with a little of the excess stuff. Again apply the straight edge until a perfectly uniform face is obtained. When slightly firm close in the face by drawing the wooden hand-float lightly over the face to correct any irregular parts there may be, after which it is troweled off.

The center channels and gutter may now be laid. The gutter is formed by working it out with a long straight-edge to the desired form and finishing it with a gutter-tool. If there should be any difficulty in forming the center gutter, the whole of it can be cast in suitable lengths, say of about 4 ft. each, in a mold, as shown in Fig. 2, and placed in position as indicated by the joint lines in Fig. 1, the bed to receive them having previously been prepared and care being taken to give the desired fall.

Having proceeded thus far, it will be well to place the concrete division slabs in position, these slabs being made before the work of excavating is done in order to give them time to mature. The slabs can be made in a mold like that shown in Fig. 3, which consists of six clean boards 12 in. wide, 1 in. thick and 6½ ft. long, nailed on to two or more cross pieces forming a flat, smooth bench. Four pieces of 3 x 3-in. stuff set 5 ft. apart one way and 5½ ft. the other are secured in position, into two corners of which quarter rounds have been inserted for the purpose of forming the rounded top corners, as clearly indicated in the interior view, Fig. 1. The edges may also be splayed or rounded by inserting corner strips in the bottom of the mold, forming the top splays with the trowel, or, if rounded edges are desired, with the edging tool.

Before casting the slabs it will be well to decide what kind of head fence will be used—two kinds being shown in Fig. 1 of the illustrations. If iron bars are used, wooden pegs will have to be fixed into the mold at, say, about 6 in. from the top and front edges and about 6 in. apart, which will leave holes large enough to allow the bars to pass through and on to which check nuts will have been screwed to allow the slabs to be fixed at their proper distance apart. Pegs will also be placed to allow the bent iron bar for the neck chain to be fixed with ½-in. bolts. The position of these bars is clearly shown in the interior view.

If on the other hand the gate method is adopted, gate posts of about 8 in. square will have to be made and sunk into the concrete of the floor before the top coat is laid. To cast these posts a mold must be made about 8 x 8 in. and 5 ft. long, using for the purpose three clean pine boards. If it is desired that the corners shall be splayed or rounded, provision must be made for this, the same as in casting the division slabs, by inserting corner strips in the mold. Pegs must also be placed at proper distances for the hinges and latch, which will be secured in position with bolts. In fixing the slabs and gate posts in their respective positions, place them into the ground 12 in. and rest them on a concrete bed, which will thus allow them to stand 4 ft. above the finished floor. Having arranged them plumb and level fill in around the sides with rough concrete, tamping well in order to keep the slabs and posts rigid.

Now with the slabs and posts in position and the passageway and the gutter finished, it will be well to fix a sufficient length of 3 x 3 in. scantling upon the surface of the passageway and of the gutter at the required distance apart for the purpose of filling in the stalls, thus raising that portion 3 in. above the passageway and the gutter. The strips may be secured in position by nailing stays from them to the wall in the passageway and also at the tail end by nailing stays across the gutter from one to the other. Having gotten the scantling in the proper position, commence to fill in the concrete at the upper or head end of the barn, tamping well during the process, working toward the door and keeping within one inch of the top edge of the scantling, thus allowing for the top or finishing coat.

Having laid the concrete throughout the stalls, the finishing coat may be laid in the following manner: First lay the plain margin around each stall to the level of the scantling. This method allows the operator more freedom by standing in the center to finish the margins. When the margins are laid and finished nail ½-in. strips on to the edge of the scantling and at the required distance from the division slabs, and fill in the center with the finishing coat, working the straight edge upon the top of the rods, leaving a clean finish, after which it may be spaced off and grooved to any desired size and design while it is still soft.

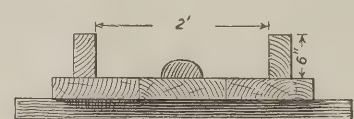


Fig. 2.—Mold for Making the Gutter.

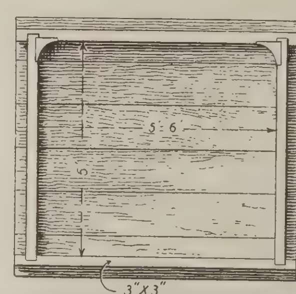


Fig. 3.—Mold for Casting the Division Slabs.

Construction of Concrete Floors and Stall Divisions for Sanitary Barns.

The grooved surface keeps dry and gives a firmer foothold, thus preventing the animals from slipping, and maintaining a comparatively dry surface upon which they may rest. The grooves are generally formed by placing a straight-edge on the surface as soon as it is floated and working the grooving tool back and forth along its edge to the desired depth. After grooves have been sunk the surface is troweled and the grooves made true by again running the grooving tool or trowel along them, care being taken to leave the indentations straight and smooth in order to give a free passage for the liquids, thus insuring a clean, dry footing for the animals.

Feed troughs or boxes should be placed at the head of each stall, and to make these it will be necessary to first construct a wooden mold about 2 ft. long by 1 ft. 6 in. wide and 12 in. deep. Place this on a clean bench and into it put a core, which forms the hollow of the trough. This core can be made by placing a few bricks or stones inside the mold and giving them a coat of plaster, rounding off the corners a little, thus leaving the internal angles of the trough rounded. This will give the interior of the trough a better shape to clean and prevent the accumulation in the corners of any food, which, if left there very long, would turn sour. This core should be 2 in. away from the inside of the mold, thus giving a trough 2 in. thick. It can be fixed in position by spreading a little soft cement on the floor and placing the trough on to it, working it back and forth a few times until it is in a rigid position. The location of the food troughs or boxes is clearly indicated in the interior view, Fig. 1.

SUGGESTIONS FOR BUILDING A MODERN DWELLING

By William Arthur.

COMPARED with the age of Abraham Lincoln, we are a nation of machine users; we do everything by pressing a button or turning a lever, but in the ordinary dwelling we still climb the stairs as in the days of old. The inventive genius of man, however, may yet conquer the stair problem in the dwelling as in the office building. There is a safe automatic elevator made large enough for two or more and by touching a button it goes from floor to floor, stops at the desired landing without further trouble, takes care of the gates, and is altogether a splendid machine for those who can afford to install it, and pay for the continuous cost of electrical operation.

A cheap elevator taking up a space of only about 3 ft. square, and a small operating cost, would revolutionize our house plan by giving more room in the best part of the house, and making the only flight of stairs the one from the kitchen.

The dumbwaiter is useful, the clothes chute is indispensable, but the cheap house elevator would be a twentieth century blessing and mean millions to the manufacturer.

Direction of Stairs

In the square house, where the stairs usually run parallel with the front of the house, it is often necessary to extend the platform outside of the main wall to keep from landing too near the center of the building on the second story. If the house is wide enough this is not necessary.

For the sake of a good-looking hall, it is better to run at least a part of the stair parallel with the front of the building. The stair that goes up by the side of the wall is too suggestive of the old, cheap boarding house.

A square platform is of much value half way up a stair, because it saves a continuous climb. Winding steps should not be used in a main stair if it is possible to avoid them.

Stairs are often spoiled by having too many short turns, even if the steps do not wind. With some stairs it is almost impossible to get furniture up to the second story. Cases are not infrequent where the larger places are taken in the windows. For want of a little care in planning, a house should not have its permanent usefulness impaired. In a home the first removal of furniture is usually the last, but when a building is rented it is different.

In general, from basement to attic, the one flight of stairs should go above another in order to save room.

Double Stairs

When a house is not large enough to make a front and rear stairway possible, it is a good plan to run a short flight from the kitchen to the platform of the main stairs, and a single flight from that up. By this method it is not necessary for any one in working garb to pass in front of the main room on the way from the second floor to the kitchen.

One of the worst ways of designing a stair with a short flight, from both the kitchen and front hall and a single flight above, is to build a platform between the hall and the kitchen, thus making it necessary to go over the two short flights every time the front door bell rings. Another way around is, of course, through the dining room and front room, but this is not always convenient and is out of the question when the way to the dining room is through the pantry. A level passageway between the kitchen and the front door should always be insisted upon. Only in a badly-planned house do people have to climb a stair year after year to reach the front door.

Outside Stair Door

In the square house it is a common practice to make the door to the basement in the side of the house, under the platform of the main stairs, and so take advantage of the hight this platform affords. It is a good plan, but the objection by some is that clothes, vegetables and everything else have to go in or out at the side of the house instead of at the rear. "Where is that palace wherunto foul things sometimes intrude not?" On washing day many a woman prefers to see everything handled at the rear of the house. It does not matter so much when there is a wide space between houses as in villages, but in cities where land is high in price and lots are small, it seems to be the better way to make the door in the rear. But, again, unless the lot slopes to the back of the house, steps are necessary on the outside, while with the side door they are not required owing to the gain in hight with the stair platform. This is one strong point in favor of the side door.

Head Room

Back in school books they have what is called the Bridge of Asses. It is a Euclidian problem that quite a few are not able enough or patient enough to solve, and so cross the bridge. It would sometimes seem that there is a sort of a bridge of this kind in stair building, for many a good architect who knows all about Machicolation, Gargoyles and Groined Arches fails to get head room enough in some of his masterpieces. It is easy enough to get plenty of everything in a costly mansion, but more difficult in a small home where every inch and dollar has to count.

Rule.—A safe rule is the standard one: Allow at least fourteen risers—not steps—in the clear before building the floor above.

Sizes

Each riser should be about 7 in. high, making a total of 8 ft. 2 in. from the top of the second floor to the bottom of the fourteenth riser. After deducting about a foot for the second story joists, double floors and plaster, ample room is left in a house where more can not be spared. It is not desirable to have to confine oneself to such exact measurements, but it has to be done in moderate-sized homes. Thirteen risers are often made to serve, especially when the riser is made more than 7 in.

The width of the step is considered without the projection, or taken from face to face of risers. Ten inches is a good width for an ordinary house. The standard rule is to make the riser and the tread equal together 17 in. If the riser is made lower the step is made wider, and vice versa.

Stair Closets

Sometimes space for a closet can be found over the stair by running back several steps past the thirteenth riser, and sloping the floor of the closet to suit the rake of the chair. On the inside of the closet a couple of shelves are then built on the floor, as the slope allows, or a single floor may be put in if raised to the necessary hight. The advantage of the double step is clear: Suppose that to suit the angle of the stair and give a level floor inside the closet, we have to raise the front two feet. By putting in two steps, each a foot high, we still have the same floor area a low step is furnished to stand on when reaching to the back of the closet. With the one high step we should have to stand on the outside, too far from the back, and reach in.

One-Story House

Houses of this kind do not, of course, have a stair except to the cellar or basement. All the rooms have to be placed on one floor. This method has advantages and disadvantages, which will be considered when we come to the bungalow.

The Second Floor

The position of the rooms on this floor is often decided by the main stair, the bath room and the chimney. The bath room may be put over the kitchen or in another place, and that regulates the position of some other room. We might have an ideal stair and chimney plan on the first floor that would spoil the second.

Bath Room

One advantage of putting the bath room over the kitchen is that the plumbing is then in a direct line from basement to roof. This saves expense for supply, soil and ventilating pipes. No one would care to spoil a house, however, to save fifty dollars' worth of plumbing, if another arrangement was considered necessary.

The bath room is often put above the main rooms, but on account of noise, apart from extra expense, it is better to be put elsewhere. In good houses the floor is usually laid with waterproof tile, so that there is not much danger of spoiling a ceiling below in case of leakage; but in many houses only wood floors are used, and if water should go through to the expensive paper or decorations of the main rooms, the damage might amount to a good deal. On the other hand, if the location above the kitchen is chosen the ceiling can easily be repaired with a new coat of paint, which costs only a trifle. Even if the stain is left there, it is seen only by members of the family, but it is different in the main rooms. A good location is over the pantry, when that is between the kitchen and the dining room.

Water Closet.—It is a debated question among architects as to whether a closet should be in the main bath room or in a separate compartment. In most houses, on account of considerations of space and economy, it has to be placed in the main room. Probably, taking all things into consideration, that is the best location. This is undoubtedly the case if there is a separate closet in the basement.

Size.—Bath rooms are usually made smaller than is altogether pleasant, but we all know why. It is not because we do not realize the advantages of a larger space.

Attic Stair

The space on the second floor is cut down by the stair to the attic. It usually happens, too, that there is one small bedroom that really needs the area taken. An attic is very serviceable, and in some families indispensable, but this is one drawback. Not only is there one small bedroom, but it often has to go without a closet.

Linen Closet

A small linen closet is often made in the hall; but a good attic is the only possible place, in an ordinary house, for a large linen closet.

Chimney

The chimney, or chimneys, should be kept in a corner of the room, or in a closet if possible. In all cases it must be set in a partition and not stand out in a room anywhere but in the attic. Only a week ago I saw a plan with a chimney in the center of a bedroom. It is passing strange that such things should be done. Even in an attic this solution of a troublesome problem seems a trifle crude, but there it is at least permissible.

Sleeping Rooms

When the bath room, chimney and stairs are arranged, we have to take what is left for the bedrooms. A good deal of planning is necessary to get the one part to fit into the other. A good plan on the first floor will often not fit in with the necessary arrangements on the second, or in the basement or attic. Each floor depends upon another. A clothes-chute, for example, should start in the bath room, but it must not go down through the ceiling of the dining room or land in the kitchen sink, or among the coal in the basement.

Size and Cost.—These usually go together. An architect likes to give large rooms with ample closet space, but he cannot. After all, most people have to be content to use a bedroom as a place to sleep in. It is impossible to make the room in the common house large enough for a parlor and a bedroom. In northern winters the heating of large rooms is too expensive. Some are using patent beds—not the New York folding kind—and getting more room that way. We shall reach them with the bungalow.

Sorrow.—I heard of one woman who cried when she saw the size of the rooms in her new house. The body of the house was finished, and it was too late to make changes. Few women can judge from the figures on a plan what a room is going to be. It would often save much vexation if the prospective builder got a few strips of wood and laid them out on the ground to the suggested sizes. The cost would be trifling, and actual sizes would be seen. An architect, however, can give a fair idea of what a house is going to run to in the dollar column, and there is no use going beyond a certain number of square feet unless you are prepared to increase the amount you have set as his limit. It would simply mean the making of another set of plans, on a more modest scale, when the bids were taken.

Doors and Windows

With a small space to work on it is sometimes hard to keep the end of a bed from looking out the window, or the other end from interfering with the working of a door. Closet doors are left off entirely in some houses, and a curtain used.

Sewing Room

Some families would divide the second floor into three chambers, and others would require four—and one of them might be used for a sewing room. A good sewing room is possible in the attic, but there are stairs to be climbed. In this one respect, at least, the Teepee woman had the best of it.

Attic

The attic is usually arranged for one large room, a linen or clothes closet, and storage space. J. Brown, Jr., B. A., might insist on a small smoking room, billiard room, or den.

In the attic, as on the second floor, the landing of the stair and the position of the chimney govern the division of space to some extent.

Clothes Closet.—If a large clothes closet is built in the attic the closets in the bedrooms can be made more useful, for clothes not required may, according to season, be stored there. A house should, if possible, have an attic, even if there is nothing else than a common board floor to walk on. The space is there in any case, and the cost, unplastered, is not very serious, say about $100 extra for a $3,000 house. A stair that is plastered only where the surface is seen from the second story, and a rough floor, is all that is really required for a valuable storage space. Division into rooms can be done at any time.

Gables.—To get the best kind of an attic, gables should be used. Here is one mistake that too many of the square house builders are making. The roof is pitched from all sides to the center, and a poor attic is the result. Of course many of these houses are built without attics, but it is a mistake, unless the room on the second floor is enough. The space for the attic stair is undoubtedly saved.

(*To be continued.*)

PUBLIC COMFORT STATION IN NEWARK, N. J.

ONE of the latest to take a position among the progressive cities of the United States in the erection of a centrally located comfort station for the convenience of the public is Newark, N. J. In its construction and arrangement endeavor has been made to avoid errors which have been discovered in the design of such buildings in other places where annoyance has been experienced from undue condensation of the moisture on the walls and the difficulty of maintaining a pure atmosphere free from odors. Provision against this contingency has received the attention of the architects, John H. and Wilson C. Ely, of Newark, from whose plans and under whose supervision the station was erected.

A sectional view of the building showing the grade line is presented in the accompanying elevation and the plan illustrates the general arrangement. The building occupies a space of 33 ft. 7 in. x 44 ft. 8 in. According to the specifications Portland cement was required for the construction, which would pass through a No. 100 standard sieve, and a briquette made from it after exposure to the air for one day and immersed in water for six days had to show a tensile strength of 350 lb. to the square inch. The sand was coarse, clean and sharp and the broken stone of sound material, either granite or trap rock, small enough to pass through a 2-in. ring for the foundation work and through a ¾-in. ring for the reinforced concrete work. The mixture for the footing course was one part Portland cement, two parts sand and five parts broken stone, all of which was thoroughly mixed and laid on beds of well-rammed earth.

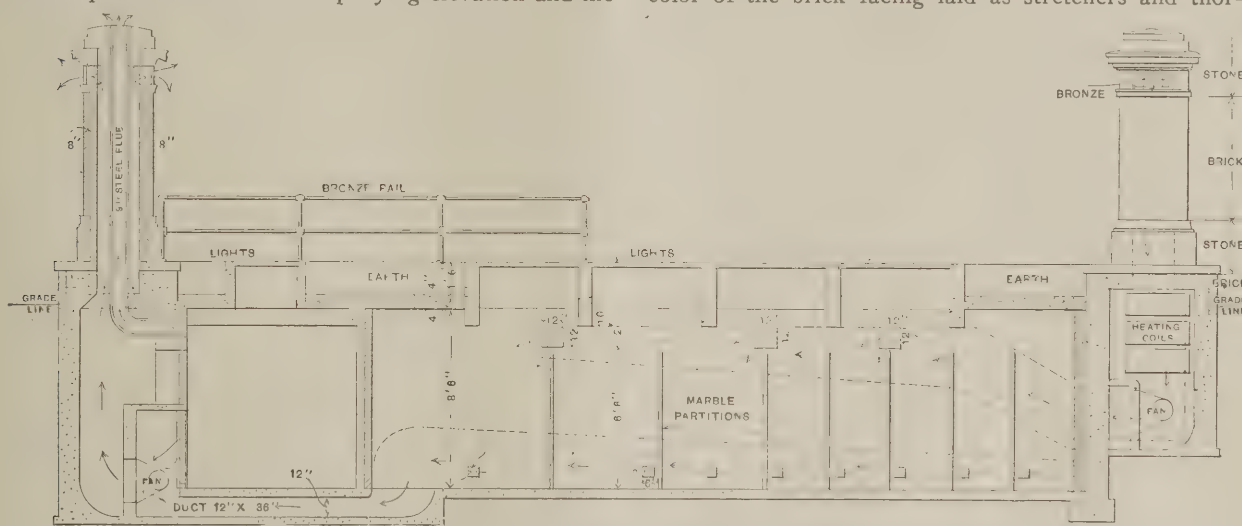
The mixture was prepared on plank platforms, in bins or boxes. The floors of all the areas and ducts consisted of a 4-in. layer of rough concrete and were covered, except where terraza floors were laid, with a 1-in. finishing layer composed of one part cement to two parts sand and fine crushed granite. They were laid smooth and brought up to the proper level and grade. The reinforced concrete was composed of four parts crushed stone of a size to pass through a ¾-in. ring, two and one-half parts clean, sharp sand and one part cement, thoroughly mixed and imbedding all the reinforced steel, which was set as the work was progressing. The side walls were constructed with the aid of wood forms, which were left in position until the concrete had thoroughly set. Reinforcing steel was required of such shapes and sections and of sufficient strength to develop the strength of all the members with a factor of safety of four.

The ceiling duct for carrying the air from the heating coils was made from concrete slabs cast during the progress of the work and placed as the walls were carried up. It was flushed or smoothed off in the same manner in which the floors were finished. In the concrete work chases and flues were constructed to provide for the heating, plumbing, gas and electric piping. Sleeves 2 in. larger than the pipes to pass through them were placed in the walls for the various piping.

In the walls hard, burnt bricks were used and were laid in a cement composed of one part Portland cement to three parts sand, no lime being allowed in any of the mortar. The interior walls from the floor to the ceiling were faced with cement brick having a porcelain finish and imbedded in impervious mortar matching the color of the brick facing laid as stretchers and thoroughly bonded or anchored to the backing. Provision has been made for a ventilated space of 2 in. between the 12-in. concrete wall and the 4-in. cement enamel-faced brick wall. The exterior faces of the interior walls and areas were swabbed with two coats of hot asphalt and three coats of tarred felt, each of which was well swabbed also with hot asphalt, were applied. This space is clearly outlined on the plan and envelops the entire building and opens into the main exhaust ventilating shaft. A cement plaster was used for finishing the ceiling and two coats of a damp-resisting paint were applied, after which the final finish of white sand and plaster of paris was put on.

The station is divided into two parts, with the entrance for men and the entrance for women as widely separated as possible when on the same end of the building. The heating, plumbing and lighting equipment was installed by Storms & Co., 126 South Fourteenth street, Newark. It will be noticed that there is provision for both a male and a female attendant and that the equipment for the use of women includes two pay closets each 5 ft. wide and 5 ft. 3 in. deep, with both a washstand and a closet. There are three free closets, 2 ft. 10½ in. wide, in which only a water closet is provided. There are also five lavatories in this apartment. The apartment of the female attendant, which is practically 8½ x 9½ ft., is provided with a slop sink.

The floors in all the apartments and the areas at the foot of the stairs are all finished so as to drain to a low point, from which a drain pipe is carried over to and connected with the main drain to the sewer, as indicated in the plan. The apartments are all lighted during the day by means of glass lights from the roof. White Italian marble is used in the partitions forming



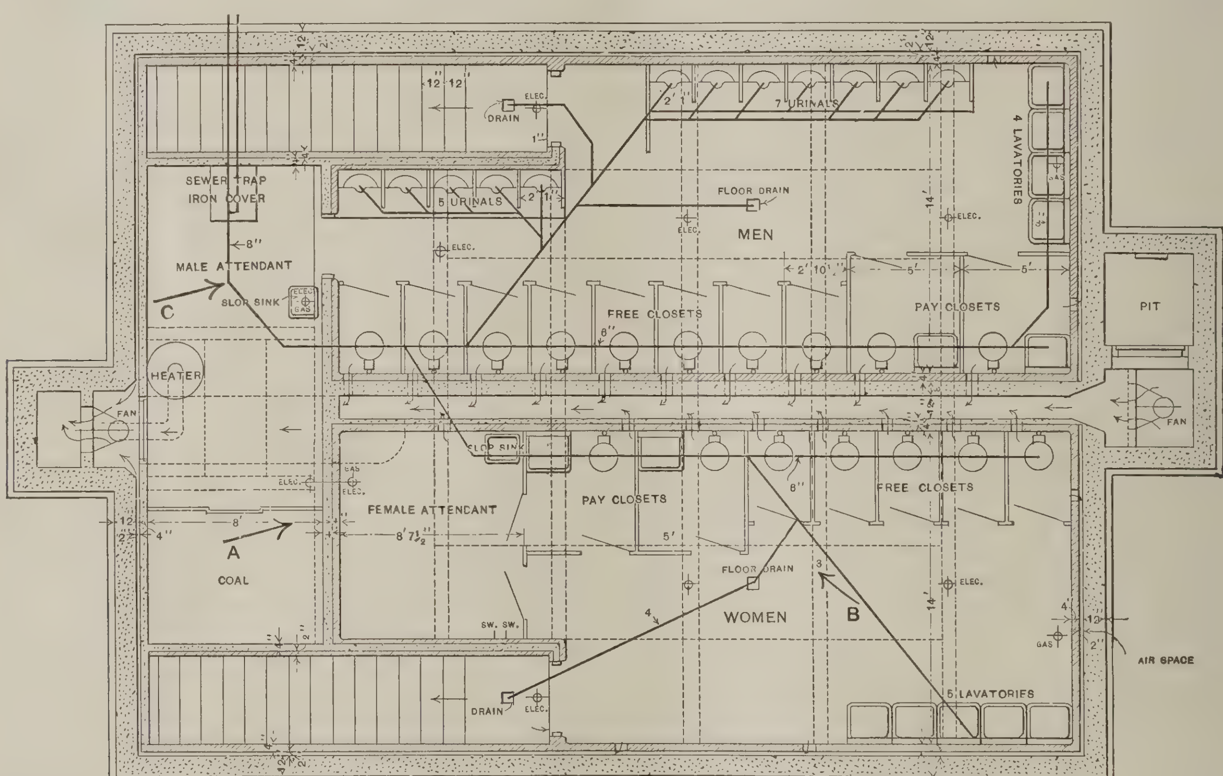
Elevation Showing Grade Line, Air Shafts, Heating and Ventilating Provisions.

Public Comfort Station in Newark, N. J.

the various stalls and extends up 6 ft. from the floor and rests on polished nickel-plated brass standards 9 in. high. The partitions are stiffened by the use of 1¼ in. polished nickel-plated brass piping set 7 ft. from the floor line.

The doors for the water closets are 1¼ in. thick, hung on nickel-plated, single-acting spring hinges, which are secured to the marble by bolts and to the wooden doors by screws. Each door is provided with a hook to hold it open when desired. Nickel-plated indicator bolts and suitable stops are provided for the doors and those to the pay closets are equipped with a lock. Each water closet apartment is provided with two extra heavy hat and coat hooks. The fixtures were furnished by the J. L. Mott Iron Works and comprise the Torrento wash-down water closets; the Sanito urinals, with integral receptors; the Unitas imperial porcelain lavatories, with single-center porcelain leg and suitable supply and waste fixtures, and the Imperial porcelain roll-rim slop sink for the apartments of the attendants. The lavatories and closets were provided stalls 21 in. deep. These are constructed of 1¼-in. polished Italian marble, having rounded corners and edges. The ends are 6 ft. high, while the interior divisions are 5 ft. 3 in. high.

From the plan it will be noticed that there is a main ventilating duct running down through the center of the building, with inlets to it from the closet stalls on both sides. This duct is 12 x 36 in. in its largest section, where it drops down to run under the floor to the main vent shaft. The duct is built back of the closets on the women's side of the station and is 12 in. in width. It is divided as shown in the elevation into an upper duct, through which warm air for heating the station is discharged 10 in. below the ceiling line through 12 x 12-in. japanned registers. Registers 6 x 6 in. square draw the foul air from the floor of the apartment and are located in the various stalls as shown. A No. 9 Volunteer steam heater having a 30-in. grate and rated to carry 900 sq. ft. of direct radiation is located on the entrance side of the building convenient to the coal bin and for management by the male attendant. A steam supply



Plan Showing Arrangement of Fixtures, Ventilating Registers and the Drainage System.

Public Comfort Station in Newark, N. J.

with nickel-plated towel racks, paper holders, plate-glass mirrors with nickel-plated frames, nickel-plated soap dishes and brass towel rollers.

The plumbing and drainage work was required to be executed in accordance with the regulations of the city of Newark and the best quality of brass goods was specified. All workmanship was inspected before receiving the approval of the authorities. Extra heavy untarred cast iron pipe was used in the drainage system and all exposed piping was given a coat of damp-resisting paint. The water-supply pipes were of galvanized wrought iron and all exposed piping, traps, vent fittings, etc., in the toilet rooms were of extra heavy nickel-plated brass. The waste pipes for the lavatories were 2 in., and ¾-in. hose bibbs were provided over the slop sinks.

The portion of the station devoted to men is provided with ten water closets, eight of which are free, in stalls 2 ft. 10½ in. wide. Two of the closets are in pay apartments with lavatories. These occupy a space about 5 ft. square. Four lavatories are provided in the men's apartment, and there are twelve urinals set in main 2½ in. in diameter is carried along the ceiling to the heating coils located in the fresh-air shaft in the opposite end of the building. In the heating coils the Vento indirect radiators are used, presenting the equivalent of 500 sq. ft. of prime surface. A 1½-in. galvanized iron return pipe is carried back from the coils with a pitch, which facilitates the return of condensation to the boiler.

A 24-in. direct-connected electric fan is located so as to draw air down through the fresh-air shaft and through the heating coils and then drive it through the ducts to the registers, as shown at the opposite end of the building, where the exhaust duct connects with the ventilating shaft. Another fan of the same type is used to draw the air out of the building.

As previously stated, the 2-in. space between the concrete wall and the brick facing connects with this vent shaft, so that the influence of the fan in drawing air from the various apartments is utilized for the double purpose of ventilation and insulation. The location of the registers opening into this space is shown on the main floor plan, also the vents into the main-vent shaft.

WHAT BUILDERS ARE DOING

AS the season advances indications of growing activity in the building line multiply, and in many cities the permits issued last month established records which have never before been equaled. Everything points to a vast amount of construction work throughout the country, especially in the way of housing accommodations for a population which is constantly on the increase. Reports covering leading cities for the month of March show that there is fully as much work contemplated as was the case a year ago at this season, and that while a falling off is shown in some sections it is more than offset by the gains in others.

Here and there labor troubles have occurred in the building industry, but even with this handicap the volume of operations is a most creditable one. All things considered the outlook is most promising for those connected with the building and allied industries.

Baltimore, Md.

Construction work is in progress all over the city, and signs of activity in building are becoming more general as the days go by. A number of important permits have recently been granted, and it is expected that before the summer is over several skyscrapers in the business section will be well under way.

Last month the Building Department issued 440 permits for new work to cost $959,275, whereas in March last year 290 permits were taken out to cost $732,290.

In the suburban developments near the city the tendency seems to be toward 2½-story frame cottages, although many 2-story brick dwellings are also in favor. It is said that the Piel Construction Company will spend about $60,000 for eighteen 2-story houses to be erected on Arunah Avenue. One of the largest building operations of 2-story frame dwellings ever undertaken in the city at one time will be started as soon as the plans which are now being drawn are completed. The work will be done by the City & Suburban Realty Company, which is developing Evergreen Lawn. The houses to be erected will cost about $4,000 each, although some will be of a less expensive nature.

Buffalo, N. Y.

A decided impetus appears to have been given to building operations, some part of which may be due to the very favorable weather which prevailed during the month of March. The number of permits issued that month by the Bureau of Building Inspection was 344, involving an estimated expenditure of $926,000. These figures compare with 306 permits in March last year for building improvements estimated to cost $664,000—an increase for last month over a year ago of 39 per cent.

The estimated cost of new structures for which plans have been filed for the first two weeks of April is about $600,000, and includes a number of buildings of importance, among which may be mentioned a school building, 59 Glenwood Avenue, $75,000; police station and barn, Genesee Street and Bailey Avenue, $35,000; Pilgrim Congregational Church, $35,000; a seven-story and basement warehouse, 46 x 132 ft., for Gerber Nott & Co., $60,000; a four-story and basement warehouse, 72 x 165 ft., for the Buffalo Glass Company, $60,000; a factory building, 80 x 140 ft., two stories, brick and steel for the Lobee Pump & Machinery Company; four-story reinforced concrete factory for the Aldrich Manufacturing Company, Illinois Street; testing laboratory and office building for the Buffalo Union Furnace Company at its plant; ice manufacturing plant, 110 x 157 ft., for the Webster Citizen's Ice Company; addition to "Pierce Plant" of the American Radiator Company, 73 x 192 ft., steel and concrete, $100,000, and a tuberculosis hospital for the city, $150,000.

Chicago, Ill.

Architects and builders are just now working under high tension, and the volume of operations projected last month is far in excess of that for March, 1909. All indications point to an active season with plenty of work in all branches of the trade. Last month 1,381 permits were issued, involving an estimated outlay of $10,002,900, whereas in March last year 1,254 permits were taken out for improvements to cost $8,145,800.

The public action committee of the Chicago Architects' Business Association, of which Argyle E. Robinson is chairman, is trying to bring about more satisfactory relations between the architects and general contractors. The matter was the subject of a conference at luncheon recently. There were about fifteen present, and Mr. Robinson presided. The subject under consideration was in the nature of a protest upon the part of architects against the present method of constructing buildings; that it is in many instances not working to the best interests of the owner and the architect, due to the fact that some of the contractors employ their own architect and erect buildings from these plans.

The architects believe that this removes a safeguard from the owner and is detrimental to the development of architecture and the allied arts, and are anxious to change the situation if such a change be possible. To that end they presented the matter at this meeting for the purpose of arousing a general discussion, in the hope that some way of improving the situation can be devised. It was not the intention to take any action in the matter, and consequently no resolutions were passed or even presented.

The luncheons will be given monthly, and those in charge have no desire to limit the attendance to any particular contractors' association, but have endeavored to include in their invitation the president and secretary of all the general contractors' organizations in the city.

Cincinnati, Ohio

The report of Building Commissioner Kuhlman for March shows an appreciable increase in building operations as compared with the same month a year ago, the bulk of the operations involving brick, steel and concrete structures. Last month 1,031 permits were issued for new improvements in the building line valued at $947,330, while in March last year 704 permits were taken out for improvements valued at $914,675.

Of the permits issued last month 105 were for brick, steel and concrete structures to cost $518,450. There were 112 permits for frame and frame veneered buildings to cost $256,025.

Cleveland, Ohio.

Building operations in Cleveland started out well during April, and the opinion is expressed that there will be more building work in the city in 1910 than was the case last year. The total number of permits issued during the quarter ending March 31 fell off some as compared with the corresponding period a year ago, but this is probably due to the severe winter weather that prevented outdoor work until about the end of March. The number of permits issued in March, however, exceeds those of the corresponding month a year ago.

During the first three months of the year 1,209 permits were issued for buildings to cost $2,065,883, as compared with 1,465 permits issued during the first quarter of 1909 for buildings to cost $2,169,318.

During March of this year 771 permits were issued for buildings to cost $1,192,204, as compared with 741 permits issued during March, 1909, for buildings to cost $1,165,983.

Denver, Col.

The total value of the building improvements for which permits were issued during the month of March was slightly in excess of the same month a year ago, the bulk of the new work being brick residences and business buildings.

The figures show 339 permits to have been issued last month calling for an outlay of $1,121,900, while in March last year 335 permits were issued for building improvements to cost $1,040,750.

Of the total last month, 190 brick residences called for an outlay of $530,400 and 5 apartment houses, $98,000. There were permits for 23 business buildings to cost $340,700, and 2 warehouses to cost $52,000.

Detroit, Mich.

Only two months in the history of the city of Detroit show a greater total for building permits issued in the monthly period than in March, 1910. The estimated cost of the improvements for which building permits were issued last month was $1,404,390, and in March last year $934,000. The total for last month was exceeded by $80 in August, 1909, and by about $200,000 in December, 1906; but in that month the permit was issued for the million dollar Ford Building.

The total for the first three months of the current year is $2,930,355, and for the first three months of last year $2,504,450.

Harrisburg, Pa.

The fiscal year of the building department ends April 1, and according to the figures compiled in the office of Building Inspector Shaffer the one just ended has broken all previous records, the total being $2,195,300. The greater portion of this amount is represented by dwelling houses, costing on the average about $2,000 each. This is the first time that the records have exceeded the two million dollar mark during a fiscal year, although the last calendar year showed an excess of this amount.

The amount of new building projected in March was estimated to cost $367,300, which is the largest March record since 1905, when the total ran to $419,000.

During the year there were 353 permits issued and nearly 800 new buildings erected, of which over 700 were brick buildings, mostly dwelling houses.

Kansas City, Mo.

The month which has just passed made a good showing, all things considered, although it was not quite up to the same month a year ago. This was due very largely to the fact that many contracts are being held up until contractors and builders can catch up with work that was begun late in the fall but delayed by reason of the unusually severe winter weather which prevailed.

Last month there were 434 building permits issued from the office of Superintendent of Buildings representing an aggregated value of $1,622,398, while in March last year 495 permits were issued for new work involving an outlay of $1,708,953.

Of the work for which permits were issued last month 74 were for brick buildings having a frontage of 2,737 ft., and costing $823,900, and 187 were for frame buildings with a frontage of 5,935 ft. and costing $583,350.

Los Angeles, Cal.

The fine weather of March brought some improvement in the new construction work started, but the season is as yet hardly far enough advanced to show how the spring will turn out. The permits numbered 1,053, with an aggregate valuation of $1,720,000, or about $50,000 more than in February.

The first few days in April, however, have made a remarkable showing, averaging 50 permits, with a valuation of $75,000 per day. Beside this, one application for a permit for the Hotel Alexandria Annex, at an estimated cost of $1,000,000, and another for a permit for the Los Angeles Trust & Savings Bank Building, to cost $425,000, have been filed. When these are granted it will give the April record such a start that the month's business is certain to break the best previous record of $2,371,000, which was reached in June, 1906.

Morgan & Walls, architects for the I. W. Hellman Building, have awarded a contract to the Pioneer Building Company for additions and alterations costing $54,800.

William Fricke has awarded a $15,000 contract to the Empire Company for a fireproof brick warehouse at 783 Hemlock Street.

F. W. Braun has awarded a contract to R. W. Martin for a three-story and basement Class C brick building on Main Street near Seventh, to cost $21,950.

F. C. Finkle has plans drawn for a seven-story reinforced concrete hotel building to be erected at the southwest corner of Sixth and Flower Streets, at a cost of $75,000.

Harrison Albright, architect for the Consolidated Realty Company, has let a contract to Weymouth Crowell for three additional stories to be added to the company's reinforced concrete building at the corner of Sixth and Hill Streets. The cost of the addition is placed at $125,000.

Louisville, Ky.

The report which has been issued by Building Inspector Robert J. Tilford for the month of March shows 298 permits to have been issued in March, calling for an estimated outlay of $336,455, while in March last year 352 permits were issued calling for an outlay of $345,466.

The figures for the first three months of the current year show a very decided increase over the corresponding period of 1909, and according to Inspector Tilford this increase would have been far greater had a large permit been taken out in March which was issued early in April. The inspector takes a most optimistic view of the building situation, providing the labor disturbances do not extend further. He expresses the opinion that it is time for several large buildings to be put up in the city in order to meet the growing requirements of the business interests.

For the first quarter of the current year the value of the improvements for which permits were issued was $927,399, and for the first three months of last year $578,697.

Milwaukee, Wis.

Like the two preceding months of this year March falls behind its corresponding month of 1909, so far as building operations are concerned. The shrinkage, however, is neither marked nor significant. Last month there were 408 permits issued for new buildings, alterations and repairs to cost $957,619, while in the corresponding month of last year 469 permits were issued involving an outlay of $1,073,746.

Minneapolis, Minn.

The feeling among architects, builders and contractors just at the present time is that the city is in the midst of the greatest building activity in its history. According to the records in the office of Building Inspector James G. Houghton, 681 permits were issued in March for new buildings, alterations and repairs to cost $1,426,150. In March last year the record was 403 permits and the cost $752,320.

The largest previous March record was in 1905, when 569 permits were issued for improvements estimated to cost $854,560.

For the first quarter of the year the building permits issued numbered 1,075, calling for an expenditure of $2,514,535. These figures compare with 799 permits and an expenditure of $1,430,905 in the first three months of last year. Should this rate of building activity continue it is estimated that the total for the year will approximate $16,000,000, which would be a new record for the city.

The Master Builders' Association held its annual meeting the last week in March, at which reports of officials for the year were presented showing the organization to be in an excellent condition. The officers elected were:

President....................James Leck.
Vice-President................J. L. Robinson.
Treasurer....................John Wunder.
Secretary....................Eugene Young.

The annual meeting was held at the conclusion of a luncheon at the café of the Builders' Exchange.

Articles of incorporation were recently filed by the Minneapolis Building Material Exchange. The incorporators included Lewis M. Glass, T. F. Smith, R. N. Bruer, H. G. Foote and others in the retail lumber business. The purpose of the organization is to formulate more uniform terms of credit and sales and to eliminate if possible some of the abuses which have made trouble for the dealers in building materials for some time past.

Minot, N. D.

The members of the Builders and Traders' Exchange held their annual meeting early in March, when one of the subjects for consideration was the entertainment of delegates attending the State Association of Exchanges. Several new members were admitted to the organization and officers were elected for the ensuing year as follows:

President....................D. A. Dinnie.
First Vice-President..........W. A. R. Foster.
Second Vice-President........Eugene Teusch.
Treasurer....................J. A. Roell.
Secretary....................H. C. Ells.

Directors were also elected for periods of one, two and three years.

Newark, N. J.

A decided increase in activity is shown by the March figures of Superintendent of Buildings Wm. P. O'Rourke, as compared with March last year, the excess being something more than half a million dollars. The records which have been compiled show that 325 permits were issued in March for improvements estimated to cost $1,793,501, while in March last year 256 permits were issued by the Department for building improvements to cost $1,278,025.

A clear indication of what the coming season promises is the permits which were issued the last four days of March and the first two days of April, when 92 were issued for building work estimated to cost $355,438. A majority of these permits were for dwelling houses.

As the month of April opens evidence of continued activity is found in the plans which are being filed with the Building Department for several costly office and factory structures, prominent among which may be mentioned the $700,000 skyscraper to be erected at Beaver and Clinton Streets, and which when completed will be the tallest in the city.

New Haven, Conn.

Building operations continue about on a par with this time last year, the only noticeable feature being that while the number of permits issued for the first three months of 1910 exceeds the number for the corresponding period last year, the value of the improvements for which permits were issued in 1909 is slightly greater than that of 1910. This is explained by the fact that permits for a number of public buildings and other large edifices were issued last year.

According to the figures available there were 126 permits issued in March for building improvements involving an estimated outlay of $350,034, while in March last year 207 permits were issued for new work to cost $364,805.

For the first three months of the current year there were 229 permits issued for building improvements to cost $623,096, and in the corresponding three months of last year 207 permits were taken out for improvements estimated to cost $650,117.

New York City

While the estimated cost of the building improvements for which permits were issued last month in the three principal boroughs of Greater New York was in excess of that for February—the gain being very nearly 50 per cent—there is shown an appreciable falling off when the figures are contrasted with March a year ago. The principal decrease was in the Borough of Manhattan and traceable to the reduction in the number of tenement houses planned, the shrinkage in this class of building being something over seven millions for the month. In considering the figures for March, however, it must be remembered that at this time last year a phenomenal record was being established growing out of the agitation over the building code revision, which resulted in a great rush of builders to file plans before the proposed new code should go into effect.

Last month permits were issued in the Borough of Manhattan for 107 buildings to cost $13,324,270, as against 132 permits for buildings to cost $18,437,100 in March last year. In Brooklyn permits were issued for 783 buildings to cost $5,210,930, against 929 to cost $4,699,820 in March, 1909. In the Bronx 225 buildings were projected last month to cost $4,803,450, while in the same month last year permits were issued for 293 buildings to cost $4,089,050.

Omaha, Neb.

A significant feature of the building situation is that more permits were issued in March this year than in any month in 1909. Indications point to great activity in the erection of homes and flats, although business structures will by no means be negelected. Last month there were 211 permits issued for new work involving an estimated outlay of $500,943, while in March last year 149 permits were issued for building improvements involving an estimated outlay of $611,245, but in this was included the $300,000 addition to St. Joseph's Hospital.

Philadelphia, Pa.

Notwithstanding labor troubles, in the nature of sympathetic strikes, which affected the trade during the greater part of March, the volume of new work was rather startling. From the statistics of the Bureau of Building Inspection it is noted that 875 permits for 2,361 operations were issued, the total estimated value of which was $5,343,270, which amount has been exceeded but twice before in that month in the history of the bureau—in 1903 and 1905—when work amounting to $9,624,875 and $6,147,750, respectively, was authorized. Compared with the same month last year, March shows a gain of $1,350,000 in estimated value of the work undertaken.

Statistics covering the first quarter of 1910—even though extremely unfavorable weather conditions prevailed during the early portion and labor troubles interfered during the latter portion—show a total materially in excess of that for the same period last year. There were 3,630 operations authorized, costing $7,676,145, as compared with 3,772 operations at an estimated cost of $9,520,120 during the quarter just closed.

The heavy increase during the past month was largely due to the boom in dwelling house operations, particularly those of the two-story type, which became quite active toward the close of the month after the various labor disturbances had subsided. Ideal weather conditions for building work were also a factor and a large amount of operation work which had been delayed somewhat was started.

E. Allen Wilson, architect, is engaged on plans for a four-story brick apartment house, 48 x 135 ft., to be erected in Germantown, at an estimated cost of $60,000. The same architect has plans in preparation for two three-story flat houses to be erected at Fifty-second and Regent Streets; each building will measure 160 x 62 feet, and contain all modern improvements. Plans were also recently completed for eighteen two-story houses to be built at Sixty-third and Jefferson Streets, for J. N. McGarvey; these will be porch fronts and measure 16 x 53 ft. on the ground plan.

The Philadelphia & Reading Railway has let a contract to Irwin & Leighton, contractors, for its new station to be built at Ninth Street and Columbia Avenue, in this city. The approximate cost is $190,000. The same company will take bids until April 26 for the erection of an office building at Ninth and Green Streets, particulars regarding which may be obtained from the chief engineer, Reading Terminal Building.

The Girard Estate is considering the erection of 80 new dwellings, from preliminary plans of John T. Windrim, at Nineteenth and Shunk Streets. A varied style of architecture is suggested.

Wilson, Harris & Richards have been appointed consulting architects for the erection of a large group of manufacturing buildings to be erected for the General Electric Company at Erie, Pa., requiring an expenditure of over $10,000,000. Some fifty buildings are to be erected of concrete, steel and brick, occupying a plot of ground nearly a mile square.

A. M. Zane, builder, is understood to be having plans prepared for 171 two-story houses and 11 stores and dwellings, which it is proposed to erect in the vicinity of Twenty-third and Somerset Streets.

Pittsburg, Pa.

Weather conditions had considerable bearing upon projected building improvements in the city last month, and the showing is a most creditable one. There were 357 permits issued for improvements calling for an estimated outlay of $853,052, while in March last year, when the weather was much more favorable, there were 408 permits granted calling for a total estimated outlay of $1,051,538. Included in this total was the permit for the Jenkins Building, costing $150,000.

Of last month's permits 163 were for new buildings to cost $677,026, and of these new buildings 57 were brick, 53 frame, 48 brick veneered, 3 ironclad, 1 stone and 1 plaster.

In March, 1908, 369 permits were taken out for building operations to cost $567,830.

Portland, Ore.

All indications point to continued activity in the building line this summer, as architects and contractors state that they have all the work they can conveniently handle at present, while many of the contractors are already experiencing more or less trouble in securing first-class mechanics. Considerable heavy construction, including several large first-class office buildings, is in prospect, and actual work is expected to be commenced before the first of July.

The records of the building inspector's office show that last month 646 permits were issued, representing building improvements valued at $1,442,535, as against 449 permits for new buildings to cost $885,585 in March last year. Although there were permits issued last month for several substantial business structures and warehouses the bulk of the permits was for residences. Handsome bungalows and cottages are springing up like magic, and every residence section of the city is witnessing a constantly-increasing degree of activity.

Providence, R. I.

The amount of new work projected in the building line during the month of March, as well as for the first three months of the present year, exceeds all records for corresponding periods. The figures compiled in the Building Department show that 225 permits were issued in March and 418 for the first quarter of the year, while in the corresponding periods a year ago the figures were 185 and 297, respectively.

The significant feature is that the larger number of the permits granted were for new construction rather than for alterations or repairs. The foreign element seems to be the most aggressive builders, and while the dwellings erected are usually of a rather severely plain type of architecture, they probably last just as long as the more ornamental ones.

San Francisco, Cal.

Although building shows some increase in activity since the advent of fine weather, the improvement has not been so pronounced as many expected. The total value of the permits issued in this city during March was $1,830,000, or an increase of about $200,000 over the month preceding. The most noticeable activity is in the down-town section, where the movement to replace the old frame buildings which went up immediately after the big fire is still under way. As an indication of the character of the construction work now under way it may be noted that the volume of brick and stone construction recently contracted for is almost twice as large as for frame construction. The aggregate of contracts for the month amounted to $2,381,909, of which $1,484,875 was for brick and $882,069 for frame, the remainder being for alterations.

A recent act of the Board of Supervisors, though its ultimate wisdom may be questioned, is likely to stimulate early rebuilding of certain sections, as it permits apartment houses and tenements to cover 80 per cent of the area of the lot instead of 70 per cent, as permitted under the old law. This is intended to encourage the rebuilding of certain sections of the city where the small size of the lots and the restrictions of the fire limits have prevented much work being done.

The situation in building materials continues to favor buyers. Lumber is low in price, and though quoted at former figures is in reality being sold at concessions to move large lots. Brick are still plentiful and rather irregular in price. Pressed brick are weaker, and may be lower within a few days. Some of the local mills are offering structural steel at lower figures, though not much business is being done. Building stone is unchanged.

Among the buildings planned for early construction are: A seven-story Class B hotel for the University of California, to cost approximately $400,000, for which plans have been drawn by C. H. Barrett; three additional stories to the Buckley Building at the corner of Market and Spear

Streets; the Knights of Columbus Hall and club building, at Golden Gate Avenue near Jones Street; a Class A building to cost $150,000, plans by Smith O'Brien; a Class A hotel building on Sixth Street near Market to cost $100,000, by Morris Brown; the Monotti & Larimer Building on Battery and Merchant Streets, for which contracts aggregating $60,000 have already been let; the six-story and basement building for the William Ede Company on Market Street near Seventh, for which some of the contracts have already been let, William Knowles, architect; the new theater building of the William Morris Company, Western, to cost $210,000, on which work has already been commenced; a Class C five-story apartment house for Mrs. Ella H. Arnold, at the corner of Van Ness and Willow Avenues, to cost $90,000; two buildings to cost $225,000 by the Diamond Estate Company on Fourth and on Mission Streets, and the First Baptist Church building at Waller and Octavia Streets, to cost $60,000.

Seattle, Wash.

The report of Francis W. Grant, superintendent of buildings, covering the month of March, shows building operations to have fallen below the corresponding month of last year, not only in the number of structures for which permits were issued but also in their estimated cost. The report indicates that 1,241 permits were issued for improvements, involving an estimated outlay of $1,475,895, while in the same month of 1909 there were 1,530 permits taken out for new buildings to cost $2,562,075.

Of the total for March, 285 permits were for frame dwellings costing $392,180, while 264 were for frame buildings intended for business purposes and costing $192,115. Another important item in the classification is found in flats and apartments, for ten of which permits were issued to cost $102,700.

There were six permits for brick buildings to cost $401,000, and two permits for reinforced concrete buildings to cost $82,000. There was also a fireproof steel frame structure planned to cost $100,000.

For the first three months of this year there were 3,112 permits issued for building improvements to cost $4,104,285, while in the corresponding period of last year 2,470 permits were issued involving an estimated outlay of $5,786,695.

St. Paul, Minn.

Building permits for the month of March call for an outlay of $881,651, which is an increase over the same month last year of $108,653. Dwelling houses figure very largely in the improvements which are now under way, and indications point to a considerable amount of work along this line during the late spring and summer.

The permits for January called for an outlay of $354,592, and for February of $543,706, which, with the total for March, makes the showing for the first quarter of the year $1,779,949.

Tacoma, Wash.

According to the report of Building Inspector George Trust building operations in the city of Tacoma during March were on a vastly increased scale as compared with February, and make a highly creditable showing when compared with the corresponding month of last year. There were 315 permits issued for building improvements estimated to cost $329,871, while in March last year 216 permits were taken out for new work valued at $295,132.

Of the 315 permits issued three were for brick structures to cost $100,000, while 123 were for frame residences to cost $154,775. There were four mills and factories to cost $30,200.

Washington, D. C.

According to the report of Building Inspector Morris Hackett there were 557 permits issued in March for building improvements involving an estimated outlay of $877,041. These permits included 85 brick dwellings costing $275,650, and 42 frame dwellings involving an estimated outlay of $90,000. There were also 4 brick apartments to cost $135,000 and 11 brick stores to cost $25,800.

Youngstown, Ohio

The members of the Youngstown Builders Exchange held their sixth annual banquet at the Tod House on the evening of Thursday, March 31, covers being laid for more than 150. Among the guests were representatives of other cities, including Sharon, Cleveland and Pittsburg.

The address of welcome was delivered by Louis Heller, one of the most active members of the Exchange, and in the course of his remarks he spoke of the fraternal spirit among the members of the local body, brought about principally by organization. He told of the Exchange providing rooms where builders assemble and learn to understand one another better; he paid a tribute to the energy displayed by the people of the city, and particularly those who guide its business interests.

He introduced as the first speaker of the evening E. A. Wales, of Sharon, who responded to the toast "Aims and Objects of the Builders' Exchanges." At the very outset the speaker stated that the builders' exchanges of the country stand as mediators between organized labor and trade organizations on one side and the unorganized public on the other, rendering fair and impartial treatment, particularly protecting the interests of the public. He pointed out that fairness in catering to public needs often proved a stepping stone to many in acquiring a home. In his opinion wages paid skilled labor and numerous other causes have resulted in the high cost of building, especially in recent years. He declared that all too frequently skilled mechanics in the building trades do not give their best efforts to employers, and that this must be considered in figuring upon contracts.

The next speaker was City Solicitor David G. Jenkins, who spoke on "Builders of Youngstown." He likened the city to an ordinary building and business block or dwelling, and stated that citizens in promoting a greater Youngstown should follow builders' rules and precepts. He pointed out that, first, adaptability of the site should be considered, then the plans must be drawn, also a system introduced insuring competent workmanship. He thought that Youngstown people had been going ahead for years building up a great city without a plan. He suggested greater care in the future, advocated more paved streets and the giving of contracts to competent men, spoke for better sanitation and cleaner streets, and suggested that if all citizens give their properties the care they should there would be a daily cleaning up instead of an annual one.

John L. Dalzell, in a clever address, replete with wit and pleasing references to the fair sex, responded to the toast "Our Ladies." Rev. S. R. Frazier closed the speechmaking by responding to the toast "Building in its Broadest Sense."

LAW IN THE BUILDING TRADES

By A. L. H. Street

SKILL REQUIRED OF CONTRACTORS

An agreement to construct a building in a "good, workmanlike manner" requires construction with fair average skill, and not with the highest skill known to the building trade. In law, "workmanlike" means worthy of a skillful workman, well executed; and "skillful" means an ability in a specified direction, experienced, practiced. (Oregon Supreme Court, Holand *vs.* Rhodes, 106 Pacific Reporter 779.)

IMPLIED AUTHORITY OF CONTRACTOR

A building contractor has implied authority to bind the property improved in procuring the labor and materials necessary to carry out the contract. (Iowa Supreme Court, A. E. Shorthill *vs.* Aetna Indemnity Company, 124 Northwestern Reporter 613.)

NECESSITY FOR WRITTEN ORDERS FOR EXTRAS.

Though a building contract provided for the allowance of extras only when authorized in writing, the contractor could recover for extras not so ordered, where pending performance, the plans and specifications were modified so as to require such extras. (New York Supreme Court, Appellate Division, First Department, Hedden Construction Company *vs.* Rossiter Realty Company, 121 New York Supplement 64.)

RIGHT OF ARCHITECT TO RECOVER FOR SERVICES.

Under a contract to furnish plans for building improvements not to cost more than $20,000, an architect could not recover for his services, where the bids for the construction so far exceeded $20,000 that the improvement was abandoned and another building was bought and altered under other plans. (Connecticut Supreme Court of Errors, Cooper *vs.* Derby, 75 Atlantic Reporter 140.)

DUTY OF LESSOR OF HOD ELEVATOR.

Where a hod elevator was safe when installed and inspected, the lessor thereof was under no obligation to the lessee's employees to keep it in repair. (New York Supreme Court, Appellate Division, First Department, Haigh *vs.* Edelmeyer & Morgan Hod Elevator Company, 121 New York Supplement 132.)

RIGHT TO RECOVER ON BUILDING CONTRACT

A building contractor who has intentionally violated his agreement is not entitled to recover any balance due under the agreement or for extras, even though the owner of the building has sustained no loss through the contractor breaking his contract. (Washington Supreme Court, 107 Pacific Reporter 184.)

New Publications.

Representative Cement Houses. By Various Architects. 128 pages. Size, 6¼ x 9¼ in. Profusely illustrated by means of half-tone engravings. Bound in illuminated paper covers. Published by Universal Portland Cement Company. Price, 50 cents.

This exceedingly attractive little work is a timely contribution to the literature of cement house construction, showing as it does a striking array of modern dwellings in the building of which cement is the conspicuous material. In the descriptive text the term "cement houses" is much more frequently used than the expression "concrete houses," although it is pointed out either term might properly be applied. The object of the work is to indicate by illustrations and descriptions one of the newer but very rapidly expanding fields of the application of cement, namely, in residence construction. It is only within comparatively recent years that any serious attention has been paid by architects, engineers and builders to the advantages offered by cement in this phase of building. The things which have brought cement houses quite prominently before the home builder are the popular demand for a fireproof home and the desire for a building material at once economical, sanitary and indestructible—warm in winter, cool in summer—and one adaptable to practically every style of architecture. Concrete is equally suitable for the construction of a workingman's cottage, a suburbanite's bungalow, or a millionaire's mansion.

In the little work under review the cement houses are divided into five classes, the first embracing the various form of reinforced concrete dwellings, including the monolithic type—those with solid concrete walls and those with hollow walls.

The second class includes the cement block or hollow tile structures with a coat of cement plaster on the exterior.

The third class comprises the plain cement block or tile structure with no exterior coating of plaster.

In the fourth class are included those having a frame structure of wood with an overcoating of cement plaster.

The fifth class consists of what may be described as cement brick houses, the bricks being made in machines in quantities ranging from four to several hundred at a time.

Following these classes are brief chapters on "Cement" and the "Home Interior," illustrated by half-tone engravings, and the "Cement Exterior," showing by half-tones the appearance of various concrete surfaces.

The descriptive text covers salient features of construction and in many cases in connection therewith are figures of cost.

Death of Robert Christie

In the death of Robert Christie, Jr., which occurred on March 29, New York City lost one of its prominent builders, he having been actively engaged in the business with his father for more than 24 years, and for the past 10 years a member of the firm operating under the title of Robert Christie & Son.

Mr. Christie was born in New York City, June 28, 1866, and at the age of 20 took up the building business as his chosen calling. Early in his career he became a member of the General Society of Mechanics and Tradesmen, serving actively for 19 years on the school committee, being its chairman for nine years and its secretary for three years. Prior to becoming a member of the society he was a student in architectural drafting at the society's school, then located in East Sixteenth street between Fifth avenue and Broadway.

He was also a member of the Building Trades Employers' Association and for many years a member of the Master Carpenters' Association, being secretary of the latter organization since 1905.

The funeral services were held at his late residence, 144 West Ninety-second street, New York City, on the evening of Thursday, March 31. The organizations with which he had been associated were largely represented, as were the building interests of the city.

Robert Fulton Memorial

In the Robert Fulton Memorial Competition, which calls for the erection of a $2,500,000 memorial on Riverside Drive between 114th and 116th streets, New York City, the first prize of $3,000 was awarded to H. Van Buren Magonigle, an architect of the city named. The four other prizes were awarded as follows: Second prize $2,000, to Robert P. Bellows, Boston, Mass.; third prize $1,500, to Albert Kelsey, Paul P. Cret and Louis E. Jallade, of Philadelphia, collaborating; fourth prize $1,000, to Charles P. Huntington, of New York, and fifth prize $500, to Heacock & Hokanson, of Philadelphia, Pa. The five prizes were selected from the best ten drawings in the original competition, which included 63 entrants. The ten chosen including the prize winners received $500.

The jury which made the awards included Robert Fulton Cutting, Isaac Guggenheim, W. H. Fletcher, Walter Scott and the following architects: George B. Post, Thomas Hastings, William R. Mead and John Russell Pope. Lansing C. Holden was architectural adviser.

The Fulton memorial is intended to serve as a watergate where visitors to the city and nation will be received. It will also include a tomb for Robert Fulton, a building for the reception of visitors and another as a museum for portraits and for historic subjects connected with navigation. The prize plans call for the use of marble and granite and an impressive stairway will lead to the monument proper, while a colonnade will separate the two buildings.

Razing a Steel Frame Building

An interesting building operation which is soon to be commenced at the northwest corner of Nassau and Wall streets, Borough of Manhattan, N. Y., will involve the razing of the 19-story steel-frame Gillender Building, work upon which will commence on the first of May. It is estimated that there are more than 1000 tons of structural steel in the building, but that in its demolition a record will be established, as this is without doubt the highest building in the world to be taken down for the purpose of erecting another tall structure on the site. The work of wrecking this 19-story building, which less than 12 years ago cost $500,000 to build, is in the hands of Volk & McGinness.

The new building will be about 500 ft. high, making it by far the tallest structure in the Wall street section. It will have 37 stories and is estimated to cost four million dollars. It will occupy not only the site of the present Gillender Building, but also of the Stevens Building adjoining on Wall street.

A NOTABLE FEATURE of one of the new apartment houses under erection on Washington Heights, New York City, is its entrance court open to the sky, which is built of limestone on the first story and decorated with Moravian and faience tiles. The upper portion of the court is of white enameled brick. The entrance to the building is through this court and the entrance passage is decorated in faience tiles, the main feature being a pictorial frieze.

Cleaning Brick Fronts

An expert in the sand blasting trade who has operated on many buildings, on being asked as to the efficiency of the sand blast upon soiled brickwork, said that he could not advise it except when the brick were extremely hard. When used against stone the blast does not remove the original face of the brick, he said, "only the grime." That is the aim of the skillful operator. But in the case of brick not extremely hard the result might be different.

You can imagine that the great force with which sharp sand can be driven through a fine nozzle is very great. If permitted it would actually cut a stone in two in time. In the case of granite, marble and cut stone the skillful operator preserves the original face of the block, but he cannot guarantee to do so with respect to all sorts of front brick. I would advise cleaning front brick with acid instead of sand blasting. The same opinion seems to be held abroad. The cleaning of brick fronts was the interesting subject of a paper recently read before the German Association of Brick and Terra Cotta Manufacturers. The author protested against the use of sand blast or other method by which the original face of the brick would be taken away, saying:

"When the blast is used, and the face of the brick taken off, the cleared front will show a good appearance only for a short time, as the brick with the original face removed will be very much more porous than before, and absorb dirt more readily. The use of steel brushes is also very bad, and will not give a first class job.

"The best method is cleaning the brick fronts with a solution of muriatic acid. The strength of the solution can be made to 1 in 12. When this solution is too strong for the brick acetic acid should be used. A good soap solution will, as a rule, take off all thick dirt, and the cleaning with acid solution can then be done easily."

A Bungalow on Stilts

One of the most novel summer residences to be found in any section of the country is undoubtedly the bungalow which is to be built at Great River, Long Island, for Harry deB. Barnes. It is described as a "Skyscraper Bungalow" and will rest on four hollow-steel piles, which will perch the bungalow 45 ft. above the level of the water. The top platform will be 25 ft. square and entrance will be by means of a spiral stairway, having a gateway that can be closed at will by anyone in the bungalow.

Mr. Barnes is of the opinion that by perching his bungalow at a considerable altitude he will avoid the hot strata of air that is always to be found near the surface during the summer. It will also enable him to secure a fine view of the surrounding country and at the same time overlook the estates of his wealthy neighbors having country houses in that vicinity. The architect who has worked at the scheme and for which much of the credit is due is W. H. Buckout, of Hackensack, N. J.

Sound Proof Wall of Terra Cotta Blocks and Mineral Wool

The "sound-killing wall," between 50 and 54 East Fifty-ninth street, which was built to protect the ears of the occupants of No. 54, has proved to be a success. The plans for the wall are the only plans for this type of construction ever filed with the New York City Building Department. They have been the object of great interest to the city's architects and builders, and it is thought that this "anti-noise" device may be adopted in other cities.

The second and third floors of No. 50 contain large printing presses. The upper floors of No. 54 are occupied by apartments. The roar of the printing machinery proved so disturbing to the flat-dwellers that they appealed to their landlord for relief.

The landlord called upon an architect, and the architect designed the wall. It is made of hollow terra cotta blocks stuffed with mineral wool. The blocks are of the kind used in fireproof floors and partitions. They have been known as good absorbers of sound waves, but this is the first test of them purely for that purpose. The mineral wool, in the hollow spaces, serves as a muffler. The wall also keeps the odor of printers' ink out of the apartments in No. 54.

Slate was used in England centuries ago. In 1314, says the Genuine Bangor Slate Company, in its little publication, *Hand Shake,* King Edward II. issued an order to replace the shingle roof of several government buildings with slate.

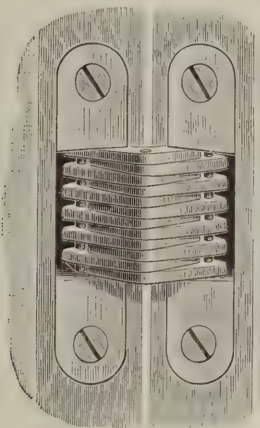
The contract for the erection of the 12-story reinforced concrete warehouse 175 x 110 ft. in size, for the Robert Gair Company, Washington street, Brooklyn, N. Y., has been awarded the Turner Construction Company, 11 Broadway, New York City. The architect of the new building is William Higginson, of 13 Park Row, New York City, who is also the architect for the model factories 5 and 6 for the Bush Terminal Company, South Brooklyn, N. Y. These buildings are to be of reinforced concrete, each 700 ft. long by 75 ft. wide, six stories high, and have a connecting wing of the same hight, 250 x 100 ft. in plan. The total floor area in these factories is said to be 18 acres. The Turner Construction Company has the contract for their erection.

CONTENTS.

NOVELTIES.

The Soss Invisible Hinge

The Soss Manufacturing Company, 245 Broadway, New York City, is introducing to the attention of architects, builders, contractors and house owners generally an invisible hinge for which strong claims are made. A view of one of these hinges as it appears when the door is open is presented in Fig. 1 of the engravings. The hinge is very strong, being made of a composition metal that is frictionless and will stand as much rough usage as the old-fashioned hinge. The claim is made that the No. 116 Invisible hinge will carry a door from 1⅜ to 2½ in. in thickness, but if the door is heavy three hinges should be used. The company furnishes a template for use in laying out the mortises, so that the hinges will fit perfectly when applied. The point is made that any carpenter can hang a door just as easily and quickly as with a common butt. The hinge is provided with roller bearings and works smoothly and with entire satisfaction. The illustration which we present herewith represents hinge No. 112, full size. The



Novelties. Fig. 1.—The Soss Invisible Hinge.

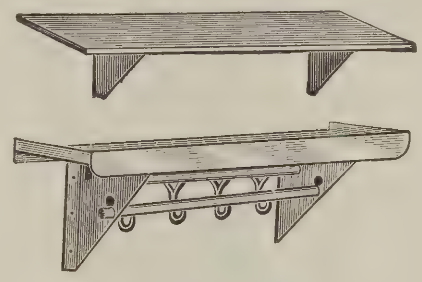
hinge can be seen only when the door on which it is applied is open, as there is no projecting metal on either side of the door. It is applied to the same part of the door and jamb as the ordinary butt and requires no special arrangement of the work. Where a number of pairs of hinges are to be used much of the mortising may be done by machine, but where it is all done by hand the hinges can be mounted, it is claimed, in less time than it takes to set the ordinary butt. The hinges are adapted for wide application, but will be found especially adapted for panel work, lockers, closets, partition doors, cabinets, bookcases, wardrobes, folding tables, china closets, ladies' writing desks, caskets, etc.

Enameled Metal Shelves

The Dahl Manufacturing Company, 154 Fifth avenue, New York City, is introducing to the attention of architects, builders and house owners generally a line of enameled metal shelves with folding brackets for which many claims are made. It is pointed out in the first place that the shelf has the strength and durability of iron, is fireproof and neat in appearance; that it costs less than any shelf that can be made of wood and put up by a mechanic and is especially adapted by reason of its economy and appearance for newly built houses. Its construction is such that it can be screwed into studs in any part of the wall. Fig. 2 of the illustrations shows one of the plain shelves in position fastened with nickel-plated screws, and in Fig. 3 is a style of shelf provided with a rod and hooks, while the edge is upturned slightly, preventing any articles which may be placed thereon from slipping or falling off. The rod in front is intended to hang towels on, while the hooks on the rod behind are for holding toilet articles, shaving and tooth brush mugs, drinking cups, sponges and bath room or kitchen accessories of any kind, as the case may be. The goods are finished in white enamel or sheet metal baked in an oven and the claim is made that they will not rust. Each shelf is packed separately in a heavy paper bag.

A New Lock Mortiser

The latest candidate for popular favor in the way of a lock mortiser is the device which is being introduced to the trade by the Sax-Nicholls-Cohn Company, Fairfield, Iowa, and the method of using, which is illustrated in Fig. 4 of the engravings. The clamps to hold the mortiser in position are referred to as a special feature, they being very wide, thereby rendering it impossible for the door to split while the mortise is being made. They are lined on the inside with felt, so as to prevent their marring or scratching the finest finish door. The point is made that the device will mortise veneered, hard, soft, cross-grained or end wood with very slight exertion. With each machine is furnished three sizes of fiber bushings which are used as bit-guides and prevent injuring or dulling of bits —a feature which cannot fail to be appreciated by those having work of the kind indicated to do. The entire ma-



Figs. 2 and 3.—Enameled Metal Shelves.

chine is made of malleable iron, the construction being very simple, consisting as it does of a screw-clamp having two metal guide rods on which slides a bushing. In order to operate the machine it is simply necessary to place a bit of the proper size for the width of mortise into this bushing, which holds the bit square with the work and true to the gauge lines. The mortiser weighs only 3½ lb., is very compact and occupies but little room in the carpenter's tool chest. It is always ready for instant use and is so easily understood, it is claimed, that even an apprentice can operate it. The construction is such as to render the mortiser very durable, and an illustrated catalogue concerning its various merits will be sent to any carpenter or builder upon application.

Waterproofing by the "Positive Seal" Method

Under the above title the Barber Asphalt Paving Company, Philadelphia, Pa., has issued a very interesting publication telling how to render concrete, brick or masonry impervious to water. For many years the company has furnished high-grade asphaltum for waterproofing purposes, and for the convenience of those interested these products have now been classified and fully described un-

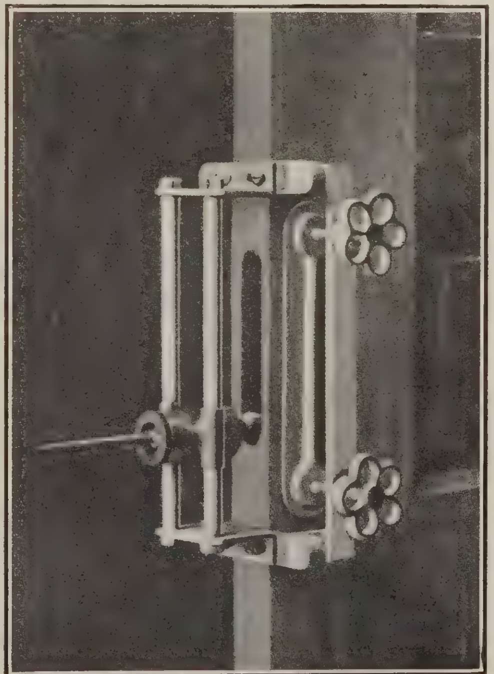
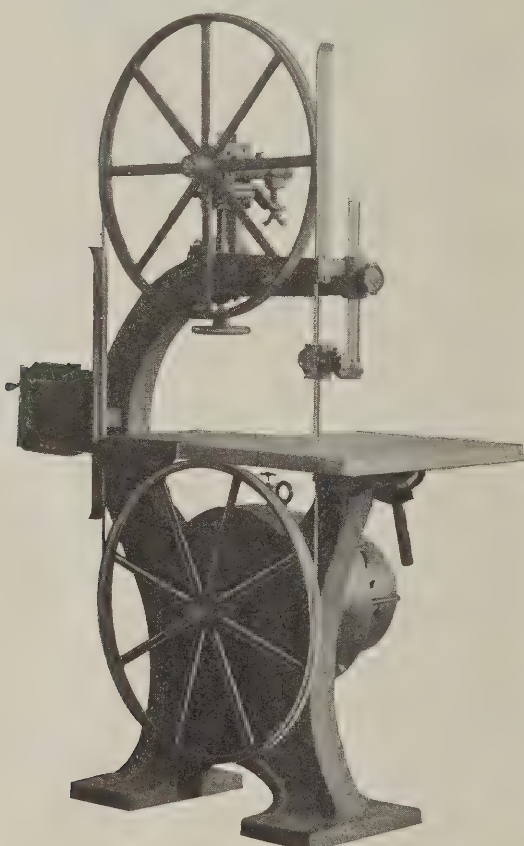


Fig. 4.—A New Lock Mortiser.

der the name "Positive Seal" in the pages of the booklet under review, with suggestions as to the methods of applying them to insure satisfactory results. A number of illustrations are given, showing a variety of typical designs of structures upon which Positive Seal products have been successfully used; the proper location of the waterproofing system is shown and the class of material indicated that is particularly adapted for such typical locations as appear in the designs. The point is made that before applying the bituminous waterproofing to concrete, brick or masonry, it is absolutely essential that the material to which it is to be applied would be perfectly dry and clean and that the weather should not be too cold. It is not possible to apply bituminous cement in cold weather, it is stated, with any assurance that a satisfactory piece of work will result. Another point is that too great care cannot be exercised in building the waterproofing course. The work should be entrusted only to skilled workmen under immediate direction of a specialist or experienced engineer. The cement should be melted at a point as near the work as possible and must not be overheated. It should be applied with cotton mops and the felt or fabric started at once immediately behind the mopper, unrolling it upon the cement as required. This, it is claimed, will prevent air bubbles under the felt and will insure putting the latter in place while the cement is hot and capable of forming a perfect bond. The thickness and nature of the waterproofing course will naturally depend upon the class of work under consideration. In the booklet specifications are given for the use of Positive Seal paint Nos. 1 and 2, also for Positive Seal liquid cement and for solid cement, etc. Much interesting information is given relative to the merits of this system of waterproofing and a copy of the booklet can be obtained by any architect or contractor making application for it.



Novelties—Crescent Motor-Driven Band Saws. Fig. 5.—A 32-In. Band-Saw with Direct-Connected, Direct-Current Motor.

Crescent Motor-Driven Band Saws

It is conceded by many at the present day that the simplest way of running a band saw with a motor is to set the motor on the floor back of the machine and connect by means of a belt. By using drive pulleys of proper size any speed of motor, it is pointed out, may be utilized. This method, it is pointed out, has the advantage of low cost, but the machines are not self-contained and at the same time they require considerable floor space. A very desirable and durable method is that in which the machine is mounted on a sub-base, the motor being mounted on the same base and connected to the machine direct with a coupling. This plan is suited, however, only for low-speed, direct-current motors. The outfit is self-contained, having heavy, broad contact to the floor, thus giving stability in running. Another form of construction is where the side of the band-saw frame is planed off and the motor bolted against it by a flange on the body of the motor. The motor shaft projects through the band-saw frame enough to receive the lower band-saw wheel, so that the armature shaft forms the lower shaft for the band saw and all in one piece requiring no coupling. The bearing of the motor projects into the frame of the machine, so as to support the shaft close to the wheel. This, it is pointed out, makes a very attractive outfit and has the advantage of being economical in first cost. The band saws which we illustrate herewith are motor-driven and are made by the Crescent Machine Company, Leetonia, Ohio. Fig. 5 of the illustrations shows a 32-in. band saw driven by direct-connected direct-current motor mounted on the side of the bracket. The table tilts to any angle up to 45 deg. and it has a quick-acting locking device, as well as an accurate scale to show the angle. The frame is cast in one piece and cored out hollow throughout. The upper shaft revolves in a bearing 1⅜ in. in diameter and 10½ in. long, while the lower bearing is of the same diameter and 14¼ in. long. Fig. 6 of the illustrations shows a 38-in. Crescent direct-current motor driven band saw with cover, the motor being mounted on a base and made an integral part of the machine. This picture illustrates the convenient manner in which the starting box is mounted, and the new way of enclosing the lower wheel. This arrangement not only keeps dust and dirt from getting into the wheel, but also prevents possible injury to the operator. This 38-in. machine is intended for those requiring a band saw unusually heavy and strong. The table tilts to any angle up to 45 deg. and the machine has a spring tension for the saw and a counterbalanced hexagon steel guide bar. In this case the upper shaft has a bearing 1⅝ in. in diameter and 13 in. long, while the lower bearing is of the same diameter and 17½ in. long. The belt shifter handle is on the front side of the machine.

Watson's Sheet Metal Products

The James H. Watson Company, Inc., Bradley, Ill., is distributing among its friends in the trade a series of catalogues relating to its sheet metal products, prominent among which mention may be made of what is known as "Perfect

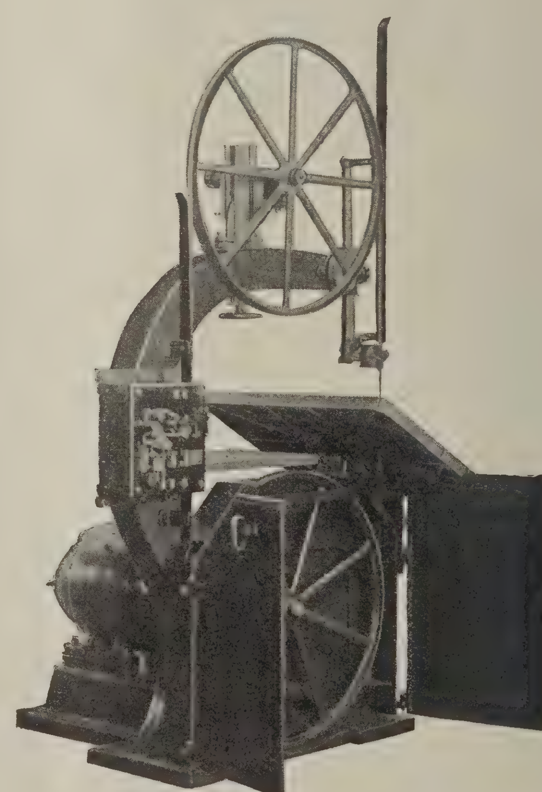


Fig. 6.—A 38-In. Saw with Motor Mounted on a Base as Part of the Machine.

Art" metal ceilings and siding. A profusion of designs of this class of work is contained in Catalogue No. 9, a 96-page publication measuring nearly 14 in. in width by 10½ in. in hight and bound in paper covers. This catalogue of metal ceiling and wall finish in classified designs is intended especially for architects, contractors and builders, as well as all others having occasion to make use of goods of this character. The early pages are given up to half-tone illustrations of interiors which has been ceiled with the company's product, after which are directions for applying metal ceilings. The body of the catalogue is given up to field plates of various styles of architecture, borders, wainscoting, wall plates, cornices, centers and combination ceiling designs. In the case of the latter each design occupies an entire page, thus permitting the artistic effects to be more fully presented. The makeup is exceedingly attractive and the catalogue will be found a valuable book of reference for the architect and builder. Accompanying the catalogue are two smaller ones covering in more condensed form the varied lines of sheet metal products turned out by the company. There is also a price list of "Perfect Art" metal ceilings and wall finish sold by the Buhl Sons Company, Detroit, Mich., who are exclusive distributors for that State.

Hollow Steel Fireproof Doors

In these progressive days every form of fire-resisting construction in connection with buildings, whether intended for business or dwelling purposes, is of special interest to architects, contractors and builders, and they are therefore likely to find much to command attention in the hollow metal construction in the way of doors, windows

Novelties. Fig. 7.—Hollow Steel Fireproof Doors.

and interior trim turned out by the American Metal Door Company, Bradford, Pa. In Fig. 7 of the illustrations we show one style of hollow fireproof door of Circassian walnut finish and used in the new National Museum at Washington, D. C. These doors are made of No. 18 gauge steel, all members being of hollow construction, with stiles and panels lined with asbestos paper. Each stile is made of a single piece and all of the door between the stiles consists of one panel subdivided by rails included between the stiles. The point is made that the doors have smooth sharp details, square corners and continuous smooth surfaces that offer the least wear, and as there is no place for dust to lodge they are readily cleaned. The finish of the doors is obtained by the baked enamel process. The company also turns out fireproof windows made of lock-seamed metal, with no soldered joints in the sash, sill or frame. It is claimed that heat contraction or expansion will not cause them to warp or buckle and the construction is such that the highly finished parts, such as the jambs, interior casings, stool and sash, can be applied after the building is erected, thereby preventing any part becoming marred or dented while the building is in process of construction. Another feature to which attention is invited is that no holes are required in the jambs for the insertion of weights, these being placed from the casing side before the casing is attached. This arrangement is claimed to prevent moisture from gathering in the window box and causing rust. All the company's doors and windows are fitted with patented glass mold, the glass being inserted without the use of putty, screws or filler. The hollow fireproof doors are referred to as being in no sense experimental, but have had their merits demonstrated by tests of long use in many of the larger buildings of the country. Among the recent contracts involving the use of these doors may be mentioned the Collinwood Memorial School, the Princeton Telephone Exchange and the Pope Building, of Cleveland, Ohio; the MacIntyre Office Building, Salt Lake City, Utah; the Traders' National Bank, Scranton, Pa., and the new National Museum at Washington.

Universal Woodworker No. 14

A feature of the equipment of every well-regulated woodworking shop, especially that of the carpenter-contractor who desires to produce a maximum of work with a minimum of machinery, is a Universal woodworker, by means of which he is enabled to perform a variety of operations on one machine. The Universal Woodworker No. 14, which has been placed upon the market by the Sidney Tool Company, Sidney, Ohio, and illustrated in Fig. 8 of the engravings, is claimed to embody twelve machines in one. As a 12-in. jointer the machine has tables 5 ft. over all, arranged so that stock can be jointed up to 12 in. wide without taking the gauges off the table. The tables can be moved back from the head sufficiently to put on any and all kinds of molding bits for doing special molding. The head is four-sided, two sides being slotted, and is so arranged that it can be taken off the arbor in case it is desirable to use special heads. The saw table has a raising and lowering saw arbor, which will accommodate saw blades up to 14 in. in diameter. The saw can be raised high enough in the table to accommodate ripping as thick as 4 in. and as wide as 14 in. The table is equipped with one miter cut-off gauge and one miter-ripping gauge. The claim is made that it is not necessary to remove the saw table to use any of the other attachments, although the saw table can be removed if desired in half a minute's time. The single spindle shaper furnished with the machine is a one-way spindle and not reversible. The head is adjustable up and down as well as the table. The company states that it has now made arrangements whereby it can furnish a reversible shaper by means of a friction disk lever extending out in front of the machine convenient to the operator, so that the spindle can be instantly reversed running in either direction, or can be instantly stopped. The boring machine on the Universal woodworker is arranged for lowering and raising to any desired hight for boring holes in different positions. The machine is also equipped with an extra boring spindle, which is arranged entirely independent of any other part

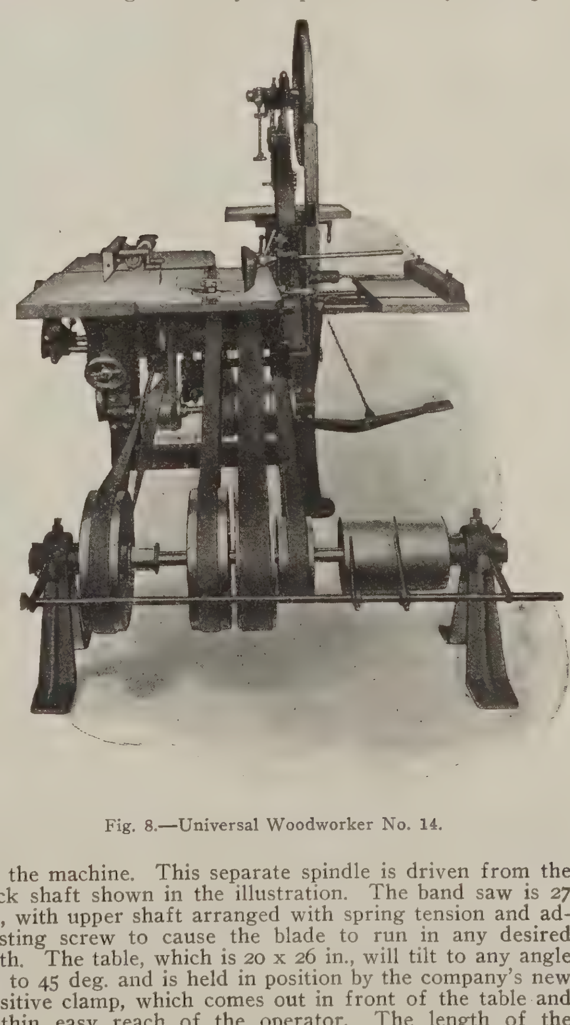


Fig. 8.—Universal Woodworker No. 14.

of the machine. This separate spindle is driven from the jack shaft shown in the illustration. The band saw is 27 in., with upper shaft arranged with spring tension and adjusting screw to cause the blade to run in any desired path. The table, which is 20 x 26 in., will tilt to any angle up to 45 deg. and is held in position by the company's new positive clamp, which comes out in front of the table and within easy reach of the operator. The length of the band saw blade is 13 ft. 6 in. The company also furnishes in connection with the machine a gauge to go on the shaper table and which is used in connection with the jointer table gauge when two-side molding or edging is desired. By this arrangement it is possible for the operator to do any kind of two-side edging, matching or molding. The company has issued a very attractive pamphlet illustrating and describing this Universal Woodworker, the half-tone illustrations showing in most cases the position of the operator when doing various kinds of work.

Diamond Flexible Metallic Weather Strip

A flexible metallic weather strip which is made entirely of a rustless and non-corrosive metal is that which is being introduced to the trade by the Diamond Metal Stamping Company, 115 Vine street, Columbus, Ohio, and the construction and application of which is shown in the accompanying engravings. The claim is made that the strip adjusts itself to all conditions of weather and will neither bind, warp nor stick. The company's top and bottom three-ply reinforced rigid strip is constructed from separate parts of metal securely joined together, thereby forming a very strong and durable combination. The strip can be applied

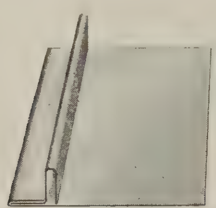


Fig. 9.

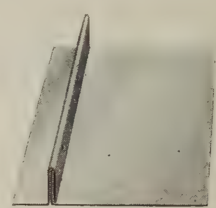


Fig. 10.

Novelties—Diamond Flexible Metallic Weather Strip. Fig. 9.—Strip Applied to Side Runway.
Fig. 10.—Top and Bottom Reinforced Rigid Strip.

to old as well as new buildings and is placed in the runway or slide in which the sash is raised and lowered. A fixed base strip is secured in the sash runway which supports a free interlocking sealing flange which extends into a groove in the sash and bears with a light-cushioned pressure against one side of the groove. The flexible type of strip, Fig. 9, is applied to the sides, while at the top and bottom is a rigid base strip, Fig. 10. This arrangement, it is claimed, requires much less rabbetting of sash than would otherwise be the case. In Fig. 9 the flexible strip as applied to the side runway is shown, while in Fig. 11 the flexible strip is shown installed with the rigid strip at the base. In Fig. 12 is a section of window frame showing the removal of the sash and flexible strip at the same time. The claim is made that the use of the flexible strip will stop the strong drafts of cold air at the windows in winter and heat in the summer time; that it keeps out dust and dirt and tends to nullify the many street noises so unpleasant to hear. Old windows as well as new ones can be equally well protected, it is claimed, by using the metallic weather stripping. The company is distributing circulars showing the construction and application of this weather

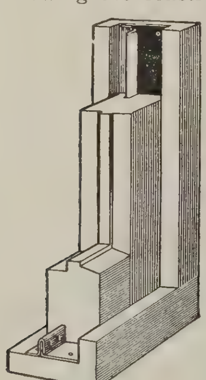


Fig. 11.—Appearance of the Flexible Strip as installed.

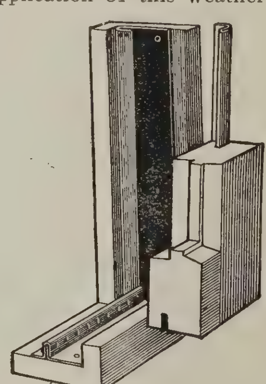


Fig. 12.—Showing Manner in which the Sash and Flexible Strip May Be Removed at the Same Time.

strip and copies of these, together with the very attractive catalogue illustrating and describing the strip in detail, will be sent to any architect, builder or contractor who may make application for them.

Construction of the American Thermostat

The American Regulator Company, 1011 Chestnut street, Philadelphia, Pa., points out that in the American Thermostat, which it is making, the caps on the top and bottom of the rubber tube or thermostatic element are perforated to allow the circulation of the room air within the tube and through it as well as contact on the outer surfaces. It is thus designed so that the instrument may not only give perfect response to temperature changes, but contribute to the preservation of its original shape and prevent any liability to warping, which would be fatal to a satisfactory operation. The thermostatic element is made of a hard rubber tube, which is said to have the highest co-efficient of expansion per degree Fahrenheit of any material suited to such a purpose. It is stated that as the instrument is designed to work at temperatures of not over 100 deg., the rubber tube will retain its expansive and contractive properties, and that with the expansion due to the temperatures below this figure, such properties of hard rubber are not destroyed. In the accompanying sectional cut, Fig. 13, the letter A represents the thermostatic element, B the adjusting screw, C the indicator hand, D the lever, E the heavy spring, F the exhaust port, G the inlet port, H the valve, J the passage conveying air at 15-lb. pressure, K the passage carrying the air to the diaphragm motor or valve, L the weaker spring, M the casing, and W the adjusting block. On the wall plate N, P is a pin shutting off the air supply when the thermostat is removed, and R and S are passages corresponding to J and K of the thermostat. A rubber gasket is used to form an air-tight joint between the wall plate and the thermostat. The operation of this instrument is described as follows: On a rising temperature A expands, causing D to lessen its pressure on H, and the

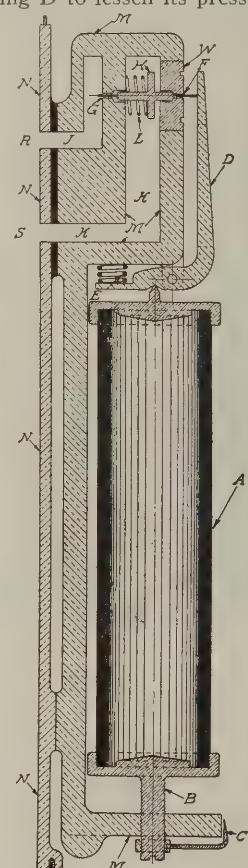


Fig. 13.—Showing Construction of the American Thermostat.

spring L seats H at F and opens G, and the air entering through G and not being able to escape at F passes through K to the valve or motor and closes it. On a falling temperature A contracts and causes H to seat at G and open at F and allows the air in K to escape, as the spring E is stronger than spring L and causes the lever D to shift the valve H when the contraction of A permits. Graduation or the intermediate position of the damper, assumed and maintained as long as there is no change in temperature, is produced by the balancing of the air pressure between the inlet port G and the exhaust port F, which balancing is maintained by the expansion of A and the tension of the two springs E and L. It is obvious that as H approaches F more air is admitted through G, and as H nears G, more air escapes through F, and according to the supply and escape of air is the position of the damper maintained. If just as much air escapes as enters, then the damper will stand half-way open, and, as the valve approaches one port or the other, so will the position of the damper be changed. The ports F and G are small, and just sufficient air is used as will change the damper from wide open to tight shut, while the element A is expanding or contracting through a range of 1½ deg. The adjusting block W regulates the movement of the valve H with relation to the expansion of the element A.

(For Trade Notes, see second page following.)

Trade Notes.

The Ullrich Improved Cement Construction Company, 720 First National Bank Building, Chicago, Ill., is sending out a folder illustrating and describing the "Blox-O-Brix" machine, designed for the manufacture and molding of cement blocks which simulate pressed brick. The claim is made that the machine will make up to 14 brick, all tuck pointed in one block.

W. H. Mullins Company, 208 Franklin street, Salem, Ohio, points out that Mullins fireproof, storm-proof and dust-proof windows are manufactured according to the latest specifications of the National Board of Fire Underwriters, and that every window is inspected, approved and labeled with their official label. The windows are of lock-seamed metal, with no soldered joints in the frame, sill or sash. The claim is made that they cannot warp or buckle, and are not affected by heat, expansion or contraction. The company has issued catalogues showing its various lines of product, and those of our readers who are interested in the fireproof windows should specify this particular class of work when making application for a catalogue.

The Eastern Granite Roofing Company, 19 Battery Place, New York City, refers to its granite roofing as being heavy, tough and reliable, and that it lasts long enough to be practical for both factories and railroad buildings, where it has been used for years with great success. It is referred to as a fire retardent, and of such a nature that anyone can lay it. The company will send a free sample to any architect, contractor or builder who may be sufficiently interested to make application for it.

Some idea of the extent to which cement tile roofing is being employed may be gathered from the statement that the American Cement Tile Manufacturing Company, Wampum, Pa., furnished the tile for roofing 17½ acres of buildings of the Pittsburg Plate Glass Company, at Crystal City, Mo., the approximate total weight of all the roofing being 6302 tons. The tile are ⅞ of an inch thick, made from clean, sharp sand, mixed in proper proportions with cement and other ingredients, to which is added a sufficient quantity of water to make good concrete. Each tile is reinforced near its under side by a sheet of expanded steel to take the tension stress. After being formed, the tiles are waterproofed and allowed to set nearly 30 days. When placed on a roof the tiles are interlocked, being simply laid on the steel work without in any way being fastened or cemented to it. The advantages of this type of roofing are said to be the economy and strength of the tiles, their resistance to wind and to destructive gases, as well as their resistance to fire.

Those builders and contractors giving special attention to farm buildings are likely to be interested in a book issued by the Lehigh Portland Cement Company, Indianapolis, Ind., under the title "The Modern Farmer." Within its attractive paper covers a vast amount of information is given relative to the construction of barn buildings, silos, fences, etc., the information in some instances partaking of the nature of specifications for the work.

Foster-Munger Company, Twentieth and Sangamon streets, Chicago, Ill., will mail free on application to any carpenter, contractor or builder a copy of its Wide Stile Front Door Book No. 107-H. This little work contains 56 pages of designs of front doors, painted and grained doors, oak veneered doors, store doors and fronts, also stair work, oriel front windows, artistic glazings, etc.

Cement Machinery Company, Jackson, Mich., directs attention in a large folder, which is being distributed among the trade to the Systematic Concrete Mixer, the merits of which are set forth at length, illustrations being given showing the appearance of it, together with that of other concrete machinery turned out by this concern.

"How to Build Fine Concrete Porches" is the title of an interesting pamphlet sent out with the compliments of the Simpson Cement Mold Company, Columbus, Ohio. The interesting feature is found in the descriptions presented by different builders of the manner in which they executed contracts involving the construction of concrete porches. The descriptions are in the nature of specifications, and illustrations are given showing the appearance of the work when it was completed. Naturally emphasis is laid upon the Simpson molds, by means of which a large number of designs may be produced adapted to any veranda, whether large, medium or small, and for houses of brick, wood, stone or concrete. The company issues another little work known as the Simpson Concrete Porch Book, which contains half-tone illustrations, not only of molds, blocks, columns, newels, balusters and other groups, but also of a large number of finished verandas, the engravings being made from photographs. This book, we understand, will be mailed free to cement users upon request with business stationery. Others should enclose 15 cents in stamps.

Hartmann-Sanders Company, Elston and Webster avenues, Chicago, Ill., and with Eastern office at 1123 Broadway, New York City, is distributing a booklet, carrying numerous illustrations of the pergola—a feature of many of the modest as well as the more pretentious country homes of the present day. Brief reference is made to the construction, which will be of special interest to the carpenter and builder, while numerous illustrations made directly from photographs, showing variations of design in connection with dwellings scattered over a wide area, will be of special interest to the architect. There is a short chapter on what vines to plant and why, and another dealing with the practical side of the pergola. There are also illustrations which are offered as suggestions for effective and beautiful garden decorations constructed of artificial stone.

The Ironton Portland Cement Company, Ironton, Ohio, calls attention to the fact that any reader making mention of this paper will receive on application a 100-page book compiled expressly to meet the requirements of the average workman, covering, as it does, more than 50 important subjects on cement and its uses in construction.

As the season opens builders are naturally interested in appliances designed to facilitate the execution of their work and they are therefore likely to find many features to command their attention in the several styles of derricks made by S. E. Parker, 1800 and 1802 North Francisco avenue, Chicago, Ill. The Parker patented derricks are made in three sizes, with capacities ranging from 800 lb. with a 6-ft. boom to 4000 lb. with 24-ft. boom. A catalogue which the maker has issued illustrates and describes not only these, but other styles of derricks, as well as hoists, cranes, trolleys, elevators, crabs, blocks, heaves, rope, etc.

Dexter Brothers Company, 105 and 107 Broad street, Boston, Mass., set forth the merits of "Petrifax," which they state is "not a paint, but a damp-proof preparation," in a booklet, which can be had on application by any architect or builder who may be interested. Petrifax, it is stated, is ordinarily used for under coats on cement, brick, plaster, stone, wood, etc. It is white in color and is said to dry perfectly flat in about an hour, although the company advises 24 hours between coats. Petrifax has been used with success on brick and concrete walls to keep out dampness, and the company recommends it for that purpose. It may be tinted by the addition of color ground in japan in the usual manner. Oil colors, it is pointed out, should not be used, as Petrifax contains no oil. Petrifax enamel used for a finishing coat over Petrifax first coating is also referred to as well as Petrifax cement stains.

The Bostrom-Brady Manufacturing Company, Atlanta, Ga., and St. Louis, Mo., reports that sales during March materially exceeded those of any other month since its farm and builders' levels were placed on the market.

Some very interesting facts concerning Clinton wire lath for use in connection with both plain and ornamental plaster work are found in a 20-page booklet distributed by the Clinton Wire Cloth Co., Clinton, Mass. Reference is made to the strength and durability of the material; one of the cases cited being that of the Boston Theatre, which was built about 1856, and in connection with which Clinton wire lath was used. It is stated that some of the wire lath placed in this building at the time it was first erected has at intervals been removed in making certain alterations and when thus taken out was found to be in good condition. Several illustrations are presented in the booklet, one of which is a rear view of a section of wall plastered on Clinton wire lath; another is a view of the plain wire lath, and still another is of the V-stiffened wire lath, which is made either plain, japanned or galvanized of 18 to 22-gauge wire, two and a half meshes to the inch, and is furnished in rolls 100 ft. long and 36 in. wide.

Dahlstrom Metallic Door Company, Jamestown, N. Y., has just sent us one of the handsome calendars which it has been distributing among its friends in the trade, with "Greetings and Best Wishes for a Banner Year." It consists of a heavy cardboard 22½ in. wide by 20½ in. high, carrying a representation of the famous painting by Albert Herter, A. N. A., entitled "Just a Song at Twilight." The leaves carrying the calendar proper are attached to the lower border of the card below the panel picture, and in addition to the days of the week and month each slip is embellished with half-tone illustrations of buildings in connection with which the company's product has been used.

Crescent Machine Company, Leetonia, Ohio, is sending to its friends in the trade a cardboard representation of a stork measuring nearly 20 in. in hight and carrying in its bill a leaflet announcing "the arrival of the 1910 Crescent Catalogue." The book is of convenient size for the pocket; contains 96 pages, and in addition to the articles in the old edition tells about Crescent safety heads for jointers, steel lip jointer tables, jointer guards, friction feed planes, saw table guards, improved 20 in. band saws, etc. This catalogue is referred to as by far the most complete ever issued by the company, and woodworkers desiring a copy can secure it on application. The stork is represented as carrying a copy of this catalogue under one of its wings.

The Building Age

NEW YORK, JUNE, 1910.

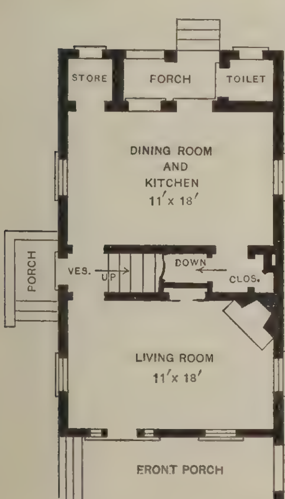
An Inexpensive Home of Reinforced Concrete

AN excellent example illustrative of the application of reinforced concrete in the erection of inexpensive houses of a thoroughly sanitary type and which is altogether a model in its way, is found in the two-story five-room cottage recently completed in Brentwood, Md., the general arrangement and appearance of which are shown herewith. This house was built along the lines of the model concrete cottage awarded the first gold medal in a competition for sanitary inexpensive workingmen's homes held at the late International Congress on the Prevention of Tuberculosis, the author being Milton Dana Morrill, an architect of Washington, D. C., who has devoted much time and attention to the subject of the sanitary house. Upon carefully considering the problem of housing in its various aspects, it was found that a box house was by far the most economical form which could be constructed enclosing a given space, as this form requires the least wall area. The box form is also the most rigid and substantial and the cottage here shown is the first of its type to be constructed with a view to demonstrating the practicability of the ideas advanced by the architect.

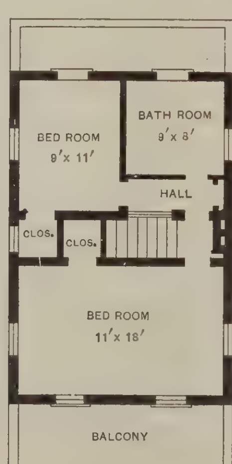
According to his specifications the walls are 8 in. in thickness and the floors are 4½-in. slabs reinforced, the molds being made of wood in standard sections. One carload of Portland cement was sufficient for the construction. Every room has windows on at least two sides, thus giving ample light and ventilation. The windows are of the casement type swinging out with no trim, but with a stencil border, the sash being hinged to simple metal strips which form a weather-tight joint.

While the box-shaped house is not perhaps as attractive as other styles, yet much can be done to enhance its beauty by the judicious application of the law of common sense. Much can be accomplished by making use of flowers and vines, as shown in the window boxes, which give both color and pleasure in their effects. The concrete flower boxes now contain small cedar trees which were gathered near the site, and the vines are the wild honeysuckle, which grows in such fragrant tangles

Perspective View as Reproduced from a Photograph.



First Floor.



Second Floor.

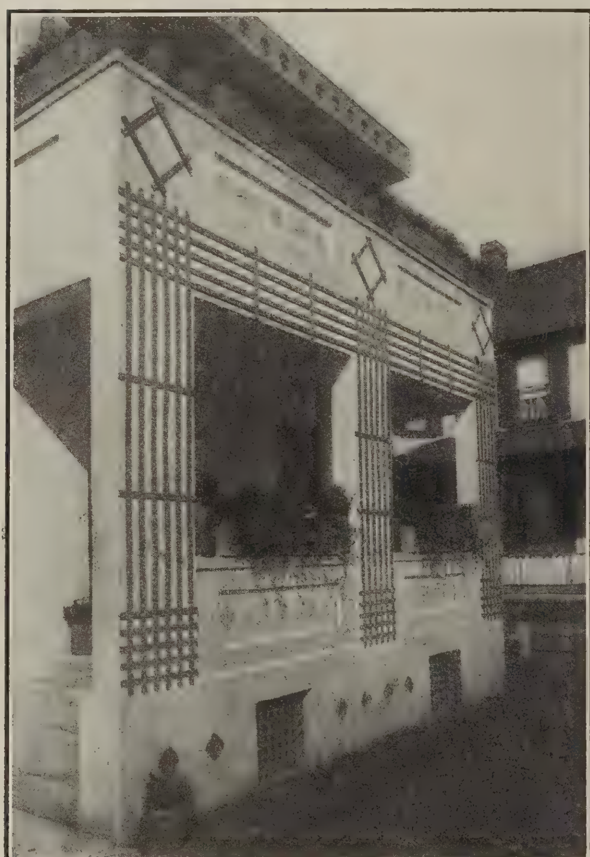
Detail of the Side Entrance Concrete Porch and Steps.

An Inexpensive Home of Reinforced Concrete.—Milton Dana Morrill, Architect, Washington, D. C.

all about the section of country in which the house is located.

The roof is of open cellular construction. At the front of the house there is a porch with balcony above and also a side and rear porch as shown on the plans. The living and dining rooms, as well as the front bedroom on the second floor, are each 11 x 18 ft. in size, with the main stairs rising from the center of the building, so that they are readily accessible from all the rooms on both floors.

The bath room is at the rear of the house, the water supply being furnished from a concrete tank built in



An Inexpensive Home of Reinforced Concrete.—The Front Porch Showing Manner in which the Concrete Surfaces may be Decorated.

the top of the bath room and filled from a small force pump at the kitchen sink. A corner in the kitchen is shown in one of the pictures upon the second page. All fixtures, such as kitchen sink, wash tubs, lavatory and bath tub, are cast in concrete, giving a very smooth cement finish. Under the wash tub at the left of the sink is an enclosure for the garbage pail. This enclosure has an outside screen door for ventilation and also for the removal of receptacles from the outside.

To thoroughly clean a room a hose is used, the cement floors being graded to plugged tile spouts discharging on the lawn.

A small wooden strip is laid in the border of each floor, so that rugs or carpet can be tacked in place if desired. All corners are coved and all fixtures are bracketed from the wall, thus leaving no places for the shelter of dust, vermin or insects, while at the same time this arrangement facilitates cleaning.

The waste heat from the kitchen range warms the house through circulation of hot water, being so built that in summer an inside fire-box cuts off the heating system.

Mr. Morrill points out that it is difficult to base an estimate of cost on the construction of this first house, since the molds and the superintendent's time have been charged against it, but it is safe to assume that these houses can be built in groups at between $200 and $300 per room. In the construction of concrete houses he has found that in some light work the cost of lumber and carpentry labor for molds was three-fourths the total cost. It was necessary that this expense be reduced or eliminated if we are to build in this material. He searched the market in this connection for a standard sectional steel mold equipment, and while several good types were found, none exactly suited his requirements. The simple equipment used was the result of many months' experimental work and should do much to reduce the cost of concrete construction, since it practically eliminates the cost of carpentry and lumber waste.

The mold plates are pressed from No. 12 gauge sheet steel into flanged sections 24 in. square. Upon the completion of the footing course the plates are locked to the cement spacing blocks, furnishing a trough into which the mixture is poured. The cement spacing blocks are left in the wall and the plates are locked to these by a key which is afterward removed. Wherever four corners join a cuff engages, wedging the plates together and drawing them to a perfect alignment on the inside. The plates are two tiers in hight, each tier being clamped together in series and attached by a hinged rod, so that the lower tier is unlocked and swung to its new position on top and then locked. The entire equipment for house construction has only ten different parts and can be used indefinitely, so that the cost per house is not great. Wood fillers are arranged to take up odd dimensions.

A group of houses of the nature indicated have recently been commenced at Virginia Highlands, a few miles out of Washington City, and while the majority are of cement a few are of brick. Good cinder concrete gives ample strength for the walls of these houses, use being made of the waste from a manufacturing plant nearby. Great public interest is being manifested in these model houses, as they strikingly demonstrate the possibilities of reinforced concrete in the construction of inexpensive homes.

Interior View Showing Sanitary Feature, with Opening under Wash Tub from which Receptacles may be Removed from the Outside.

SOME SUGGESTIONS FOR LAYING SLATE ROOFING

BY L. S. BONEBRAKE.

THERE was a time in the history of slate roofing when it was considered a definite trade, and guarded so jealously in its details that the slater did slate work only.

When tin work was required, such as valleys, flashings, &c., the tinner was called on to execute it. During the last decade or more, however, all has been changed in this, as well as in work of other character, and there are now more tinners doing slate roofing than legitimate slaters, and we desire to say at the very outset that what follows is intended more especially for the benefit of the numerous roofers and tinners who have had no experience or opportunity to learn slate roofing, while at the same time it may interest and meet the approval of old slaters.

The better sizes of slate are considered as varying from 10 x 20 to 12 x 24, the smaller size for dwellings and small buildings, the larger for factories and barns. A good size for a medium roof and one easy to lay is 11 x 22, giving 9½ x 11 exposed surface. However, in a great many localities a 2-in. lap on the third course is given instead of 3 in., which would make the exposed surface 10 x 11. Of this we will speak later.

The object in using an even multiple of length by width is to be able to break joints evenly in length by the width when required. Slate of different lengths may be used on the same roof when necessary, if the width is the same, and the length equal throughout any one course. This is done by regulating the lap of the slate so that they all have a lap of 3 in. at the bottom, over the nails driven to hold the second course below them.

The only exception to this is at the eave, where the bottom or eave course is laid lengthwise, as shown by A A, Fig. 1, from gable to gable. The next or second course covers the bottom course, edging with it at the eave, and laying lengthwise up the roof, but starting with a half width slate, bringing the joint, as shown at C, after which whole slate will break joints throughout the row, as shown by B B. The next or third course D is started with a full width slate, breaking joint over B B and lapping 1½ in. over the top edge of the bottom eave slate, as shown. The next or fourth course is started with a half width slate. Continue alternating until the comb has been reached. Three inches are usually allowed for the third under lap, and slate quarrymen and dealers send enough pieces to the square to lay a full square allowing the lap referred to, yet in some localities where quality is sacrificed for price, a 2-in. lap only is given, making a saving of ½ in. to each course of slate, apparently trifling, yet amounting to 30 sq. ft. in two sides of such a roof as that shown in Fig 4. The size of the roof being 20 x 14 ft. 10 in. and the size of the slate used being 10 x 20 in., the roof will require 21 courses, with 24 slates to the course, with 3-in. lap. With a 2-in. lap less than 20 courses will cover the same surface, a saving of 48 slates 9 x 10, equal to 4320 sq. in., or 30 sq. ft., or approximately 5 per cent., a small gain for inferior workmanship.

The color of the slate to be used must be determined by the customer. Black is a color that will not fade and is very desirable. A good quality is found in the Bangor district in Pennsylvania. Unfading green, sea-green, purple, variegated and red are quarried in Vermont and north New York. Red slates are unfading, but they are too expensive to use except in working out such a design as that shown by Fig. 4, in which the red slates are shaded lighter than those supposed to be black or green. This design requires only 48 to either side of the roof.

A pleasing combination for figure or design work is made by using purple for the figure and unfading green for the body. Sea-green looks well when new, yet the liability to fade and form all manner of grotesque figures, renders it unreliable. Sea-green is the cheapest slate for roofing purposes, and the monotony or sameness may be broken, when it is used exclusively, by running courses of the slate with the corners cut, as at A and A in Fig. 4, alternating with slate having square corners. The soundness or quality of the slate may be determined by a slight tap of the hammer in laying. If a clear ringing sound is given out you can depend on their being perfect. If defective, black slate break lengthwise, green slate through their width.

Slate from the quarry must be in carload lots to get the best freight rate, and as it is rated at 600 lb. a square, 40—squares—12 tons—is a minimum carload. Unless one has contracts calling for more, as a start, this amount may be divided into 30 squares green and 10 squares of purple, size 11 x 22, which is not too large for a small building or too small for a larger one. It is good stock and can be realized on at any time. No matter, however, what size or color you prefer, do not order less than carload, as local freight rates on slate are ruinous to profits.

Too much care cannot be taken in lining a cornice having a gutter, as illustrated in Fig 2. No matter what

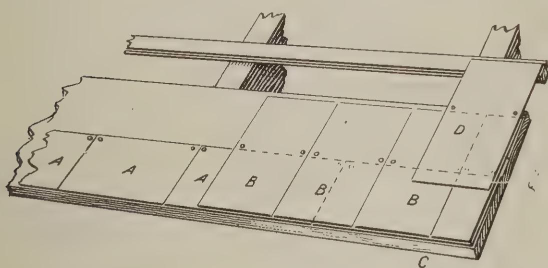


Fig. 1.—Method of Laying Slate at the Eaves.

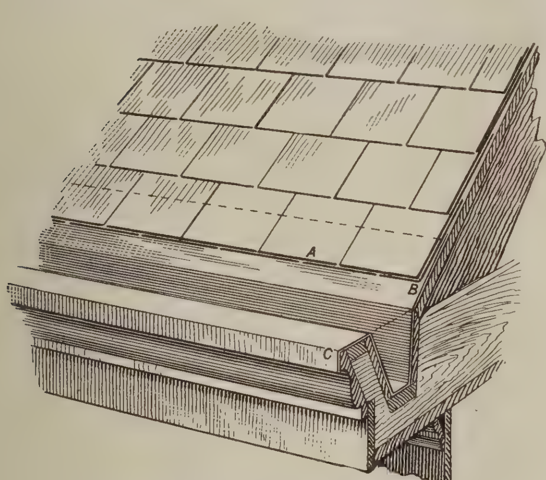


Fig. 2.—Lining a Cornice Having a Gutter.

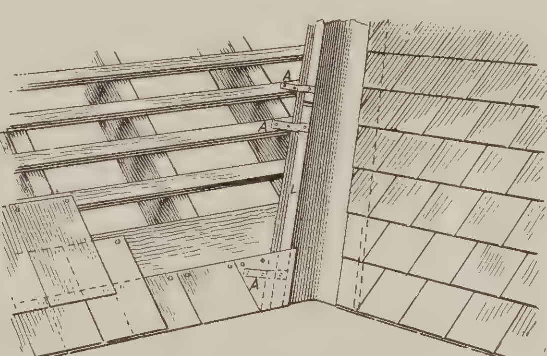


Fig. 3.—Showing a Valley in a Roof.

Some Suggestions for Laying Slate Roofing.

metal it may be lined with, galvanized iron, after copper, an important item is to have the back part of the gutter at B higher than the front C, the first course of slate to be laid 2 or 3 in. higher up the roof than a point level with the front as shown at A. This is to provide against an overflow into the building in case of freezing and snow thus forcing the overflow in front in case of an emergency, especially when the conductor pipe has become clogged. To prevent the latter, wire strainers should be placed in all outlets. All the metal of the roof gutter above the first row of slating nails is useless; nails, in short, should not be driven through the metal at all, as the expansion and contraction of the metal will work the holes larger, and if not high enough leakage will follow. Capillary attraction and nail holes have been the cause of hundreds of unexplained leakages.

A valley in the roof is shown by Fig. 3, one side of which has the slate laid complete, and has the eave course started on the left side showing the slate projecting over a common plastering lath "L," laid along the edge of the valley over the metal to give the valley course of slate to be spaced so that the top of the rows of slate will rest on the center of the lath, the bottom slate having a 3-in. lap over the top of the second course below, as shown by Fig. 1. If the size of the slate is 10 x 20, this will give an exposed area of 85 sq. in. to each slate, or measuring surface of 8½ x 10.

Unless very cheap work is desired it is at all times advisable to use common sheathing, surfaced on one side, placing the rough side up; this, covered with slater's felt, will prevent sleet, snow or driving rain from being forced into the garret. Slate should not bind at the side edges, as it will prevent drainage between the slate and induce breakage by freezing in cold weather.

If laths are used upon which to lay the roof, the bottom or eave should be sheathed solid for at least three courses, to provide a solid base for the eave trough hangers, &c. A hanger free from the roof is undoubtedly preferable, and such is shown in Fig. 6, which can be made in the shop of hoop iron and of a gauge suitable for the purpose intended; that is, it does not require as heavy iron for a 3½ in. hanger as for 6 or 7 in. The band D is formed in the rolls after the hole E has been punched or drilled, after which the hook C is formed by turning the end down ¼ in. to receive the back edge of the trough. The front is slightly curved as shown; the strap is then riveted to the brace A, having two screw holes at B and F, which completes the shop work on it. In hanging the trough a brace is placed at each end of the roof, secured to the facia board, or the end of the rafters, by means of wood screws; one "F" above the hook C and one engaging both the strip D and the bracket A at the holes E and B. The bracket at the outlet being lower than the one at opposite end provides for the pitch and a line stretched from the bottom of one to the other provides a gauge for the placing as many more in the intermediate as may be deemed necessary. The trough is laid in the bracket, using care to have its back edge engage the hook C, Fig 6.

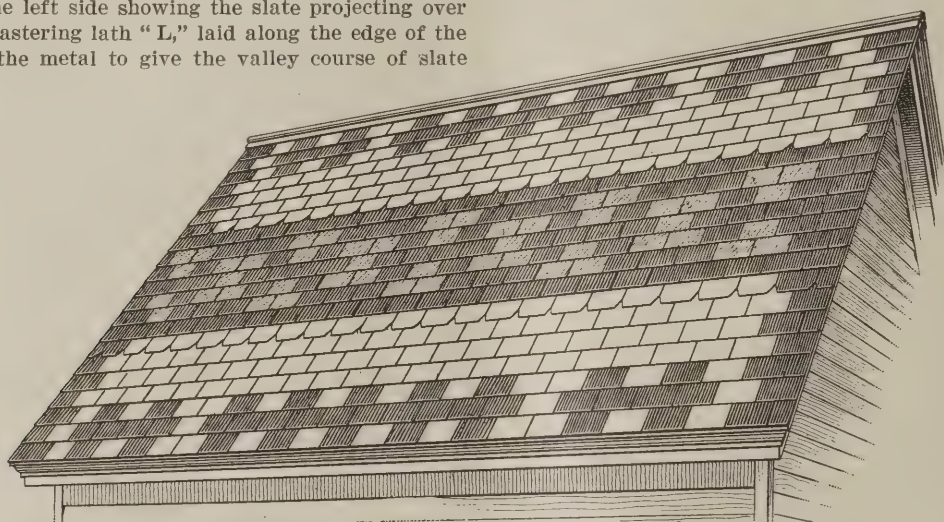


Fig. 4.—Roof Showing Use of Slate of Various Colors, Forming What Is Known as the Double Maltese Cross Design.

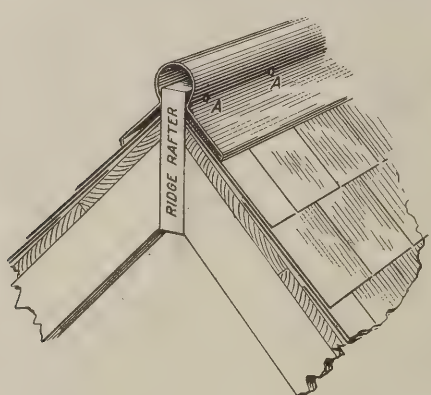


Fig. 5.—Hip and Comb Finish.

Fig. 7.—A Slater's Ripper.

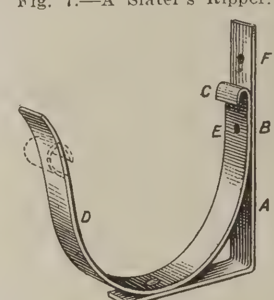


Fig. 6.—Style of Eaves Trough Hanger Recommended.

Some Suggestions for Laying Slate Roofing.

the proper elevation at their butts. The lath is held in place by means of strips of galvanized iron nailed to them as at A A. These strips are nailed back of the edge of the valley and not through the metal. The slate can project over the lath an inch and the lath be placed 5 in. from the center of the valley on each side, giving 4 in. of exposed valley on each side of the center. To get an even edge it is best to use chalk and line it.

For hip and comb finish it is good economy to use a ridge roll, as illustrated in Fig 5. The comb or ridge rafter should project above the roof sheathing an inch to allow the cap to be nailed to it, as shown at A and A, and also against which the slate may abut.

Flashing, chimneys, fire walls, skylights or places where the roof abuts against another building are proceeded with in the same way as in tin or shingle roofs, the slate being cut to the required size and shape.

The roof foundation may be either lath ⅞ x 3 in. or 4 in., or solid sheathing. If laths are used they will have

When the strip D is formed over the bead in front, as shown by the dotted lines, the hook C and the formation over the bead will keep the trough in shape and position; its advantages are an unobstructed flow, strength, and the avoidance of nailing through the slate.

A set of slater's tools requires but small outlay, a handy blacksmith being able to make all required. However, a set bought from a dealer is generally better proportioned and the additional cost so slight that it is advisable to buy from the latter. A slater's hammer, a ripper, shown in Fig 7, a stake and a nail punch are required. A home-made hammer can be made by welding a steel point to the blade of a hatchet, as at B, Fig. 8.

A steep roof requires scaffolding. The brackets may be made out of scrap pieces of wood to be found around a new building, as shown in Fig. 9. The pitch of the bracket is regulated to conform with the pitch of the roof by the length of the standard support A. The bottom board need not be longer than from 16 to 18 in. A galvanized iron strip, G, is nailed on the under side of it at D, and is of a length to reach over the top of the last course of slate laid, approximately 18 in.; and to allow the front of the bracket to be down the roof far enough not to interfere with the lap of the next course of slate to be laid, the brackets are distributed across

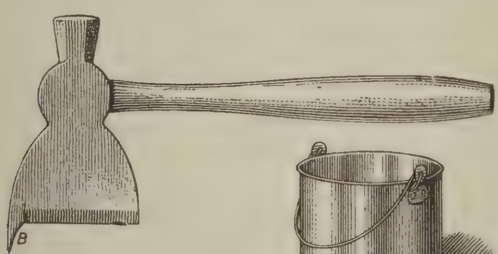


Fig. 8.—A Home Made Slater's Hammer.

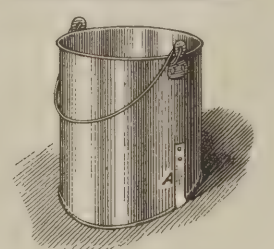


Fig. 12.—A Roof Paint Bucket.

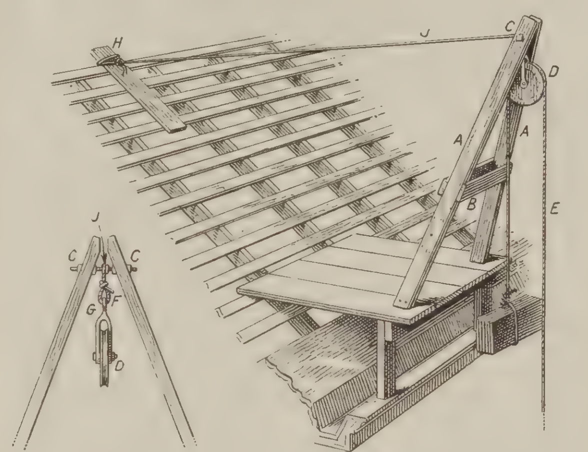


Fig. 10.—Details of One Form of Derrick Used in Raising Slate to Roof.

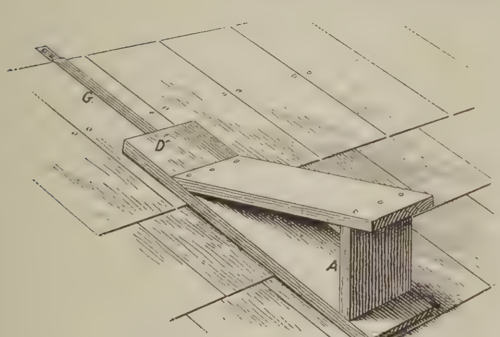


Fig. 9.—A Scaffold Bracket for Slaters' Use.

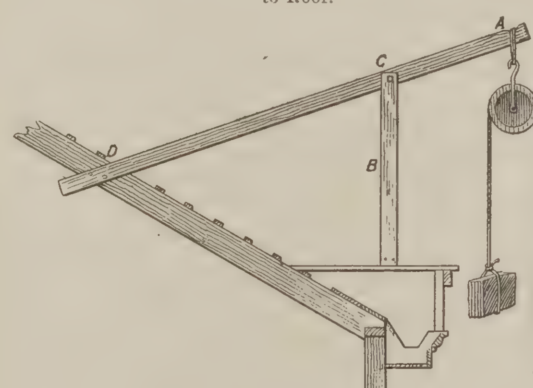


Fig. 11.—A Projecting Beam Derrick.

Some Suggestions for Laying Slate Roofing.

the roof, nailed to the sheeting by means of the galvanized strips, and common 10 or 12 in. sheeting boards are laid on top of them, from which to work. Slates are laid upon the boards and stacks of slate are piled immediately above the brackets, and the number of brackets required for safety must be determined by the workman. The slate is laid up the roof, over and regardless of the galvanized iron strip, and when the roof is completed the bracket is removed by placing one hand on the slate over the galvanized iron strip and bending the strip close up to the bottom of the slate, when it will break off, freeing the bracket.

A device for raising slate to the roof is shown by the derrick illustrated in Fig. 10. This derrick is made with 2 x 4 standards, A A, 7 ft. long. Two boards, 1 x 4 in., are nailed, one on each side of the standard near the center B, and of such a length as to spread the standards 3 ft. at the bottom and 6 in. at the top. The top rod, ½ in., will secure the standards firmly by using nuts and washers both inside and outside, which are drawn up tight, as shown at C C in the detail sketch at the left. The rope J with the loop F is tied around the rod and taken to the comb of the roof, where it is coiled around the board H, which is nailed and projects over the opposite side of the comb, as shown. The wheel D, or iron sheave as it is commonly called, shown at D in Fig. 10, is made after the style of a bicycle rim, but of iron, and about 1 ft. in diameter. A bolt passes through it, to which a forked rod is attached, on the end of which is the hook G, which engages the loop F of the rope J. The rope E should be of a length that will allow both ends to touch the ground after passing over the wheel D. A small chain may if desired be attached to the end of the rope engaging the slate, which will not allow the slate to slip as easily as a rope. Two men can elevate the slate with ease with this derrick, which is secured on the roof by means of a platform. This platform may be about 4 ft. long by 3 ft. wide, supported in front so as to make it level, as shown. The standards A A are toenailed to the platform and the top is fastened as has been described with the rope J. The derrick should lean out over the cornice or eave far enough to avoid striking any projection of the building by the slate in being hoisted.

The man on the ground and the one on the platform can both pull on the rope until the slate is high enough to be pulled in and balanced on the center brace B until the rope or chain is loosened, when the platform man gives the rope a downward throw and while he carries the slate to the roof scaffold the man below loads up again.

A projecting beam derrick can be made as illustrated in Fig. 11 and operated as above described, or a horse may be used on the ground instead of man power by passing the rope over a snatch block, held firmly to the ground by a stake. The platform may be as already described, the exception being in regard to standards and beam. The latter are made of 2 x 4 oak timber from 10 to 12 ft. long, projecting over the eave as at A and passing back of and nailed to a rafter of the roof at D at an elevation giving the desired pitch. It is braced at the platform with two side braces B, which are spread at the bottom, as shown in Fig. 10, and are toenailed and secured to the beam by a bolt at C.

In relaying slate in part, upon a roof undergoing repairs, the row or last course to be laid must be secured by driving the nails between the slate of the row above and covering the nail heads by slipping a strip of galvanized iron over the heads and under the slate.

The double Maltese cross design, Fig. 4, is one of the most pleasing designs that can be laid with green and purple slate, having a red relief, as shown by the slate of lighter shade, and withal an easy one to develop. The length of rafters and width of the roof are reduced to inches and the amount divided by the exposed length and width of the slate, giving the number of slate to a course and the number of courses required. When this has been ascertained a rough draft may be made by the workman, similar to Fig. 4, and taken upon the roof, which will show at a glance where each slate on the roof should be located.

In driving nails care should be taken not to draw the slate tight, otherwise freezing weather, followed by a thaw, will crack them or burst the nail head through, allowing the slate to slip down the roof.

A roof paint bucket made to conform to the pitch of the roof and used in slate roofing for valleys, flashing, &c., is shown in Fig. 12, and may be made in size to conform to the fancy of the workman. For tin or metal roofing, the steel spring band A riveted on each side is intended to engage the standing seam to help prevent the bucket from slipping, and a No. 6 wire across the top, as shown at B, may be used to wipe the brush of excess of paint.

For contract roofing it does not pay to use seconds or No. 2, or do indifferent work, as one poor roof will ruin the reputation of a score of good ones. If a price cannt be gotten that will justify good slate and careful workmanship, it is far better to turn the job down. Your reputation for quality and skill will soon make itself manifest and you can get fair prices. It has long been said that the foundation of a house and the roof were the important items to consider, and no one able to build at all will object to a fair price if satisfaction is assured.

In making an estimate see that there is a complete and full understanding as to terms of pay and guarantee of work. If the roof is in the country, never fail to mention hauling the slate to the work and returning that not used; also terms for board, free or otherwise, for your man and horse or team; also specify the price per square for all tin or galvanized iron work, and also that there be a foot of width added as extra for the length of each hip and valley on the roof. If copper nails are to be used, add 25 cents per square extra, otherwise use common galvanized slater's nails. Ridge roll, Fig. 5, should be used on all hips and over the comb and price per foot specified. As it is almost an impossibility to remember all the items to be considered when taking a contract, each roofer should have some simple printed contract form that he may draw up at his leisure to meet his own views, embracing all items that could probably come under dispute, thereby saving himself possible untold annoyance and ofttimes cash.

Concrete Blocks and Bricks

For a number of years concrete blocks and bricks were not regarded with much favor by engineers or experienced contractors. Probably one reason for this lay in the claims made by many makers of block machines to the effect that the possession of a machine, a few yards of sand and a carload of cement was all a man needed to make lots of money, says a late issue of the *Engineering Record.* This was so absurd that men who knew about concrete were naturally led to be suspicious of the possibilities of concrete blocks. Another reason for the dislike of them was their very crude appearance in most cases, and still another reason was a feeling that the very dry mixture necessarily employed in a machine could not produce a durable building material. This feeling still exists, but is fast disappearing on account of the really excellent results attained with well-made blocks properly used. In the hands of competent men, the concrete block machine has proved such a useful piece of apparatus that the time has apparently come when one will be kept busy a good part of the time on many a railroad division and by many an industrial establishment.

There are numerous places where building materials, other than sand and stone, are quite expensive, for one reason or another. The cost of putting up small frame buildings for operatives, storehouses or shops is so high in these places that old structures are patched up instead of being torn down, or unsatisfactory sheds are constructed. Apart from their fire risk, the high maintenance charges of such buildings make them undesirable. The block machine affords an excellent remedy for this unsatisfactory condition. By a little planning of the work of the repair or construction men employed at all large plants and on all railways, time can be gained for turning out a supply of blocks while other work is slack, so that when a new house or signal tower is wanted the material will be ready and will have cost comparatively little. One railroad has already taken up this idea so far as to prepare standard plans for concrete block structures of a minor character, for its early trial of them proved unexpectedly successful.

The successful use of concrete blocks and bricks for power-house and factory construction has been so well demonstrated that these materials must be recognized by industrial architects. While reinforced concrete is probably less expensive under most conditions on large work, block construction has an economical advantage over both it and clay brick in some cases. The recent cement brick mill of the Plymouth Cordage Company is a case of this sort. It seems that even temporary structures may sometimes be constructed of concrete blocks at less cost than any other material which will be satisfactory; it has been reported that in several recent large construction undertakings in the semi-arid Western States this has proved to be true, but definite information concerning the matter is not available at this writing.

One great advantage of concrete block construction which contractors should consider carefully is the resistance to fire of structures built in this way. A few days ago, for example, a concrete block garage in Plainfield, N. J., was gutted by a fire. The automobiles, gasoline and oil made such an intense heat that the steel beams in the structure were badly warped, but the blocks were practically uninjured, although some of the burning automobiles were close to the walls. A contractor who invests a large sum in a power plant or a compressor station, on the continuous operation of which rests the progress of his whole undertaking, runs a considerable risk by housing his expensive plant in a light frame structure which may actually cost almost as much as a concrete block building. Some contractors engaged on work which will last several years keep all their business records, payrolls, time-books and often considerable sums of money in frame buildings, without fire protection, which, if burned, would cause great inconvenience. The opportunities during bad weather for making blocks for offices and storehouses for important supplies could be utilized to advantage on such contracts.

APARTMENT HOUSES are rapidly becoming a feature of the Fifth Avenue residential district in New York City, the latest addition to the colony being a 12-story building with accommodations for 18 families at the northeast corner of Fifth avenue and Eighty-first street. The building will have a frontage of 102 ft. on the avenue, 115 ft. on the street, and will cost half a million of dollars. Plans for the improvement have recently been filed in the Bureau of Buildings.

NOTES ON PLAIN AND REINFORCED CONCRETE CONSTRUCTION

BY PAUL T. LESHER

WE will now take up the calculation for beams as illustrated in Fig. 5. The beams are 6⅔ ft. apart and 15½ ft. span. The area of the floor in square feet supported by one beam equals

$$6\tfrac{2}{3} \times 15\tfrac{1}{2} = 103.3 \text{ sq. ft.}$$

Let us assume the depth and width of the beam as shown in the diagram, then the weight per square foot of floor is as follows:

2″ cement	24 lb.
4¼″ slab	51 "
Beams	16 "
Live load	120 "
Total	211 lb.

Effective depth = (9/10 x 14″) — 1.14″ = 11.46″.

Total load carried by beam equals 211 lb. multiplied by 103.3 sq. ft. or 21,796 lb.

$$\text{Bending moment} = \frac{wl}{8} = \frac{21{,}796 \times (15.5 \times 12)}{8} =$$

506,757 inch pounds.

$$\frac{\text{Bending moment}}{\text{Effective depth of beam} \times 16{,}000} = \text{square inches of}$$

$$\text{steel required} = \frac{506{,}757}{11.46 \times 16{,}000} = 2.76 \text{ sq. in.}$$

We will use three 15/16 in. square rods.

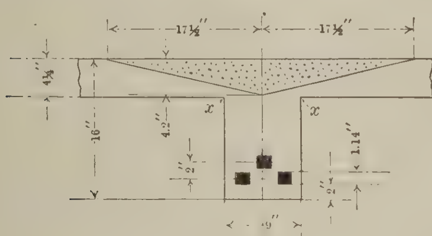


Fig. 5.—Section of T-Leg.

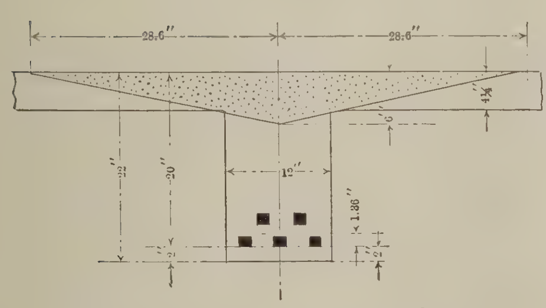


Fig. 7.—Assumed Depth and Width of Beam.

that the triangle overruns the corners x x, it will be necessary to increase the thickness of the slab or increase the width of the beam. This is the determining factor in deciding the width of the beam.

The vertical shear equals one-half the total load, which is 10,898 lb., divided by the cross section of the beam, which is 9″ x 16″ = 144 sq. in., and we get for our result 75 lb. per square inch, which is safe.

The horizontal shear equals 10,898 lb. x ⅔ rods = 7265 lb., divided by 11.46″ = 634 lb. per lineal inch of beam, and divided by 9 in., the width of the beam, we get an answer of 70 lb. per square inch. When the horizontal shear exceeds the allowable 75 lb. per square inch, steel stirrups must be used. The general practice in spacing stirrups is to make the spacing near the end of the beam equal to about one-half the depth of the beam and to increase the spacing toward the center equal to about the depth of the beam.

Adhesion = horizontal shear = 634 lb. per lineal inch divided by 7.5 sq. in., which is the surface of two 15/16 inch square rods, equals 84 lb. per lineal inch. Note that the adhesion is more than the allowable, therefore mechanical bond bars should be used.

In making our calculations for girders, let us assume the depth and width of the beam as shown in Fig. 7, then the weight per square foot of floor is as follows:

2″ cement	24 lb.
4¼″ slab	51 "
Beams	16 "
Girders	13 "
Live load	120 "
Total	224 lb.

Effective depth = (9/10 x 20″) — 1.36″ = 16.64 in. The girders are 16 ft. apart and 18⅔ ft. span, and the beam load equals 6⅔ ft. x 16 ft. x 224 lb. = 23,890 lb.

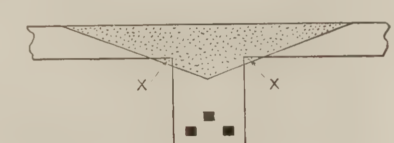


Fig. 6.—Filled-in Triangle Should Never Over-run the Corners x-x.

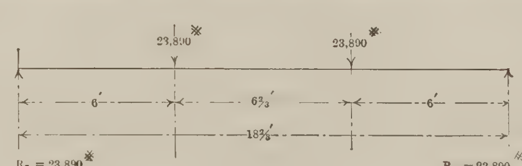


Fig. 8.—Showing Loading of Girder.

Notes on Plain and Reinforced Concrete Construction.

The effective depth of the concrete equals 0.3 x 14 in. or 4.2 in., and the effective area is represented in Fig. 5 by the filled in triangle.

The number of square inches of concrete required for compression equals the

$$\frac{\text{Bending moment}}{\text{Effective depth of beam} \times 600} = \frac{506{,}757}{11.46 \times 600} = 73.7$$

sq. in.

This, divided by the effective depth of the concrete, which is 4.2 inches, gives an answer of 17½ inches, which equals half the length of the T-leg shown in Fig. 5. The filled-in triangle must always be inside of the corners x x and should never overrun them as shown in Fig. 6.

If after determining the length of the T-leg and laying out the triangle on the beam section, it is found

Our girder is then loaded as shown in Fig. 8, and the bending moment in inch pounds equals 23,890 lb. x (6 ft. x 12 in.) or 1,720,080 in. lb.

$$\frac{\text{Bending moment}}{\text{Effective depth of beam} \times 16{,}000} = \text{square inches of}$$

$$\text{steel required} = \frac{1{,}720{,}080}{16.64'' \times 16{,}000} = 6.46 \text{ sq in.}$$

We will use five 1⅛-in. square rods.

$$\frac{\text{Bending moment}}{\text{Effective depth of beam} \times 600} = \text{square inches of con-}$$

$$\text{crete required for compression} = \frac{1{,}720{,}080}{16.64'' \times 600} = 172$$

sq. in.

Length of T-leg = 172 divided by the effective depth of the concrete (0.3 x 20″) equals 28.6 in.

Vertical shear = 23,890 lb. ÷ 22″ x 12″ (264 sq. in.) = 90 lb. per square inch.

This value seems rather high, but when we consider that the rods take some of the shear, we are on the safe side.

Horizontal shear = 23,890 lb. divided by 3/5 rods = 14,334 lb. divided by 16.64 in. equals 861 pounds per lineal inch of girder divided by 12 in., the width of girder equals 72 lb. per square inch.

Adhesion = horizontal shear = 861 lb. per lineal inch of girder ÷ 13.5 sq. in. (the surface of three 1⅛-in. square rods) = 64 lb. per square inch. Note that the adhesion is more than the allowable value, therefore mechanical bond bars should be used.

We now come to the calculation for basement columns as illustrated in Fig. 9. The load coming on the first story wooden column, due to the weight of the building, equals 200,000 lb. The load coming on the basement column, due to the weight of first floor, equals 224 lb. x 16 ft. x 20 ft. = 71,680 lb. Total load on basement column therefore equals 200,000 lb. plus 71,680 lb. equals 271,680 lb.

The allowable unit stress upon concrete in direct compression in columns for stone or gravel concrete equals 500 lb. per square inch and 271,680 lb. divided by 500 lb. equals 543, the number of square inches required in the cross section of the column. We will therefore use a 23-in. square column.

The area of the vertical reinforcing rods for columns is to be about one per cent. of the area of the cross section of the column. One per cent. of 543 sq. in. is 5.43 sq. in., therefore we will use four 1⅛-in. square rods. In addition to these we use ¼-in. diameter horizontal binders, spaced 12 in. apart, as shown in Fig. 9.

In Fig. 10 is a plan through the beams and girders at the side wall clearly indicating the position of the reinforcing material. Fig. 11 shows an elevation of a beam, while Fig. 12 is a partial floor plan, with the reinforcing rods represented in place.

Reinforced concrete roofs are designed the same way as for floors. To provide for the roof covering, snow and wind pressure, and the weight of the concrete itself, a roof load of 40 lb. per square foot of roof area is ample for temperate climates.

A concrete roof of itself should not be assumed to be watertight, unless special provision is made in the construction, as the rays of the sun place the roof under disadvantageous conditions. If a tar and gravel or other form of roofing is provided, this tends to eliminate the disadvantage.

(*To be continued.*)

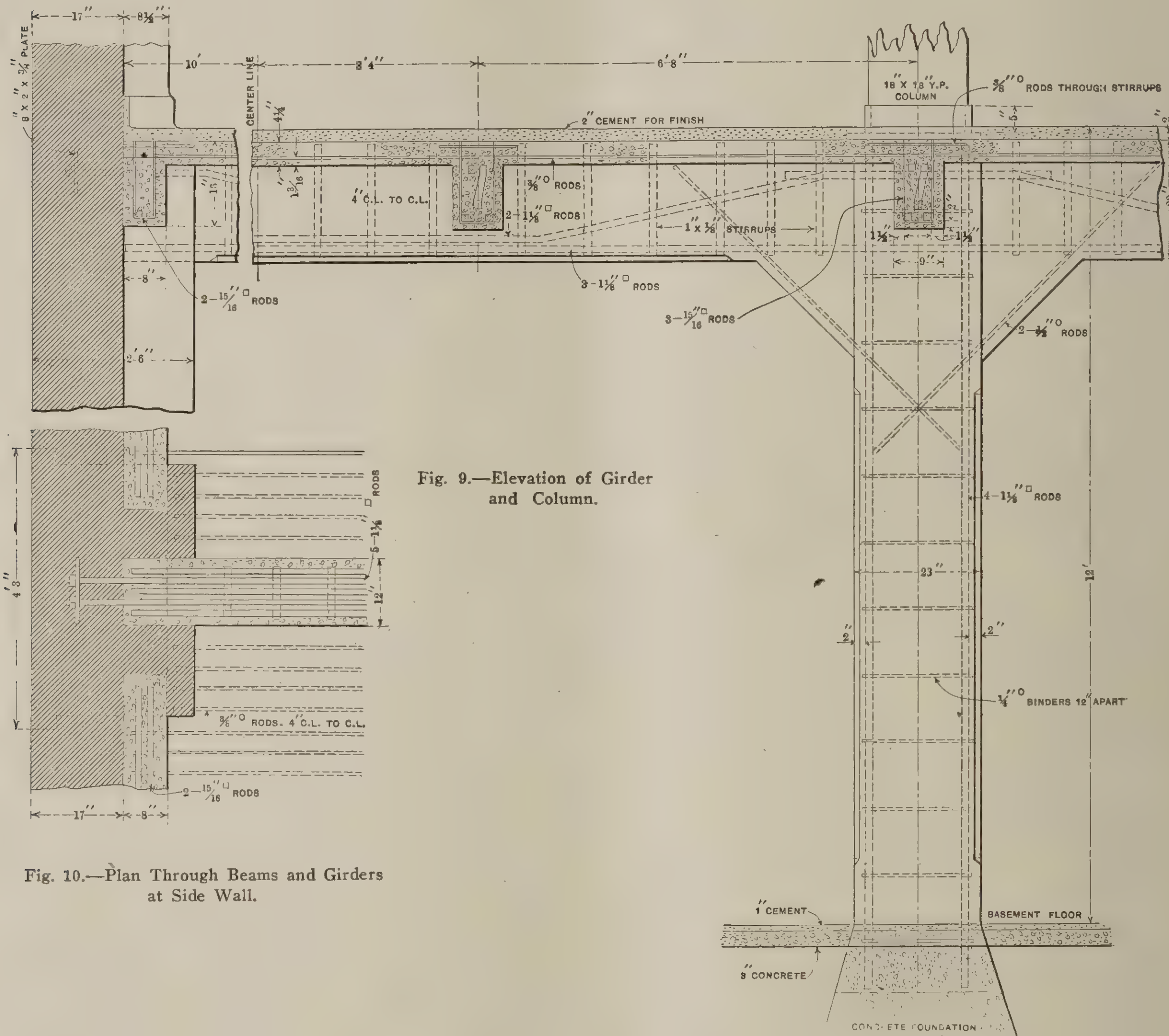


Fig. 9.—Elevation of Girder and Column.

Fig. 10.—Plan Through Beams and Girders at Side Wall.

Notes on Plain and Reinforced Concrete Construction.

OLD DWELLING HOUSES in Twenty-second street, Borough of Manhattan, N. Y., are rapidly giving place to the onward march of improvement and soon none will remain to indicate that that particular section of the city was once the abode of fashion. Three of these old-time dwellings just east of Fifth avenue are to be razed to give place for a 12-story million-dollar structure, a portion of which will be the new home of the *Scientific American.*

Cement Show in New York City

Official announcement has been made of an exhibition of cement products and machinery pertaining thereto, which will be held in Madison Square Garden, New York City, December 14 to 20 of the present year.

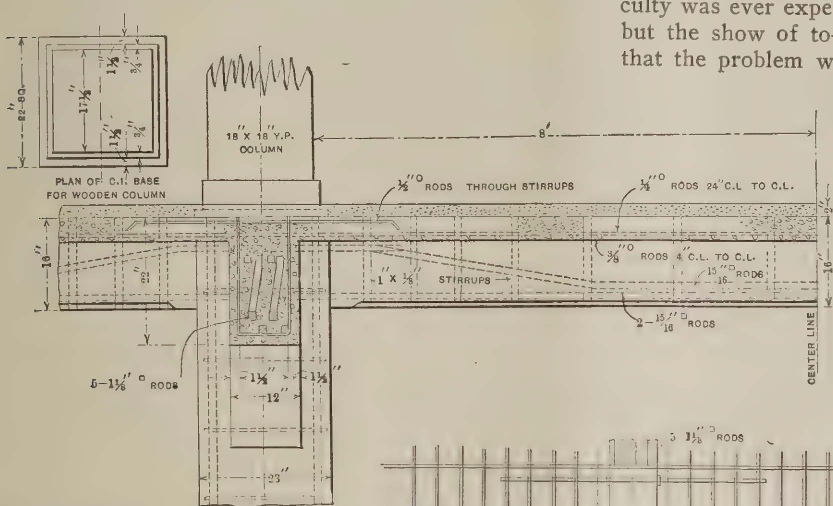


Fig. 11.—Elevation of Reinforced Concrete Beam—Scale, ⅜ In. to the Foot.

The affair will be under the management of the Cement Products Exhibition Company, which has had charge of similar shows in Chicago during the past few years. The New York undertaking is widely endorsed and we understand that somewhat more than 80 per cent. of the exhibitors at last February's Chicago show have signified their intention of exhibiting in New York City. The interest manifested by Eastern manufacturers who have not hitherto exhibited is already apparent and the number of inquiries for space is such as to indicate a large representation.

The prospectus soon to be issued will contain full information regarding the cement show to be held in this city as well as the one to be held in Chicago at the Coliseum during the week beginning February 17, 1911. There will be diagrams showing the space available at the Madison Square Garden and at the Coliseum, also the rules and regulations by which exhibitors will be governed, together with application forms. Elaborate plans to make the New York show a world-wide event are in preparation and in keeping with the importance of the occasion many innovations unique in character are promised. The general uniform plan of exhibits, however, has again been decided upon, as it has given such satisfaction in the past.

The classification of exhibits is under consideration and the management will probably be guided by the decision of the majority of the exhibitors at the last show, who are about being approached for their views on the matter. A word on classification is therefore appropriate at this time. Exhibitors who are interested in the show from an educational standpoint, in their efforts to avoid the possibility of being located next to the manufacturer of a concrete mixer or tamper with its attending noise, should refrain from seeking a remedy which would in any way imperil the advantages resulting from the present system of allotting space by drawing.

From the visitor's viewpoint much might be said in favor of classification. At earlier exhibitions no difficulty was ever experienced in locating certain displays, but the show of to-day has assumed such proportions that the problem warrants the immediate attention of the management.

It may be, however, that a more elaborate schedule of directions embodied in the official programme and the installation of an efficient information bureau with a uniform staff of attendants might overcome this phase of the difficulty. In any event, some such arrangement is at least worthy of trial before resorting to classification which would impose an injustice on many of the exhibitors who favor the absolute fairness of the present system in allotting space.

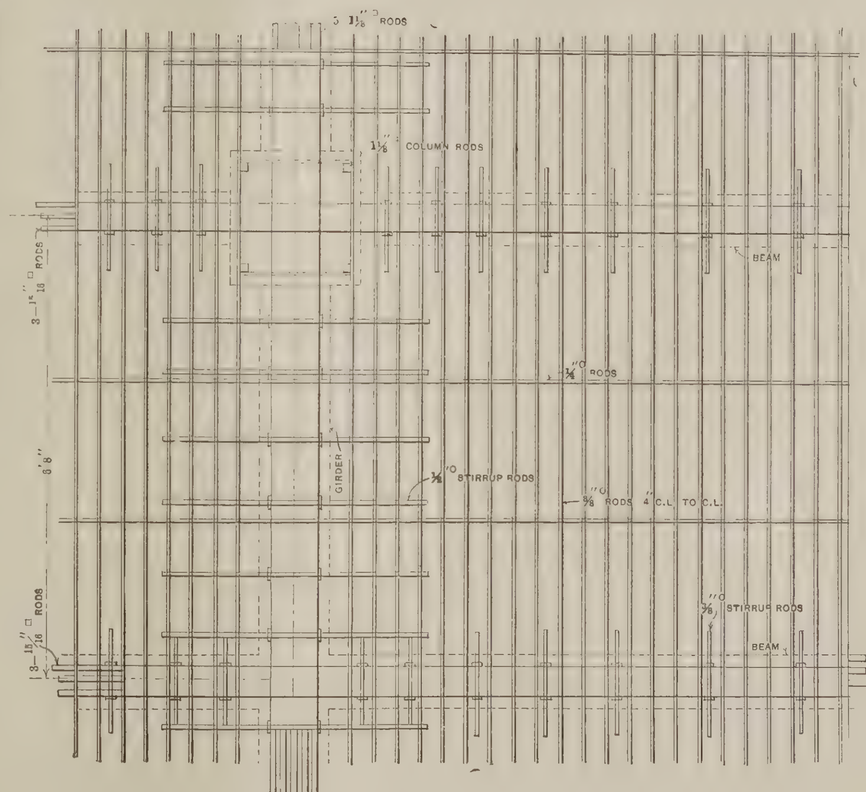
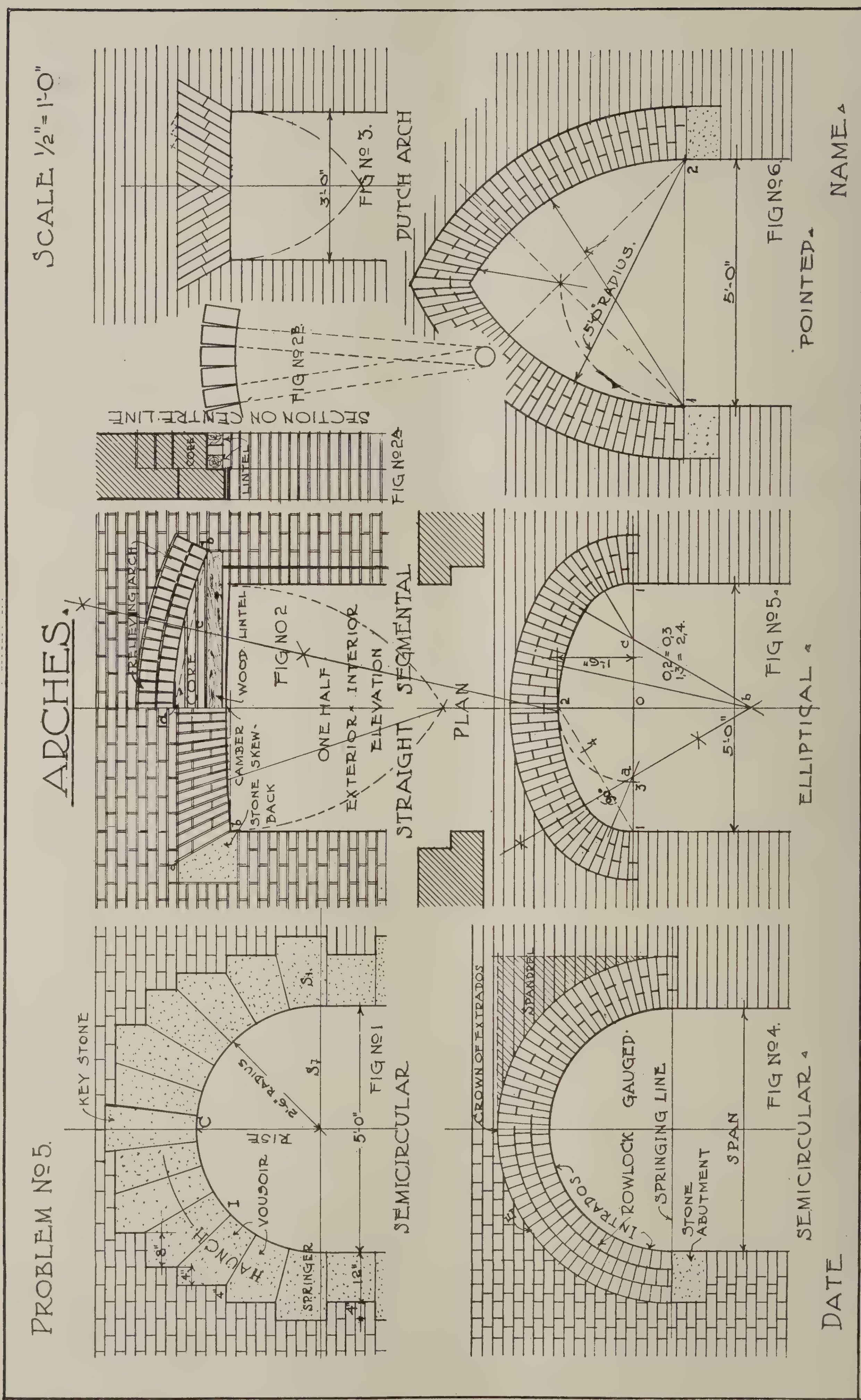


Fig. 12.—Partial Plan of Floor, Showing Arrangement of Reinforcing Rods—Scale, ⅜ In. to the Foot.

Notes on Plain and Reinforced Concrete Construction.

A COLD-STORAGE STOCK HOUSE, 10 stories in hight and to cost $300,000, has just been planned by a Philadelphia architect for erection on the southeast corner of Third avenue and Ninety-first street, New York City. It will have a frontage of 101½ ft. in the avenue and 200 ft. in the street, the facade being of brick with granite trimmings.



Lessons in Architectural Drawing for Beginners.—Scale of Sheet, Three-Quarter Original Size.

LESSONS IN ARCHITECTURAL DRAWING FOR BEGINNERS

BY ALFRED AUSLANDER.

FOR our fifth lesson we will take up the construction and drawing of arches, but before proceeding with the description we will give the following definitions and terms relating to the lesson.

An arch in a building has been defined as a judicious arrangement of stone or bricks in some curved form over an opening, so planned and with the weight and mutual pressure of the materials so adjusted in combination as not only to support each other, but also to sustain a considerable superincumbent weight.

Arches are named according to the curve assumed by them, as circular, elliptical, as shown in Fig. 5; straight, as seen in Figs. 2 and 3, etc. Circular arches are again subdivided, according to the quantity of the circumference described by them, such as semi-circular; seen in Figs. 1 and 4; segmental, shown in Fig. 2, etc.

Arches are also denominated according to the method describing the curve, as two, three, four, five centered arch, etc.

Rowlock.—A rowlock (also rollock) is an arch in which the rough bricks are laid in rows (two, three, etc.), showing the header ends on edge. The bricks are not cut and all radiate to the same center, consequently the joints are wider at the top of the arch than at the bottom (see explanation below for top and bottom of arch).

Gauged.—A gauged arch is constructed of bricks cut and afterwards rubbed down to the required shape. By this means all joints are of equal thickness, but each brick is wider at the top than at the bottom.

As every part of the arch has its own individual name, the student should become acquainted with the following terms, reference being being made to Figs. 1 and 4.

Abutment Course.—The first course of brick or stone on each side of the opening, which is covered by the arch, is called "abutment course or impost" (see Fig. 4 brick and stone abutment).

Keystone.—The central stone of an arch (see Fig. 1) is called "keystone"—in a wooden arch "keyblock."

Extrados.—The external or upper bounding curve of the arch (line E of Fig. 4) is called extrados, sometimes the "back of the arch."

Intrados.—The inner or lower line as at I, in Fig. 1, is called intrados or "soffit of the arch."

Springing Line.—The line S from which the stones spring is called the springing or "spring line."

Span.—The distance between the abutments—in other words, the width of the opening—is called "span."

Crown.—The highest part of the arch, as at C, is called crown of the arch.

Springer.—The first stone above the abutment is called "springer."

Voussoir.—The separate stone blocks in a stone arch excepting the center one and the springers are called "voussoirs."

Haunches.—All voussoirs between the springing stones and keystone together are the "haunches."

Spandrel.—The portion of a wall below a horizontal line through the crown of the extrados and above the haunches are the spandrels (see hatched part of Fig. 4).

Rise.—The vertical distance from the springing line to the crown of the arch is named "rise."

Skewback.—The line *a b* of a straight arch (Fig. 2) is called "Skewback."

A rowlock arch is used over an opening on the outside of a building in cheap work only, while in the inside it is used in even good work over an opening as "relieving arch" (see Fig. 2). The reason why this arch is used in the inside even for good class of work is that the arch is covered up with plaster afterwards and not seen. For a good class of work on the outside a gauged arch is used.

Camber.—When a straight arch is used a rise of ⅛ of an inch to 1 ft. of span should be allowed, in order to provide for settlement of the arch. This rise is called "camber." In building an arch the bricks or stones are laid upon a timber frame work called a "center."

Explanation of Figures on Opposite Page

Fig. 1 shows a semi-circular arch built of stone in a brick wall. The span of this arch is 5 ft.

Fig. 2 shows one-half elevation of an exterior straight-gauged arch with a stone skewback and one-half of an interior elevation, showing a piece of wood 2 in. over the opening, which is called "lintel," over which again a segmental two-rowlock arch is sprung. The arch in this case is called "relieving arch," for it relieves the lintel of the weight above. The space between the top of the wood lintel and the intrados of the arch is filled up with brick and called "core." The rise of any segmental arch should be at least one-tenth of the span. The span in this case is 6 ft. 4 in. The rise therefore will be 8 in. To find the center for a segmental arch to which all brick joints should radiate, draw a line *a b* and bisect it at *c*. Draw a line through *c* perpendicular to *a b* and continue this line until it reaches the axis of the arch.

Fig. 2a shows a vertical section through the straight and segmental arch of Fig. 2, taken on the center or axis and showing the lintels, the two different arches, etc., in their true relation to each other.

Fig. 2b shows in detail how a rowlock arch is to be drawn. The bricks in a rowlock arch being uncut have their sides parallel; therefore, when drawing its elevation in order to preserve this parallelism the lines representing the joints should not radiate to the same point (center), but must be drawn either by getting the center line of each brick and radiating these center lines to one point (center) and the sides of the brick parallel to its own center line, or by drawing a circle the diameter being equal to the thickness of one brick, and the sides of the bricks drawn as tangents to this circle as shown by this sketch.

Fig. 3 shows a straight arch known as a "Dutch" arch. The bricks in this arch are not wedge-shaped. The bricks are laid parallel to each other and are only cut at the ends to form the straight line (see dotted lines). This construction is very weak and should not be used for spans over 3 ft.

Fig. 4 shows again a semi-circular arch, one-half being a three-rowlock, the other half a gauged arch.

Fig. 5 shows a three-centered elliptical-gauged arch. The bricks radiate to their respective centers of the arc (see radius on this figure).

There are many ways of constructing an ellipse. The one adopted here is as follows: Connect the outer point 1 of the major axis with 2 of the minor axis by a line 1 2. Lay off o, 2 (the minor axis) on major axis, beginning at o; cutting this line at 3. Take the remaining distance 1 3 and lay off on line 1 2, cutting this line at 4. Bisect remainder of this line 1 4 and draw a line perpendicular to line 1 4, cutting the major axis for first center at *a*. Continue this line until it reaches the axis line of the arch for the second center at *b*. Take distance *o a* and lay off the same distance on major axis at *c* for third center.

Fig. 6 shows a pointed arch. The curves are struck from the points 1 and 2 with a radius equal to the span of the arch. The bricks radiate to these points excepting the upper part, which radiate to a point on the axis not below a circle drawn, using one-half of the span as a radius.

To lay out drawing No. 5, the student will proceed as follows:

Place the paper horizontal and draw a rectangle measuring exactly 10 x 14 in. Draw a vertical and horizontal center line. Measure off from vertical center line (right and left) 4¼ in. and draw vertical lines through these points. These three vertical lines will be the axis for all arches on this drawing. Measure off 1¼ in. above horizontal center line for springing line of arch, Fig. 1. The intersection of this springing line and the vertical axis will give the center for this arch. Measure off 2 ft. 6 in. (to a scale ½ in. to the foot) from center on the springing line and draw one-half circle, which will be the intrados of the arch. Lay off 22 brick courses 2½ in. apart, beginning 1¼ in. above springing line and 7 courses below this line. Draw horizontal lines indicating these brick courses. Measure off 12 in. for width of abutment and take 5 brick courses for hight of same. Project springer 4 in. beyond the abutment for width and 5 brick courses for hight. Draw first voussoirs 4 in. back of each and also 5 brick courses high. Draw lines towards center arch from the intersection points of horizontal and vertical lines of voussoirs. The third voussoir is 8 in. wide on top and only 3 brick courses high. The keystone is one brick course higher than the last two voussoirs.

Measure off 2 ft. 6 in. right and left of vertical center line of sheet for Fig. 2 and measure off 2½ in. above horizontal line, and draw lines through all these points. This will give the opening and the intrados of the arch above. Measure off 12 in. for hight of arch and draw a line through this point. Lay off on this line (extrados) brick courses 2½ in. each. Draw one-quarter circle with a radius same as span of arch, 5 ft., using point C as a center. The intersection of this arc with the axis will give the center, to which all brick joints of the straight arch will radiate.

The segmental relieving arch is drawn as explained above under Fig. 2. The bricks (2½ in.) are to be laid off on the intrados. Place a wood lintel consisting of two pieces of timber 3 x 4 in. (6 ft. 4 in. long), giving a bearing of 4 in. on each side and spring arch from the end of the lintel. Draw brickwork above lintel called core. Sometimes the wood lintels are cut to the shape of the arch and so omitting the core.

For Fig. 3 measure off 1 ft. 6 in. on each side of axis and draw intrados and extrados on same hight as Fig. 2. Lay off brick course 2½ in. x 8 in. as shown and draw these as explained under Dutch arch above.

Draw the straight arches with a camber as explained. Measure off 2⅜ in. from horizontal center line down for spring line of semi-circular arch, Fig. 4. The span for this and the following arches are all 5 ft. Lay off all bricks 2½ on the intrados for the rowlock on the extrados for the gauged arches.

The spring line for Fig. 5 (same as major axis of ellipse) is 2 in. below horizontal center line and on center of sheet. The arch is 12 in. thick. The spring line for the pointed or Gothic arch, Fig. 6, is 3 in. below horizontal center line.

While all the measurements given above are for a sheet to contain all Figs. 1 to 6, we would advise the student to draw each of these figures on a separate sheet to a scale 1½ in. to the foot and marking all different measurements, designations, etc., before drawing to a scale ½ in. to the foot.

A 12-story store and loft building, having a frontage of 68 ft. and a depth of 88 ft., is about being erected in West Twenty-seventh street, New York City, in accordance with plans drawn by Buchman & Fox, architects, and to cost $275,000. It will have a facade of brick, limestone and terra cotta.

Rough Masonry in Building Construction

In the course of a very interesting lecture recently delivered by M. H. Baillie Scott on the "Art of Building" in London, he had the following to say regarding some of the materials used in building construction:

We have in many districts stone of various kinds for building, and in most of these districts we have object lessons in old buildings, showing how stone may be beautifully used. It is unfortunate, however, that the modern mason seems quite unable to profit by such examples. He always wants to improve on them. The art of masonry may often be made a kind of rude mosaic, in which stones of various shapes and sizes and tints can be combined and arranged. In old cottages in Surrey you may find the irregular spaces between the stones adorned with scraps of flint, iron, stone and broken red pottery, with excellent effect. Another instance of the same mosaic in masonry may be found in the old castle at Peel, in the Isle of Man, where the wide scale of tints in the local stone, from various shades of red to gray and yellow, is taken full advantage of. Is it necessary to add that in the local modern buildings of the same stone the material has been reduced to an absolute regularity of tint and surface? When the modern mason does descend to rough walling he lets us know it, and can only give us an exaggerated excrescence in the center of each stone—a confection known as rock-faced. And he seldom knows how to deal with the mortar joint, which in good old work makes such a beautiful reticulated pattern of varying shades of gray.

If only, instead of ignoring the qualities of materials and forcing them into these meaningless forms, we were to begin at the other end, what a new world of art would be disclosed to us! A visit to the site of our building may disclose, perhaps, the fact that flints are the essential local materials for walling. What a palette is there for the artist, of tones of pearly gray; what a variety of textures can be obtained, too! Here the soft rounded outlines of the uncut stones, and here, to mark some special feature, the cut flints; the surfaces of the walling enriched, perhaps, with the shivers of the broken flints set in the joints, or notes of red brick or brown stone. And all this you won't find anything about in books, or learn anything about in offices, or art schools. It is a kind of rude natural mosaic, and if rightly done implies the use of materials in the right way, inasmuch as it develops to the utmost their possibilities, instead of obliterating their character by forcing them into preconceived academic formulas. It seems that we are too apt to put the cart before the horse in these matters, and instead of letting the materials influence us and suggest the design, we let them have no voice in the matter at all, but simply shape them into the arbitrary forms we have learned at school.

Slates have the defect that they do not readily yield to nature's inimitable coloring. The rougher and thicker they are, the better the artist in building will like them; and except in their own special locality he will perhaps prefer a good gray tone to the more fashionable green. There is a kind of harshness about slates which makes them specially at home in bleak and barren uplands, or in wind-swept open spaces by the sea, while the kindly warmth of tiles makes them more adapted in wooded and sheltered places.

After careful consideration of the matter, the United States Government has decided to adopt for the new Federal building to be erected in San Diego, Cal., the "Mission Style" of architecture. This, it is said, will be the first building in the State of California to be constructed by the government on the "Mission" lines. The building will be used as a Custom House and Post Office and will contain offices for all the governmental officials in that city.

THE JOBBING CARPENTER AND SOME OF HIS WORK*—XV

By Edward H. Crussell.

THERE are a number of items of carpentry which, though simple enough once they are understood, are likely to puzzle the mechanic the first time he attempts them. As an instance, we may cite the making of a drawing board. Very seldom is the carpenter given anything more for his guidance than the mere size of the board, though in rare cases he may be told that it is to be grooved and cleated in the proper way. Even when a sketch or drawing of the board is provided, the workman does not always grasp the reason for the grooves in the under side of it, and at least one case has come to the writer's knowledge where the man who made the drawing was not himself sufficiently enlightened to explain it. All he could say was that drawing boards were always made that way because the grooves prevented them warping. This of course is only partly correct.

Every ambitious young mechanic should make a drawing board for his own use. The cost, apart from his labor, would be but a trifle, while the experience gained might at some future date be a source of satisfaction to him in a business way.

The sizes of drawing boards vary all the way from the dinky little 16 x 22-in. Correspondence School outfit to the 16-footer of the engineer's office. A handy size for general work is 2 ft. wide by 3 ft. long. Architects and engineers have in their offices boards much larger than this supported on trestles on which they do special work, but many important building plans have been drawn on boards of about the size stated above. As the principle of construction, however, is the same the size is immaterial, so we will for our present purpose assume a board 2 ft. by 3 ft. as the size required.

Drawing boards are almost invariably made of soft white pine or sugar pine, as it is called in some sections, and here it will be well to point out that soft wood must be used, so as to permit of the easy insertion and removal of the drawing pins. Young mechanics are sometimes carried away with the idea of having an extra fine board and make one of some fancy hardwood, only to find later that for practical purposes it has been labor and material wasted.

Before beginning upon the actual construction of the drawing board, it will perhaps be well for us to examine into the nature of the material that is to be used and consider the form it takes as it shrinks in drying. All woodworkers know that narrow boards are not so liable to warp as wide ones, and many mechanics are wise enough to turn the heart sides of the boards alternately up and down when gluing them together, so as to counteract this warping tendency as much as possible. Every mechanic, however, cannot tell for certain which way a board will warp when dried under natural conditions. Without going too deeply into the matter, therefore, it may be stated that all wood shrinks most in the direction of its annual rings, the effects of this shrinking being to make the board cast hollow on the side that was nearest the bark of the tree or just as if the annual rings were trying to pull themselves into a straight line.

Sap wood shrinks much more than hard wood and the effect of the shrinking upon a log cut into boards is shown somewhat exaggerated in Fig. 97 of the accompanying sketches. The pieces marked A A, if cut into boards, will shrink and warp more than any other part of the log, because they are nearly all sap wood, and the annual rings in them run almost parallel with the surface. The board in the center will shrink thinner on the edges where the sap wood is, but will warp scarcely at all, because the annual rings in it are at right angles with the surface. All properly quarter-sawn

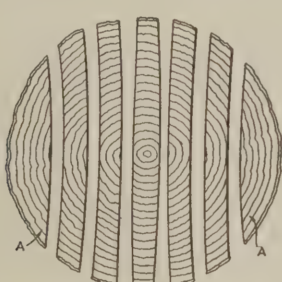


Fig. 97.—Effect of Shrinking Upon a Log Cut Into Boards.

Fig. 98.—Boards Arranged so as to have the Annual Rings Running Through the Thickness.

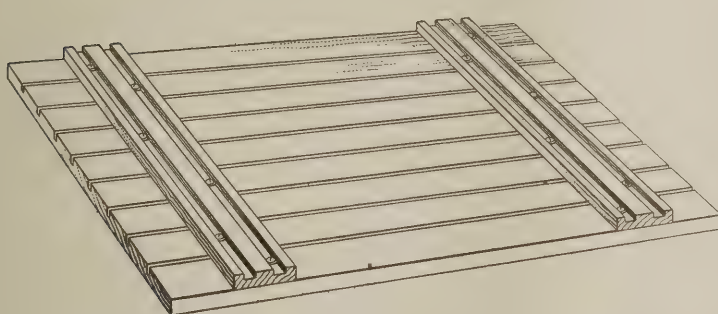


Fig. 99.—An Under-Side View of a Drawing Board.

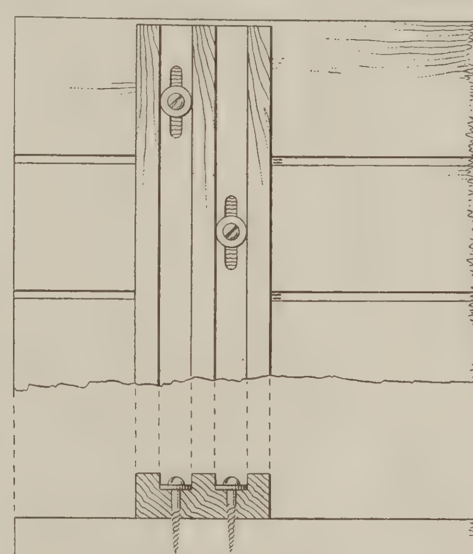


Fig. 100.—An Enlarged-Plan View of a Corner of the Drawing Board.
Fig. 101.—A Section of the Corner Shown in the Upper Part of the Drawing.

The Jobbing Carpenter and Some of His Work.—XV.

* The author of these articles will be glad to discuss any phase of work in the line of jobbing carpentry that the reader may suggest.—Editor *The Building Age.*

material has the annual rings at right angles with the surface as shown in this board, which is the reason why quarter-sawn material keeps its shape better than that sawn in the ordinary way. The *moral* is, if you want to pick a board for some particular purpose, one that will stay flat—select one with the grain running as in the central board of Fig. 97. If you wish to glue up a wide surface and cannot find boards of this character, and you will never believe how scarce they are until you commence looking for them, rip up the boards you have and arrange them as far as possible, so as to have the annual rings running through the thickness of the board, as shown in Fig. 98.

You will sometimes see workmen rip the material into small strips and glue it together again any old way, they seeming to have the idea that the virtue lies in cutting up their material. If the material stays in any better shape than it would in its original form, it is more by good luck than good judgment.

We are not always able to get boards that are just right for our purpose, and although we should always take advantage of the best grained pieces, where we have a pile from which to choose, it is quite possible to make almost any kind of a board lay flat by the arrangement of grooves and cleats indicated in Fig. 99, which represents an under side view of our drawing board.

Now, to explain the reason for the grooves. Some mechanics seem to have a hazy idea that the cutting of the grooves prevents the board warping. This is not so, for a board if left to itself after being grooved would warp more than ever. The real function of the grooves is to weaken the board transversely, so that it may be easily held flat by the cleats that are screwed to the under side of it. In fact, when we groove a board in this way we are acting upon the same principle as when we saw-kerf a molding before bending it around a curve. Supposing the board shown in Fig. 99 to be ⅞ of an inch thick and the grooves ½ in. deep. This leaves only ⅜ of an inch of wood for the cleats to hold straight, although we have practically the full strength of the board lengthwise.

The cleats shown in Fig. 99 should be of hardwood—preferably quarter-sawn oak. The screws which fasten the cleats to the board are round-headed. They have a small washer beneath the head and are passed through slotted holes, so that the drawing board may expand or shrink without changing shape or splitting. Both the screw head and the washer are sunk below the face of the cleat in a groove, so as to avoid damage to any surface upon which the board may be placed.

In Fig. 100 is shown an enlarged plan view of a corner of the board, while Fig. 101 represents a section of the same corner. Of course it is only necessary to groove the cleats in the case of a small board like the one under consideration, which, when in use, will be resting upon a desk or table or perhaps upon the surface of a larger drawing board. In the larger boards the screws and washers are the same, but they are not sunk beneath the surface. Large boards are sometimes fastened to stiff, heavy cleats and merely laid on their supports, their own weight keeping them in place. At other times they are fastened directly to the trestles.

Trade School Exhibition

An exhibition of the work done by the students of the Stuyvesant Evening Trade School, in East Fifteenth street, New York City, was held on May 12, which was the second annual affair of the kind and was given for the purpose of interesting the patrons and friends of the pupils in the work of the school and increasing its utility. There are 23 classes embracing among other branches carpentry, cabinet and pattern making, electric wiring, plumbing, architectural and mechanical drawing, shop mathematics, elementary and industrial chemistry, machine shop practice, etc.

"Prevailing Rate" of Wages for Buildnig Mechanics

A prevailing rate of wages for mechanics engaged in the various branches of the building industry has been prepared and recently made public by the New York Building Trades Council. The scale is based on the union rate of wages, some of which are the same as the mechanics have been receiving for some time past, the rates being for a working day of eight hours. The schedule as prepared is as follows:

Asbestos workers, $4.50, helpers, $2.80; bluestone cutters, flaggers, bridge and curb setters, $4.50; boilermakers and iron ship builders, $5; carpenters and framers, $5; cabinetmakers, $4; cement and concrete masons, $5; derrickmen and riggers, $3.75; decorators and gilders, $4.50; decorative art glass workers, $5; elevator constructors, $5; electrical workers, $4.50; electrical fixture workers, $4.50; stationary engineers, $4.50; portable hoisting engineers, $5.50; house shorers, movers and sheath pilers, $3.50; housesmiths and bridgemen, $4.80; and after July 1, 1910, $5; metallic lathers, $4.80; and after January 1, 1911, $5; marble cutters and setters, $5; marble carvers, $5.50; marble polishers, $4.50; marble sawyers, $4.75; marble bed rubbers, $5; mosaic workers, $4.50; machine stone workers, $4; machinists, $4.50; plate and sheet glass glaziers, $3.50; plasterers, $5.50; plumbers and gas fitters, $5.50; painters, $4; riggers, $4; roofers, $4; sheet metal workers, coppersmiths, tinsmiths and metal roofers, $5; steamfitters, $5.50; tile layers, $5; upholsterers, $4.08; wood lathers, $4.50.

In all building work which is not for the city the schedules call for double wages for all overtime, as well as for Sunday and holiday work.

Wages of Building Mechanics in England

Consul Benjamin F. Chase, at Leeds, England, has summarized the earnings of laborers in the building and woodworking trades in the United Kingdom and the following statistics are presented as being of possible interest to our readers:

The total number employed in these trades in 1906 was about 1,250,000, of which about 1,000,000 belong to the different branches of the building trade. The average net earnings per man during that summer were $7.66 per week. The average full-time earnings of all men were $8.03, for skilled workmen, $8.84, and for ordinary labor, $5.94. In the harbors, docks, sewers, etc., the average full-time earnings of men were $7.74. In the sawmills, machine joining and box and packing-case making industries, $6.59. In cabinet making and allied trades, $8.03. The average wage in the building trade has advanced about 18 per cent. since 1886.

In Leeds the hours of labor and rate of wages in these trades in 1909 were as follows:

EMPLOYMENT.	Hours.	Rate.	Overtime.
Bricklayers	49½	$9.53	1¼ to 1½
Cabinetmakers	49½	6.60	1¼ to 1½
Joiners:			
Summer	49½	9.03	1¼ to 1½
Winter	41½	7.57	1¼ to 1½
Plasterers	49½	9.53	1½
Plaster laborers	49½	7.02	1½
Plumbers	49½	7.57	1¼ to 1½
Polishers	52½	8.51	....
Slaters and tilers	50	9.12	....

In Ireland the wages per week of 54 hours of the mechanics in the leading branches of the building trades are as follows: Bricklayers, $9.36; cabinet makers, $8.76 to $9.03; pattern makers, $9.48; painters, $8.76.

DESIGN FOR AN UP-TO-DATE SWING

By Paul D. Otter.

THE writer has found such extreme comfort in the modern swing that it seems selfish not to tell the versatile man of tools about a good thing. Two have been created and a third is seriously thought of, but in this last one the mistake will not be made of constructing it less than lying down length, or 6 ft.—for once the swing habit is formed an active man really acquires the rest habit unconsciously and many a Sunday afternoon sleep catches him unawares. You know many men think it belongs only to old ladies and children to have an afternoon nap, but wait until you get your swing with a soft cushion and an arm pillow, you will go to it with the express purpose of lolling and reading your magazine—well, your wife will have to awaken you for supper.

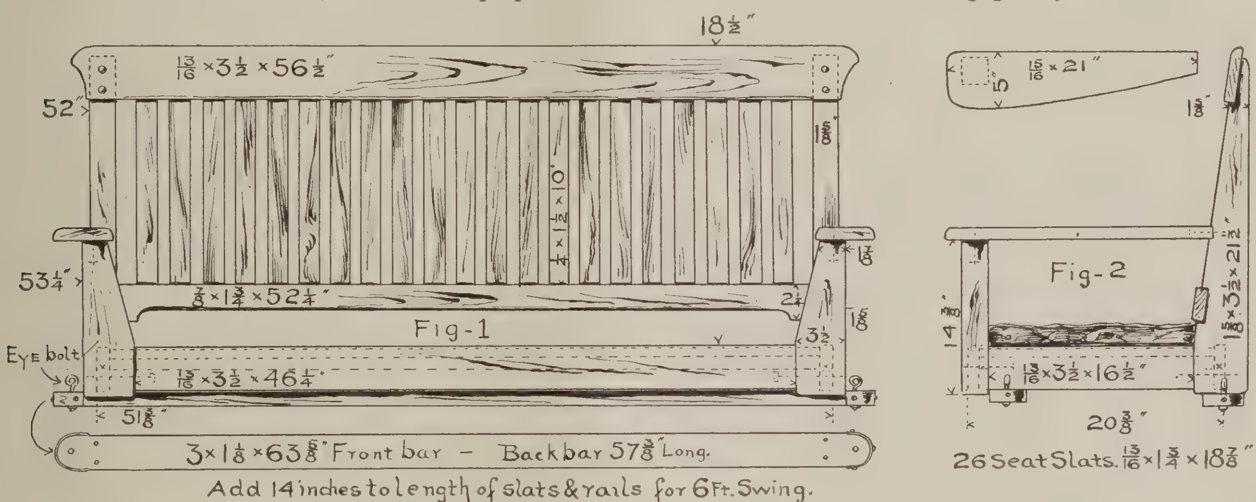
My first swing is a product of circumstances—or shall I say of material at hand? In the wake of the builder of the new home there was enough stock in quartered oak ⅞-in. flooring and other refuse oak to meet the requirements of a working drawing carried out with this stock in view; all save the proper sizes for the posts—four pieces of clear, sound and dry 2 x 4-in. hemlock studding. These were drafted into service for the corner posts and with three seasons' exposure under oil and varnish have no reason to regret the combination, which, under the golden oak stain, is little noticed. As 2 x 4 was a determining size, it afterward proved suggestive of a happy bevel to be drawn from the top of the box rail to give the proper back inclination and yet have the rail ends and lower part of the posts cut, mortised and tenoned all on the square. The bevel pattern of the back post then did service also for the shape of the front posts, except that they were placed broad side as shown and cut off to the hight of the arm as indicated in Fig. 2. This bevel then gave a rakish and proper spread to the front.

The front and end elevations presented in Figs. 1 and 2 show the use of the one post pattern. Joint bolts should be a part of every joint of a large construction for out-door purposes, as the mortise and tenon, however well fitted, part company under weather conditions and the bolts with nuts put on over washers should be there to tighten up at any time the parts feel loose, although it is hardly possible that a well put together swing of seasoned lumber would need any after tightening if the joint bolts were well drawn up in the first place.

Glue may be thought to be useless for outdoor purposes, but its effectiveness will be long continued by the protection of boiled oil or any other outdoor varnish, such as spar varnish. At the same time the use of glue assists greatly in connection with joint bolts in securing a most permanent union.

In the front and side views the position of the bolts is clearly indicated, located in such a manner in crossing that they do not interfere. In this swing the desire was to have no bolts show, so a prepared hole was bored for the bolt head to sink in far enough to allow plugs to be driven in and flushed off. On the inside of the rails an intersecting hole was bored and chiseled out to permit of the dropping in of a washer and nut, the nut being driven tight by using a drift or dull cold chisel. In boring into the ends of the ⅞-in. side rails care must be observed to leave a little inside to allow of chiseling out the intersecting hole to turn the nut. An octagonal nut will work to better advantage if handy, or the corners of a square nut may readily be filed off to meet the requirements.

The top slat was secured to the posts by carriage bolts and the center slat engaged by a countersunk screw. After the seat cleat had been secured on the inside of the front and back rail a middle stretcher or yoke was put in; then a final decision was made, which time has proven to be very satisfactory in fastening the many seat slats to the seat frame, so that no nails or screw heads would give off rust marks to clothing. Two holes for each slat were drilled along the front and back rails and the latter set properly spaced, after which long finishing nails secured them in place, the nail heads being well set and the holes puttied up in finishing. A good grade of denim was the overcover to a 2-in. cushion made up with a top and bottom box welt of the style of a carriage seat. This cushion was of course taken into the house at night or during wet weather.



Figs. 1 and 2.—Front and End Elevations of the Swing; also Details Showing Construction of Parts.

Design for an Up-to-date Swing.—Contributed by Paul D. Otter.

One of the important improvements contemplated in Paterson. N. J., is a 4-story and basement apartment house which will consist essentially of three buildings affording accommodations for 40 families. The buildings will be erected in accordance with plans prepared by Architect William D. Johnson, Inc., of Hartford, Conn., and will have concrete foundations, brick and stone walls of ornamental design and tar and gravel roofs. The buildings will be equipped with modern plumbing, electric wiring, steam heating, fire escapes, etc. The contract for the work has been placed with Frank B. Gilbreth, Inc., 60 Broadway, New York City.

SOME THOUGHTS ON CONCRETE BLOCK CONSTRUCTION

By James F. Hobart, M. E.*

THE concrete building block, for years shunned by the architect, viewed askance by the contractor and barely tolerated by the home builder, is coming into its own. Not only has a great change occurred in the opinion of architects and builders concerning it, but it must also be noted that there is just as great a change in the concrete block itself. The trouble with the once despised block was that its maker used for its construction any material nature may have placed within his reach. He built his blocks in the belief that "no experience is required" and that with the perfected (?) machinery of Sell Cheap & Co. it was only necessary for the cheapest laborer obtainable to throw a bag of cement and a great lot of sand into the machine and take out blocks enough to almost build a small house.

Materials Used by Block Makers

Now, the block maker does not use the material as nature gave it to him—not without first closely inspecting and analyzing it to determine if it meets the requirements of a first-class concrete material. The block maker has found that not only must there be a certain proportion of cement, sand and gravel mixed together to make a good building block, but there must also be a certain percentage of gravel of one size, a certain percentage of a smaller size, then certain percentages of various smaller sizes; and the same method of proportioning must be applied to the sand as well as to the gravel. The cement and the water also come in for a share of the percentage business, and the whole arrangement, and ratio of the amounts or percentages of each size of material to each other, depend upon the largest size of material to be used.

For instance, were concrete to be made from half-inch gravel as the largest size of material to be used, then the entire list of percentages of each size of material, cement and water included would be different from what is required were one-inch gravel to be used as the larger size. And the ratio changes greatly even when one-half inch, three-quarters or one-inch material is to be used. Furthermore, the amounts of both cement and water are much smaller with the larger aggregate than with the smaller sizes. Therefore, it will pay the concrete maker and user to employ the largest size of gravel which he can manage to tamp into the work; and this is true of all forms of concrete work, from the delicate ornament to massive retaining walls and solid-bearing walls. If 36-in. stones can be worked into the latter, put them in by all means and save material and gain strength by so doing. If ½-in. gravel can be tamped into moldings, then the resulting concrete will be stronger and more impervious to water than if smaller material had been used.

What Makes the Best Concrete

It must, however, be kept in mind, when making concrete of the largest obtainable or usable material, that large material alone will *not* make good concrete. Neither will one size of large material and one size of small, fine material make the best concrete, but it *will* make better concrete, and with less cement, than can be made from all-fine material. When it is stated that the largest obtainable or usable material should be used, it is to be understood that with the large material is used certain percentages of all of several finer sizes of gravel and sand.

While the best possible concrete will be made when all the smaller sizes of material are combined with the largest size used, still very good concrete can be made from a few of these sizes, but to do so they must be combined in a different ratio from what is necessary when all the smaller sizes are used. And by changing the percentage according to the material to be used, a fairly good concrete can be made from two sizes of material. A better concrete can be made by the use of three sizes, and the product will increase in strength and decrease in absorption accordingly as the number of sizes of sand and gravel are increased—and properly proportioned.

Thus, by means of tests made upon samples of the material it is proposed to use for concrete, it may be readily determined what other kinds of sand and gravel may be mixed therewith, and in what proportions, to improve the resulting concrete and to save cement. It is safe to predict that within a very few years sand and gravel intended for concrete will be separated into several sizes or grades and then recombined for concrete in the proportions which give the greatest strength, the least absorption, and requires the least cement to obtain maximum strength. Indeed, a series of factories, covering the entire field of block making, has been designed by a well-known maker of concrete block machinery, and the above-noted separation and grading of the concrete material is provided for by means of automatic labor-saving machinery, which reduces the cost of separating the several sizes to a nominal cost which is almost negligible.

High Grade Work

With the brief preface given above, the writer wishes to pass by the making of good concrete blocks for the present, and to demonstrate some of the high-grade work which is now being executed in concrete block work. It has been shown that both technical knowledge and experience is necessary for making good blocks, notwithstanding published statements to the contrary. Likewise it is found necessary to have a certain degree of knowledge and experience in order to build a good structure of concrete blocks. The man who never saw a truss roof might design and construct one which would serve his purpose if it did not fall down, but it is safe to say that it would look so wretched that the sparrows would not build their nests under it. With experience and certain knowledge, this man could build a better truss roof and a much better looking one.

Let no more, therefore, be heard regarding "experience not necessary" in building concrete block structures or concrete blocks. The more experience and technical knowledge the better, and a high degree of skill is just as valuable when building with concrete blocks as with front or face bricks, or with cut stone! It is assumed that the architect has settled the matter of what kind of blocks shall be used, and he has also designed the structure to concrete blocks. Never make the error of trying to imitate some other form of construction with blocks. It is detrimental, every time. Let the concrete block stand upon its own individuality every time; then the building will look well. Try to imitate something, and it "looks like thunder."

Avoid Rock-Faced Blocks

In line with the above, avoid "rock-faced" blocks as you would a pestilence. To begin with, the rock-faced stone is only left in that shape to save the expense of cutting. Why, then, should we, in making a concrete block, go out of our way to imitate the cheapest form of finished masonry? It is easier and cheaper to make a plain-faced block than it is to make a rock-faced one, and this is a strong argument against that monstrosity

* Engineer for the Ideal Concrete Machinery Company.

even if the appearance of the block is to be left out of the discussion.

The half-tone engravings, Figs. 1, 2 and 3, presented herewith, illustrate this point very forcibly. Built largely of rock-faced blocks, the structures look well in spite of the rock facing, but note in Fig. 3 the richness and massive effect which have been lost by not using tooled or peck-faced blocks! The water table, the window sills and lower story cap course, the corner-course blocks and the lower member of the cornice all emphasize the loss in artistic effect caused by employing rock-faced blocks for the body of the building.

Some Thoughts on Concrete Block Construction. Fig. 1.—A Suburban Semi-Bungalow Built of Rock-Faced Blocks at Cary Station, Ill.

The same is true of Fig. 2 The plain window sills, water table and piazza floor and columns just "save the life" of this fine residence and indicate very forcibly the splendid possibilities of plain, tool-faced or bevel-edged blocks. The value of plain work is forcibly apparent when the piazza or porch columns are compared with those shown by Fig. 1. It is plainly evident that the rock-faced block is not "in it" with the dressed-face block or the tooled column. How much more pleasing would have been the appearance of this fine little "Suburban Semi-Bungalow" had the porch railing and cap been carried through unbroken and tooled monolithic—or even sectional columns used instead of the cumbersome rock-face posts!

The rock-faced block costs more than the tooled-faced block because there is required to make it more cement, more aggregate, and more labor than in the plain or tooled-faced block. All the projecting material requires concrete, and a very considerable amount of it will be contained in the facing of 1000 or 2000 blocks.

Fig. 2.—An Impressive Two-Story Dwelling of Concrete Blocks and Monolithic Porch Columns at Carlinville, Ill.

While a man can turn out on a machine, by hand, from 200 to 250 blocks, he cannot make more than 180 rock-faced in the same length of working time.

It is extremely desirable that the surface of a block-constructed building be broken up as much as possible in order to destroy the monotony of the surface. The rock-face block adds to the monotony and requires double the "breaking-up." But take great care *not* to break the monotony of a surface with large mortar joints. In all block work the joint should be made as inconspicuous as possible. No mortar joint should be more than one-fourth of an inch thick. The color of the mortar should also be such as to hide the joint as much as possible.

In laying blocks, they should be placed with great accuracy. The least tip of a block, so as to bring one portion of the joint thick, the other portion thin, is fatal to a good appearance. It can be seen for a great distance and is very objectionable. The exact alignment of the blocks is another feature which must receive close attention. One end of a block projecting inward or outward, even for a very slight distance, becomes visible with startling distinctness and great care is necessary not to "break the monotony" of a wall by such irregularities in block laying.

Contrast the appearance of the wall surface in Figs. 2 and 3. The former has very prominent mortar joints, while in Fig. 3 the joints are practically invisible. Nobody can complain of sameness as regards that house front, yet, as impressive as it is, it could be greatly improved by the elimination of rock-faced blocks and the concealment of the mortar joints, which are very prominent, probably by the use of a strong color contrast in the mortar. When the rock imitations are replaced by tooled or peck-faced blocks, the ever-recurring similar bunches of concrete are replaced by a surface which is broken up from a dead flat by the grooves or indentions which reflect the light at different angles, and have the effect of ridding the blocks of the glaring appearance seen in the two belt courses in Fig. 3.

Fig. 3.—A Two-Story Country Home of Concrete Blocks, Built at Silvis, Ill.

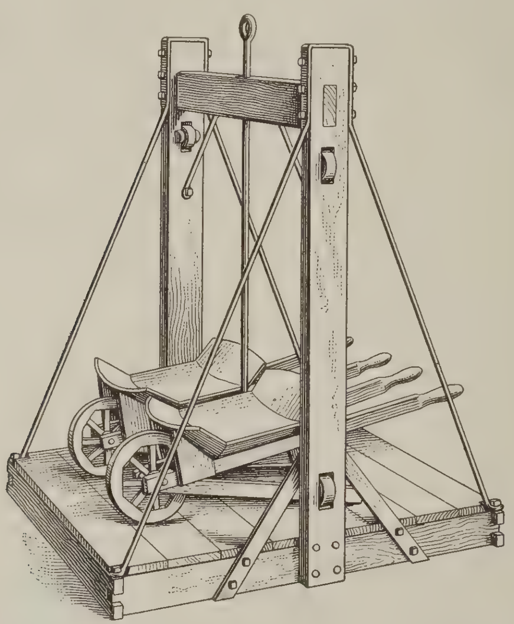
Note the manner in which the porch column bases are built up in Fig. 2. Certainly there is no sameness there, and it indicates slightly the possibilities in breaking up the surface of a wall by the use of different lengths and thicknesses of blocks. The wall expanse in Fig. 3 could have been broken up in a very satisfactory manner by the use of blocks of different thicknesses, thereby giving on a much more elaborate scale the effect shown in the porch column bases of Fig. 2.

Fig. 3, showing the cheapest and plainest of cottage construction, presents the monotony-breaking effect of a different face for the corners and a couple of belt courses, and indicated slightly what the magnificent effect would have been were the body of the wall, between the plain corners, filled in with plain or tooled ashlar blocks of several sizes and shapes.

In another article the writer desires to discuss some of the constructive problems met with in building houses of the types represented by Figs. 1 and 2, for these are many, varied and most interesting.

OPERATING HOD HOISTERS AND CODE OF SIGNALS

ONE of the most important auxiliary appliances necessary to modern building construction, especially in connection with work which is being done in the cities and larger towns of the country, where the buildings generally rise to a hight of several stories, is the "hod hoisters," by means of which materials and men are conveyed from street and lower levels to the upper floors; yet, strange to say, no one so far as the writer can recall has ever recorded or described the method of their working. It is therefore with a view to



Operating Hod Hoisters and Code of Signals. Fig. 1.—General view of platform car with two wheelbarrows.

affording the readers some slight conception of how the hod hoisters mechanically and accurately fulfill their functions daily, especially in the case of high buildings, where carrying the hod up many stories of ladders would be altogether out of the question, that we present the accompanying illustrations.

Referring to Fig. 1, we show the car as it is usually designated, which runs up and down or, rather, is hoisted and lowered between vertical ways or runways of 2 x 4-in. scantling placed end to end, cleated and braced and set parallel and plumb from top to bottom, as clearly indicated in Figs. 2 and 3. The former picture shows the car about to start and loaded with 3 hods containing brick and mortar. This sketch also shows the runways or verticals in position as well as the general construction.

The elevator or car is suspended on a wire rope and the engineer locates the several hights of floors by either chalking the rope to stop at certain points on his winding drum, or tying a piece of ribbon or rope strand around it at a fixed point. When hoisting, this strand or chalk mark comes down and round to a fixed point and then the engineer knows that the elevator has arrived at the floor desired.

The signals are conveyed to the engineer by a gong worked by a cord carried down from the highest floor, to which the elevator is equipped and the orders are transmitted by the following code, which is almost universal in the building trades:

1 bell means to "hoist up."

2 bells means "lower down."

3 bells means "lower slowly with care"—man, men or dangerous materials on elevator.

4 bells means "stop."

5 bells means "strike bell to stop at number of intermediate floors from 1 to 47."

In Fig. 4 is represented a specimen of guard railing around hod hoister openings or wells in floors. It should be remarked that these must never be left unprotected and the word "DANGER" in red letters on a board should be nailed to the runways at the several floors. It is nowadays comparatively safe to ride on hod hoisters, although the risk still remains for any one who does so.

A Church Roof of Reinforced Concrete

Apropos of the article which appeared in a recent issue descriptive of a church dome of concrete slab construction, it is interesting to note that Glasgow, Scotland, has just completed a church roof of reinforced concrete, it being the first example of its kind in that city.

In plan the church is of the usual cruciform shape, and the building is faced with red freestone in the classic style, the reinforced concrete roof work being carried on the main walls. The roofs over the nave, transepts and apse are in the form of semi-circular arches, the nave roof having a clear span of 44 ft. 6 in. and a length of 65 ft. The nave roof is supported on arch ribs, reinforced in such a manner as to take the whole of the stress due to thrust without putting any thrust on the side walls, where the load is vertical. The ribs carry a 4½-in. slab forming the roof covering, this slab being reinforced with expanded steel.

There are two four-light cupolas in this roof, which act also as ventilators. The roofs over the transepts and apse are of somewhat similar construction but of smaller span.

Three of the main arches carrying the large central dome are of brickwork. The central dome, which is

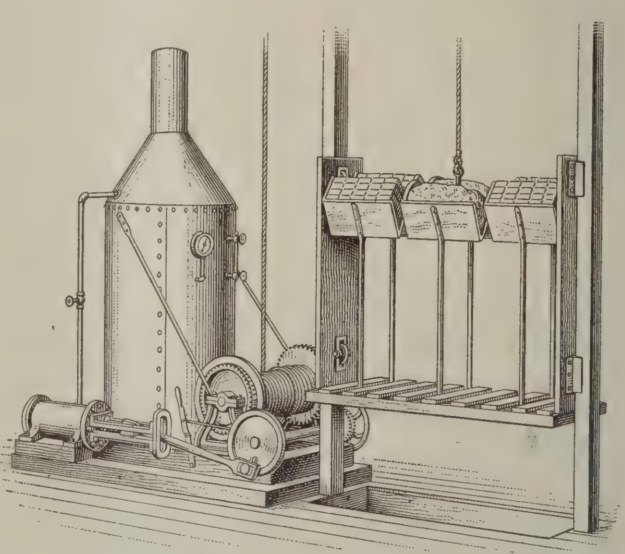


Fig. 2.—Device for hoisting brick and mortar.

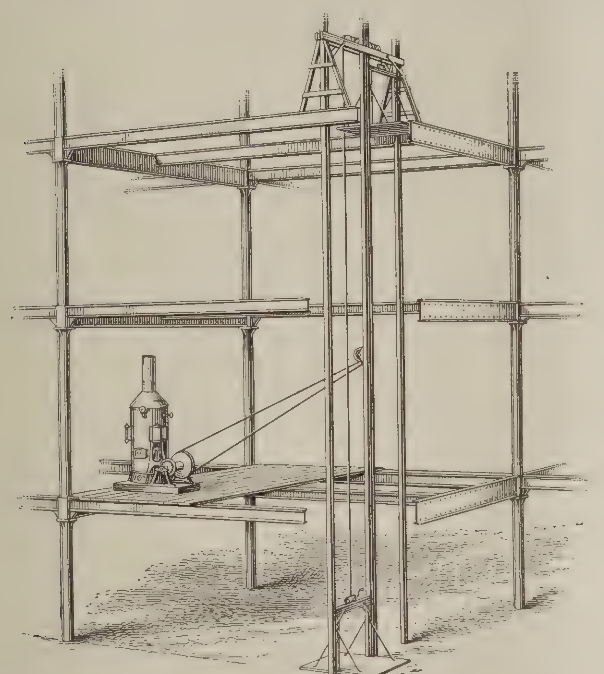
44 ft. by 34 ft. 3 in., has a radius of 29 ft. 6 in. for the first portion and a radius of 21 ft. for the upper portion or dome proper. There are eight large lights in this dome.

The concrete in the dome is generally 9 in. thick throughout, reinforced with expanded steel and circumferential round steel rod rings.

The reinforced concrete work was carried out by the Expanded Metal Company, of London, under the supervision of Architect Charles J. Menart, of Glasgow.

Three-Family Houses to be "Dwellings."

Efforts have recently been made by the building interests in the Borough of the Bronx, New York, to change the legal classification of buildings, so that three-family h uses will be taken out of the jurisdiction of the Tenement House Department under certain circumstances. A section of the bill recently pending in the State Legislature provides that when there is an alley way 3 ft. wide running from front to rear of these structures they are to be classed as "dwellings"



Operating Hod Hoisters and Code of Signals. Fig. 3.—View showing arrangement of double hoists in connection with a steel frame building.

and not as "tenements" in the meaning of the law. The leading builders in the Borough of the Bronx endorsed the measure, but the Tenement House Committee of the Charity Organization opposed it. The building interests claim that if three-family houses such as described in the bill could be left out of the tenement house classification there would be widespread construction of the type. In the Bronx, for example, two-family houses are becoming an economical impossibility and it is necessary that three-family houses should take the place once filled by the dwelling erected for two families. Once a man could build a house in part for himself and in part to rent out, but now in most sections of the borough the cost of doing this is too much for such a financial plan, unless there are two apartments which can be rented.

Death of Architect William G. Preston

William Gibbons Preston, the architect of many of Boston's most familiar buildings, recently died at his home in Beacon street, Brookline, Mass., in the 68th year of his age. He was born in Boston and began his career as an architect in the office of his father in 1861, having meanwhile studied in Cambridge and in Paris, where he was a student at *Ecole des Beaux Arts*.

He was the architect of a number of familiar buildings, prominent among his earlier work being the Rogers Building of the Massachusetts Institute of Technology; the building of the Boston Society of Natural History, and later he designed the building of the Massachusetts Charitable Mechanic Association; the Cadet Armory in Columbus avenue; the Boston University School of Law in Ashburton place, as well as several buildings devoted to mercantile uses. He was the architect of the 30 or more buildings of Massachusetts School for the Feeble Minded; for the Lyman School for Boys at Westboro, and the State Industrial School for Girls at Lancaster. Among the dwellings which he designed were a number of private residences in the suburbs of Boston, at Narragansett Pier and other places.

Mr. Preston was always greatly interested in matters pertaining to the beautifying of the city of Boston, was a member of the Boston Art Club, of the St. Botolph Club, was a fellow of the American Institute of Architects, and of the Boston Society of Architects.

Novel Idea for Workingmen's Homes

A special plan for building entire districts of houses for the workingman has been devised by an architect in Buenos Ayres, the novel feature being that instead of erecting the houses on the ordinary square block the architect, Professor Pierre Roveda, has used a circle which has a diameter of from 100 to 130 yards. This circle of ground is divided into 99 radial lots converging to a center. The circle is concentrically divided to form an interior avenue 4 yards broad to allow communication with the center of the circle. Each avenue leads to external sidewalks and to longitudinal and transverse streets.

In the center of the circle is a plot of 40 yards in diameter where children may be left to themselves without their parents' care, in charge of a specially designated person. In this garden a playroom, a school, a hospital, a fire station and an administration room are to be found.

Naturally this circular plot of ground leaves free four corners. In each of these four corners the professor proposes to build four chalets, such as grocery shops, dairies, haberdasheries and the like, which are intended to be carried on in a co-operative way. In each of the 99 radial plots a workingman's house is to be erected on the English plan. Professor Roveda argues for his circular arrangement that it will give continuous sunshine at all hours of the day and plenty of light and air.

An exhibit hall for devices to prevent accidents has just been engaged in the Engineering Societies' Building, 29 West Thirty-ninth street, New York City, by the American Museum of Safety. This will constitute a

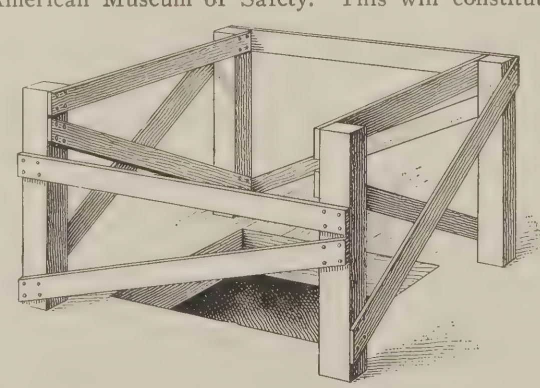


Fig. 4.—Guard rail around openings or "wells" in a floor.

permanent exhibition, free to the public, of safeguarded machines in operation, models, charts and photographs.

No exhibit will be displayed that has not been approved by the Board of Approval of Exhibits, which consists of Professor F. R. Hutton, Philip T. Dodge, Charles Kirchhoff, T. C. Martin and W. H. Tolman. All makers and inventors of safety devices, in the threefold aspect of safety for the worker, the public and the machine, are invited to exhibit.

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JUNE, 1910

New York's Latest Skyscraper

The rapidly growing colony of towering office buildings which cluster the lower end of Manhattan Island is to have an addition in the shape of a skyscraper of rather attractive construction, which, when completed, will form one of the many conspicuous objects of interest to the architect and builder visiting New York City. The new building will be unique in several respects, not the least of which is that it will express a type of architecture and not a mere pile of masonry and brick. The main section will rise to a hight of 20 stories above the curb level and will be surmounted by a tower section 80 x 80 ft. in plan and 10 stories high. There will be a roof garden on the tower which will be the "cloud garden" of the city. The floor area of the tower will be larger than any similar one in the city, the next largest being that of the Metropolitan Life Insurance Company's building facing Madison Square and which measures approximately 74 x 83 ft. The new building, which will rise only a few doors from the editorial sanctum of *The Building Age,* will have a frontage on Park Place of 173 ft. and on Broadway of 80 ft., and will cost approximately a million and a half dollars. It has been designed by architect Cass Gilbert, to be one of the finest structures in the down town district. The ground floor will be fitted for use by banking interests, while six or seven of the floors will be used as the headquarters of the owner, F. W. Woolworth, of five-and-ten-cent-store fame. The highest stories will be designed for occupancy by a club. The new building will rise upon the site of a group of five old structures, the demolition of which will doubtless commence early in August, present leases expiring about that time. This new building and the one which the city is erecting near the Brooklyn Bridge terminal are diagonally opposite the City Hall Park, and the operations suggest the type of improvements which will doubtless eventually surround the park.

Trade Schools in Reformatory Institutions

The modern industrial school as a central feature of the institutional experience of boys who have transgressed the criminal laws has been suggested as combining a new source of supply of skilled mechanics, with a most wholesome influence in the process of reformation. Thus far the excellent work that has been done in improving the conditions which surround young offenders during their terms of imprisonment has been largely accomplished by capable penologists, including the practical men who have immediate charge of the institutions. It is recognized that during the period of his restraint the lad should be kept well occupied in the schoolroom and in some useful employment besides being directed wholesomely in his recreation. Work on the institution farm is frequently adopted, and the manual training idea has been taken up to some extent. Certain trades have been taught, usually of the simpler sort. But the installation of a modern, well-equipped school for thorough practical training, with competent instructors, is almost, if not altogether, unknown in such institutions. It is believed, however, that a considerable percentage of boys of this class, trained under a restraint that would insure application, would become efficient workmen.

How Boys Become Good Mechanics

The usual system is to make the term of confinement indeterminate. Good behavior counts for a great deal in this connection and serves as the incentive to do well in the schoolroom, as it would in the shop, in the beginning of the term. It takes no deep study of boy nature to realize that a lad soon becomes interested in most labor which requires the skilled use of his hands. He likes to work with tools. It becomes recreation for him. While some are lacking in the mechanical bent, and a certain number of every group of boys would prove unfitted for skilled shop work, even for these there are occupations in which they can be made useful. With the present demand for mechanics, which is steadily growing, there would be little difficulty in a boy, who had been qualified by practical training, finding employment in his chosen occupation when released from the institution. The suggestion has possibilities of value. Abnormal traits would remain with some boys, and these perhaps would retrograde; but the chances of permanent reform for most of them would be many times greater than if they were left to learn, after their discharge, how to earn a living. The several States could well afford the cost of the system, not only because it would help to better social conditions as a whole, but for the same reasons that cause the establishment of the industrial schools of the cities.

Lumber Manufacturers' Association

At the eighth annual convention of the National Lumber Manufacturers' Association held in the city of New Orleans, La., in April, the following officers for the ensuing year were elected: President, Edward Hines; vice-presidents, E. G. Griggs, W. B. Stillwell, R. H. Downman and R. H. Vansant; treasurer, J. A. Freeman.

Sundry interesting papers relative to forestry and the lumber business were presented and discussed and an elaborate banquet was held at the Grunewald Hotel on the evening of the day following the business session.

New York's New Post Office

The new Post Office Building, which has a frontage of 375 ft. on Seventh avenue and 333 ft. on Thirty-first and Thirty-third streets, New York City, just west of the new Pennsylvania Railroad station, has many interesting structural features.

The tracks leading from the two Pennsylvania tunnels under the Hudson River fan out and 22 of them pass under the building. This necessitated a special spacing of the columns to the first, or basement, floor, on the girders of which rest the building columns. The former are of two 15-in. 55-lb. channels, with 18 x ¾-in. cover plates, although those carrying exceptionally heavy loads have several cover plates reinforced with angles. The largest column has two 15-in. 55-lb. channels, with six 18 x ¾-in. cover plates (three on each side, with an additional 11 x ¾-in. plate on each), a ¾-in. plate on both sides of the channel web, two 6 x 4 x 13/16-in angles on the inside cover plates, and a diaphragm consisting of an 8 x ¾-in. plate to which is riveted four 6 x 4 x 13/16-in. angles connecting it to the channels. This column is designed to carry a load of 2,000,000 lb.

The columns described above support the girders for the basement floor. The girders running north and south are 9 ft. deep, spaced approximately 20 ft. apart, with varying spans, the longest being 79 ft. There are several that weigh 75 tons apiece, but the heaviest is 86 tons. This monster girder required a truck with 40 horses to haul it. The greatest end shear is estimated at 2,000,000 lb. Between the 9-ft. girders, extending east and west, are others 7 ft. 10½ in. deep for the building columns.

Twenty feet above the basement floor is the workroom for the post office employees. The workroom is a large open space 160 x 225 ft., free from any columns, the roof being supported by trusses. In the court walls are trusses 8 ft. deep, with 50-ft. span, built up of two latticed girders. Supporting the trusses are 3 x 3-ft. columns (five in the north and south walls respectively and two in the east and west walls), in which are ladders. These special trusses and columns are for inspection purposes, for from the former a complete view of the men working in the court may be obtained. An inspector can climb up unseen from the track floor through the 3 x 3-ft. columns to the trusses, through which he can walk and watch the men below.

Although the building will be only five stories high, yet 9240 tons of steel were required up to the basement floor and 9000 tons above, making a total of 18,240 tons. Open hearth steel was used, which on analysis had 0.25 per cent. carbon, 0.40 per cent. manganese and 0.02 per cent. phosphorus.

McKim, Mead & White, New York, are the architects, and Gunwald Aus is the consulting engineer for the steel work, assisted by S. F. Holtzman. The Pennsylvania Steel Company is furnishing the steel for the structure up to the ground level, and has given a part of the work consisting of the heavier sections to the Eastern Steel Company.

Some Rulings by the New York City Building Bureau

Some special orders relating to features of construction have recently been promulgated by Superintendent of Buildings Rudolph P. Miller, of the Borough of Manhattan, N. Y., among which mention may be made of the following:

In regard to the framing of wood floors, it is ruled that in non-fireproof buildings where the header beams are made double and the tail beams framed into them, the two beams forming the header shall in all cases be securely bolted together, with not less than three ⅝-in. bolts per linear foot of span; or, in lieu of the above, bridle irons may be used to support the tail beams, provided the bridle irons carry over so as to have a support on both beams. In cases where the header beams are single, the connection of the tail beams to them shall be by means of bridle irons, or else the header shall be of extra thickness to allow for the material cut away in framing. The method of supporting the tail beams by abutting the latter against the header and spiking must not be permitted.

In fireproof construction, where the space between the beams is filled in with hollow-tile arches of hard burnt clay or porous terra cotta, the joints shall be solidly filled with cement mortar and the arch so constructed that the key-block shall always fall in the central portion of the arch. The keying of arches by means of broken key-blocks, pieces of broken terra cotta, mortar or slate is prohibited.

In fireproof buildings fireproof construction will not be required for the floors of galleries which are not more than 6 ft. wide and the area of which does not exceed 10 per cent. of the floor area within the partitions enclosing the room in which the gallery is placed, provided, however, that the structural parts of the entire gallery construction shall be of incombustible materials.

Officers of Building Material Exchange

The twenty-ninth annual meeting of the Building Material Exchange was recently held at its headquarters, 20 Vesey street, Borough of Manhattan, New York City. After listening to the report of past-President Frank E. Wise, and the report of the treasurer, officers and trustees for the ensuing year were chosen. The officers are: President, Uriah F. Washburn; vice-president, W. B. DuBois; treasurer, William C. Morton.

The latest improvement for which plans have been filed for that section of Fourth avenue which lies between Fourteenth and Twenty-third streets, Borough of Manhattan, N. Y., is the 20-story structure to cost one million dollars to be erected on the northeast corner of the avenue named and Seventeenth street. It will have a frontage in Fourth avenue of 80 ft. and a depth of 115 ft. It will be French Renaissance design, with a tall mansard containing the four upper floors. The structure will be of brick, stone and steel and will be erected for the Germania Life Insurance Company.

CORRESPONDENCE

Design for a Five-Room Bungalow

From Henry T. Gates, Spokane, Wash.—The cottage of which I send a plan and photograph may be of some interest to the correspondent who made inquiry in the March issue for a design suitable for a five-room bungalow. I have built this house with some modifications several times here in Spokane and it may meet the requirements of the correspondent in question. The building has a concrete foundation consisting, below grade, of monolithic construction and above grade of two courses of cement blocks.

The shingled base extends about 1 ft. below the joists of the first story and up to the line of the window sills. The shingles are laid in double courses, with 1½-in. and 7½-in. exposure. The walls are sided with 4-in. beveled siding to the frieze line.

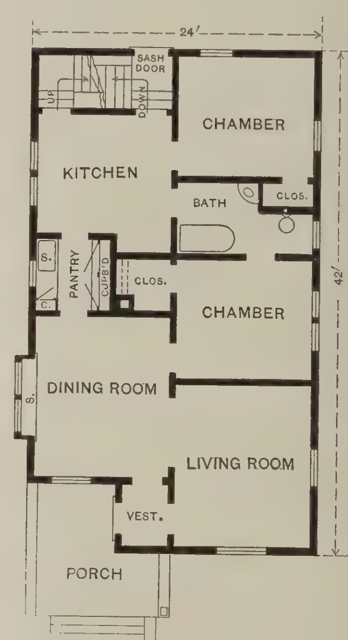
The interior is finished with slash grain fir stained a light brown and wiped off, after which it has two coats of hard oil. The floors throughout the bungalow are of 1 x 4-in. strips vertical grain fir.

There are several good points in connection with this design which I consider worthy of mention. The sink in the pantry saves many steps daily in washing dishes and putting them away. The pantry is convenient to both the kitchen and dining room. The bedrooms are convenient to the bath room, which is warm, owing to its proximity to the kitchen and also to the placing of the hot-water boiler there.

The back door at grade is handy to the cellar as well as the kitchen. The dormer at the back gives head room for the attic stairs and serves as a water shed, preventing the eaves from dripping from the doorway.

The vestibule protects from the cold winds in winter and makes both living room and dining room accessible to the front door, besides keeping both rooms cleaner and freer from dust. The rooms are a comfortable size—not too large for a moderate family nor too small for comfort. The plan I think will readily be understood by any practical builder.

View of Bungalow as Reproduced from a Photograph.



Floor Plan—Scale, 1/16 In. to the Foot.

Design for a Five-Room Bungalow.—Submitted by Henry T. Gates, Spokane, Wash.

Questions in Barn Construction

From J. E. D., Milton, Iowa.—I come to the Correspondence columns for information, trusting that some of my brother readers who have had more experience on the subject will make reply. I would like to know what is the best hight to place the joist of the hay loft above the horse floor in constructing a barn? Some people say 7 ft. 6 in. is enough; some say it should be 8 ft.; others claim that 8 ft. 6 in. is the correct, and still others advocate 9 ft. I want plenty of head room for the horses after the gutters have been put in to support the joist.

How wide should a double stall be made, and how wide a single stall? How far should the stalls be placed from the outside of the barn, so that the horses have plenty of traveling space to where the stall posts set?

What is the best length for horse room from outside of barn to outside of manger? Some claim that 12 ft. is plenty, others that it should not be less than 14 ft.

How wide should a manger be at the bottom and how wide at the top? What should be the distance from the barn floor to the top of the manger?

What is the best width and hight for a horse door?

What is the best way to put in stanchions, etc.?

I consider this a good subject to talk about, as I am sure a discussion of such questions as these would benefit a number of the readers and prove much more satisfactory than working out puzzles.

Cement Plastering on Wood Lath

From J. L. P., Waupun, Wis.—Will some of the many practical readers of the paper give me specific information as to the proper manner of applying outside cement plastering on wooden lath for "slap-dash" finish? What is the correct width of lath that should be used? What proportions of cement plaster, and how is it applied?

Note.—In previous volumes of the paper this topic has been discussed at considerable length, but as the custom among builders differs in various sections of the country, we shall be very glad to have practical readers express their views as to the practice which prevails in their respective sections.

Cleaning a Grindstone

From C. P. S., Rochester, N. Y.—In answer to the question in the Correspondence columns of the May issue, propounded by "J. H.," Jersey City, N. J., I will give him a method which has proven itself to be the best, of which I have knowledge, to remove the steel coating from a grindstone and make it take hold of any tool. When the stone is in motion, take a short piece of gas pipe that can be easily handled and apply the end of the pipe to the stone, turning the pipe at the same time with the hand and rolling it, so to speak, from one side of the face of the stone to the other. The pipe should be held a little out of square with the face of the stone and the stone should be turned from, instead of toward, you when holding the pipe. If the correspondent in question will try this method I am sure he will accomplish what he desires.

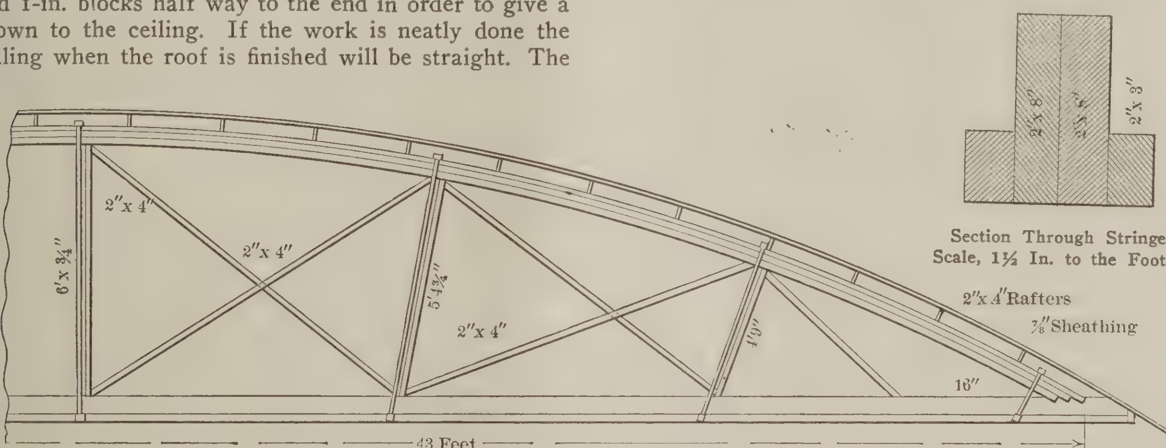
Roof Truss for a Garage

From D. A. Clark, Milford Center, Ohio.—Last summer I built a roof truss for a town hall in this place and, thinking it may possibly be of interest to " C. C. H.," Brookville, Pa., I am sending a sketch of it. I am inclined to the opinion that any ordinary carpenter will understand the method of building the truss from a careful study of the drawing and therefore I am giving somewhat brief particulars.

The trusses can be built on the lower joist and raised into position by means of a derrick. Put the stringers on some level place with a 2-in. block under the middle and 1-in. blocks half way to the end in order to give a crown to the ceiling. If the work is neatly done the ceiling when the roof is finished will be straight. The ceiling joists should be placed level on the wall at the ends of the building.

Each stringer is made of two pieces of 2 x 8 spiked together, and on each side at the bottom is a 2 x 3-in. piece spiked to the stringer for a joist bearer.

The sheathing in the case of the trusses as used runs from eave to eave and should be in as long lengths as possible. The truss here shown has a radius of 43 ft. I think any carpenter can do the work by laying it out to a scale of 1 in. to the foot.



Elevation of One-Half of Truss of Town Hall—Scale, ¼ In. to the Foot.

Roof Truss for a Garage.—Submitted by D. A. Clark, Milford Center, Ohio.

Cutting Bridging for Floors

From J. W. W., Fallsington, Pa.—I have been much interested in the various replies to the inquiry of "E. B." on the question of bridging. It seems to me some of them go a long way to hunt work.

When we have bridging to put in one man takes the lath—2 x 3, or whatever may be its dimensions—and laying it across the top corner of one joist pushes the end down against the next joist—not against the bottom of the joist, but up from the bottom—the thickness of the bridging material; in other words, over and above the space which will be occupied by the bridging when nailed in position.

The other man then holds his saw against the joist at the high end and saws off the piece. Another piece is then sawn between the same joist and the operation is continued across the building in less time than it would take to hunt up the square. Of course the odd joist, if any, would require a change of bevel at the first cut.

From W. F. S., Hermitage, Tenn.—My method of finding the length and cut of bridging for floors is the same as one of those illustrated in the April issue; therefore, I will not go into details concerning it at this time. The correspondent making the inquiry, however, seems to be surprised to find a contractor who cannot make cuts with the square. It is quite the contrary in my section of the country and I am surprised when I find a man who can make half a dozen cuts properly. I have worked 15 years in Nashville, a city of 150,000 people, and have also worked over a radius of 50 miles around this place, but have found only three first-class carpenters. I have had men on a job who claim to be "old, experienced hands" and yet could not read a steel square, much less use it. I do not know how it is in other parts of the country, but, according to my experience, there are mighty few carpenters in Tennessee.

I have been reading *Carpentry and Building,* now *The Building Age,* for eight years and consider it one of the most valuable papers in existence for members of the building trades. The Correspondence Department could be made more valuable if we mechanics would only do more writing and let our brother chips know something more of our experience. In my opinion the paper would not be anything if it were not for the Correspondence Depatment. Let us write more in the future and permit the good work to go on. There are some good books on the market and if the young carpenter would only buy them and read them he would profit immensely thereby. Unfortunately there are many young carpenters working at the trade who seem to think they can learn all about the business by simply seeing how other men do the work and by asking questions. I want to say to you, Mr. Cub Carpenter, if you ever make a mechanic, you will do it by carefully reading and studying books relating to the trade. Be sure you master every problem presented within the covers, say of such a work as "Hicks' Builders' Guide," and you will be worth twice the money to your employer that he is now paying you. There is no excuse for a man going uninstructed in this rapid age of the world.

Opportunities for an Ambitious Carpenter

From W. F. Gernandt, Fairbury, Neb.—In answer to the very interesting communication in the March issue of the paper contributed by "F. S. B.," White Plains, N. Y., I wish to advance the opinion that such an appeal should receive serious attention and I consider it one of the most interesting communications which has been published in your valuable paper for some time past. I am indeed sorry to learn that there are no contractors in or about White Plains who appreciate the value of a man who displays such ambition as that manifested by "F. S. B.," and I wish to state right here that if he were located in this locality he would not want for employment, but would find plenty of men who would appreciate the value of a man with the qualifications "F. S. B." claims to possess.

The very fact that a young man is willing to forego all pleasure for a chance to climb the ladder by taking up his spare moments to obtain a technical training for the benefit of his employer should attract the attention of those who might benefit by his ambition. I would say to "F. S. B." that if he desires to come West he will find reward for his ambition to the full value thereof, and we hope he will come out here and grow up with the country. Opportunities are plentiful in this western country for men of his makeup, both in the building line and in the office of the architect, and should he decide to come we will welcome him and give him every assistance that is possible and will be glad to see him engage where his efforts will be appreciated.

From P. Maxwell, Mendocino, Cal.—I am much impressed with the communication in the March number of the paper from "F. S. B.," White Plains, N. Y., and I fully agree with all he there describes. It seems to be a general fact that a man who has put in his time studying and expended money for tools should be given an opportunity to better himself, but it also seems to be a fact recognized the world over that these "basket men," as he calls them—and they are well named—always appear to be the general favorites, especially if they "shoot up" the beer to the foremen on the jobs.

I should think that contractors and builders generally would get their eyes opened and put in a little time keeping a more strict watch on some of their foremen, for I surely think they would find it to their advantage by the end of the week and there would be more work done if they would hire the ambitious men in place of the basket men.

I am 40 years of age and have gone through much the same experience as described by "F. S. B." I have been foreman on a good many jobs and for the last few years have been doing my own contracting, but I make it a practice never to hire a man or have one around me who drinks. I find that the majority of these basket men or beer punchers, or so-called mechanics, cannot, as "F. S. B." says, properly frame a rafter for an ordinary gable roof.

I would like to hear again from "F. S. B." after he has read some of the communications which will doubtless be published in reply to his strong appeal to the building contractors of the country. It would no doubt interest others as well as myself to know what course he finally decides to pursue.

From J. H., Chicago, Ill.—It is certainly refreshing to a brother craftsman to read the letters of J. Irving Maxson, Westerly, R. I.; "Hee H. See," Sacramento, Cal., and "J. S. H.," Atchison, Kan., which appeared in the Correspondence columns of the May issue of the paper. It gives a young carpenter courage and hope for the future, but, notwithstanding this, he will have many disappointing and discouraging spells, as every man in every trade has them. I have had mine and am expecting more. I am not old, yet I am past youth; have had my ups and downs and the knowledge which I possess I have gained by experience, so I know whereof I speak, which makes me think sometimes that all the time expended at the drafting table or in the pursuit of other studies has been time wasted. I have expended hundreds of dollars and uncountable hours in studying and drawing and as yet have nothing to show for it, as I am still working in the ranks.

I have time and time again seen men put up as foremen who could not make a job of anything, nor lay off a common rafter, but they were excellent slave-drivers, even if they did not have the knowledge or ability. In connection with such cases I commence to think what is the use of wasting time, paper and oil to learn the trade theoretically and practically. I have been working on jobs where the foreman was only four years working at the trade. He was neither able to file his saw nor sharpen his tools, and if some one else fixed them up for him he could not handle them, but he had a good mouth-piece.

At other places the "saw and hatchet men" had the run of the job, for the simple reason that after quitting time they took the foreman over to the saloon and treated him or brought along a bottle in the morning for him. Another place it was necessary to pay the foreman 5 cents an hour to keep your job or pay him a round sum in hand before you started. This is no dream, but hard, cold facts. "Hee H. See" says he never met this kind of man and, of course, it is very hard for him to believe it, but there are others like me who know that this is the truth, and is it then not excusable to think that study is unnecessary—all you need is a pull. Study does not pay and money is what counts in this world and in these times.

Notwithstanding all my disappointments, however, I am glad that I did study and I am studying yet, for it is necessary to know the ins and outs of the trade, and I advise every young man who desires to make progress to spend his spare time in study, for some day he will receive his reward for it. As one of the correspondents says, do not be scared of the unions, for it is not so much to keep the boys from learning a trade as it is to keep the employer from hiring all apprentices, as they are very apt to do. Then, again, some one says, do not watch the clock too much. I say be on time to commence work as well as for quitting. To keep you from 10 to 15 minutes after quitting time the boss or foreman thinks nothing, but just try to start a quarter of an hour late or quit before the regular time and then you will find that they are watching the clock and you find this out when pay day comes around. Therefore, I say to the boys, start on time and work to the best advantage of your employers. That is your duty and it is by study in your spare time that you may be able to do this even if you are not paid for it, for it gives pleasure and satisfaction to yourselves, while placing you and your craft on a higher plane. Some day it will be recognized, if not by your immediate employer, then by the public at large.

Question in Church Acoustics

From J. H. W., St. James, Mo.—I have been a reader of *The Building Age* and *Carpentry and Building* for a good many years and am always interested in the Correspondence columns, as they contain so many different ideas from different men engaged in the building business. I would like to avail myself of the invitation, which I understand is extended to all, to make use of the columns of this department for asking questions, and the one which I wish propounded may appeal to some of the readers of experience.

My question is this: Can an echo in a church building be overcome by stringing wires in the building? The room in question measures 38 x 48 ft. in area and is 20 ft. high, and, being located in the center and back portion of the building, it is difficult and almost impossible to understand the speaker on account of the echo which occurs. I want to know if wires can be stretched across the room in such a way as to remedy the difficulty. I have heard that it can be done, but am not sufficiently experienced to determine just where they should be placed or the manner. If some of the readers can give me the information, it will be greatly appreciated.

Problem in Mensuration

From R. B. Y., Philadelphia, Pa.—In reply to the request of "C. J. M.," St. Johns, N. F., in the May issue for a solution of the building lot problem, would say that mensuration alone cannot give the required distances—a slight use of trigonometry being essential. I submit the following as a correct solution based upon the assumption that the long sides are parallel, the short side 62 ft. and the angle 95 deg. at C are correct.

Referring to the accompanying diagram, Fig. 1, the line from *a* to C being a right angle the large angle at C is divided into two angles, one of which is a right angle, 90 deg., and the remainder an angle of 5 deg., consequently *a b* C is a right-angled triangle.

The altitude of a right-angled triangle or *a b* is equal to the hypotenuse multiplied by the sine of the opposite angle

$$62 \times .08716 \text{ (sine of 5 deg.)} = 5.4 \text{ ft.}$$

the distance from *a* to *b*, about 5 ft. 5 in.

From this can be found the other side of the triangle or the distance between the parallel sides

$$(62)^2 - (5.4)^2 = x^2$$

from which we derive

$$x = 61.76 \text{ ft. or } 61 \text{ ft. } 9 \text{ in.}$$

Adding the difference between the parallel sides or 2 ft. to the short side of the right-angled triangle or 5.4 ft. we get 7.4 ft. as one side of another triangle, the base of which is 61.76 ft. The hypotenuse is equal to the square root of the sum of the squares of the other two sides. Therefore

$$(61.76)^2 + (7.4)^2 = 3869.6011$$

the square root of which is

$$62.206 \text{ ft. or } 62 \text{ ft. } 2\tfrac{1}{2} \text{ in.} = \text{length at E.}$$

It is very evident that it could not be 62 ft., as one parallel side is 2 ft. longer than the other.

From S. D. S., Portsmouth, Va.—Replying to the query of "C. J. M.," I would say that the problem is one in which trigonometry must be called to our aid. Referring to Fig. 2 of the diagrams, since *b c* is at right angles with the two parallel sides, the angles *d b c*, *c b a* and *b c e* are each equal to 90 deg., then *a c b* equals 95 deg. minus 90 deg., or 5 deg.

The sine of an angle is the ratio of the hypotenuse to the perpendicular; thus in the triangle *a b c* the sine of the angle *a c b* is *a b* divided by *a c* and the sine of the angle *b a c* is *b c* divided by *a c*.

The sine of 90 deg. is 1. The sines of the angles in a right-angled triangle are to each other as the sides of the triangles opposite them. Thus, the sine of *c b a* is the sine of *a c b* as 62 is to *a b* or

$$a\,b \times 1 = 62 \times \text{sine } 5 \text{ deg.}$$

From a table of natural sines we find the sine of 5 deg. to be 0.0871557, which multiplied by 62 gives us 5.4036534 ft. or about 5 ft. 4 13/16 in. equals the side *a b*.

In a similar way the angle *b a c* = 90 deg. — 5 deg. = 85 deg.

The sine of 85 deg. is equal to 0.9961947. Multiplying this by 62 we get as a result 61.764 + or 61 ft. 9⅛ in., which equals the distance *b c*.

Since the side *c e* is 2 ft. longer than *a d* if *d f* is drawn perpendicular to the two parallel sides *f e* will be 2 ft. longer than *a b* or equal to 5.404 + 2, which equals 7.404.

If now "C. J. M." will apply the formula

$$(d\,e)^2 = (d\,f)^2 + (f\,e)^2$$

he will find that *d e* should be 62.206, which is equal to 62 ft. 2½ in., about, instead of 62 as he gives it.

From J. W. W., Fallsington, Pa.—I fear "C. J. M.," who presents a problem in mensuration in the May issue, has his dimensions wrong. Assuming the figures at the bottom of the diagram to be correct, we find by inspection that the line *a b* is the sine of an arc of 5 deg. in a radius of 62 ft. By applying the rules of trigonometry we find the length of the line *a b* to be 5 ft. 4 13/16 in. The line *b c* is 61 ft. 9 3/32 in.

The short parallel line at the top, which, however, is not parallel, is 62 ft. 2 15/32 in. long instead of 62 ft. As to laying out degrees without a good surveying instrument of some kind, I am inclined to think that "C. J. M." might just as well guess at it.

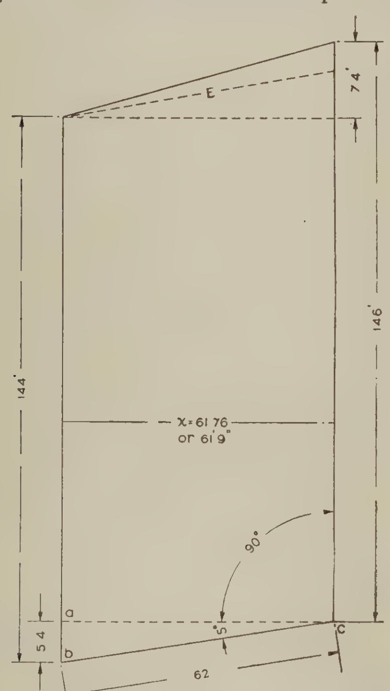


Fig. 1.—Diagram Accompanying Letter of "R. B. Y.," Philadelphia.

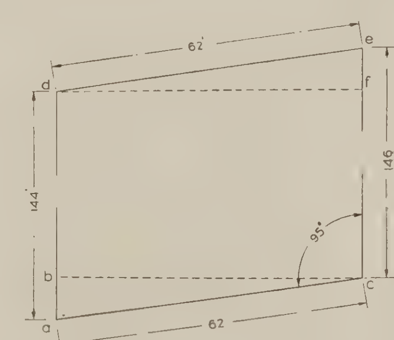


Fig. 2.—Diagram Submitted by "S. D. S.," Portsmouth, Va.

Problem in Mensuration.—Solutions Submitted by Various Correspondents.

From J. S. H., Catonsville, Md.—The problem given by "C. J. M.," of St. Johns, in the May number is not an easy one to work out by any rule of arithmetic, but it can be done by trigonometry in a very simple manner. As the dotted line at the bottom of his diagram is assumed to be perpendicular to the two given sides, the angle at *b* is a right angle or 90 deg.; the angle at C is 95 deg., the given angle, and subtracting 90 deg. from 95 deg. gives 5 deg. The angle at *a* is 90 — 5 deg., or 85 deg.

This gives us the three angles and the side *a* C (62 ft.) to find the other two sides. We then have *a b* as 5.44 ft. or about 5 ft. 5¼ in., and *b* C 61.76 or about 61 ft. 9⅛ in.

By constructing a similar triangle at the other end of the parallelogram the other angles and side at E can be determined. The line E is 0.21 ft. too short, or about 2½ in. It should be 62 ft. 2½ in. if the long sides are parallel.

Note.—Just as we go to press we have solutions similar to some of those presented above from "E. E. P.," Gloversville, N. Y.; "E. J. McL.," Calgary, Alta.; "W. T. G.," Saline, Mich., and "H. J. K.," Oakland, Cal.

Strength of Truss for Bridge Construction

From C. J. C., Troy, Pa.—I have a bridge to build, but am somewhat uncertain as to its factor of safety owing to the position in which it will rest on the piers. If some of the practical readers will help me out I shall be very thankful for the information. The main chords of the truss are built of two pieces of 6 x 14-in bolted together. Each piece is composed of one piece 36 ft. and one piece 16 ft. long, shiplap bolted and keyed splice. One of the piers is 2 ft. 10 in. higher than the other one, making the bridge 2 ft. 10 in. out of level in 50 ft. The timber is hemlock unseasoned and the bridge has to carry loads of wood, coal, grain, etc. The main features of the construction are indicated in Fig. 1 of the sketches.

Answer.—While the data furnished by the correspondent is not very complete, I think by making certain assumptions I can give him some information which may be useful; at least, for comparison. The assumptions are as follows: Width of roadway, 12 ft.; weight of floor system, 120 lbs. per lin. ft. (of truss); weight of truss, 80 lbs. per lin. ft.; uniform live load, 80 lbs. per sq. ft. of floor; rods of steel, with upset ends; bottom chord to be so detailed that at least one-half of the gross section will be available for direct stress.

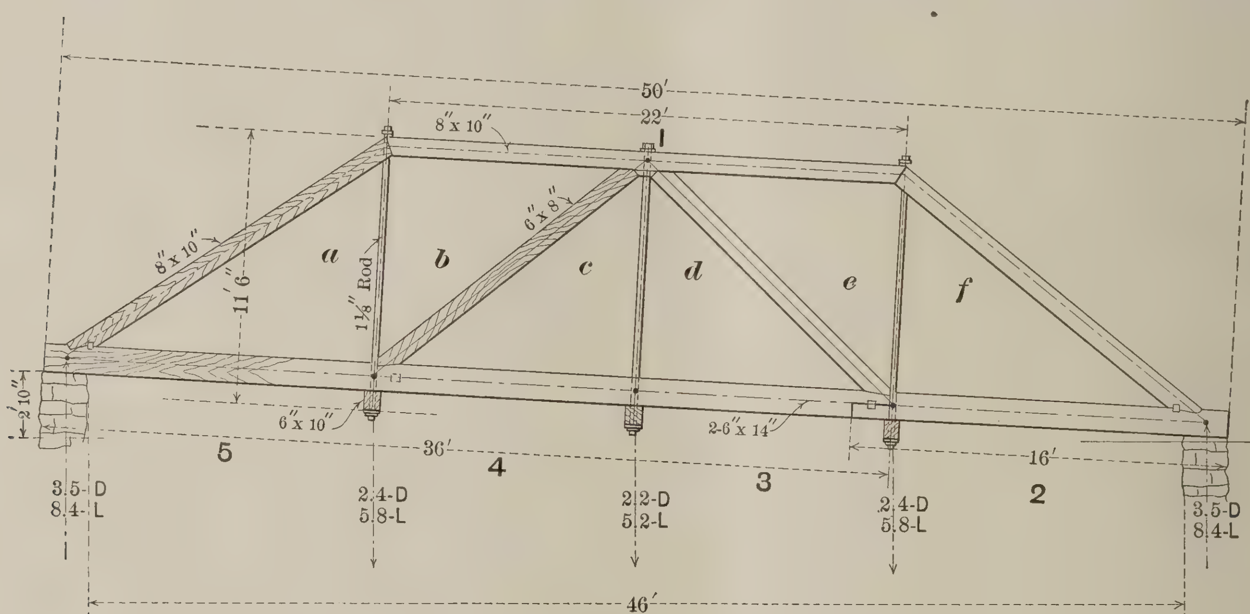


Fig. 1.—Elevation of the Truss, Showing Dimensions of Various Members—Scale, ⅛ In. to the Foot.

Strength of Truss for Bridge Construction.

On the above basis, the truss would seem sufficiently strong. It would improve the bridge, however; that is, make it stiffer under moving loads to put in counter braces, though these are often omitted in bridges of this type.

The top chord should be stayed laterally at the ends by means of slanting braces running down to the ends of the floor beams, which should project several feet beyond the truss for this purpose. The 6 x 10-in. floor beam seems entirely too small. I would suggest a 12 x 16-in. timber or equivalent, if the lumber be the same kind as the rest of the truss.

Putting the bridge on the grade specified will not affect its factor of safety to an appreciable extent. I may remark, however, that "factor of safety" is a very uncertain term, and when applied to unseasoned timbers, means almost nothing.

I am sending sketches, Figs. 1 to 4 inclusive, showing some of the details involved and which I think will be found practically self-explanatory. I would, however, call special attention to the tabulation in Fig. 5. In this the "safe stresses" are those which good practice would allow. In the case of the timbers they are supposed to be ordinarily well seasoned, containing about 18 per cent. of moisture when exposed to the weather. As these are in no case less than twice the figured stresses, there would seem to be a very good margin to allow for the unseasoned condition of the timbers.

ROBERT C. NOERR.

Inclination of Soil Pipe per Foot Run

From W. I. H., Monroe, N. Y.—I would like to ask the following question of the readers of *The Building Age:* Can a 5-in. soil pipe on a sloping grade have too much fall per foot run? It is contended by an acquaintance that if the pipe has too much fall the water will rush through with such speed that it will have a tendency to leave the solids behind; therefore the line should be stepped down and run with elbows and short inclines until the desired distance has been covered on a uniform grade of ½ in. to the foot. The claim is made that by this arrangement much better results will be achieved. Here is an opportunity for the practical experts to throw light on a subject which ought to prove interesting to many.

Position of Valley Rafters

From M. C. W., Topeka, Kan.—What follows is an answer to the inquiry of "T. K. W.," Lake Providence, La., on page 116 of the March issue of *The Building Age*. If the rafters are tied by what are commonly known as collar ties and if a brace is placed under each valley rafter in a vertical position, and as near its center as possible, the roofs may intersect at the ridge of the main roof. In such a case all four valleys are supposed to be of the same length, but if the ridges of the wings are lower than that of the main roof, then I would say allow both long rafters to be nailed to the main ridge board opposite each other and place a collar tie diagonally across from one valley rafter to the other; also place the same kind of uprights in about the same position as for the previous case.

Design for Poultry Coop

From Subscriber, Moscow, Idaho.—I greatly appreciate the discussions that are carried on through the pages of the Correspondence Department of *The Building Age,* and would like to ask for information from some of the brothers. I would like to have some of the boys who have had experience give designs of coops for poultry shows. I would like something that is light and durable of the "Knock-down" variety. It should be about 8 to 12 ft. long and have interchangeable partitions for single or double stalls. I would also

Veneering Round Columns

From G. H. W., Pleasant Ridge, Ohio.—From the statement contained in the April issue I think the trouble described by "S. A. T.," Boyne City, Mich., comes from the way he makes his caul. In the first place he should cut his tin wide enough to reach around the column and lay over about 3½ in. He should then take two strips of board 4 in. wide, lap the edges of the tin on to the boards about 2 in. and tack them there. When the caul is applied as shown in the sketch presented herewith there is very little strain on the tacks.

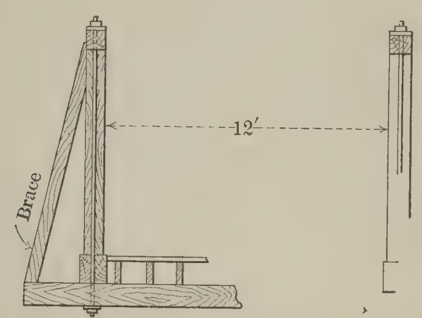


Fig. 2.—Showing Construction at the Side.

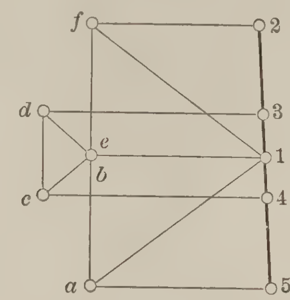


Fig. 3.—Stress Diagram—Dead Load.

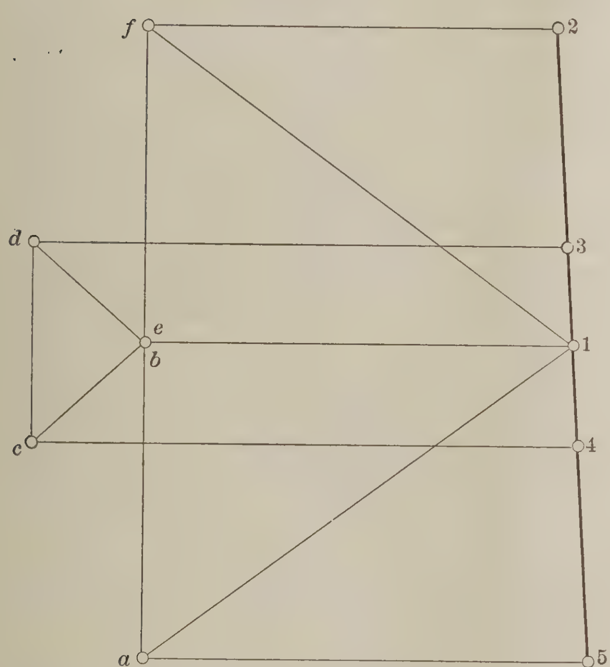


Fig. 4.—Stress Diagram, Uniform Live Load—Scale of Load and Stresses, 5000 Lbs. to the Inch.

Member	Dead Load	Uniform Live Load	Total Dead and Live	Safe Stresses
1-*a*	+ 5.7	+ 14.0	+ 19.7	+ 42.5
1-*b*	+ 4.6	+ 11.2	+ 15.8	+ 38.5
1-*e*	+ 4.6	+ 11.2	+ 15.8	+ 38.5
1-*f*	+ 5.7	+ 14.0	+ 19.7	+ 42.5
5-*a*	− 4.8	− 11.7	− 16.5	− 50.0
4-*c*	− 5.9	14.4	− 20.3	− 50.0
3-*d*	− 5.7	− 14.0	− 19.7	− 50.0
2-*f*	− 4.4	− 10.8	− 15.2	− 50.0
a-*b*	− 3.5	− 8.4	− 11.9	− 14.9
b-*c*	+ 1.7	+ 4.0	+ 5.7	+ 24.0
c-*d*	− 2.2	− 5.2	− 7.7	− 14.9
d-*e*	+ 1.7	+ 4.0	+ 5.7	+ 24.0
e-*f*	− 3.5	− 8.4	− 11.9	− 14.9

Fig. 5.—Table Showing Loads and Stresses in Fig. 1. + Indicates compression. — Indicates tension.

Strength of Truss for Bridge Construction.

like to have some information on an exhibition shipping coop. Anything on this subject will be appreciated by me and it may be of benefit to others as well.

Preventing Plaster from Cracking on Yellow Pine Lath

From H. H., Akron, Ohio.—In answer to the inquiry of "G. B. S.," Montgomery City, Mo., on page 113 of the March issue of the paper, I would say that the cracking of plaster on yellow pine lath as well as of outside plaster work on wood lath has been prevented by covering the lath previous to plastering with ¾-in. poultry netting, fastening it with small staples every 12 to 16 in. in every direction. Cement plaster work on the interior and exterior of a building done five years ago shows not a sign anywhere of a crack to-day.

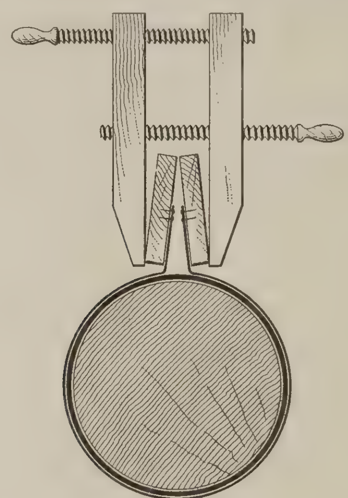
I prefer heavy canvas instead of the tin or, in fact, in place of any kind of metal. I have used tin, zinc and galvanized iron.

I have made use of cauls constructed in the manner here shown to veneer rolls only 3 in. in diameter. The veneer of oak was 1/16 in. thick, the grain running round the roll which made a pretty stiff proposition and the same caul could be used in putting on hundreds of veneers before it gave out in any way.

From C. B. M., Redlands, Cal.—In looking through the Correspondence columns for April I noticed the request of "S. A. T.," regarding the veneering of round columns, so I will give him my experience, although it relates to straight columns only. Cut the veneering so it will meet together, then apply the glue to the column, allowing it to set cold so it will not stick to the veneer. Have a 2-in. strip of webbing, such as upholsterers use in connection with furniture. Hang the column in center pins if possible, then wind the webbing around the veneer a single course; stretch tight, then apply boiling water.

Raising the Roof of a Building

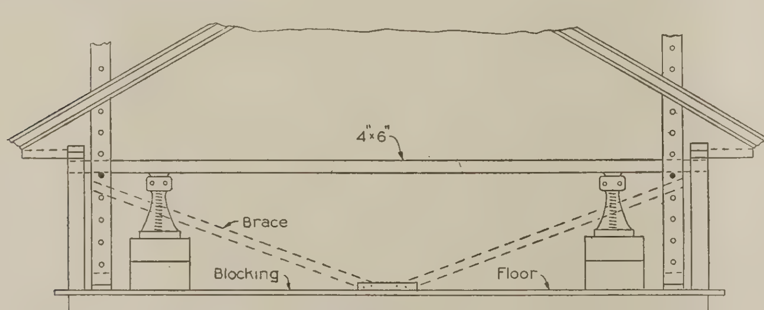
From M. L. S., Pekin, Ill.—I offer the following comments, which I trust may be of interest to the query of "J. H. B.," Caledonia, Canada, who asked for hints on raising the roof of a lean-to, so as to corre-



Veneering Round Columns.—Method Suggested by "G. H. W."

spond with that of the main building. The sketches, Figs. 1 and 2, which accompany these comments, will clearly indicate the method advocated.

The roof is first cut loose from the walls and the plates pried off from the studs, although perhaps a better method is to saw the studs about 6 in. or 8 in. below the plates. The "hoists," as they may be designated, are then placed one at each corner of the building and if the roof be very long the hoists should be set about every 8 ft. apart. A piece of 4 x 7-in. stuff is then run through from one hoist to the other and extended to the outside of the plates. A number of 1-in. holes are bored in the hoists every foot of elevation and a pin of iron is used to carry or sustain the 4 x 6-in. piece. The jacks are placed under the 4 x 6-in. piece as shown in the sketches and after everything is in place and ready for operation the screws are turned up, so that the roof is raised one hole or one foot. The pins are then inserted directly under the 4 x 6- in. piece to hold it in place while the jacks are taken out and the blocking upon which they rest built up a foot, after which the jacks are replaced and the roof raised another hole, this operation being continued until the desired hight is reached.



Raising the Roof of a Building.—Fig. 1.—Cross Section Showing the Hoisting Apparatus in Position.

This is about as safe a method as any of which I have knowledge. The hoists must be braced and the holes through the roof to admit the hoists must not be large enough to allow the roof to get away from its position. About every other ceiling joist should be spiked in place before starting, so as to tie the roof together and keep it from spreading. After the roof is raised 4 or 5 ft. the hoist braces should be placed higher up to correspond with the increased elevation of the roof. Bundles of shingles are a very good thing to use as blocking should they be handy.

What Old Subscribers Say of "Carpentry and Building" and "The Building Age."

From W. F. Gernandt, Fairbury, Neb.—As an architect I desire to state that I have been a subscriber of the paper since 1892 and fully appreciate the value of it, awaiting with anticipatory pleasure each issue as it comes from the press. I have a tender feeling for the

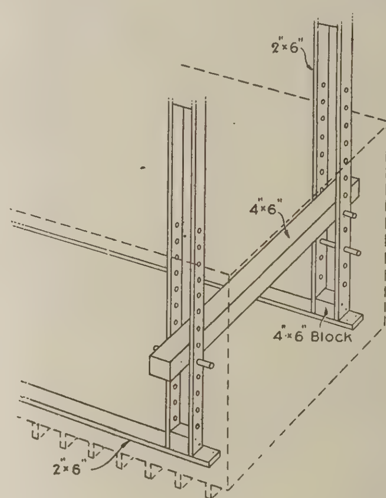


Fig. 2.—Perspective Showing the "Hoists" in Detail.

old name *Carpentry and Building;* hence, find it difficult to get used to the new name. However, the paper is the best of its kind published and I herewith extend congratulations to the editor for his untiring efforts to make each and every issue better than the previous one. I shall await with pleasure the coming issue to hear what subscribers have to say in answer to the appeal of "F. S. B."

From J. J. P., Dundee, N. Y.—Noting the many interesting letters which are appearing in the Correspondence Department from some of those who have been readers of its columns for a quarter of a century or more, I am constrained to say a few words in this connection. My subscription to *Carpentry and Building* commenced January, 1879, and I have every number from the very beginning up to the present time. I think the same can be said of an acquaintance of mine here in this place, although possibly he may be too modest to write about it. I have the numbers for the first eight years bound into four volumes, which make very nice books. The others I have on file.

In this connection it may be interesting, as showing the interest which I have taken in the paper since it started, to state that I have sent in a club list every year for the past 31 years.

From S. P. Gray, Detroit, Mich.—I have been taking *Carpentry and Building,* now known as *The Building*

Age, for about 30 years—a portion of the time from newsdealers—and in all that period have never seen a poor number. In my estimation each issue of the paper is worth the price of a year's subscription to any mechanic. I have preserved all numbers received and each year I have them bound. I would say that *Carpentry and Building* has been of more benefit to me than a long course of instruction by mail and I know others can say the same.

From C. E. H., Jamaica, N. Y.—I should like to say a word in regard to old subscribers. You will not find my name on your regular list of subscribers until a few years ago, for I used to get the paper through my newsdealer. My oldest copy is dated August, 1888. I should like to go on record as quite an old subscriber and beg to say in this connection that I like the paper very much.

From H. J. W., Phelps, N. Y.—It may be of interest to some of the younger element in the trade to know the appreciation and esteem in which we older readers hold the paper which you publish. I would say that I keep *The Building Age* on the table in my den and if I get it at night I do not go to bed until I have seen what is in it and every time I take it up I find some new thing. I live here in Phelps but work in Geneva, eight miles away, leaving home at 6.11 in the morning and returning at 7.30 p. m.—a long day, but I can always find time to read *The Building Age.*

Looking over the articles on "The Jobbing Carpenter and Some of His Work" recalls to my mind the time I was "Jobbing Carpenter" for a large contracting firm in Geneva and the jobs that showed up were a caution. When I got stuck on a job and became "fogged" on the best way to do the work, I took out my files of *Carpentry and Building* and went through them until I found something bearing on the subject. These files of the paper have saved me a great deal of worry more often than otherwise.

From A. H. Fidler, Jamestown, N. Y.—I am enclosing check for another year's subscription to *The Building Age* and permit me to say right here that while I believe in a good name, it is not the name but what is between its covers that makes *The Building Age* so valuable to me. Again, I wish the magazine the lion's share of prosperity and a long life, for, as the editor knows, it was largely due to this magazine, when known as *Carpentry and Building,* that brought me into my present successful occupation as architect.

From A. E., Hartford, Conn.—Although I am not a regular subscriber to *The Building Age,* my copies being secured through a local newsdealer and giving him the profit thereof, I wish to say a few words in regard to the paper. I have received and read every copy for the last 10 or 12 years and have always taken great interest in the paper, especially the Correspondence Department, by which I have been greatly benefited. I think the new name very appropriate.

I would say to H. J. Aurlie that I have all the copies of *Carpentry and Building* for which he inquires, but I would not like to part with them at less than many times their original cost.

From M. F. B., Waterloo, N. Y.—In one of the late issues of the paper I noticed the letter of a correspondent in which he intimated that he had taken *Carpentry and Building* so long as to be counted as one of its oldest subscribers. This prompts me to state that I have taken the paper ever since it was published, beginning with the issue for January, 1879, and have nearly every number. Some years' issues are fastened together with wire, but all are in good shape. I enclose the front cover taken from Vol. I, No. 1, which is proof of my claim.

From James H. Young, 400 Bangor Building, Cleveland, Ohio.—Your first issue of *The Building Age* shows quite an improvement over *Carpentry and Building,* both in name and contents.

From G. W. B., Cincinnati, Ohio.—Referring to the letter of "J. H. K.," Dundee, Mich., in the February number of *The Building Age* as to the oldest subscriber and who seems to think he is entitled to the "proud distinction," I beg to say that I have every number of *Carpentry and Building* from January, 1879, and have the 31 bound volumes. It should go without saying that I have been pleased with the paper and profited by it or I should have quit long ago, and there are probably hundreds of others who can say the same thing.

There are several old correspondents whom I miss from current discussions in this department of the paper, and especially "Wood Butcher." He I think it was who said he "would brush off his tool chest with a handful of shavings" and "invited Shirley Dare to a seat in the shop as a sister carpenter."

From John O'Connor, Irvington-on-Hudson, N. Y.—Under the title "Who Are the Oldest Subscribers to *Carpentry and Building?*" in the Correspondence section of the February issue, I read with interest the claim of "J. H. K.," Dundee, Mich. He, it seems to me, has surely proven himself to be an old subscriber by stating that he can produce copies of *Carpentry and Building* as far back as 1883, but I truly think "T. A. H.," whose claim I also read in the January issue, has the better record. Nevertheless, whoever may be the oldest subscriber, I would like to state that "T. A. H." and myself stand just about the same, as I have copies of *Carpentry and Building* from its very first issue in 1879; likewise of *The American Builder* dated 1874, so that "T. A. H." and myself are, I think, very evenly matched for honors if such should be bestowed.

I take this opportunity to compliment you on the value of your work, which it is needless to say is good and I wish you still greater success.

From W. H. S., Middleboro, Mass.—I have been a reader of *Carpentry and Building* for a sufficient length of time to feel that I may be numbered among the oldest subscribers to it. I have the various issues on file from Volume I., No. 1, dated January, 1879, to Volume XXXI., No. 12, inclusive, and consider *Carpentry and Building* the most valuable publication in its line that I have ever seen. When failing health and the weight of three score years and ten compelled me to retire from active participation in the building business I still continued to enjoy the pages of your publication, thinking, however, each year that I would discontinue my subscription, as old age was upon me, but each year I have enjoyed it as much as ever, so now as I am well started in my 75th year I enclose the price for *The Building Age,* recognizing an old friend under a new name.

From F. A. H., Kansas City, Mo.—I notice in recent issues that some of the readers of the paper have been boasting of being old subscribers, and I am constrained to go on record as stating that there are probably not very many who can show 28 bound volumes of *Carpentry and Building,* as I can. There is not a single number since 1882 which has not been carefully read by me, and I am willing to confess that I have profited greatly thereby. It is like an encyclopedia in the building line and one cannot very well do without it. I hope to enjoy the reading of the paper for many years to come.

CONSTRUCTION OF FACTORY FLOORS

IN a report about to be issued giving the results of its recent investigation into the subject of "Wearing Surfaces of Factory Floors," the Aberthaw Construction Company, of Boston, presents many details of theory and practice that are of interest to builders and carpenters. The investigation of the matter was undertaken in order to collect the results of wide experience under the test of actual factory and machine-shop use. More than a hundred large concerns scattered all over the northern and eastern part of the country answered the questions proposed by the Aberthaw Company, and added various suggestions from their own special experiences. The two main topics discussed were the effect of granolithic finish on the health of workmen and the relative value of granolithic and wood floors.

Of the construction and cost of these two types the report says:

General Principles

Certain general principles which apply to the matter of choosing between the granolithic and wood surface may well be stated as a preface to a more detailed discussion. A one-inch trowelled surface of cement finish can be put in place for about the cost of good quality maple top-flooring delivered on cars at the site of the work. The difference in cost between the top floor of cement and that of wood will be the cost of the underfloor, the screeds, and cinder or other fill between the screeds, plus the cost of the extra strength in columns and girders required to carry the load of the combination wood floor, which is much heavier than the one-inch granolithic finish. On the ground of first cost, therefore, the advantage is entirely with the cement floor.

The difference in cost is not merely a question of the comparative cost of laying an inch of granolithic surface and laying the maple top with its underflow and screeds. The granolithic finish ought when possible to be laid upon the floor slab while the latter is green. This is the only way, in the first place, to secure a perfect bonding between the surface finish and the slab. In the next place this uniting of the cement finish with the cement slab makes the finish so completely an integral part of the floor slab that it bears part of the compression strains in the floor structure, and by this fact permits of the use of a much lighter slab than is required for a wood top. The importance of this fact in self-supported floors is obvious.

The Wood Floor

The wood floor, on the other hand, is absolutely dead load so far as the concrete floor-slab underneath it is concerned. The weight of screeds; of cinder or concrete fill between the screeds and not forming structurally a part of the floor-slab; and of the two or three inches of plank in the underfloor, plus the ⅞ in. maple overlay reaches a much higher total figure than might be supposed by any one who has not gone into the engineering side of the matter. Wherever, therefore, a wood finish is used on top of a cement floor, a considerable increase in the strength of columns, girders and floor-slabs is needed for the dead load of the wood floor in excess of the strength that would be required for the granolithic finish. It should be clear, therefore, that the wood top floor in the concrete mill or factory means a higher cost per square foot or cubic foot for the whole structure.

Aside from the desirability of laying the granolithic surface on the wet floor slab, there is also required for the satisfactory cement surface proper choice of aggregate, proper proportioning and proper manipulation. To give good service the aggregate must be a hard, tough stone. Many stones that are hard are so brittle that they crack under a slight blow, and will come out from the cement leaving a pocket which becomes a center for further breaking down. Sand is objectionable because brittle. Proper manipulation of the cement, aggregate and water which go to make up the granolithic finish is difficult to secure, and it has been one of the problems of the Aberthaw Company's own work to get its men trained to the efficient handling of this material. This company has found that the best result is obtained with a finishing mixture that is rather dry—wet enough to make a good bond with the green floor-slab underneath, but dry enough so that prolonged trowelling is required to secure a film of water on the surface. The trowel, in its contact with the aggregate, should arrange the pieces of stone so that they lie with flat surfaces uppermost, thus providing a good wearing surface. It is difficult to get the ordinary concrete workman to trowel a cement finish with the care that is necessary. Good wearing quality requires that the aggregate in the finish shall be worked into an absolutely perfect bond with the cement; and angular aggregates set in a thin layer of cement form a material that the average workman does not enjoy working over. When the granolithic finish is completed the aggregate should show on the surface in innumerable points or flat surfaces with the solid cement between. These points and surfaces of the aggregate, if they are of properly hard, tough material, will take the greater part of the heavy wear on the surface, protecting the mortar to a large degree from the effects of truck wheels, which are the cause of most serious wear.

Granolithic Finish

For granolithic finish, the company in question gives its own specifications as follows:

These specifications contemplate work in localities where tough stone is available; local conditions will govern the selection of other materials.

If the surface is to be laid upon an unset concrete base, the specifications should require that it be laid as soon after the base is in as may be, and if possible before the under concrete has set, so that the base and the finish shall bond together; otherwise the specification will apply.

Mixture of the top finish should be in the proportion of 1 part Portland cement; 1 part stone from ½ in. to the smallest size, excluding dust, and 1 part sharp sand. (No grains passing a 50 screen, the majority of sizes which will pass between a 20 and a 30 screen.) This shall be mixed to a stiff paste, just wet enough so that in trowelling the water will barely work to the surface.

Base. If old concrete, the surface shall be roughened either by sand blast, acid treatment, or other equally satisfactory method of cleaning the stones so that the mortar shall adhere to them. The under concrete shall be thoroughly wet, and shall be kept wet long enough to absorb all the water it will take up readily, thus insuring a base so wet that it will not draw water from the finish when the latter is applied. Before scrubbing the base with grout, the excess of water shall be removed so that the finish shall not become too wet.

Finish. The surface of the base shall first be scrubbed with a thin grout of pure cement rubbed in with a broom. On top of this, before the thin coat has set, a thin coat of finish, mixed as above specified, shall be troweled hard, using as much pressure as possible, and rubbing the finish hard down on to the roughened base so that it shall take firm bond. After this, the finish shall be applied of the desired thickness, screeded, and floated to a true surface. Between the time of the initial and final set, it shall be finished by skilled workmen with the steel trowels and worked to final surface. Under no condition shall dryer be used, nor shall water be added to make the material work easily.

It is to be understood that with the mixture specified, the surface will show slightly pebbled because of the small pieces of stone. It will not be possible to get so slick a job as can be obtained by using sand alone, and this is not expected.

If the finishing is done in hot weather, the finish shall be protected from sun and wind in order to prevent too rapid setting.

For a wood top laid on tar concrete base, the following is the chief part of the specifications by Lockwood, Greene & Co., architects, of Boston:

Tar Concrete Base. Lay a tar concrete base to support plank sub-floor. The surface of the ground to receive concrete to be well rolled to a true level before laying the concrete. Where filling is required, it must be tamped and puddled thoroughly. A layer 4½ in. deep of concrete shall be put down, composed and laid as follows:

First—A layer 3 in. thick of coarse screened gravel, thoroughly mixed with tar and rolled down to a hard, level surface.

Second—A layer of pea gravel screened and well mixed with coal tar, to fill up spaces between and to be again well rolled, making both layers 3½ in. thick, with a hard surface.

On this bed spread top dressing, consisting of sand HEATED and thoroughly mixed with the coal tar and pitch (one part pitch and three parts tar). To be mixed together until the sand is completely covered, making a homogeneous mass. Spread the top dressing 1½ in. thick over the whole surface, using a 1½-in. plank as a gauge and levelling off even with top of same. This to be rolled to a level surface, 1 in. thick, ready for receiving floor plank, which is to be bedded on the top dressing before hardening.

Plank Sub-Floor. The floor plank where supported on concrete to be of sound hemlock, 3 in. thick, planed on one side to an even thickness and edges jointed, so that each plank is the same width its entire length. To be laid level on concrete, following closely after top dressing of concrete is laid, before hardening, that the plank may be bedded on it. To run *across* the building, butted and toe-nailed with 4-in. wire nails. This plank is not to exceed three different widths in the entire lot and not over 10 in. wide.

For wood top locked to concrete floor slabs, the following is the chief part of specifications by F. W. Dean, mill engineer and architect, of Boston:

Two inch by three inch beveled edge planed sleepers shall be built into the concrete in the following manner:

The Concrete Floor shall be brought up to within 2 in. of its ultimate thickness. The sleepers will then be accurately placed in parallel lines 18 in. apart and running at right angles to the girders. The concrete should then be poured between the sleepers, using them as screeds in leveling the top surface. Care must be taken to see that the sleepers are thoroughly imbedded in the concrete without any voids. On top of the sleepers and at right angles to them shall be spiked square edged plank surfaced on one side and both edges, 3 in. thick and 7 to 10 in. wide. This plank shall be tightly drawn up and nailed with two 4-in. nails at each bearing. The ends of the planks shall meet half way between the sleepers.

The maple top-flooring is laid upon the plank underfloor, at right angles.

Portable Garage of Concrete Construction

One of the latest uses to which concrete has been adapted is in the construction of portable garages. The multiplying use of the automobile has rendered desirable a form of garage construction for private use which shall reduce the fire risk to a minimum, more especially as the garage is usually placed within a very short distance of residence properties, particularly in the case of suburban sites where land is an important consideration in a building operation. The portable garage has walls of reinforced concrete slabs in sizes of 5 ft. x 1 ft. and 2½ ft. x 1 ft., with a thickness of 1½ in. The slabs have tongue and groove joints which fit together and no mortar is required. The frames of the garage are made of steel and the concrete slabs are bolted to the frame with lag screws. The roof frame is also of steel and may be covered with either copper, asbestos or corrugated galvanized iron, according to preference. The roof has an overhang of 3 in.

In the side walls are numerous glass-covered port holes for purposes of illumination and in this way the disadvantages of windows are eliminated, the light being distributed much more efficaciously than would be possible with a limited number of windows, while at the same time the fireproof idea is more definitely incorporated and the structure becomes more essentially

General View of a Private Garage of Reinforced Concrete Construction.

burglarproof. The port holes are fitted with 3-in. circular Dale lens, through which the light is diffused.

The most desirable results are secured by having a substantial concrete foundation and floor, bearing in mind the fact that good drainage is important and considering the location and piping from the gasoline storage tank, which of course will have to be buried beneath the surface outside the building.

We present herewith a picture of a portable reinforced concrete garage which attracted a great deal of attention at the show recently held in the city of Boston, where it was exhibited by the David Craig Company, 68 and 70 Broad street, Boston, Mass. The point was made that a great improvement over the ordinary concrete block construction was secured, as the slabs can be made with a much larger face and still not weigh too much for one man to handle, while the size of the face gives the appearance of solid freestone. The various parts of the frame can be put together with a monkey wrench, thus making it possible for any one of an average mechanical turn of mind to erect his own building without skilled labor. It also enables the garage to be readily taken apart, removed to any location and erected again. The doors are of either wood or metal, as may be preferred, and are glazed with 1/4-in. maize glass.

The portable concrete garage shown in the picture is 17 ft. 7 1/2 in. in length by 12 ft. 7 1/2 in. wide, outside measurement. The door opening is 8 ft. wide by 9 ft. high, and the small door shown in the right hand large one is for easy entrance to the interior.

MODERATE COST DWELLING AT OAKMONT, PA.

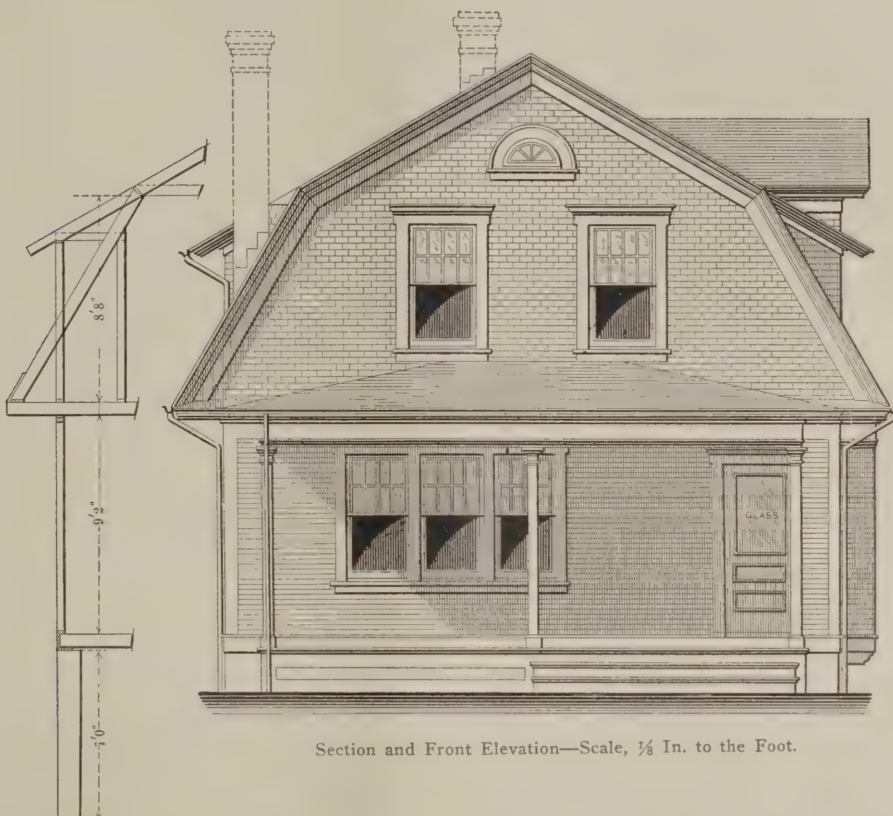
A TYPE of dwelling which always appeals to the prospective home builder in moderate circumstances is the cozy cottage of neat and attractive exterior and combining in its arrangement and equipment herewith are likely to prove interesting to many who are considering the question of building a house for their own occupancy. The half-tone engraving upon this page shows the appearance of the completed struc-

Photographic View of Cottage of Mr. F. C. Jones, at Oakmont, Pa.

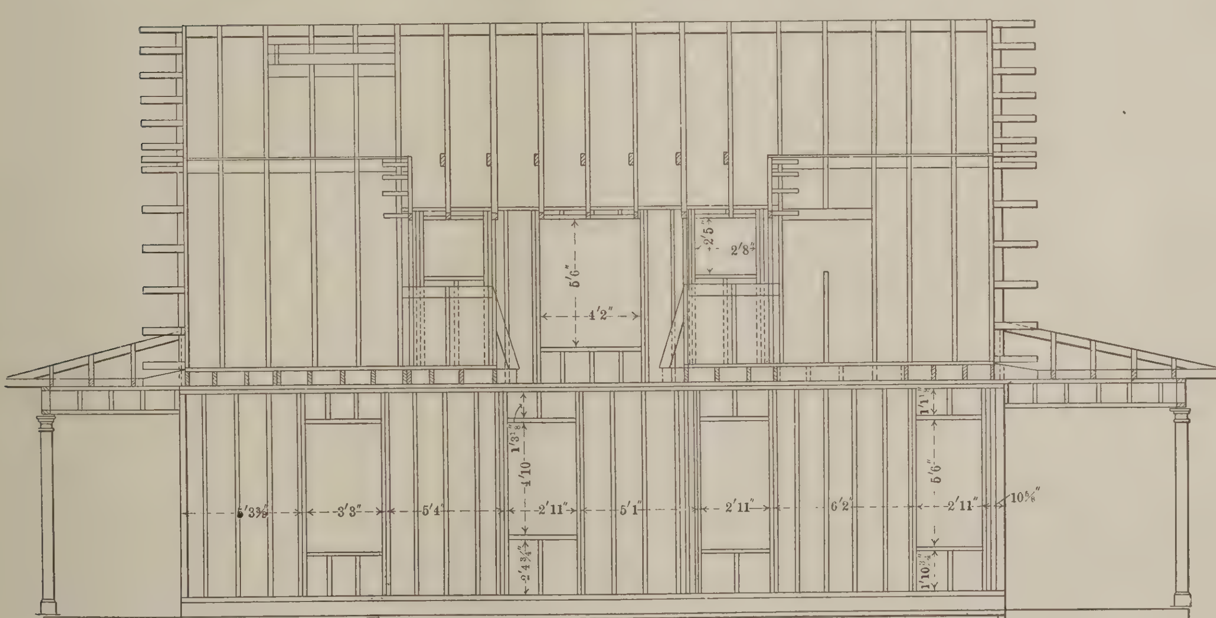
A Moderate Cost Dwelling at Oakmont, Pa.—Designed by the Architects of the Modern House Manufacturing Company, Pittsburg, Pa.

of rooms the modern features of convenience and utility. That such designs of homes are popular is strikingly demonstrated by the thousands upon thousands which are to be found scattered all over the country, especially in connection with the development of suburban property in and about the larger cities, as well as in the smaller places where land is comparatively inexpensive and the cost of materials and labor is not prohibitive. In this connection the illustrations and descriptive particulars of the cottage presented ture, while upon the pages which immediately follow are elevations and floor plans, clearly indicating the construction employed.

The dwelling rests upon foundation walls of concrete 8 in. thick, plastered on the interior as well as above grade on the exterior and marked off in squares to represent block stone. In the framing, box sills are used built up of two pieces of 2 x 8-in. material and one piece of 2 x 4 in. The posts are 6 in.; the rafters are 2 x 6-in. yellow pine; the studding is 2 x 4-in. sized, and the floor joists are 2 x 8 in. From an inspection of the half-tone picture it will be seen that the main story is covered with siding and the roof with shingles. The siding is double-half "V" No. 1 yellow pine put on with an exposure of 6 in. to the weather. The shingles are 16-in. No. 1 red cedar laid 4½ in. to the weather. The porch, which extends entirely across the front of the cottage, has three turned columns.



Section and Front Elevation—Scale, ⅛ In. to the Foot.



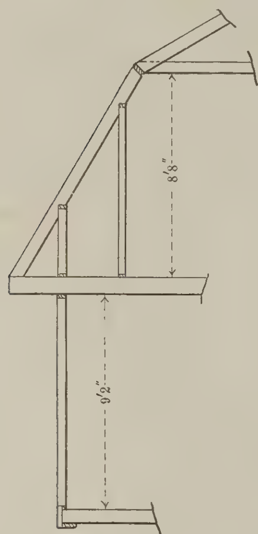
Framing Plan for Left Side Elevation—Scale, ⅛ In. to the Foot.

A Moderate Cost Dwelling at Oakmont, Pa.

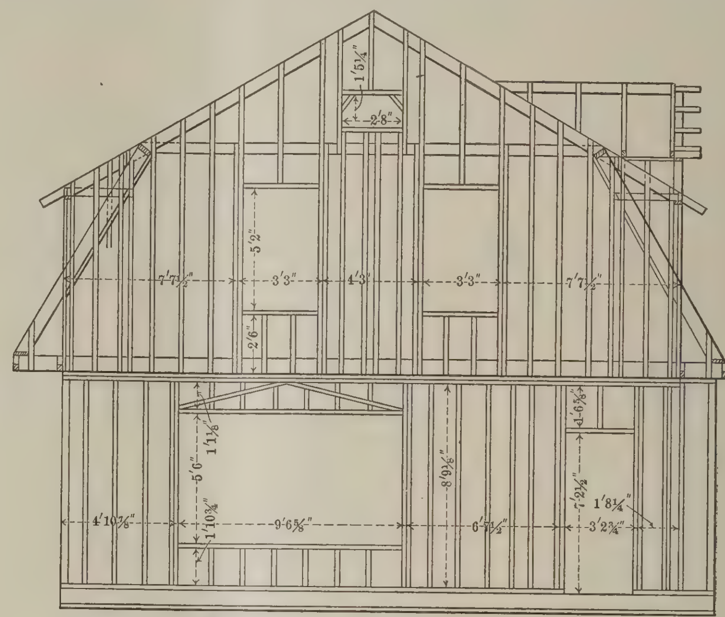
A feature of the interior arrangement is the large living room at the front lighted by a triple window looking out upon the porch and two single windows at the side. The main hall opening from the porch is lighted by a double window and beyond is the stair hall giving access to the second floor. Communication between the two halls is established by a cased opening. The dining room opens from the central hall, the kitchen being at the left and communicating with the dining room by a double swing door. The pantry is between the living room and kitchen and from it the cellar may be reached by stairs directly under the main flight. The arrangement of the stairs is such as to do away with the necessity of a rear flight. While readily accessible from the living room of the house the stairs can also be used from the kitchen without the necessity of passing through the living apartments. On the second floor are four bedrooms and bath, each bedroom being provided with a commodious closet.

The interior of the dining room and living room is stained in Flemish, Mission style, the mantels in both rooms being of neat design and of the Mission type. The floors are of tongued and grooved strips not over 4 in. wide, with 8-in. base and 4½-in. door and window casings. The bath room is equipped with tub and wash basin of the Standard Sanitary Manufacturing Company's make and a John Douglas closet.

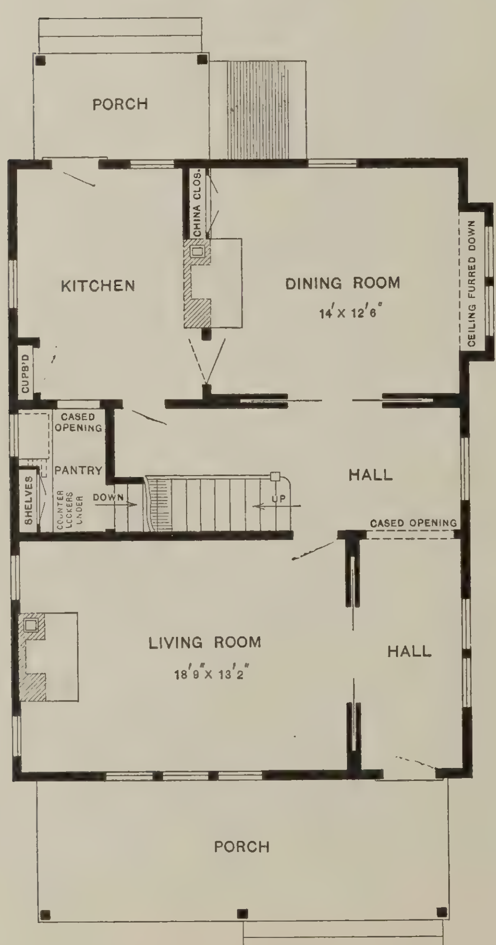
The cottage here shown is located at Oakmont, Pa., and was built for F. C. Jones, president of the Electric which makes "ready built" houses; the various parts marked, and then shipped to the site, with full directions and erecting plans. For example, all pieces of the frames of the houses are cut by template and marked by number; pieces No. 1 being posts in the cel-



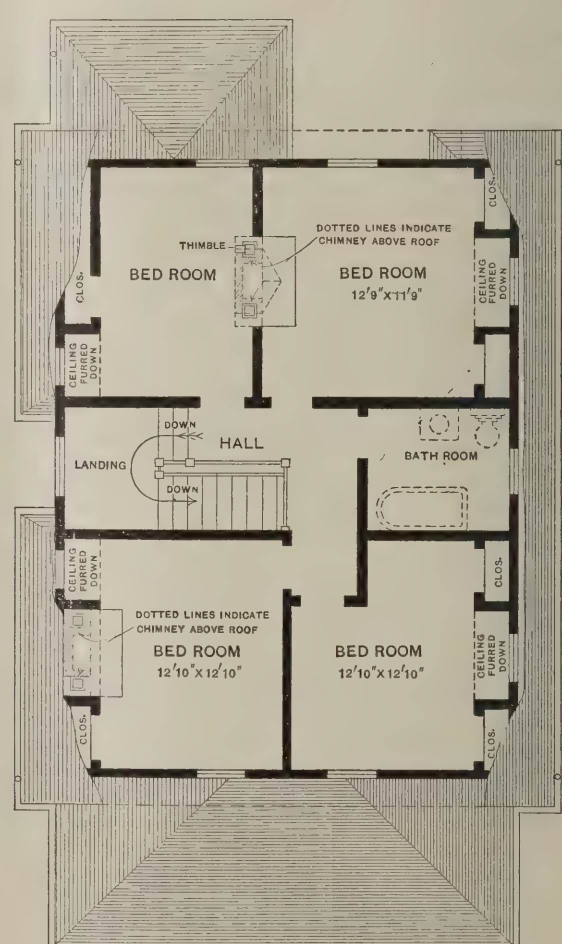
Section of Side.



Framing Plan of Front Elevation—Scale, 1/8 In. to the Foot.



Main Floor.



Second Floor.

A Moderate Cost Dwelling at Oakmont, Pa.—Floor Plans.—Scale 3/32 in. to the foot.

Renovator Manufacturing Company, by the Modern House Manufacturing Company, Farmers' Bank Building, Pittsburg, Pa., in accordance with drawings prepared by its architects. An interesting feature in connection with this attractive cottage is that the material was prepared by machinery by the company, lar; No. 2, the girders; No. 3, the sills; No. 6, the first floor joists, and so on until the complete frame is finished. In this way every piece fits true in its proper position, so that the average carpenter can easily put the house together without waste of material, and upon an economical basis.

WHAT BUILDERS ARE DOING

WITH comparatively few exceptions leading centers of the country are experiencing a degree of activity in the building line which is in excess of that prevailing during the corresponding month a year ago, this activity being reflected not only in the increased number of buildings for which permits were issued, but also in the amount of vested capital involved. The present situation is notable in one respect at least, and that is the large number of dwelling houses which are being erected in all sections of the country and which constitute a very appreciable percentage of the grand total. From reports at hand from something like fifty cities of the country more than three-fifths show an increased volume of operations as compared with April last year. Among some of the important cities showing a falling off in the value of the improvements for which permits were issued may be mentioned Buffalo, Milwaukee, St. Louis, Philadelphia and Seattle. Taking the country over, however, the building situation possesses most encouraging aspects. In many places where men in some of the various branches of the building industry went out on strike the 1st of May the differences have been adjusted and the situation is rapidly assuming a more normal aspect.

Atlanta, Ga.

Building Inspector Ed. R. Hays is of the opinion that Atlanta will again lead the South in 1910 in the number and value of its building permits. The figures issued from his office during April show the estimated cost of the improvements to have aggregated $1,111,177, which makes it one of the greatest building months in the history of Atlanta. In April last year the value of the improvements for which permits were issued was $504,662, and in April, 1908, the total was $1,294,130. New structures are going up in every section of the city, and this is especially noticeable in the residential sections, where dwellings are being put up in large numbers. Building Inspector Hays is of the opinion that the activity will continue throughout the year and that the city will set a new record for the South. He expects that by the end of the year the six million dollar mark will probably be exceeded.

For the four months of the current year the value of the new work for which permits were issued was $2,581,264, which compares with $2,057,673 for the corresponding four months of last year.

At the annual meeting of the Atlanta Builders' Exchange, held at the clubrooms in the Grant Building, Wednesday evening, May 11, the "open shop" and a nine-hour day were endorsed. It is only fair to say that, while the "open shop" is not considered compulsory by the members of the organization, it was largely favored, and a resolution to that effect was introduced and adopted.

George B. Hinman, retiring president, was favored with a handsome gift by the members as a token of their esteem and appreciation of the conscientious manner in which he had discharged the duties of his office.

The new officers for the ensuing year are: President, D. A. Farrell; vice-president, V. H. Kriegshaber, and treasurer, R. M. Walker.

Buffalo, N. Y.

The building permits for the month of April show a falling off in the amount to be expended as compared with the corresponding month of last year. This was due not to any permanent decline in the building business, but was attributable to the continued rainy weather prevailing during the month, which interfered seriously with builders' plans. The number of permits issued was 402; estimated cost, $875,000, a loss of 8 per cent.

Plans have been completed and work commenced during May on structures which will involve a large aggregate expenditure. This new construction includes further extensive additions to the plants of the Pierce-Arrow Motor Car Company and the American Radiator Company, a factory building, forge shop and power house for the Superior Motor Vehicle Company to cost $75,000, a cereal mill and grain elevator for the Buffalo Cereal Company, $80,000; the Niagara Machine & Tool Company's new plant, $75,000; addition to New York Central Railroad car shops, East Buffalo, $80,000; New York Central Railroad warehouses, Buffalo River, $200,000; a theatre for the Metropolitan Amusement Company, Broadway and Fillmore avenue, $100,000; new college buildings for Conesius College, $200,000; addition to German Deaconess' Home, $100,000; church and rectory for St. Luke's German Evangelical Church Society, $90,000.

Plans are also being prepared for a new Washington Street Market building, 264 x 460 ft. in size, to be erected by the city on the site of the present Washington Street Market, at an estimated cost of $500,000.

Calgary, Alberta

At the annual meeting of the Builders' Exchange, held the first week in April, marked interest was manifested in the proceedings by those present. The officers elected for the ensuing year were:

President	R. A. Brocklebank.
First Vice-President	R. J. Priestley.
Second Vice-President	H. H. Movers.
Secretary-Treasurer	C. H. Webster.
Sergeant-at-Arms	J. A. Gorman.

Cincinnati, Ohio

Now that the building season is in full swing the record of operations shows an appreciable increase over the corresponding period last year. Not only is there an increase in the number of permits issued, but there is also a gain in the estimated cost of the improvements. The figures show that last month 971 permits were taken out for new work, alterations, additions, etc., to cost $1,180,885, while in April last year 753 permits were issued for building improvements costing $965,765.

The Cincinnati Chapter American Institute of Architects, aroused over the introduction into the City Council of a measure making it compulsory for the city to employ an electrical engineer upon any public building, park or playground, has petitioned for a public hearing before the Ways and Means Committee. According to the ordinance introduced at the meeting of the Council on Monday evening, May 2, the official would make all plans and specifications for the important works, but the architect would after all be held responsible for any and all errors that might be made. The ordinance provides for the selection of a competent electrical engineer whenever it is contemplated to illuminate or provide electrical power for any purpose in any public park, public playground or other public space other than a public highway, lane or square, "to prepare the necessary electrical plans and specifications and supervise the construction of said electrical installation."

The ordinance says the electrical engineer selected must be of recognized ability and shall have had five years' experience in electrical construction work and not less than the same amount of time in the field of plan preparation and specification making. He must also have a degree of electrical engineer conferred upon him by some recognized institute or school of electricity. Section 7 states that the architect commissioned to make the plans for the building shall afford the electrical engineer every facility and provide him with the necessary blue prints for carrying out his part of the work. It also cautions the architect and the expert to "work in harmony in order to produce the best results possible."

The latter is to be paid upon the percentage basis, not to exceed five per cent. of the total cost of the electrical equipment.

Such architects as are willing to speak on the subject say that the ordinance is a reflection on the entire profession; that if such a measure were made a law in time the architect would be hampered and his powers and authority limited and ultimately he might expect to see experts appointed on all branches of work, leaving only the shell of the commission in the hands of the architect.

Cleveland, Ohio

The building outlook for the year continues very satisfactory in this city. A good volume of work is now under way and there are no labor troubles to interfere with operations. During April permits were issued by the city building inspectors' office for 853 structures, the estimated cost of which is $1,711,165. This is a gain of 29 per cent. over the same month last year.

Arrangements have been completed for the annual summer outing of the Cleveland Builders' Exchange. It has been decided to make a shorter trip than usual this year, the place selected being Conneaut Lake, near Meadville, Pa. The Cleveland builders will leave on a special train on the morning of Tuesday, June 24, and arrive at Exposition Park at the lake in time for lunch. They will occupy quarters at the Hotel Conneaut. The time at the resort will be spent in athletic sports, fishing and other amusements. The outing will continue until Friday afternoon, when the party will start home, arriving in time for dinner.

Denver, Col.

The striking feature of the building situation last month was the permit for the Tramway's new seven-story office building and two-story barns, calling for an expenditure of $392,000. This brought the total value of the building improvements for which permits were issued last month up to $1,184,500, as against $1,157,650 in April a year ago. There were 311 and 359 permits issued in the two periods respectively. Some handsome residences are to be erected, as permits have been issued for one to cost $21,000, another $20,000 and another $19,000.

The month of May opened auspiciously, and one of the most important permits was that for the twelve-story office building for the Foster Realty Company to cost $850,000.

Elizabeth, N. J.

After a dispute extending over a period of two years announcement was made on the 1st of May that the Master Builders' Association and the Building Trades Council had come to a satisfactory adjustment of their difficulties and that hereafter all questions will be referred to a board of arbitration. According to the agreement the wages of carpenters is fixed approximately at $21 per week beginning July 1 and the Master Builders will conduct union shops. After October 1 the lathers will receive an increase of 25 cents per 1,000 lath.

Kansas City, Mo.

Records are being broken from month to month in the way of building operations throughout the city, and according to the figures compiled in the office of the Superintendent of Buildings there were 412 permits issued last month for improvements to cost $1,823,830, whereas the value of the permits for April, 1909, was $1,708,953 and for April, 1908, it was $1,659,050.

Of the permits issued last month 217 were for brick structures having a frontage of 9,182 ft. and estimated to cost $1,534,000.

Los Angeles, Cal.

In this city the building record for April reached the high water mark. There was a total of 930 permits, with an aggregate valuation of $3,360,577, as compared with 1,053 permits, with a valuation of $1,719,921, for the month preceding, and 722 permits, with a valuation of $1,019,957, for the month of April, 1909. A considerable part of the good showing was due to the issuing of permits for a few large and costly buildings, but aside from these the record stands well up toward the top. The best previous building month in the history of the city was June, 1906, when the total valuation of the permits issued reached two and one-half million dollars.

The total number of building permits issued for the first four months of the present year was 3,530, with a total valuation of $8,371,198, as compared with 2,488 permits, with a total valuation of $3,405,160, for the same four months of last year. This shows an increase of 50 per cent. in the number of permits and of 150 per cent. in the valuation of these permits.

Among the large buildings for which permits were issued during April were: The addition to the Hotel Alexandria, to cost $1,000,000; the Los Angeles Trust & Savings Bank block at Sixth and Spring streets, to cost $425,000; a six-story hotel building to be built by Dr. J. H. Edmonds at 249 South Olive street at a cost of $75,000; the New Auditorium Hotel building at Fifth and Olive streets, to cost $140,000; the George J. Birkel Music Company building at 448 South Broadway, to cost $100,000, and a six-story hotel building to be built by J. C. H. Ivins at Tenth and Figeroa streets at a cost of $96,000. A permit was also issued for a two-story addition to the Consolidated Realty Company building at Sixth and Hill streets to cost $125,000.

Buildings which have been planned for early construction in this city include the new reinforced concrete Union League Building on the corner of Hill and Second streets, to cost $250,000, F. O. Engstrum & Co. contractors, L. S. Munson architect; the ten-story Chester Fireproof Building Company block at the corner of Fifth and Spring streets to cost upwards of $750,000, Parkinson & Bergstrom architects; and the eight-story reinforced concrete Robert Marsh & Co. hotel building on Eighth street near Broadway, to cost $100,000, Fred R. Dorn architect.

Milwaukee, Wis.

More building permits were issued last month than in April a year ago, but the value of the improvements projected shows a considerable shrinkage as compared with that period. The report of Inspector Edward V. Koch shows 506 permits to have been taken out last month for new buildings, alterations, additions, etc., to cost $924,465, while in April last year 490 permits were taken out for improvements costing $1,226,845.

For the first four months of the current year 1,105 permits were issued for building operations to cost $2,336,435, as compared with 1,225 permits for building improvements costing $3,140,423 in the first four months of last year.

One of the important improvements in the near future will be a $100,000 factory building of brick construction covering an area 500 x 300 ft. for the Globe Seamless Steel Tubing Company, which has just purchased 30 acres of land on Burnham Street west of the city limits. The contract for the structure has been let to the Worden-Allen Company, and it is expected that the plant will be in operation by the first of October, giving employment to more than 500 skilled hands.

Minneapolis, Minn.

Building activity is on the increase and the figures for April establish a new monthly record so far as permits are concerned and surpass all others in cost of construction with the exception of December, 1889, when permits for the courthouse and city hall and the Guaranty Loan Buildings were taken out. According to the figures of the Bureau of Building Inspection 832 permits were issued last month, calling for an estimated outlay of $2,233,610, whereas in April last year there were 824 permits issued for improvements costing $1,401,955.

The total estimated cost of building improveenmts for which permits were issued for the first four months of the current year is $4,748,145, which amount is distributed over structures of all kinds, embracing office buildings, stores, factories, warehouses, garages, dwellings, etc.

New Bedford, Mass.

Judging from available statistics issued from month to month New Bedford is one of the most rapidly growing cities in the New England States. It is not therefore surprising to find building operations showing a considerable improvement over preceding periods, as evidenced by the report for April, when 147 building permits were granted calling for an outlay of $824,950, as against 96 permits, involving an estimated cost of $252,595, in April last year. The great increase of last month, however, is due in part to the permit for the Quissett mill, but the fact that more work is being planned this year than last is shown in the number of permits issued in the two periods.

New York City

As the building season progresses the record of contemplated improvements in April makes a trifle better showing when compared with the corresponding period a year ago than has been the case for a month or two past. In other words, with the advent of more seasonable weather new construction work comes more closely to attaining the high water mark of last year. Of the three principal boroughs of Greater New York, Manhattan is the only one which shows a falling off in the estimated cost of the improvements as compared with April last year, although there is an increase in the number of new buildings for which permits were taken out. According to the figures there were 113 new buildings projected last month in the Borough of Manhattan, estimated to cost $14,731,400, while in April last year 99 new buildings were projected to cost $15,709,500.

In the Borough of the Bronx permits were taken out last month for 240 buildings to cost $5,300,125, as against 245 buildings to cost $3,253,800 in April last year.

In Brooklyn permits were issued for 828 new buildings to cost $4,300,100, while in April last year 775 permits were issued for building improvements to cost $4,536,457. The comparatively large increase in the amount of capital required for new building operations in the Borough of the Bronx accounts for the net gain in the total for the three boroughs as against April a year ago.

The labor situation is quieting down and thus far no serious interruption to operations has been experienced. The 1st of May is always approached with more or less uncertainty on the part of those engaged in the building industry, but this year, outside of widely scattered instances, the month opened with few strikes.

Architects have filed plans for the 13-story lofts and offices to be built over the tracks of the New York Central Railroad on the west side of Lexington avenue from Forty-sixth to Forty-seventh street with a frontage of 201 ft. and a depth of 250 ft., with an extension five stories high and 25 ft. deep. The structure will cost $1,500,000, and the building will have a facade of brick trimmed with granite, limestone and terra cotta.

Plans have just been filed for the ten-story extension to the department store of James McCreery & Co., Nos. 4 to

16 West Thirty-fifth street at a cost of $240,000. The extension is to be built on the west side of the present building and will conform in design to the older structure. A feature will be a recreation shelter on the roof. The architects are Goldwin, Starrett & Van Vleck.

Fleischmann Company is about erecting a four-story reinforced concrete factory on Washington street south of Perry street to cost $25,000.

The plans for an eight-story warehouse to be erected at the corner of Greenwich and Morton streets have just been filed by Harry Dean, architect, who estimates the cost at $135,000. The building will cover an area 110.4 by 110.4 ft. and will have a facade of brick with limestone trimmings. Seven old three-story dwellings which occupy the site and which have been landmarks of Greenwich Village will be razed to make room for the new structure.

The new building about to be erected at the corner of Broadway and Astor Place will rest upon a foundation of concrete piles and will cost in the neighborhood of $450,000. The building will have a frontage of 92.2 ft. on Broadway and 75.1 ft. on Astor Place. It is expected to have it ready for occupancy by the first of January next. The architect is Francis H. Kimball, well known as the designer of the Empire, Trinity and other skyscraping office buildings of the city.

As we go to press the Real Estate and Ideal Homes Show is about to open at Madison Square Garden and continue from May 18 to 25. It has attracted the interest of real estate developers in other cities, as demonstrated by applications for literature relating to the matter received from Porto Rico, Cuba, Canada and New Mexico. One of the interesting exhibits will be the Craftsman Library, which will tend to convey a complete example of the Craftsman idea of decorating and furnishing a home.

In the Borough of Queens there was a slight falling off in the number of permits filed during the first four months of this year, but a decided increase in the estimated cost of new structures, despite the fact that there is practically no activity in multi-family house construction. Builders are awaiting for modifications in the Tenement House Law which will permit of the erection of three-family houses. Since the first of January plans were filed for 1,382 new buildings to cost $5,259,207, while during the corresponding months of last year the vested capital involved was $4,678,282.

Last month plans were filed for 422 buildings to cost $1,561,720, as against 452 structures to cost $1,592,702 in April last year. The indications, however, are for increasing activity, as during the second week in May plans for 94 buildings were filed, estimated to cost over $400,000, this being the second largest week in the borough since the first of the year.

Omaha, Neb.

Building Inspector Withnell is of the opinion that the present year will be a record-breaker in home building in the city, as more dwellings are being erected than ever before. Last month permits were taken out for 183 buildings of all kinds to cost $583,005, as against 176 buildings to cost $489,350 in April a year ago.

For the first four months of the current year 550 permits were issued for building improvements to cost $1,522,403, while in the corresponding period of last year 508 permits were taken out for new work, alterations, etc., to cost $1,808,885. While more dwellings are being erected this year than last the increase in the amount of capital invested a year ago as compared with the first four months of this year is due to the fact that several permits for large buildings now almost completed were taken out.

Philadelphia, Pa.

While the amount of new building work undertaken during April shows a decrease when compared with that of the previous month as well as that of the same month last year, actual work performed has been extremely heavy, a considerable volume of deferred work having been started by contractors and builders. The number of permits issued by the Bureau of Building Inspection was 913 for 2,024 operations, at an estimated cost of $4,589,300, a decrease of about $750,000 when compared with the total estimated expenditure for March.

Since the first of the year building operations at an aggregate cost of $14,109,420 have been authorized, which exceeds all previous records for the first four months of any year in the history of the Bureau. It is also to be noted that the number of operations is smaller, indicating that there has been a relatively higher cost per individual operation. Permits have been taken out since the first of the year for 3,230 two-story houses, at an estimated cost of $6,299,400; 404 three-story dwellings, costing $1,975,550; 28 four-story houses, estimated to cost $186,000, and five frame houses, costing $13,700, a total of 3,667 dwellings at an aggregate estimated cost of $8,474,640. A sharp gain in tenement house building is to be noted.

During April over one-half of the total authorized expenditure was for dwelling houses, $1,929,500 being credited to two-story houses, $676,000 to three-story and $12,000 to four-story dwellings, this showing a decrease as compared to last month.

Roydhouse, Arey & Co. have the contract for the erection of a ten-story brick, concrete and terra cotta garage and light manufacturing building, 100 x 73 ft. on the ground plan, at the southeast corner of Broad and Spring Garden streets, from plans by Watson & Huckel, architects, estimated to cost about $250,000.

Harry Brocklehurst, builder and contractor, has the contract to build 52 two-story brick and plaster finished dwellings and 24 three-story dwellings in different styles of architecture at Eighteenth and Shunk streets for the Stephen Girard Estate from plans by John T. Windrim, architect. The estimated cost will be about $250,000.

Cramp & Co. have the contract to erect the five-story office building for the Philadelphia & Reading Railway Company, estimated cost $235,000, to be on Percy, Green and Spring Garden streets.

Estimates have been taken on plans by LaFarge & Morris, architects, for a proposed new St. Patrick's Church at Twentieth and Locust streets. The building is to be an ornate structure, 80 x 180 ft. on the ground plan, the estimated cost of which is $300,000.

Alexander Wilson, Jr., is having plans prepared for eight two-story flat houses, to be erected at the corner of Forty-first street and Baltimore avenue, estimated to cost $60,000. The same builder is taking estimates from sub-contractors for 11 two-story flat houses, 20 x 69 ft., to be erected at the corner of Thirty-eighth and Chestnut streets, costing $82,500.

Seymour Davis & Paul A. Davis, architects, have been commissioned to make plans for a domestic science and manual training school to be erected at Eighth and Chestnut streets, Camden, N. J. The building will be two stories high, of brick, and measure 108 x 124 ft. on the ground plan.

Portland, Ore.

The building record of Portland for the month of April was the best in the history of the city, notwithstanding some threatening aspects of the situation. The total value of the 617 permits issued was $2,014,722, or $303,000 more than for the best previous month in the city's history, which was the month of April last year. The gain for April as compared with the month preceding was practically 35 per cent. The building record for the first four months of the year shows a total valuation of $5,118,522, a gain of 21 per cent. over the first four months of last year.

The labor situation in Portland is causing great uneasiness and is holding back building to some extent. The open shop rule prevails in Portland, though a large portion of the workmen are organized. Talk of a strike with joint demands for higher wages and the closed shop has been in the air for some time, and a number of contractors are reported to have already advanced wages in the hope of maintaining the open shop without a strike.

Sacramento, Cal.

The building permits in this city for April reached a total of $216,885, an increase of $70,000 over the total for April, 1909.

The total value of the permits issued during the first four months of the year was $956,593, as compared with $797,949 for the first four months of last year.

Salt Lake City, Utah

The volume of building suffered a heavy shrinkage during April as compared with the same month last year, the heavy falling off being due to the fact that comparatively few permits were issued for large business structures, apartment houses or other buildings costing in excess of $10,000.

A considerable amount of building and improvement work is being done in the business section, and permits for the amount of these were taken out some time ago and therefore figured in the records of other months. The books of Building Inspector A. B. Hirth show that for April this year the total value of the buildings for which permits were issued was $350,650, while in April last year the estimated cost was $585,000.

Even with this decrease and a decrease for March over the record of a year ago there is still a gain of $250,000 for the first four months of this year over the corresponding period of 1909.

The contractors of the city are considering the matter of forming a Builders' Exchange, as at the present time there is no such organization in the city and it is felt that the formation of such an exchange would be of material advantage to all contractors engaged in the building industry.

San Diego, Cal.

Eighty firms, including nearly all of the leading contractors of this city, have signed an agreement advancing the minimum wage scale of carpenters from $3.50 to $4, and it is believed that the danger of a strike is past. The scale was cut from $4 to $3.50 two years ago.

San Francisco, Cal.

The increase in building activity which has been promised for many months appears to have actually begun. The building record for April shows a substantial increase in both the number of permits issued and in the aggregate cost, the latter figures being $2,320,826, as compared with $1,830,000 for March and $1,676,000 for February. The April figures are also largely in excess of the work for the same month last year. An encouraging feature of the building report is that by far the greater portion of the permits was issued in the latter half of the month, more than forty per cent. of the total, or practically $800,000, being credited to the final week of the month. With the advancing spring there has been a considerable improvement in the number of permits issued for buildings outside of the fire limits. The earlier months of the year showed most of the activity to be centered in the downtown districts, but now the work is widely scattered and is not confined to any particular class of buildings. The construction of frame flats and dwellings has been increased, and there are a number of new hotels and business buildings started in various parts of the city. The fact that the building law seems at length to be pretty well fixed has led to some work being started in the hill section of the city, which has never been as fully rebuilt since the fire as other parts of the city. This district is now within the fire limits, and work has been started on a considerable number of brick apartment houses and private hotels, to which it is expected the entire section will eventually be devoted.

The material market is still plentifully supplied in all lines. Prices have naturally firmed up a little in some lines on account of the increased demand, but, on the whole, prices are practically unchanged. Lumber is about the same, with good stocks in both the wholesale and the retail yards. Fir and pine lumber are about as heretofore. There is still talk of an advance in redwood for finishing purposes, but builders are inclined to think that this advance will not take place, though redwood is now considerably lower than other lumbers as compared with previous years. There is a possibility that the export and shipping demand for redwood and other California lumbers may lead to a stiffening of prices. Common brick are still plentiful and low in price, although neither the quantity on hand nor the prospective output are so large as earlier in the year. The fact that a large factor in the brick manufacturing in this section is reported to be about to retire, and the further fact that the second of the two controlling manufacturers is about sold up, have had a strengthening effect on prices, though no actual advance has been made. It now looks as though there would be a larger demand for architectural terra cotta than was expected. Some of the larger buildings in which large amounts of stone were to be used will, it is understood, substitute cheaper materials, leading to a greater call for terra cotta and sheet metal.

During the past week or two contracts have been awarded on a number of buildings for which plans were made earlier. Among the more important are the following: The eight-story Class A brick and stone Native Sons Hall on Mason street near Geary; the new St. Mary's Hospital, to cost $660,000; the six-story brick William Ede Building at Market and Seventh streets; the three-story brick building of N. Clark & Sons on Minna street near Second, Cunningham & Politeo architects; the Schmiedell Estate building on Post near Jones, Williams Bros. & Henderson contractors, F. H. Meyer architect, to cost $125,000; the new Mission Turn Verein Hall at Eighteenth and Lapidge streets, to cost $42,800, A. Reinhold Denke architect; the C. Schroth six-story brick and concrete building at the corner of Eddy and Leavenworth streets, J. E. Krafft & Sons architects; the H. & W. Pierce Building on Mission street near Sixth, to cost $33,000, E. T. Leiter & Sons contractors; and the Martens & Tietjens three-story apartment house, Martens & Tietjens architects, to cost $36,000.

Plans have been made for the following important buildings on which work has already been started or will soon be under way: The Charles Mitchell bath house on La Playa street near Balboa, to cost $65,000, for which a permit was issued last week; the four-story Moses Ellis building, Charles C. Frye architect, to cost $60,000; the Berkshire Apartments on Jones street near Sutter, to cost $120,000, a permit for which has been issued; the two-story J. F. Poheim building at California and Kearny streets, to cost $20,000; the Sisters of Mercy building, D. H. Burnham & Co. architects, at the corner of Hayes and Stanyan streets, to cost $227,837; and the new Shubert theatre building on Geary street, for which preliminary contracts have been let.

A large amount of municipal work is to be done in San Francisco during the present spring and summer. Bids have already been invited for the Spring Valley School building, to cost $110,000, and for the eight buildings of the City and County Hospital, this being the most extensive municipal work that has been undertaken since the fire. Melvin G. Dodge, secretary of the Board of Education, has completed and submitted a revised list of the school buildings to be erected, plans and specifications having already been called for and in some cases completed. The list includes the following: Spring Valley School, cost $110,000; Burnett School, cost $50,000; Marshall School, cost $80,000; Grattan School, cost $80,000; Franklin School, cost $85,000; Peabody School, cost $75,000; Harrison School, cost $20,000; Cleveland School, cost $65,000; Visitacion Valley School, cost $35,000; Girls' High School, cost $350,000; Lowell High School, cost $350,000; Adams School, cost $110,000; John Swett School, cost $100,000; Lincoln School, cost $90,000, and the Polytechnic High School, cost $600,000. The Board of Public Works has recommended an appropriation of $387,500 for the construction and equipping of the Spring Valley, Franklin, Cleveland and Adams schools.

Scranton, Pa.

The report of Superintendent E. L. Walter of the Bureau of Building Inspection for the month of April shows a very appreciable increase over the figures for April last year. In fact, a record mark as regards the number of permits issued was reached last month when 134 were issued for improvements valued at $196,223. Nearly 90 per cent. of the permits issued were for new dwellings or additions or alterations to present dwellings. In April last year the department issued 93 permits, calling for an outlay of $158,145.

For the four months ending April 30 building improvements valued at $458,219 were authorized, as against $800,968 in the same period last year. The latter figures were made possible by the permits for the new shops of the Delaware, Lackawanna & Western Railroad.

Seattle, Wash.

The building season is opening auspiciously, and while the number and value of improvements projected in April are somewhat under the figures of a year ago, yet their total is such as to indicate a gratifying degree of activity in the various branches of the trade. As usual, the bulk of the work has to do with frame construction, there having been issued from the office of Francis W. Grant, superintendent of the Department of Buildings, 309 permits for frame dwellings to cost $429,810, as against 303 permits for residences, to cost $754,685, in April last year, and for frame business structures 269 permits were issued, involving an estimated outlay of $151,290, whereas in April last year 495 permits were issued for frame business buildings to cost $406,035. In the way of flats and apartment houses permits were issued for seven to cost $93,250, and for the first four months of the current year 37 permits were issued for buildings of this classification to cost $401,200. Among the April work projected were four brick buildings to cost $153,000, as against 17 brick structures to cost $563,480 in April a year ago. Reinforced concrete construction was represented by one permit for a building to cost $385,000.

For the first four months of the current year 4,355 permits were issued from the Department of Buildings, involving an estimated outlay of $5,493,290, these figures comparing with 5,015 permits for improvements involving an estimated outlay of $7,858,063 in the corresponding four months of last year.

St. Louis, Mo.

The building industry here in the city is just now suffering by comparison with April last year, when there was an unusual splurge in building operations, although builders have nothing very serious about which to complain. Permits to the number of 992 were issued last month for new buildings, alterations, additions, etc., calling for an estimated outlay of $2,326,885. In April last year 1,054 permits were issued for building improvements costing $3,679,690.

Of the total for last month $2,095,897 was for new brick buildings, against $3,407,933 for the same class of structures in April last year. Comparatively little is being done in frame construction, the total estimated cost of work of this kind projected last month being only $95,049, although there were 403 permits issued.

St. Paul, Minn.

During the month just closed a less number of permits was issued from the office of Building Inspector Cunningham than was the case in April last year, although the estimated cost is slightly in excess of that of a year ago. The figures show 293 permits to have been taken out last month for building improvements to cost $1,160,373, whereas in April last year 419 permits were issued for new work, alterations and repairs to cost $1,137,616.

Thus far the present year there has been a steady increase month by month in the estimated cost of the building improvements for which permits were taken out, and the same applies to the corresponding months of a year ago. The increase for the first four months of 1910 is $388,270 over the first four months of last year.

Washington, D. C.

Activity pervades all branches of the building industry in this vicinity and during the month of April permits were issued for 616 buildings, calling for an expenditure of $1,542,690, as against 516 permits for building improvements in April last year to cost $1,164,977. Dwellings and apartment houses are much in evidence, and the tendency seems to be a continuance along these lines.

Winnipeg, Can.

This city is enjoying what might almost be designated as a "boom" in building if the figures for the current season are compared with those of previous years. According to the figures given out by Building Inspector E. H. Rodgers, 501 permits were issued last month for 621 buildings to cost $2,211,000, while in April last year 252 permits were taken out for 279 buildings costing $1,064,200. Comparing these figures with April, 1906, which was heretofore high water mark, the increase last month is very perceptible.

For the first four months of this year 924 permits were issued for 1,166 buildings to cost $5,673,000, as against 526 permits for 631 buildings costing $2,134,200 in the first four months of 1909. In the first four months of 1906 there were 857 permits issued for 1,084 buildings costing $3,222,700.

LAW IN THE BUILDING TRADES

By A. L. H. Street

RELEASE OF SURETY ON CONTRACTOR'S BOND.

The surety on a building contractor's bond is released from liability by any valid agreement made without his assent, which varies the terms of the original contract in any material respect, regardless of whether the change is for the surety's benefit or prejudice. (Texas Court of Civil Appeals, Zang *vs.* Hubbard Building & Realty Company, 125 Southwestern Reporter 85.)

RIGHT OF OWNER TO WITHHOLD PAYMENT OF CONTRACT PRICE.

Where one contracts for the erection of a building upon his land, he is entitled to withhold payment of the agreed price until protected by a release of the claims of the contractors, laborers and material men. (Kentucky Court of Appeals, Schnute Holtman Company *vs.* Sweeney, 125 Southwestern Reporter 180.)

ACCEPTANCE OF BUILDING.—RIGHT TO MECHANICS' LIEN

The owner of a building did not accept it, as in compliance with the contract for its construction by moving into it, where he moved through necessity. A contractor or subcontractor who fails to furnish materials or workmanship required by his contract can not enforce a mechanics' lien.. (Michigan Supreme Court, Frolich *vs.* Klein, 125 Northwestern Reporter 14.)

LIABILITY OF CONTRACTOR FOR PENALTY FOR DELAY.

Under a provision in a building contract for a penalty for each day's delay in completing the work, the courts will not attempt to apportion the damages resulting to the owner through the combined fault of the contractor, the owner or his agents or independent contractors, and the owner's claim for the penalty will be wholly disallowed. (United States Circuit Court, Northern District, West Virginia, Caldwell & Drake *vs.* Schmulbach, 175 Federal Reporter 429.)

WHAT CONSTITUTES "MATERIAL."

A Federal statute requires government building contractors to give a bond to insure payment for "materials" used. Held that coal used by a contractor to heat buildings, which were covered by specifications requiring him to provide fuel for heating while the work progressed, was "material" within the meaning of the statute. (Vermont Supreme Court, United States *vs.* United States Fidelity & Guaranty Company, 75 Atlantic Reporter 280.)

RIGHT OF CONTRACTOR ON ABANDONING WORK.

A contractor who abandons the work before it is substantially completed cannot sue on the contract, though under certain circumstances he can recover the reasonable value of the work done. (Texas Supreme Court, Murphy *vs.* Williams, 124 Southwestern Reporter 900.)

STIPULATIONS FOR DAMAGES RECOVERABLE FOR BREACH OF BUILDING CONTRACTS

Stipulations for a certain amount of damages in ordinary building contracts for failure to complete within a given time will be enforced, if not clearly disproportionate to the probable loss. An agreement for $10 a day will be sustained where the contract makes the time for completing the work a material part of the agreement and where the loss to the owner and advantage accruing to the contractor through his failure to complete the contract at the agreed time are uncertain. (Alabama Supreme Court, Stratton *vs.* Fike, 51 Southern Reporter, 874.)

CONTRACTOR AS NECESSARY PARTY TO SUIT

A building contractor is a necessary party to a suit by a subcontractor brought to enforce a mechanic's lien. (Michigan Supreme Court, Godfrey Lumber Company *vs.* Kline, 125 Northwestern Reporter, 682.)

UNENFORCEABLE PROVISION IN BUILDING CONTRACT

Where a building contractor refuses to complete work or threatens to abandon it unless paid more than the price originally agreed upon the owner's promise to pay more is unenforceable as being made without consideration, if made while the original contract is still in force. If a building contract makes the architect's certificate conclusive as to the expense and damage caused the owner through the contractor's breach of agreement, the certificate will be given that effect, unless it appears that the architect has made a gross mistake or has been actuated by fraud in making the certificate. (Alabama Supreme Court, Shriner *vs.* Craft, 51 Southern Reporter, 884.)

RIGHT TO ENFORCE MECHANIC'S LIEN

A corporation engaged in erecting buildings cannot enforce a mechanic's lien under the Indiana statute, which gives such lien to persons performing labor upon buildings; Neither can a lien be enforced by one who has furnished tools or appliances used in construction work. (Indiana Supreme Court, Ward *vs.* Yarnelle, 91 Northeastern Reporter, 7.)

LIABILITY OF EMPLOYER FOR CONCURRENT NEGLIGENCE

A contractor is liable for injury to an employee caused by the falling of a ladder resulting from the contractor's negligence in not properly securing the ladder and in permitting another employee to work where he might displace it, though the displacement was caused by the last mentioned workman's negligence. (Texas Court of Civil Appeals, Buchanan & Gilder *vs.* Murayda, 124 Southwestern Reporter, 973.)

DAMAGES FOR CONTRACTOR'S BREACH NOT WAIVED

The owner of a building does not lose his right to recover against the contractor damages for defective performance or for delay in completion by terminating the contract on the contractor's departure from the specifications and by completing the work himself as provided for by the contract. (California Supreme Court, Dahlberg *vs.* Girsch, 107 Pacific Reporter, 616.)

LIABILITY OF ASSIGNEE OF BUILDING CONTRACT

Plaintiff contracted to do certain glazing for the general contractors of a building, who thereafter assigned their contract to a bank, informing it of their obligation to plaintiff and other subcontractors. Plaintiff failed to file a mechanic's lien because the contractors agreed to include the amount due in their own lien and to enforce the same *pro tanto* for plaintiff's benefit. The bank having failed, its receiver sold the contract, which was worth $7,000, under order of court, to defendant for $1. Defendant in purchasing from the bank knew of the obligations of the contractors and equities in plaintiff's favor. Held, that defendant received sufficient for the payment of the claims of the subcontractors and it was liable to plaintiff for the balance of its claim. (New York Supreme Court, Appellate Division, Fourth Department, Buffalo Glass Company *vs.* Assets Realization Company, 117 New York Supplement, 1087.)

Fire Retardant Roofs

The ability of a roof to resist fire from within is perhaps negligible in almost any case, for the destruction of the support will ruin any roof, whether it be of metal, felt or tile. The best that can be expected of a roof under such conditions is that it will remain intact as long as possible, so as to form a blanket over the flames. It is, however, of no value as a blanket unless it remains in a continuous unbroken sheet. Tin, for instance, will frequently stand considerable exposure to fire and be recognizable in the ruins, but it buckles and stretches with the heat, the solder melts in the seams, thus opening the roof and giving the draft which feeds the flame. The ability of a well-built felt, pitch and gravel roof to withstand fire is strikingly illustrated in the accompanying picture reproduced from a photograph taken after a fire which recently occurred in Chicago. The interior of the building was entirely burned out, the floors and partitions destroyed and most of the roof's support was consumed, leaving only a few charred members under the roof.

The roof in question was laid according to a standard specification which calls for five plies of felt, a thorough mopping with pitch and a heavy coating of gravel. When exposed to great heat from below such a roof softens, but does not immediately blaze. The softness of the pitch causes every small break and puncture to heal, so to speak, thus preserving the continuity of the roof until the last moment.

While the felt in such a roof is combustible when exposed to flame in the open air, it is non-combustible when bedded in the pitch and surfaced with gravel or slag. Such roofs give off a dense smoke, and after the fire is over it will be found that the pitch has gradually been turned to an incombustible coke. It is obvious that in the instance here illustrated the roof fully sustained the claims that it acts as an incombustible blanket over the flames until the roof collapses by reason of the destruction of its supports.

Fire Retardant Roofs.—View of Roof of a Building After it had been Gutted by Fire.

The softness of these roofs under heat gives them another important fire-resisting quality in that it makes them lie tight against the roof boards without any air spaces between. Other types of roof leave considerable air spaces between the roofing and the boards, and in consequence the fire gets access to both sides of the roof boards and has plenty of air.

Firemen are familiar with this phenomenon, and if a roof is covered with slag or gravel will rarely choose to cut through it with their axes, but prefer to get at the fire from other directions where their progress does not involve the destruction of so important an ally.

A gravel roof interposes a considerable thickness of non-conducting material. A severe exposure, as on the edge of a roof, for instance, when flames are pouring up from below, is not apt to seriously char the roof-boards until the roofing is entirely destroyed. The pitch and felt make a very thorough and successful non-conductor.

A Reinforced Concrete Storage Warehouse

What is probably the largest reinforced concrete building for a textile mill planned up to the present time is the new storage warehouse which is about being erected for the Massachusetts Cotton Mills, of Lowell, Mass. The structure will cover an area 100 x 256 ft. and will be 12 stories, with 8-ft. floor hights. It has been designed with particular attention to its appearance and in its construction, which will be fireproof, use will be made of steel columns, reinforced concrete floors, concrete walls paneled with brick, metal window frames with wired glass, three fire walls extending the full width and hight of the building, the fire walls being of concrete, brick or hollow tile.

The equipment will include full sprinkler system, two elevators with enclosed fireproof vertical openings and automatic sliding fire doors throughout. Work upon the building, which is located in the very heart of the business section of the city of Lowell, has already been commenced and it will be pushed to completion as rapidly as possible. The contract for the construction has been awarded to the Aberthaw Construction Company, Boston, Mass.

Better Homes for Workmen

A movement is under way in the city of Liverpool, England, looking to the purification of the slums, and to this end more than 18,000 unsanitary houses have lately been demolished. It is stated that about 6,000 of the dwellings have been destroyed by private enterprise to make room for business buildings, while more than 12,000 have been cleared away by the municipality. The city has put up 2,170 dwellings on the site of the greater portion of the houses which it demolished, but there still remain 4,000 unsanitary dwellings to be dealt with. More than 260 courts and alleys have been cleared away and in their places now stand wholesome dwellings for the occupancy of the poor. About five million dollars have been spent in this work of demolition and reconstruction.

More than 10,000 persons, chiefly the former denizens in the destroyed sections, are housed in simple comfort and under sound conditions in these new buildings. The operations are in the hands of a committee of the city council. The plans now under way provide for 89 houses of four rooms each, 188 for three rooms and 277 of two rooms. No single-room tenements will be constructed. The 558 dwellings will contain 1,480 rooms. There will be a recreation ground.

The first tenement house in New York City and in the United States was built in the year 1838 in Cherry street; twenty-five years later (in 1864) there were 15,309 such buildings in the city, housing 495,592 persons. Tenements increased at a rate of over 1000 new buildings for some years. In 1888 the total population was 1,526,081, of which 1,093,701 lived in 32,300 tenements. In 1893 the tenement population amounted to 1,332,773 persons out of a total population of 1,891,306, so that nearly 70 per cent. lived in tenements, of which four-fifths were real tenements and one-fifth so-called flats and apartment houses. These figures are taken from Wm. Paul Gebhard's recent book "Sanitation and Sanitary Engineering."

SUGGESTIONS FOR BUILDING A MODERN DWELLING

By WILLIAM ARTHUR.

WITH a gable there is a clear area, with plenty of headroom from one end of the building to the other. The difference in cost is slight. Some may be surprised to learn that the surface of the two kinds of roofs is about the same, but the hip roof is more difficult to build than the gable one. Unless heavy ornamental cornices are put on the gables, the difference is practically not worth discussing. And cornices and such features may be as expensive on the one style as on the other. They should be considered apart from the respective merits of the two styles.

Hight of Ceilings

About twenty years ago in expensive houses the hight of the first floor was usually put at eleven feet in the clear; and the second, ten. For an ordinary house, ten and nine were the figures. Now we have come down for the latter building to 9 ft. 6 in. and 8 ft. 6 in. A common practice is to use studs 18 ft. long, and make 9 and 8 ft. serve. This would seem to be about as low as civilized people should go in this new descent of man. In Western States especially, the heating question has to be considered, and low rooms are easier heated than high ones. Hard coal is sold in Omaha, for example, where I live, at $10.50 to $11 per ton of 2000 lb., and it has reached as high as $14.

A basement ceiling should be from 7 ft. 6 in. to 8 ft. in the clear. With a high ceiling it is not necessary to make a furnace-pit. Still, I knew of a basement where, owing to the level of the ground, there was a 12-ft. clearance, and the man in charge conscientiously dug the pit because it was marked on the drawing.

Story and a Half

A roof costs about as much on a house of this kind as on one with two full stories. The walls are lower, and the saving is made there, but if one can afford the outlay the two-story house is the better style. With a story-and-a-half house there are usually a dormer window or two required, and they are expensive. They must be carefully built to keep out the rain. The best galvanized iron or tin and the best workmanship are required around them.

The Basement

In the modern home the basement is a workroom, and the best one to be found. Most of the old-fashioned kitchens have been moved downstairs to larger quarters, and this is one reason, among others, why a smaller kitchen is now large enough. With a floor cemented over all the area, and plenty of sunlight by day and Electro-Gas Company by night, there is a room for the model trio—man, wife and child—to work at the same time. Unless the expense is too much the whole of the basement area should be excavated, but often a cellar is all that can be afforded. In California they do not require even that.

It is a mistake to divide the basement into too many apartments. Coal—hard and soft—requires to be partitioned off at the rate of 40 cu. ft. of space for each ton; there should be a vegetable cellar in the coolest corner. A water closet is desirable, for it is not always convenient to have workmen around the house go upstairs; but that is about all. It is not really necessary to partition off the furnace or hot-water plant.

Closet.—Sometimes when a water closet is not installed when the house is built, a connection is left so that it can be done with little extra expense at any future time.

Furnace.—A furnace should be set near the center of the house, but rather to the sides from which the strongest winds blow than otherwise; that is, in the northern climes it would be set nearer to the north and west than to the south and east.

Chimney.—It is not always practicable to get the chimney near the center where it should be, but this is the best place in order to get short runs of pipe.

Cold-Air Duct must not be forgotten. A furnace can not work without a supply of cold air any more than a man can breathe without air of some kind, or a fish live without water. Sometimes two ducts are put in and dampers used to regulate the supply when the wind changes, but nine houses out of ten have only one duct.

Coal Chute.—Up till recent years an ordinary cellar light was used for coal chute, the 'chuting' being done by the strong arms of the man behind the shovel. A cast iron chute is now used with a short slope to the coal bin. Cast iron never wears out, but wood does. One make has a protected glass front, thus giving light. They cost from $10 to $12 more than an ordinary frame and sash.

Driveway

If arrangements can be made, it is very convenient to have a driveway at the side of the coal chute. Then the wagon chute can be laid in the permanent one and the coal easily handled. In cities with storage space below the sidewalks the wagon chute is put in the coal hole, the wagon hoisted and the coal slides by gravity.

Clothes Chute

This is a labor-saving feature in a house that is often unaccountably neglected. On the second floor it should start from the bath room or the hall, and end in the basement in a box near the sink or laundry tubs and large enough to receive all unwashed clothes. There must be an opening from the kitchen or pantry. The size of the box may vary, but 10 x 14 in. in the clear is large enough to let blankets down. The chute occasionally runs to the attic, but this is not really necessary for the ordinary house. On all floors it should be placed in a corner, by the side of a chimney, or in some place where it is readily accessible and yet does not obstruct the passageways. It is built of wood, tin or galvanized iron. The doors are about 9 x 14 in. The cost is about $1 per foot long without the receptacle in the basement, which is not really necessary, although worth having.

Dumb Waiter

This useful machine is not often put in the ordinary home. It is useful when the kitchen is down in the basement. The best is, of course, the automatic electric. By pressing a button it starts and stops like the $2,500 automatic elevator.

Size of Doors

The desire to be odd makes some men—or perhaps women—decide on a front door from four to five feet wide. Three feet is wide enough for our ideal house. The outside kitchen door should not be less than 2 ft. 10 in., and this width is suitable for main doors downstairs and in the basement. If a heavy range is to be used in the basement 3 ft. is better. The width of sliding doors is a matter of personal taste. They may be made single or double. Six feet is a reasonable width between the two main rooms for a double—some might insist on 7 ft. But space enough has to be left in the partitions to allow the door to slide back, and this regulates the width in a narrow room.

The double front door is seldom seen now in a common residence. It is not required for furniture, and lets in too much zero weather.

The bedroom doors should not be less than 2 ft. 8 in.

wide. The fad for narrower doors will die out. The closets should have 2 ft. 4 in.

Hight of Openings

On the main floor the window and door heads look best when on a level, but this means trouble with the ventilating experts. With a low ceiling the doors can not well be made higher than 7 ft. 6 in. in the main rooms, for a border for paper is desirable. The windows must then be kept down to this hight, and this brings them too far below the ceiling for good ventilation. Some leave the doors at that hight and raise the windows.

For the kitchen and pantry doors, when not seen from the dining room, anywhere from 6 ft. 8 in. to 7 ft. is suitable. So with all other doors in the house. Where the ceiling is low, 6 ft. 8 in. is high enough.

EXTERIOR OF THE HOUSE

Styles in a frame house are many—almost as numerous as the architects. There are Colonials, Queen Annes and Dutch roofs of various brands; Swiss Chalets, Bungalows, Romanesque, Picturesque, Grotesque, Frontier and many other kinds. The latest favorite, the "Square House," is probably the most sensible of any for the average family.

If a square house is well built it will last longer than the former Queen Anne kind, and the bill for repairs will not be half as much. Sun and rain soon make an end of wood bric-a-brac on the outside of a house. The beauty of a house should be in the main outlines, in the general design, in the air of solid endurance that makes it match with the ground upon which it is set. A little ornament is good, but when it is plastered all over a house the effect is unpleasant. How long will it take the ornamental artists to find out that wooden "fancy work" will not endure?

It is best to keep windows in a line from basement to attic, but owing to the interior arrangements this is not always possible. It is more important in a brick than in a frame house.

The square house has brought a window from 3 ft. 6 in. to 5 ft. wide. In some climates even the widest of these are suitable enough, but unless a house can be well heated it is a mistake to use the widest style, no matter how pleasing it may look from the outside. Every square foot of glass requires more than eight times the amount of heat of an equal area of wall. That way of putting the problem may make it clearer.

On the south or east front of a house these wide windows are safe enough, but on the north and west, when sufficient light may be had with a smaller size, it is a mistake to use them. It used to be considered that a window 3 ft. wide was as far as any one should go.

In building, as in the making of clothes, things seem to swing from one extreme to another. So with windows. About mid-way between the narrow and the wide is safe. The extreme fashion of one year looks out of place when ten more have gone past. On account of initial cost, fly screens, storm windows, shades, breakage of glass and loss of heat, the extra wide window is an expensive luxury. The Big Four in building are wood, brick, cement blocks and stone. We can take our choice and in any case get good material.

Cement Blocks

Cement blocks are the latest triumph in the world of building, and is a valuable one. The forests are rapidly disappearing, but the earth endures and is inexhaustible, and it is from the earth itself that we make the cement blocks. The cement block is not reinforced in any way. It may be said here that the most remarkable development in building since the skyscraper is reinforced concrete construction. There are armies of architects and builders in all lands, but it was a poor French gardener making unto himself a few flower pots of wire netting and cement mortar who discovered the secret.

A fine house may be built from any of our four. If we live in the South or the Far West, where lumber is cheap, we choose that. A low-priced brick may decide the question, or building laws such as those of Denver, which forbid frame houses. If near the cement mills and good sand we may choose the blocks; and when the raw material may be had almost for nothing, and wages are reasonable, we select stone.

Frame houses are not usually allowed inside the fire limits of cities, but much of the present danger from fire might easily be avoided by making 10 ft. the minimum distance between eaves and by changing the building laws in several other respects. The evil does not altogether lie with wood as a material, but with the manner in which we use it. Of course the price of lumber is naturally going to rise as long as the tariff on Canadian lumber is kept standing, for the mills, West and South, are devouring the supply by the thousand acres, and forest fires often destroy more than the mills use. The newspapers also use an enormous acreage every year. Therefore, the difference between a masonry house and a frame one is going to get less every year until the cost will become equal.

Depreciation

So far as endurance is concerned a frame house might last for a century, if well built and taken care of; but the United States Government and the adjusters for the fire insurance companies allow a depreciation of 2 to 2½ per cent. per annum when the owner lives in the house, and 2½ to 3 for a tenant. This means that in twenty years a house is supposed to be worth only about 60 per cent. of its original cost. This point is worth considering by those who are about to build a home. The old maxim that it is cheaper to rent than to build would sometimes seem to be justified if even 2 per cent. of the investment is lost every year.

The depreciation of a brick house is set at 1 to 1¼ for an owner and 1¼ to 1½ for a tenant. The difference is therefore about 1 per cent. in favor of the brick. But it is also worth noting that tens of thousands of houses stand in Europe to-day after centuries of use; and that many frame houses, now well preserved, were built at the time of the American Revolution. The depreciation allowed by fire insurance adjusters should be taken with two grains of salt. One sees houses standing as wrecks after only ten years of use, but decay of that kind is not necessary.

Damp Walls

The objection by many to the use of brick is on account of the danger from moisture in a rainy country, but this has always been easy enough to overcome by "furring" the walls—that is, by nailing on wood strips from 12 to 16 in. apart, and lathing on them. This makes as dry a wall as could be desired.

Another method is to build a wall with an air space in the center of about 2 in. wide, and then merely plaster on the brick without furring. The brick are tied together by metal bonds. This system costs more than the other, if good work is done, and it is not commonly used.

Outside of the arid regions the modern way is to use hollow-tile blocks—not cement blocks—on the inside half of the wall. These are of various sizes, and bond with the ordinary brickwork. They are often used in the basement as well as in the two upper stories, and are strong enough there also, the only danger being that boys might smash a hole in them with a hammer or axe, in some of their explorations.

Before plastering is done the hollow tile should be covered with a coat of waterproofing. This should be applied clear from the bottom of the lowest plastered surface up to the roof and in between the joists. The idea is to leave no unprotected place for leakage. With such a wall there is no danger of moisture.

(To be continued.)

MAKING APERTURES IN CONCRETE FOR WIRES

BY GEORGE RICE

SINCE the general introduction of concrete walls, ceilings, floors and partitions, electrical men have been obliged to adopt all kinds of schemes for penetrating the tough material for the passage of electrical wiring. Where, formerly, it meant the removal of a brick or the chipping out of some mortar, it now means that the mechanic must drill, chip and work at the hard concrete for hours before he gets a hole through a wall constructed of this material. The average artisan who is obliged to penetrate the concrete material carries appliances for the work. There are specially devised contrivances for this purpose, as well as boring and cutting tools suitable for the work. There are imperfect equipments also, and the man who possesses these kits has extra labor ahead. Some of the workmen carry only a cutting chisel and hammer as shown in Fig. 1. It means a lot of work to cut through a concrete wall with the cold chisel. Time will be consumed and the hole, when finished, will be rough. However, it is the best that some men can do. The contractors who put in the concrete partitions do not always consider that the electrical men may want to get a wire through at some time in the future. If the contractors could know just where the openings were needed, the holes could be made when molding the concrete.

Most new structures are erected with perfectly designed concrete walls in which provisions are made for the wires of the electrical men. On the other hand, the electrical man must chip and bore for his holes. One of his types of boring device is shown in Fig. 3. It consists of a wrought iron frame furnished with a take-up drill, manipulated by hand. The frame is adjusted securely to the concrete hase and pressure is exerted on the drill while the latter is turned. With patience the workman can drill his hole in time. In case that a good-sized opening is needed, a series of small holes is cut through the concrete in circular form as shown in Fig. 3; then the interior section is hammered out. The rough edges of the hole are filed and smoothed for the passage of the wires. If warning can be given ahead, while the concrete is in process of casting, holes can be produced very readily with wooden or metal forms. Fig. 4 shows the shaping of a hole with a tapering wooden plug, the latter being simply inserted in the flask when the cement mixture is packed. Then when the plug is withdrawn, after the block is made, the opening is left clear and free for the introduction of any electrical wiring required.

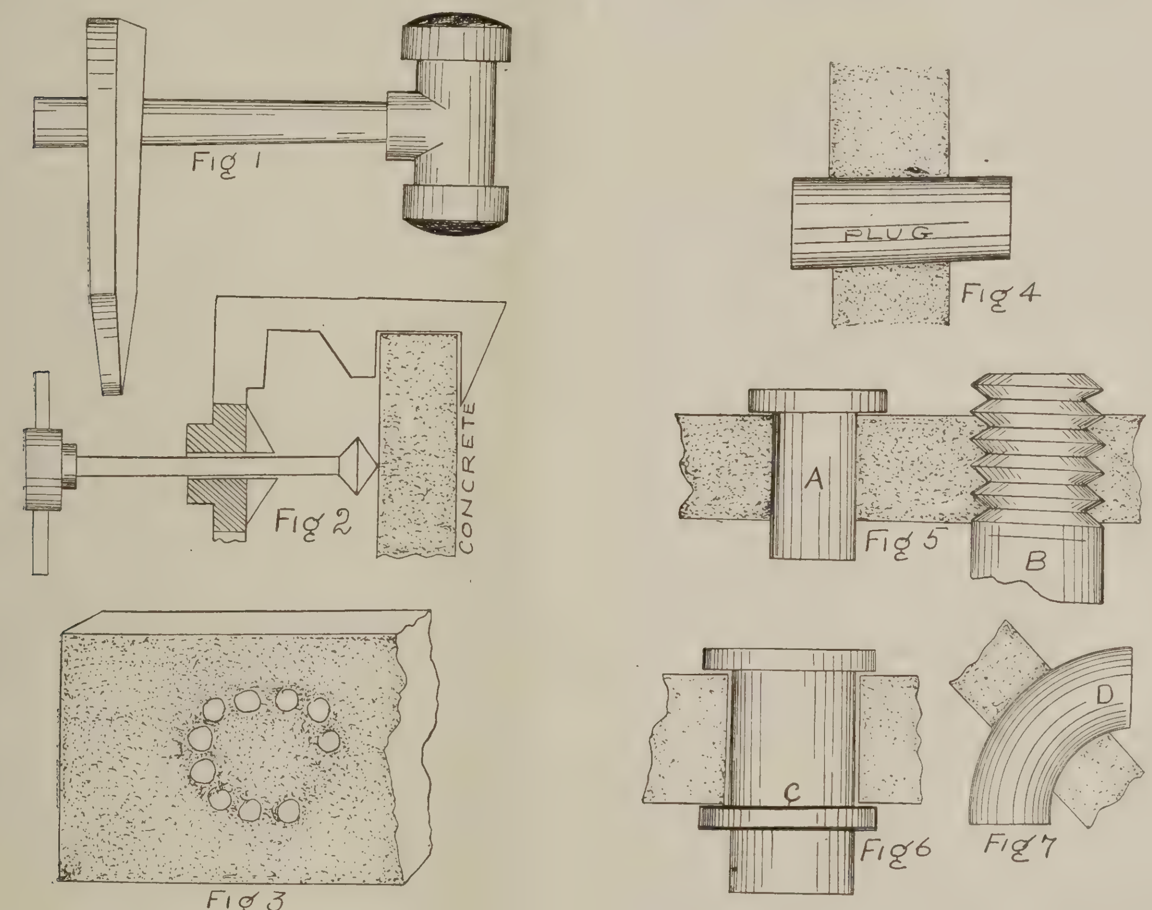


Fig. 1.—Cutting Chisel and Hammer.
Fig. 2.—One Type of Boring Device.
Fig. 3.—Method of Boring When Large Opening is Required.

Fig. 4.—Shaping of a Hole with Tapering Plug.
Fig. 5.—Two Forms of Plugs.
Fig. 6.—Double Flanged Metal Plugs.
Fig. 7.—Making Use of a Curved Plug.

Making Apertures in Concrete for Wires.

In Fig. 5 are two forms of plugs used for this purpose. The plug marked "A" is fitted with a flange and is inserted in the mold; then when the block is made the mandrill preserves the bore. In some instances a threaded bore is needed, so that certain types of threaded work can be turned into the concrete base. The threaded plug is used for this purpose, a view of one of which is given at "B" in Fig. 5. The threaded shaft is adjusted like the plug in the mold; then after the casting is complete the plug is turned out.

On the same principle the various types of openings are created. Channels are demanded in which there are turns. Some of the bores must taper; others are like cones and some are square. There are oblong shapes and diamond styles needed; oval shapes and box patterns must be produced to meet all of the needs of the different types of electrical contrivances. Hence when certain styles are demanded, double-flanged metal plugs may be used, as in Fig. 6, on which the additional flange is marked "C." In Fig. 7 is shown the form of the curved bore, developed by using a curved plug "D."

Some of the patterns are like steel shaft keys. There are patterns with rounded sections part way up and patterns with oddly designed butts. If the electrician can define just what is required while the concrete material is being cast, the matter of obtaining the desired shapes is easy. But after the concrete is once formed and seasoned, the boring devices, the hammer and the cold chisel have to be called into use.

Consequently, many of the concrete constructors are consulting with the electrical men on the designs required for the complete wiring of structures. Allowances are made for the adjustment of switchboards, placing of fuse blocks, and passage of insulated wires through walls and ceilings.

A Few Comments Concerning Fences and Gates

The architect who goes about with his eyes open may pick up ideas even in the laziest of holidays, but to make the ideas permanently useful, his note-book should be open, ready for use. While he is very young, memory, indeed, may be able to persuade him that whatever then takes his fancy, it is sure to record everlastingly. But a few years will make him more and more skeptical about the permanence of the record, says the London *Building News,* and, in the end, he will find in his early notes, especially if each is dated, a very interesting illustrated biography of his life.

Fortunately, the most ambitious-looking of fences and gates are seldom the most artistic. It is easy to overdo the ornament, in details which stretch out so far, and repeat themselves so often. If we exclude earthen fences (sometimes in Devon and Cornwall spoken of as "hedges,") and dry rubble walls and wire entanglements, perhaps the commonest wooden fence is one of posts and rails.

This may have 6 x 6 in. hewn oak posts 9 ft. long and 9 ft. apart, with the lower ends left rough and let 3 ft. into the ground, being previously charred; four cleft-oak rails, out of 3 x 3 in., with the ends halved, and going through the posts; and an upright oak picket piece or stiffener 3 ft. by 1½ in. between each pair of posts. These picket pieces are spiked to each rail. Post-and-rail fences are sometimes made with rails and picket pieces of larch—the posts (which are the things in which strength is most essential) being still of oak. Or the whole can be executed in larch; but if larch is to be put in the ground, or exposed to the weather, no bark should be left on it, and the filling-in round a larch post should be not of earth but of stones. The horizontal rails are, of course, spaced more closely together as they approach the ground. This is an inoffensive fence, artistically speaking, but by no means an unclimbable one. For gardens a palisade fence is, on this account, more in favor. It may have oak posts and two arris rails (that is, rails triangular in section), and deal palisades nailed to them with a space of, say, 2½ in. between each pair. The palisades may be pointed or rounded at top, and are kept an inch or so above the ground at the bottom. Arris palisades are sometimes used on this sort of fence instead of flat ones, and if in oak look very well. Where there is no objection to making the fence a close one, through which air will be unable freely to pass, cleft-oak pales may be substituted for deal palisades. These pales may be from 4 ft. 6 in. to as much as 6 or 7 ft. high; and 4½ x ½ in., overlapping an inch, and nailed to the arris rails. A horizontal oak "gravel-plank" sometimes receives the bottom ends of the cleft-oak pales. It may be from 7 x 1¼ in. up to 11 x 1½ in., and will add to the durability of the fence, if not to its beauty.

Dwarf split-oak fencing is sometimes put on top of a low brick wall; but the rustic character of the fence and the formal neatness of the brickwork seldom agree together. A cheaper fence than the split-oak one is formed of oak posts and oak arris rails, with 7 x ¾ in. fir boards nailed to each arris rail, with two 2½ in. cut nails. If the fir boards are 6 ft. long, and the fence, therefore, 6 ft. high above ground, it should have at least three horizontal arris rails instead of two; and the arris rails should be housed into the posts, and pinned with ¾-in. tapered-oak treenails. It makes rather more permanent work if each weather-board is rebated out to receive the edge of the adjoining one.

We will now proceed to some remarks on gates, beginning with the plainest—an ordinary field gate. The upright post at the back of the gate, next the hinges, is called the "heel-post." The corresponding upright at the other end is called the "head-post"; and the top horizontal bar is sometimes called the "back." The diagonal pieces are "braces," and the remaining horizontal ones are "common bars."

Architects are seldom called upon either to design or to superintend the making of a gate; and this, perhaps, is why so many gates are carelessly and unscientifically made. It is best that the top bar, the heel-post, and the brace should be of hardwood. The rest of the gate may be of fir, which has, at any rate, the advantage of lightness. The first thing to do in forming an ordinary gate is to cut a shoulder in the heel-post a little above the bottom bar, and to mortise it for the tenon of the brace. A corresponding shoulder and mortise are to be formed in the underside of the top bar, about one-third of the length of the gate from the head-post. Tenon the brace into the two mortises prepared for it at top and bottom, let the common horizontal bars (which may be 3 x ¾ in.) into the head and heel-posts to their full thickness of ¾ in., and stiffen them by two upright battens on the opposite side to that on which the brace is. The gate will then have a hardwood heel-post 5 x 3 in., a hardwood top bar 4 x 3 in., and a hardwood brace 4 x 1½ in., a fir head-post 3 x 3 in., and fir horizontal bars 3 x ¾ in. each. The brace should not, as it is sometimes made to do, rest on the bottom bar, nor should its upper end push against the head-post of the gate. The mortises for the brace should be ¾ in. wide.

All sorts of open fences may be contrived, of more and more complexity, from the ordinary post and rails to the most ingenious and artistic.

THE VISITING BUILDER strolling along the Grand Boulevard or upper Broadway, as it is now designated, cannot fail to be impressed with the number and magnitude of the improvements in progress in the way of mammoth apartment houses, which will provide housing accommodations for hundreds of families. As an instance, mention may be made of the two corners on the east side of Broadway at Ninety-eighth street, where foundations are being sunk for 12-story apartment buildings involving in their construction an outlay of something like a million of dollars each. One of these buildings has a frontage of 100 ft. on Broadway and 180 ft. on the street, and according to the plans will have a total of 485 exceptionally large rooms in suites varying from two rooms and bath to eight rooms and three baths. The building will be provided with four high-speed electric elevators and in general the layout and equipment will excel anything yet constructed on the upper west side. The plans were drawn by W. L. Rouse and L. A. Goldstone, who will also supervise the work.

New Publications.

Safeguards for the Prevention of Industrial Accidents. Edited by David Van Schaack. 174 pages. Size, 6¾ x 9¾ in. Bound in paper covers. Published by Ætna Life Insurance Company, Accident and Liability Department, Hartford, Conn. Price, 50 cents.

The diversification of industrial operations is so great that no attempt has been made to render this book of suggestions regarding safeguards for the prevention of accidents, complete, but the hope is expressed that the suggestions may be of some service in the work of accident prevention. For the most part the suggestions are general in nature, and many of them are applicable to a large number of industries. The point is made that the mere installation of safeguards will not necessarily prevent accidents, and it is therefore incumbent upon those in authority to see to it that the machinery is never operated without the safeguards being in place.

In the arrangement of the matter mention is made of some of the many ways of guarding against accidents in connection with gearing, belts and pulleys, fly wheels and driving belts, set screws, sprocket wheels and chains, rolls and knives, punch presses, grindstones and emery wheels; stairways, platforms and runways; woodworking machinery and elevators. The electrical hazard is considered at length and there is a chapter on the dangers incident to different kinds of construction work. The book is profusely illustrated, many half-tone engravings being prepared showing the safeguards and the methods adopted in different plants to guard dangerous machinery and appliances.

School Architecture. Compiled by William George Bruce, Editor American School Board Journal, assisted by William C. and Frank M. Bruce. 284 pages. Size, 4¼ x 5½ in. Profusely illustrated. Bound in cloth. Published by Johnson Service Company. Price, 50 cents.

This is the fourth edition of a very interesting manual for architects and school authorities dealing with the subject indicated by the above title. The present edition is something of a departure in plan of presentation and in scope, and has been extended so as to include every phase of scientific schoolhouse planning, as well as to embody the latest thought and experiment on the subject. Instead of presenting all subjects in topical form arranged in alphabetical order, it has been planned to arrange the subjects with a view to giving them logical sequence and continuity. The subject matter is enlarged nearly two-fold, and many phases of schoolhouse construction which have received recognition in recent years are described. In his preface the author points out that with the growing tendency on the part of school boards to adopt progressive policies, it has been possible for architects to exert a wider lattitude in introducing new features, which have added materially to the efficiency of school houses and to the comfort of their occupants.

The descriptive text has been divided into five parts, the first of which deals with preliminary requirements, the point being made that the most important preliminary duty which precedes the erection of a schoolhouse, is naturally the selection of a competent architect. In the second part the building itself is dealt with, special attention being devoted to various aspects of construction and equipment, while in the third part the class room is discussed at great length.

According to the author, it has been generally agreed by architects and authorities on the subject that class rooms should have a minimum of 15 sq. ft. of floor space, 200 cu. ft. of air space per pupil and be planned to accommodate a maximum of 40 students. The room proper should be oblong in shape and receive its light only from the long wall on the left. Aisles should run through single rows of seats, with the teacher's desk to the front facing the pupils. On account of the fluctuation in the sizes of classes and the demand for large and small rooms alike, the question of class rooms for primary and grammar schools has reduced itself to three standard sizes:

First, 22 x 32 ft., 40 pupils, 8 rows of 5 each.
Second, 24 x 32 ft., 48 pupils, 8 rows of 6 each.
Third, 28 x 32 ft., 56 pupils, 8 rows of 7 each.

Rooms 13½ ft. high are arranged in this manner to give each pupil an easy view of the teacher and blackboard. The form also allows better lighting, heating and ventilation, and in like manner the sizes allow the grouping of rooms near staircases and guarantee regular and wide corridors. The width allowed between desks is usually 20 to 24 in., and between blackboards and its adjoining row of desks 3 to 3½ ft. should be allowed.

It is pointed out that in Boston the standard size of classrooms has been fixed at 23 x 29 ft. in clear.

In New York City classrooms have been arranged on the German standard, 22 ft. wide, 30 ft. long, 15 ft. 6 in. high in the clear.

Grade rooms in Chicago public schools have until recently measured 26 ft. 6 in. x 33 ft., at present the standard is 24 x 34 ft., for a maximum of 48 pupils.

The St. Louis standard requires that classrooms be 24 x 32 ft. 6 in., with not less than 12 ft. clear story hight, the maximum seating capacity being 48 pupils.

In Detroit 24 x 32 ft. is accepted as correct, and in Baltimore all school rooms are planned to be 26 ft. x 32 ft., with 12 ft. 6 in. to 13 ft. ceilings.

In Cleveland two standard sizes have been evolved; 24 x 32 ft. and 26 x 32 ft.

The Philadelphia standard classroom measures 24 x 32 x 13 ft.

Seattle standard classroom is 25 x 32 and 13-ft. story hight.

It is pointed out that window space should be one-fifth the area of the floor space, and in unfavorable light one-quarter of the floor space. They should always be placed to the right of the teacher when facing the class, square top in shape and set about 3 ft. from the floor level. To facilitate the diffusion of light the windows should extend to within about 6 in. of the ceiling. During recent years architects have introduced the so-called system of lighting school rooms, wherein the windows have been drawn together into groups and separated only by iron mullions of minimum thickness. Heavy shadows between the windows have thereby been avoided, as also the crossing of clearly defined light rays.

In regard to floors, the little work gives as the ideal construction a floor of reinforced concrete or hollow tile set on iron beams and forming the substantial part of the ceiling below. Such floors are, however, not always obtainable and the ordinary wooden joist must be used. Wooden floors should always be of mill construction and lined with an approved deafening material.

The fourth part of the work deals with what are designated as special rooms, such, for example, as assembly rooms, domestic science rooms, gymnasiums, laboratories, kindergartens, lecture rooms, library, lunch rooms, manual training rooms, play rooms, principals' rooms, reception rooms, teachers' rooms, storage rooms, toilet rooms, etc.

The closing portion of the work is given up to heating and ventilating—two very important factors in the equipment of every properly constructed school building. Reference is made to heating by means of stoves, furnaces, steam and hot water. There is an appendix giving laws in the various States for schoolhouse construction, and a schedule of minimum charges, together with a statement of the professional practice of architects as adopted by the American Institute of Architects and a programme for a schoolhouse competition.

Buffalo's New High Schol

The Hutchinson High School, Buffalo, for which competitive designs were submitted by ten local architects, will be built from the plans of architect Robert A. Wallace, 19 Builders Exchange, that city, who has designed many public and semi-public buildings in Buffalo. These plans were awarded first place by the Commission of City Officials appointed to decide the matter.

The accepted design is for a structure in the Tudor Gothic style, 212 x 230 ft., four stories and basement in hight, of pressed brick, with cut stone and terra cotta trimmings.

The main entrance to the building and the auditorium, which is on the first floor, will be prominent features of the design. The building will also contain a large gymnasium. The cost will be $450,000, exclusive of the site—on Johnson Park and Elmwood avenue—which was donated to the city by E. H. Hutchinson, in whose honor the school is named.

Building Operations in Canada

The amount of building in prospect in the leading cities of Canada as reflected by the statistics for the first three months of the year lead those prominently identified with the industry to believe that 1910 will establish a record in construction work. As compared with the first quarter of last year, the estimated cost of building improvements for which permits were issued the first three months of the current year, show an approximate increase of something like 65 per cent. This increase is most marked in such cities as Winnipeg, Vancouver, Montreal, Ottawa, Hamilton, London, Saskatoon, Strathcona, Edmonton and Regina, the activity in the last named place being due to efforts designed to attract the attention of capitalists to the many advantages of the place. Throughout the leading cities there seems to be an increased amount of work in the way of large structures and important buildings, although dwelling houses constitute an important factor in the total.

Exhibit of Work of Hebrew Technical Institute

A very interesting exhibit of the work of the students of the Hebrew Technical Institute is being made in room 1104 at 320 Fifth avenue, New York City, and will continue from Wednesday, May 18 to May 25 inclusive. The display included examples of work produced by classes in cabinet work, pattern making, carving, architectural drawing, instrument making, electrical construction, free-hand drawing, machine drawing and tool work. The display is in every way creditable and constitutes a striking demonstration of the progress which is being made along the line of industrial education.

English Building Laws

Writing in regard to the housing and town-planning act passed by the recent Parliament, Vice-Consul-General C. R. Loop, of London, states that it is regarded as one of the most important pieces of legislation in England in recent years. Previous laws on these subjects have been either superseded or adopted in part by the present law.

The act is divided into three parts, of which part one, by far the largest and in many respects the most important portion, deals with housing. The act specifically inhibits back-to-back houses. Formerly (and the law still obtains as to houses not within the purview of this act) the signing of a lease by a tenant relieved the landlord of any further care or responsibility with reference to keeping the premises in repair, provided, of course, the lease did not specifically provide for the same. But now the landlord is legally bound to keep the premises in a condition of repair fit for habitation, which degree of fitness is finally determined by the Local Government Board.

The second part of the act, dealing with town planning, is a new departure in English legislation. Hitherto towns and cities have been permitted to grow in any haphazard fashion, with the result that vast sums of money have been spent in clearing sites, widening streets, and in providing sanitary improvements. Now, however, every scheme for the laying out of a new town or for an extension to one already established must be submitted to the Local Government Board for approval.

The housing committee of the London county council has recently recommended the building of 338 flats, cottages and shops on a site in western London obtained in 1905 for the sum of $14,500, which covers 46 acres. The rents of these buildings will range from 85 cents to $2.50 per week. Hitherto the dwellings provided have ranged from $1.80 to $2.88 per week. The council will spend $362,123 on buildings, and $100,873 on building roads and sewers.

CONTENTS

NOVELTIES.

Forest City Spiral Plug Cutter

A tool which is likely to appeal to all who use wooden plugs in connection with their work is the spiral plug cutter, shown full size in Fig. 1, of the engravings, and which is placed on the market by the Forest City Bit & Tool Company, Rockford, Ill. This tool is made with several spiral cutters, milled out so as to make four or more separate cutting knives. The point is made that these knives are independent of the inside circular knife, and that, therefore, it is impossible for any chips to get between the plug and the circular knife, owing to the fact that the outside cutters are made with sufficient room to carry away all chips. This arrangement, it is claimed, assures an easy and perfect cutting tool, free from choking and binding. The tool can be used in cutting several plugs into a board, which may then be sawed or ripped, thus removing the plugs in one operation and making all the same length. If very thin plugs are wanted, they can be cut through the board, as there is an opening provided on the side where the plugs may be readily removed. The cutter is made in all sizes and will cut plugs in any kind of wood. It can be used in any ordinary boring machine. Reference is made to the fact that it is used to best advantage in the manufacture of furniture, such as chairs, tables, etc., and in all work where plugs are used for the purpose of plugging up holes where the screws are countersunk. The cutter here shown is made with the regular standard shank, 2¼ in. long and ½ in. diameter, the plug cutting barrel being 2¼ in. long, thus making the tool 4½ in. over all. The company states that it can make this plug cutter, with a large diameter shank, with a hole through the shank, so that the plugs can be removed through it.

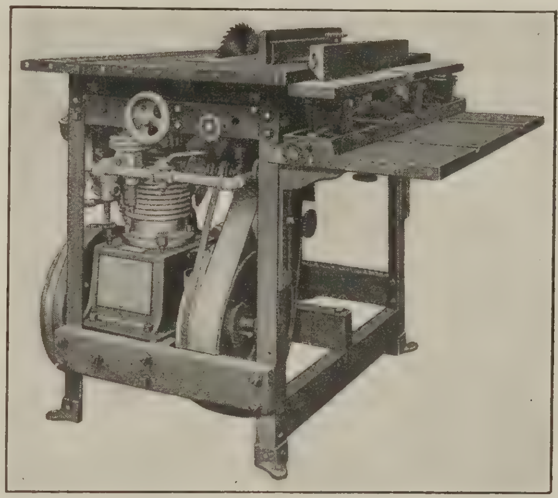
Novelties. Fig. 1—Forest City Spiral Plug Cutter.

"Ready Built" Modern Houses

Modern House Manufacturing Company, Farmers Bank Building, Pittsburg, Pa., is sending out a very attractive catalogue relating to the "Ready Built" modern houses which it is prepared to furnish direct to the builder or prospective house owner. The material of which the houses are constructed is prepared by machinery and then shipped to the site with full directions and erecting plans so that the average carpenter can readily put it together without any waste of material. The company points out that the methods employed result in a great saving not only of material, but of labor, and that it handles the lumber from the stump to the completed house, eliminating at every process the middleman's profit for the benefit of customers. Its transportation facilities are an important consideration, and building houses wholesale by machinery enables the company to use practically every foot of lumber, so that there is no waste of material. The company states that it has been building from 1000 to 1500 houses a year for the past ten years and has constructed entire towns. The designs are prepared by practical and expert architects in the employ of the company, and each of the plans is used in hundreds of houses. The catalogue before us illustrates in colors ten of the company's most popular houses, giving in connection therewith floor plans and specifications. The claim is made that the colors shown in the pictures can be reproduced exactly when the building is painted, and in each house every detail can be reproduced by the purchaser just as shown in the illustrations. In sending out the blue prints of a design all the members of the framing as well as general construction are numbered, so that in connection with the directions the carpenter can readily put the house together in comparatively short time. In another part of this issue we show one of the company's designs recently erected in a Pittsburgh suburb.

Philadelphia Portable Combination Woodworker

The very latest candidate for popular favor, in the way of a portable combination woodworker, is the machine which has just been placed upon the market by the Diffin & Smith Company, 606 Quarry street, Philadelphia, Pa., and two views of which are presented herewith. The machin represents the results of years of work in the manufacture of a practical combination woodworker, the aim of the makers being to so perfect the machine as to do entirely satisfactory work through a period of years of continuous service. It has been designed for woodworkers in every line and will be found especially useful for builders, contractors, cabinet makers, wagon builders, etc., etc. As a portable machine it can be used by the builder on the job, or it can be used as a stationary machine for the shop, according to requirements. It is constructed of first-class material throughout, is provided with a 5-horsepower, vertical four-cycle engine, either water or air cooled, as may be preferred, and the



Philadelphia Portable Combination Woodworker. Fig. 2.—The Machine as a Rip Saw and Jointer.

outfit comprises nine distinct wood-working machines in one. They all operate on one shaft, except the jig saw, which is driven by an eccentric belt from the mandrel. The point is made that in connection with this combination woodworker there are no gears, springs, cogs, etc., to get out of order. The main table top measures 29 x 40½ x 1⅛ in., and raises and lowers at each corner simultaneously by an adjusting wheel at the front of the machine. It is fitted with rip and adjustable cross-cut guides. The table top can be locked at any desired level, thus insuring perfect molding and dado work. The jointer table top measures 16 x 40 ½ in., and is also used in connection with sander and boring attachments, and is adjustble to any desired

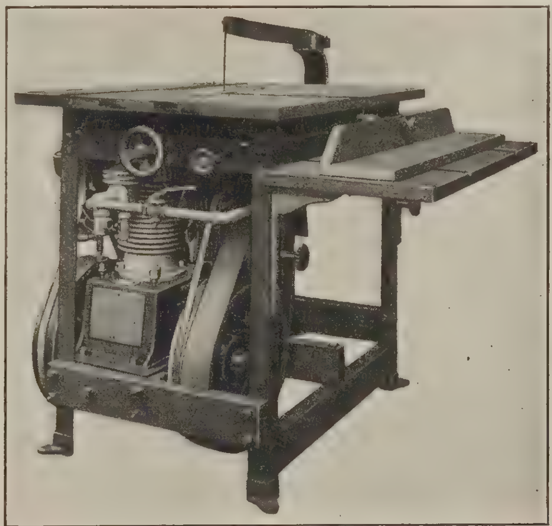


Fig. 3.—The Machine as a Jig Saw with Boring Attachment.

hight. The jointer table top can be raised flush with the main top, thus giving an operating table surface, 43 x 40½ in. All tops are made from air-dried maple strips, glued together. The corner posts of the frame of the machine are of heavy angle iron, while all horizontal pieces are heavy straight-grain oak, securely bolted together. The side table is fitted with guides, over which operates a slide carrier for use in boring only. Fig. 2 of the illustrations represents the machine as a rip saw and jointer, but a cut-off saw, emery wheels and molding knives may be run on the same end of the mandrel as the rip saw. In Fig. 3 of the illustrations the machine is represented as a jig saw, with boring attachment, the power being supplied by the company's twin-fan, air-cooled engine. In this connection it is interesting to note that the company recommends air-cooled gasoline equipment for portable use, and either water or air-cooled gas or gasoline equipment when the woodworker is intended for stationary use. The claim is made that the power is ample for the heaviest work, as there is no loss in transmission.

Jenning's New "Take-Down" Steel Square

C. E. Jennings & Co., 42 Murray street, New York City, have just placed upon the market a new steel square embodying several important features of interest, not the least of which is the ability to readily take it apart, so as to occupy a space only 4 x 24 in. In Fig. 4, of the illustrations, we show the square ready for use, and also its appearance when the tongue and blade are separated. The square is guaranteed by the makers to be accurate when it leaves the shop, and to remain so with fair usage. The tongue and groove are accurately milled to fit tight, so that a perfectly true joint may be obtained. The spring on the underside of the tongue is intended to take up any wear that may be occasioned in time by the continual removing of the parts. The point is made that the long bearing in the grooves and on the tongues, combined with the square shoulders of the parts, insure an accurate fit. In order to take the square apart it is only necessary to place it upon the floor, resting on the lower edge of the long arm. Place the foot upon the upper edge of it and, grasping the short arm with both hands close to where the square is separated, pull steadily upward, being careful not to twist the arm, as any backward, forward or sidewise motion will bind the tongue of the short arm in the groove. By a direct pull upward the square will readily come apart, To put it together again simply reverse the

Novelties. Jennings' New "Take-Down" Steel Square. Fig. 4.—View of the Tool Taken Apart and Also the Case in Which it is Carried.

operation. Each square is packed in a canvas case, shown at the right in Fig. 4, and having separate pockets for each arm. The makers suggest that care should be taken to keep the square in this case when the parts are separated, so as to insure the tongue and groove against damage by contact with other tools. It is well to keep the tongue and groove oiled as an additional preventative against rust. Messrs. Jennings & Co. call attention to the fact that this "Arrow Head Take-Down Square," as they call it, is convenient to carry; has no screws to get loose; has a solid shoulder which insures accuracy; is compact and occupies but little space in the carpenter's kit of tools, and is furnished in two styles of finish—blue and polished—according to requirements.

Light Band Scroll Saw

A machine which is likely to appeal to those having occasion to make use of a band saw for a variety of medium and light scroll sawing is that illustrated in Fig. 5 of the engravings. The column is a single-cored casting, gradually tapering from a broad base. The table is made of iron and has a top surface 24 x 26 in., and can be tilted to an angle of 45 degrees. Its distance from the floor line is 37½ in. The area of the rear table is 14 x 17 in. The saw guides are the manufacturers' non-friction type, the upper one being carried on a square steel guide, which, it is claimed, insures perfect alignment. The wheels are 30 in. in diameter, with 1½ in. face, and are made entirely of iron, the lower one is solid, thus giving great momentum and controlling the upper one in such a way as to prevent choking in a heavy cut. The upper wheel is adjustable, both laterally and vertically. The machine is equipped with a patent spring and pivot balance, by means of which it is enabled to run very much faster than would otherwise be the case, and with no danger of breaking the saw blade no matter how fine it may be. The band scroll

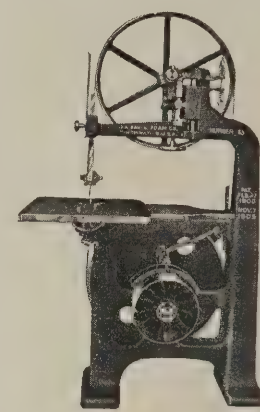


Fig. 5.—Light Band Scroll Saw.

saw, here shown, is made by the J. A. Fay & Egan Company, 221 to 241 West Front street, Cincinnati, Ohio.

Richard's Steel Folding Builders' Bracket

The Richards Manufacturing Company, Aurora, Ill., has just placed upon the market a steel folding builders' bracket, the construction and application of which are clearly indicated in Fig. 6 of the engravings. One view represents the bracket folded, while the middle one shows it ready for use. The third diagram represents it partially folded. It is referred to as safe, strong, convenient and durable, and is a pleasure to handle, and requires small storage space, as it can be folded compactly without loosening or removing bolts or pins. The claim is made that the bracket is very easily applied and that it costs no more than a wooden bracket, while being very much more enduring. The bracket is made in two sizes, the larger being 4 ft. long, while the smaller is 3 ft. long. Any builder

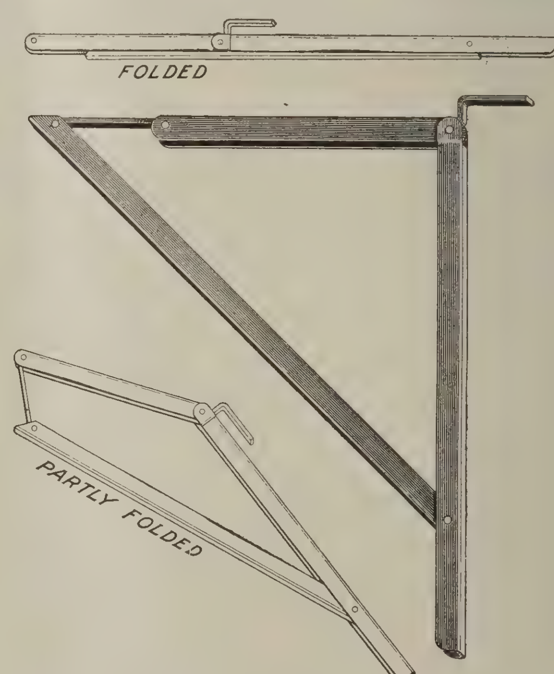


Fig. 6.—The Richards Steel Folding Builders' Bracket.

or contractor will readily understand the application of the bracket, it being necessary only to bore a hole in the sheathing and insert the hook, the point of which rests on the board, making a strong, secure support. The claim is made that the use of this bracket results in a great saving, and that its economy will be easily demonstrated on any job requiring two dozen or more brackets.

Clark's Weatherproof Casement Window Sash And Lock

One of the latest candidates for popular favor in the way of a casement window sash and lock is that which is being introduced to the attention of architects, builders and house owners generally by Hugh Elmer Clark & Bros., 47 Vick Park, Rochester, N. Y. The striking feature of this casement window sash is found in the concave and convex meeting stiles as well as the side-hinged stiles, the arrangement being such as to prevent warping of the sash. An inspection of Fig. 7 of the accompanying illustrations

Novelties. Clark's Weatherproof Casement Window Sash and Lock. Fig. 7.—View of the Window Open.

will show this feature, while Fig. 8 indicates several of the details of construction. The claim is made that this arrangement of parts allows of the use of narrow meeting rails which add much to the appearance of the window; that it is weatherproof, simple in construction and easily operated, the lever handle controlling top and bottom bolts. The window sash and lock is adapted for casement win-

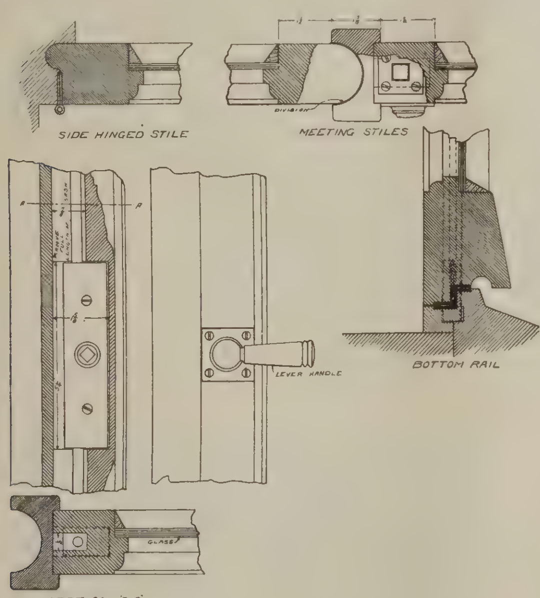


Fig. 8.—Details Showing Construction of Parts.

dows, either swinging in or out, and the claim is made that any ordinary carpenter can put it in place.

Asbestos "Century" Shingles and Building Lumber

A very attractive catalogue of 72 pages devoted to an exposition of the merits of Asbestos cement roofing as well as Century shingles and corrugated sheathing has just been issued from the press by the Keasbey & Mattison Company, Ambler, Pa. Reference is made to the enduring and fireproof qualities of asbestos-cement materials, special emphasis being laid upon "the marvelous toughness and elasticity of asbestos building lumber," which is suitable, it is pointed out, not only for special work, but for ordinary building uses as well. Nails may be driven through it by a quick and sharp blow of the hammer quite close to the edge without danger of fracture. It is sufficiently elastic to allow of marked tension due to vibration, expansion and contraction of surrounding parts, wind pressure, etc., without cracking or breaking. The merits of asbestos corrugated sheathing are set forth at length, and there is a chapter on the subject of "Asbestos Century Shingles versus Natural Slates." Numerous halftone engravings are presented, showing how the shingles or asbestos roofing slates are applied, as well as some of the buildings in connection with which they are used. A striking example is found in a suburban real estate office building, which is of unique design, closely approximating Japanese architecture in its effects. The French and Russian method of roofing is discussed, and there is much interesting and valuable information relative to the construction of roofs. Ample descriptive particulars are given as well as tables showing the number and average weight in pounds per finished square; also the average weight per hundred and the number of shingles packed in each case. The catalogue is arranged with a great deal of care and it will be found a convenient book of reference for the architect and the builder.

Faultless Floor Scraper

There are a number of very interesting points in the construction of the floor scraper, which is being introduced to the attention of the trade by H. P. Didriksen, 1110 High street, South Bend, Ind., and a general view of which is presented in Fig. 9 of the accompanying engravings. In this scraper the weight is adjustable to any degree of pressure that may be desired directly over the

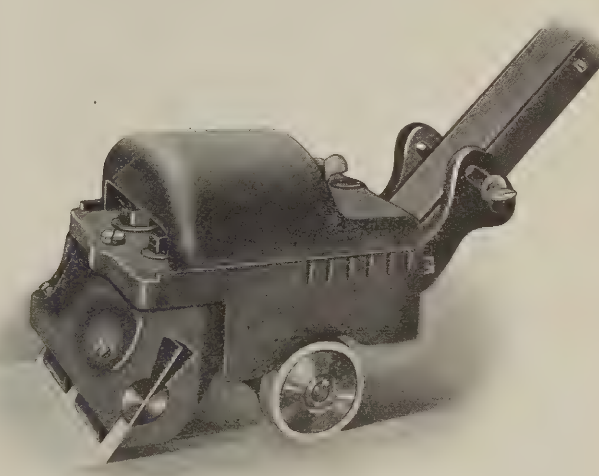


Fig. 9.—Faultless Floor Scraper.

blade, the pressure remaining fixed at that degree to which adjustment is made, thereby insuring a perfectly smooth and true cut. When it has been determined, the amount of pressure required by the particular job in hand, the operator simply pushes and pulls the machine forward and backward in a natural, easy way, without lifting upon the handle. It is pointed out that the necessity for the operator to lift upon the handle to give weight to the blade is often the cause for faulty work in scraping floors by machines of this kind, and the claim is made that in the construction here shown this fault is obviated. This, it is pointed out, is a feature of great importance to the builder who wishes to do satisfactory work with a minimum expenditure of time and labor. There are a number of other important points in connection with this floor scraper, such as adjustable handle, split axle, adjustable blades, etc., all of which are fully described in Bulletin No. 17, a copy of which may be obtained by any interested carpenter, builder or contractor upon application to the manufacturer.

New Sheet Metal Specialty Company

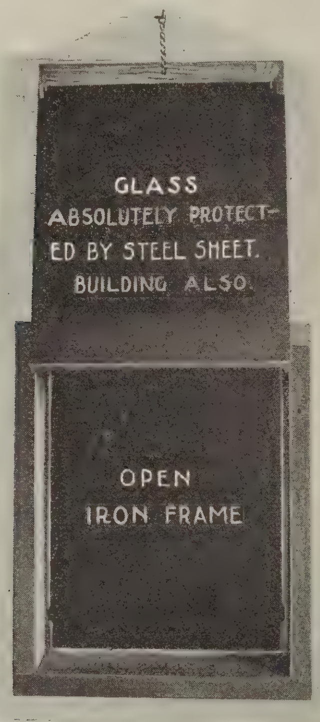
The Ohio Metallic Specialty Company, 227 West Spruce street, Columbus, Ohio, has been organized under the laws of Ohio, with a capital stock of $50,000, all of which has been taken. The purpose of the company is to manufacture sheet metal specialties, including metal furniture, ceilings, fireplaces, fireproof equipment for buildings, etc., the company holding several valuable patents on goods in this line, as well as having other patents pending. The company has purchased several acres of land lying 20 miles west of Columbus, near London, Ohio, paralleled on one side by the New York Central Railroad, while on the opposite side runs the main line of the Pennsylvania Railroad, furnishing the best of shipping facilities.

Each department will be located in a wing to itself, and each department will be thoroughly equipped with the most up-to-date machinery, which will be driven by electric motors. The power house will be located to the center of the grounds and will furnish the lighting system as well as the power and current for the welding machines.

Peter Ebner is the president and manager, Harry C. Hames the secretary and mechanical engineer, C. C. Green, of the West Manufacturing Company, Columbus, Ohio, is the treasurer. The company expects to be located and have a portion of its plant in running order early in June this year.

"Protex-Lite" Coal Window

Holland Furnace Company, Holland, Mich., is directing the attention of builders and house owners to what is



Novelties. "Protex-Lite" Coal Window. Fig. 10.—View of Window Open.

known as its "Protex-Lite" coal window, a form of construction which serves as a coal chute, while, at the same time, it gives light to the basement when closed. Fig. 10 of the illustration shows the window open, the glass being protected by a sheet of steel, which also protects the side

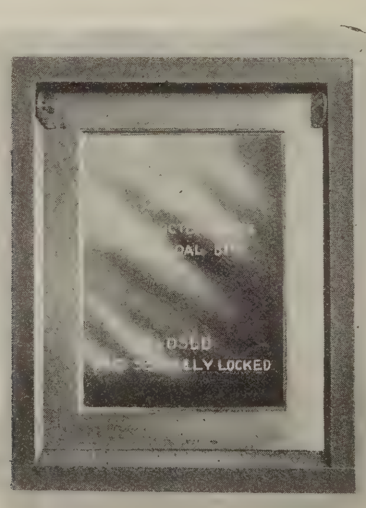


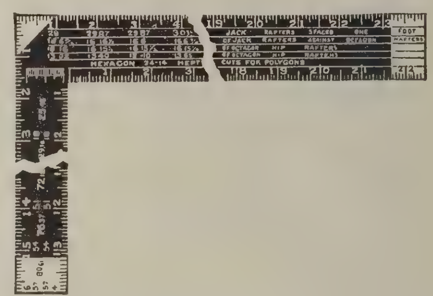
Fig. 11.—The Window as it Appears When Closed.

of the building, while coal is being put into the cellar. In Fig. 11 the window is shown closed. It locks automatically from the outside by pushing the steel sheet, which, as already stated, protects the glass when open, over locking lugs provided on the lower sides of the wall frame. Special attention is directed to the recess feature of the window, and to the fact that it conforms with basement lines. The window is made in two sizes, one having wall opening 16¾ in. wide by 23 in. deep, while the other has the opening 25¾ in. wide and 23 in. deep. The claim is made that this form of construction will last a lifetime and costs only a trifle more than a wooden frame and sash.

Nicholls Mfg. Company Adds A Hardening Plant

We are advised that the Nicholls Manufacturing Company, Ottumwa, Iowa, has just added to its already extensive establishment a hardening plant for hardening, by a secret process, the corners of the carpenter's framing squares, which it placed upon the market some time ago.

We understand that the process of hardening has proven an entire success, and the company feels that it is now in a position to supply a want long experienced by the carpenter, and that, therefore, the trade cannot fail to be interested in what it has accomplished. The parts of the square treated to the hardening process are shown by the light color in Fig. 12 of the cuts. The Nicholls framing



Figg. 12.—View of Nicholl's Steel Square, showing the Corners that are Hardened.

square, it may be mentioned, gives, among other things, the side cuts of jack rafters, hip and valley rafters with their length, together with lengths and cuts necessary for a roof of any kind, size or shape. The figures are plainly stamped on the body of the square, and as no character marks are used this eliminates the necessity of a carpenter trusting to his memory. The squares made by the company, both framing and standard, are in one piece, cut from a sheet by means of a heavy machine designed especially for the purpose. In this connection the company desires to emphasize the fact that the tongue of the square is not welded on the body, which is a frequent method of making carpenters' squares. The steel used in the Nicholls square is claimed to be of the best quality obtainable and rolled at the mills especially from an analysis furnished by one of the best chemists in the steel industry.

Sample Board Of Diamond Expansion Bolts

A pressed steel sample board, highly finished in dark-green enamel, with bronze and nickel plated samples and solid bronze name plates indicating the various types of expansion bolts and shields riveted to the board, has just been brought out by the Diamond Expansion Bolt Company, 90 West street, New York City. The board is equipped with a pocket at the back, in which is inserted a full-size facsimile print of the actual samples mounted on heavy cardboard and giving the dimensions, correct desig-

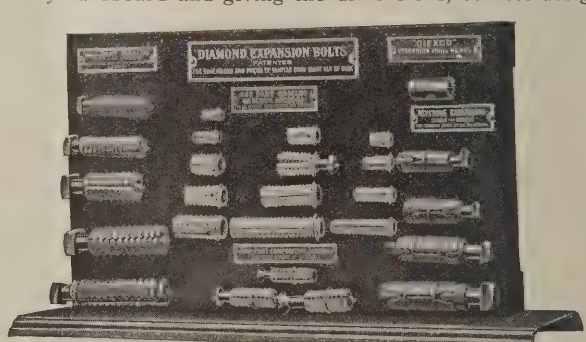


Fig. 13.—View of Sample Board of Diamond Expansion Bolts.

nation and list prices on every article shown. The point is made that by referring to this sample board, a view of which is shown in Fig. 13, the purchaser can readily select the right bolt for the particular job he has in mind. The company states that to offset the expense of sending the board separately it is the custom to include it with an order for shields. We understand the board is offered to all dealers who carry a stock of Diamond bolts, and is now offered to those who do not at present carry a stock, but are desirous of increasing the demand for the Diamond bolts, with a view to keeping them in stock.

(For Trade Notes, see second page following.)

TRADE NOTES.

NOW THAT THE BUILDING SEASON is in full swing, carpenters, contractors and builders will be interested in the steel scaffold brackets which are being offered by the James L. Taylor Manufacturing Company, 237 to 239 Glenwood Avenue, Bloomfield, N. J. The brackets are strongly constructed and in such a way that the strain is borne by the solid metal rather than by the rivets with which the parts are fastened together. The hook bolt is of tough material, and only the best quality angle steel is used in the construction of the bracket itself. The company also manufactures steel roofing brackets and steel shingle holders.

H. KLEIN, 38 Pearl street, New York City, has just introduced to the attention of architects, builders and owners of business structures a sectional telescopic office partition for which strong claims are made. The sections are readily adaptable to any hight of ceiling, the partition being handsome in appearance and may be changed and moved whenever desired without damage or waste. One of the strong features of this office partition is the economy with which it can be manufactured and placed in position. We understand that Mr. Klein desires to arrange with reliable concerns for manufacturing and handling the partition in their respective territory.

THE UNIVERSAL PORTLAND CEMENT COMPANY has recently adopted a voluntary accident relief plan for the benefit of its employees; the details being given in a little pamphlet which can be had on application. The plan of relief adopted corresponds to one which has been made operative among all the subsidiary companies of the United States Steel Corporation.

DAVID CRAIG COMPANY, 68 and 70 Broad street, Boston, Mass., has issued a four-page folder calling attention to the merits claimed for the Craig Portable Concrete Garage, which it manufactures. A garage of this nature cannot fail to prove interesting to a large class of readers, more especially in view of the extent to which the automobile is being used throughout the country at the present time and the tendency toward increasing popularity. The company is also in a position to furnish portable concrete residences, churches, etc., constructed upon the same principle as the garage.

THE "SPECIAL" SAW SET is claimed by the maker, Charles Morrill, 273 Broadway, New York City, to be so constructed that it is possible to set a saw just right, whether the operator be an expert or a novice. Those having occasion to set many saws are likely to be interested in the pamphlet illustrating and describing the "Special," which has been issued by the manufacturer.

THE CONCRETE STONE MOLD & MACHINE COMPANY, Clarks Lake, Mich., points out in "Catalogue B," which it has issued, that the Oliver automatic concrete block machine is built strong and durable, to stand hard tamping. With it all blocks are made face down, and all on the same-sized pallet. The machine has a wide range of work, turning out blocks for hollow, solid, veneered or double walls and angle, circle and gable blocks. The claim is made that it is easy to operate and does not get out of adjustment.

THE RICHARDS MANUFACTURING COMPANY, Aurora, Ill., embellishes one side of the calendar card for May, which it has been distributing among its friends in the trade, with an illustration of the "Royal" Ball Bearing Trolley House Door Hanger. This is center hung, and runs noiselessly on a hard maple track. On the face side carrying the calendar for the month of May is a bust portrait of the very attractive young lady whose face has appeared upon a number of the calendar cards sent out by this concern. In the present instance she is shown with a lace shawl around her shoulders, while upon her head is a lingerie hat, a prominent feature of the trimming of which is American beauty roses.

THE A. W. BURRITT COMPANY, well known as "the mantel folks," 239 to 473 Knowlton street, Bridgeport, Conn., has issued a new catalogue of mantels, showing designs for every sort of house and every room in the house, which is likely to prove of interest to architects and builders. The company states that if any one is looking for mantels "which are above the average as to stock, workmanship and finish," he should write for a copy of Catalogue "B," enclosing business card and advising the company of his present needs.

FIRE OF MYSTERIOUS ORIGIN destroyed the plants of the Cincinnati Roofing Tile & Terra Cotta Company and the Jacob Freund Roofing Company, in Winton Place, a suburb of Cincinnati, Ohio, very early Monday morning May 2. President Jacob Freund, of both companies, is of the opinion that it was the work of an incendiary, but others of the officials believe sparks from passing locomotives may have been the cause. President Freund is not yet certain that the plants will be rebuilt, as he is desirous of receiving assurance of better fire protection before he will agree to invest a large sum of money in buildings and equipment.

AMERICAN SEA GREEN SLATE COMPANY, 350 Clark street, Granville, N. Y., calls attention to the fact that "there is one kind of roofing material that will outlast the best building ever constructed, and that is slate." Emphasis is laid upon the merits of Sea Green and purple slate for roofing purposes, and those who are interested can readily secure from the company information as to the economy of this slate for the purpose named; the ease with which it may be handled and the satisfaction which it gives to those who have used it.

TOUSEY VARNISH COMPANY, 193 Michigan avenue, Chicago, Ill., makes announcement that it will explain to prospective varnish customers how an investment of 10 cents will effect a saving of $4. In addition the company will send an interesting book on "Wood Finishing," containing many recipes and formulas.

THE KEASBEY & MATTISON COMPANY, Ambler, Pa., refers to its asbestos "Century Shingles" as making a roof that will outlive the building which it covers. The shingles are made of hydraulic cement, reinforced with asbestos fibre, and subjected to tremendous pressure. The claim is made that they will neither rot, rust, crack, split nor blister. The shingles can be obtained in shapes and sizes to fit any architectural scheme and in three colors. The company suggests to those interested that they write for a copy of the booklet entitled "Climate Proof, 1910."

THE MASSACHUSETTS FAN COMPANY, Watertown, Mass., is furnishing ventilating fans for the following school buildings: The Bulwer, Dennison, Doan and Wade Park schools, of Cleveland, Ohio; the Hicksville and Oceanside schools on Long Island, and schools in New Bethlehem and Haysborough, Pa., and Salem, W. Va.

THE PITTSBURGH TESTING LABORATORY, with general offices at 325 Water street, Pittsburgh, Pa., has recently opened cement laboratories at No. 511 Omaha Building, Chicago, Ill., and 305 and 306 Prætorian Building, Dallas, Tex. This step has been found necessary in order to meet the rapid growth of its cement-testing department, and facilities are now afforded to take charge of cement tests either at the laboratories, or to make mill inspection of cement at any of the leading cement mills. The management also has cement laboratories at Easton, Pa.; Cincinnati, Ohio; Birmingham, Ala., and San Francisco, Cal.

THE ABERTHAW CONSTRUCTION COMPANY, Boston, Mass., general contractors for the Massachusetts Cotton Mills Warehouse, have placed the contract for the piling with the Raymond Concrete Pile Company of New York City. Work has been actively started, the excavating being well advanced and the driving of the piles is under way. About 1,400 will be required—a double row under each line of columns, and a triple row under each fire wall. The piles will be capped with heavy, reinforced concrete girders extending the full width of the building.

ALABASTINE COMPANY, Grand Rapids, Mich., has issued a very attractive series of post cards, showing interiors in various color schemes, with arrangement of stencils. The interiors embrace a wide range and clearly indicate the effects which may be produced by the use of Alabastine as a durable and sanitary wall coating. Each set consists of ten cards, and are sent postpaid on receipt of 10 cents.

A BUILDING which will contain apartments for 83 families and to cost $600,000 has been planned for erection on the triangular plot at the intersection of Riverside Drive, Audubon place and 157th street, New York City. It will be 10 stories in hight and cover an area 230 x 307 x 203½ ft.

IT IS STATED that contracts will soon be awarded by the Peoples Portland Cement Company, with a capital stock of $2,000,000, for a plant to be erected of steel and concrete at Square Bay on Lake Pend Oreille, 60 miles northeast of Spokane, Wash. The plant is expected to be in operation next August and will have a capacity for turning out 2000 barrels of cement. A town will be established near the mill site the coming spring and every building will be of concrete construction. In speaking of the matter, L. G. Monroe, secretary of the Chamber of Commerce, says the advent of the plant means that many of the lower-priced dwellings erected in Spokane in the future will be built of concrete and that building activities will be greater than ever before.

The Building Age

NEW YORK, JULY, 1910.

Residence of Brick and Cement-Plaster on Metal Lath

A VERY striking example of half-timbered effects in combination with dark brown brick laid in white mortar joints and trimmings of Bedford stone for the first story is found in the design of residence which we illustrate herewith. The second story has the woodwork of a dark brown stain, with the cement plastered panels of light gray. The roofs are of black slate.

The living room extends the full depth of the house and is so situated as regards the points of the compass as to have the sunlight the entire day. The dining room also gets the morning sun, which is certainly a good feature. The entrance is from a portico reached by a short flight of stone steps and then through a vestibule into a commodious reception hall, from which any of the rooms on the main floor are readily accessible, and also from which rises the main flight of stairs lighted in part by a ground-glass window in the "den" partition. Between the dining room and kitchen is a commodious pantry, with built-in refrigerator, which may be iced from the rear hall without the necessity of passing through the kitchen. The "den" is at the rear of the house beyond the main flight of stairs and isolated as much as circumstances will permit.

The second floor is arranged to give all the sleeping rooms the direct rays of the sun at some portion of the day. There are four of these, each provided with ample closet and out of the master's room is a good-sized dressing room. The "nook" directly over the vestibule is almost large enough to be used for a sewing room in an emergency. The central hall is commodious and from it every room, including the bath, is directly accessible. In the attic is a maid's room, a trunk room and a bath room.

The building is designed for a corner lot 132 x 50 ft. The foundation and basement walls up to the grade line are of concrete, above which, starting first with a grade course of stone, the entire first story is of brick having a facing of dark brown face paving brick laid with white mortar joints. The second story is of frame construction, hemlock being the material used. The outside of the second story is finished in cypress treated with creosote stain and panels of cement plaster on metal lath.

View of the East Elevation—Scale, 3/32 In. to the Foot.

Residence of Brick and Cement Plaster on Metal Lath.—Architect, George Mutscheller, Saginaw, Mich.

The entrance and veranda steps are of stone, while the veranda floor is of cement, reinforced with bars made by the Trussed Concrete Steel Company, Detroit, Mich.

The basement of the house is not plastered, but all other rooms have two coats of plaster, the second one being a sand finish.

The vestibule, the nook in the living room and the bath room on the second floor have tile floors and the wainscoting in the bath room is also tile.

The entire first story rooms as well as the second story hall have a standing finish of oak, with the exception of the kitchen pantry and rear entrance. The balance of the rooms are finished in yellow pine for natural finish or gum wood for stains and enamels.

The floors of the living room, dining room, den and reception hall are of oak and the balance of the floors throughout the house are of maple. The living room and the dining room have beamed ceilings, as indicated on the main floor plan. The mantel in the living room nook is of buff pressed building brick and colored mortar. A good quality of porcelain plumbing fixtures is used throughout the building.

The house is wired for electricity and piped for gas. The wiring is in accordance with the rules and regulations of the National Electric Code. All wires are concealed and run in such a manner as not to come in direct contact with plaster or timbers. The two-wire closet system for 110 volts pressure is used, the feed wires running from a point where service will enter the cut-out cabinet. Flush switches are placed in the living room, dining room, reception hall, den and second story hall. The balance of the house has approved indicating six-ampere snap switches. A four-point automatic annunciator is placed in the kitchen, with wires leading to the front door, the side door, the rear door and the dining room. These doors are all provided with push buttons and in the dining room is a floor push.

Section and South Elevation—Scale, ⅛ In. to the Foot.

Residence of Brick and Cement Plaster on Metal Lath.

The residence here shown was designed by George Mutscheller, 136 Mott street, Saginaw, Mich.

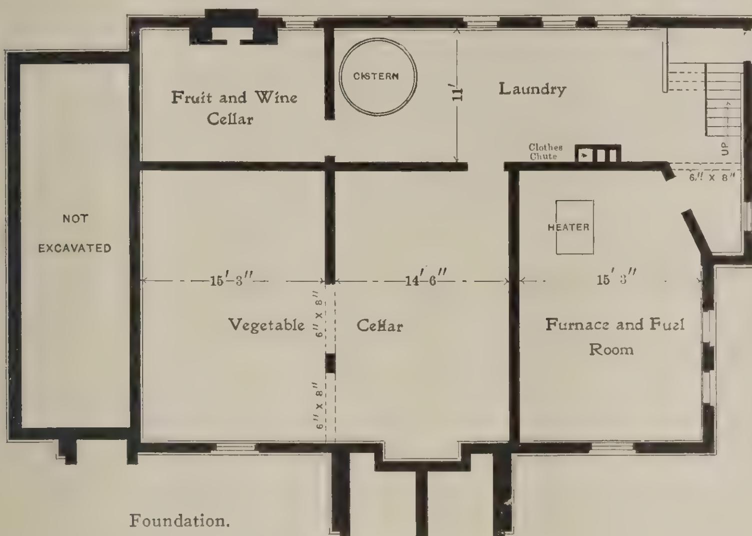
The Lighting of School Buildings

One of the most important points to be considered in the planning of a school building is the lighting for the various rooms. This feature was taken up at the meeting of the Royal Sanitary Institute, held not long since at Cardiff, Wales, and in a paper read before that body by G. Topham Forrest, some rather valuable suggestions were presented. In the course of his comments, he says:

A combination of three requirements is necessary for the proper and efficient lighting of a school: 1, The selection of the site; 2, the requisites of the architecture and equipment, and 3, the teachers' duty. With reference to the latter it is important that the teacher bear in mind that he has an interest and responsibility in connection with each of the subdivisions. He may have no hand in the choice of the site or in the planning of the building, but unless he knows the principles involved he is almost certain to violate seriously the requirements of school hygiene as applied to the lighting of classrooms.

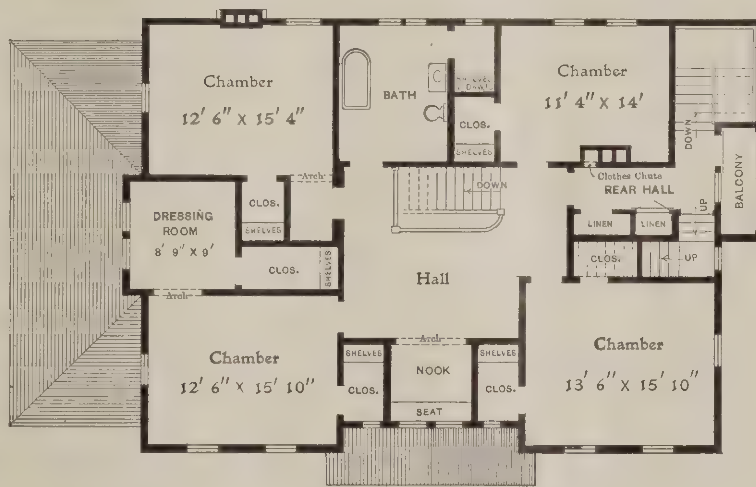
The value of high ground for the school site is inestimable. It insures good drainage and more light by reducing the hight of the obstructions and giving a freer play to the sunlight, the influence of which secures immunity from dampness. The building should be placed so that it is possible for each child to see the sky from his desk. The control of trees should be secured with the purchase of the site. If they do not interfere with the lighting of the building, well and good, but this point should be carefully considered when inspecting suitable ground. The question of how to secure sunlight for all the rooms during some part of the day has led to considerable discussion as to the best direction for a building to face. Buildings should not be placed so as to coincide with the points of the compass, otherwise the north side room, if lighted on one side only, is cut off from the sun, while south rooms may get too warm in hot weather. To avoid this the building should face the middle points of the compass. By this arrangement each side receives the sun at some time during the day. A frontage of this sort makes southeast rooms most desirable, southwest next, then the northeast, and the northwest is least desirable, as the effects of the sun are only felt after the children have gone for the day. These distinctions, however, must not be carried to an unnecessarily fine point, but when such a site can be obtained as readily as another it should be given the preference.

If a building is so planned that it is impossible to secure the sun for each room the deficiency should be made up by increasing heating and ventilation. Having

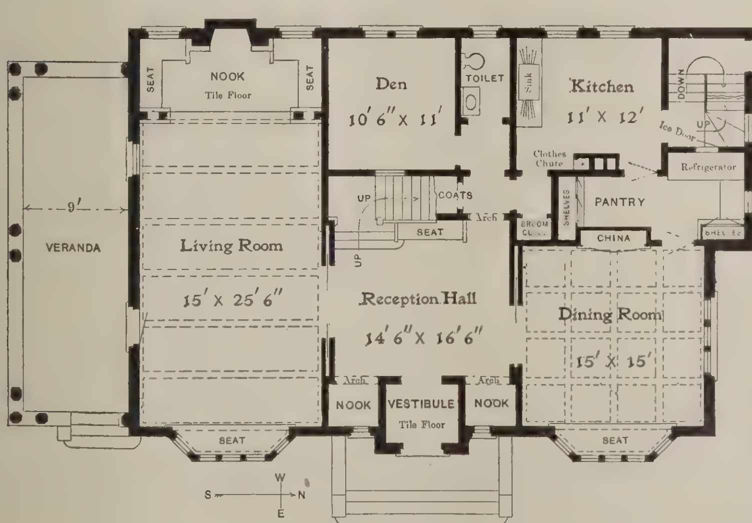


Foundation.

determined the character of the building be careful to put the light in the rooms used for school work. This, of course, is the mandate of common sense, but how many times do we see that these considerations are not always regarded—*e. g.*, assembly halls put on the south side, teachers' rooms monopolizing windows which should go to light classrooms, and staircases often to be found on the side of the building having the best light? The relation of window space to floor space should be at least one to six; this ought to give the minimum of defective eyesight. Knowing the amount of window space required, as compared with the floor space, the next problem concerns the location of the light. Here



Second Floor.



Main Floor.

Residence of Brick and Cement Plaster on Metal Lath.—Floor Plans. Scale, 1/16 In. to the Foot.

two considerations are involved—(1) The full light must shine on the children's work; (2) the light must not be faced by pupils or teacher.

The conditions are fulfilled by adequate lighting from the left, and it must be borne in mind that light from the highest part of the room is the most valuable. That which comes through the lower panes goes to the floor. No shadows are cast by left-hand light. The light from behind, however, casts shadows on the books from the head and body of the pupil. Light from the right is obstructed by the pupil's hand, and there should be no light facing the pupil. For reading purposes, front lighting is exceedingly bad, as the light is thrown on the binding of the book instead of the page. Of all possible combinations of bilateral lighting that with windows at the left and rght is to be preferred. This form of lighting is often seen in country schools. Also care should be taken that the lighting from the right hand should be shaded, leaving the chief source of illumination from the left. Light from the left and rear is particularly trying to the teacher, although from the pupil's standpoint alone the left and rear lighting is usually better than right and left, for, as a matter of fact, the children furthest away from the windows on the left get from that direction not only the light from windows on that side, but even the light from most of the rear windows comes to them from the left.

In furnishing a classroom, seats should never be placed close to the window; the last desk nearest the wall facing the teacher should always be in a line with the side of the window openings, and not be placed in the shadow of the wall.

So many varieties of classroom windows are in vogue, both as regards design and construction, and having regard to the ventilation of the classroom, that it will be sufficient here to outline a few of the main principles which determine their use. It is well to remember when designing windows that the light should enter the room as a unit, so that there will be no distinguishing cross lights, no distinctly outlined shadows, and one light will shade into another without any visible lines. In other words, there should be broad piers or mullions between the daylight openings. On that account I am not an advocate of planning classrooms having only two windows, as this necessitates a considerable amount of wall surface between them. I am of opinion that the best and most suitable form of classroom window for an ordinary-sized classroom to accommodate, say, 50 or 60 children, is a three-light one, but it is hardly possible to construct brick piers of sufficient strength in a building of any hight that will not interfere considerably with the light. Eighteen inches seems to be the width usually adopted, but as this width throws a shadow on the desks nearest the window, cast-iron mullions are, I believe, now used, although I have not seen any. These are cast with heavy webs, and with the window frames bolted directly to them. In this way it is possible to put the windows sufficiently close and at the same time provide sufficient strength. When brick piers are used they should always be beveled on the inside.

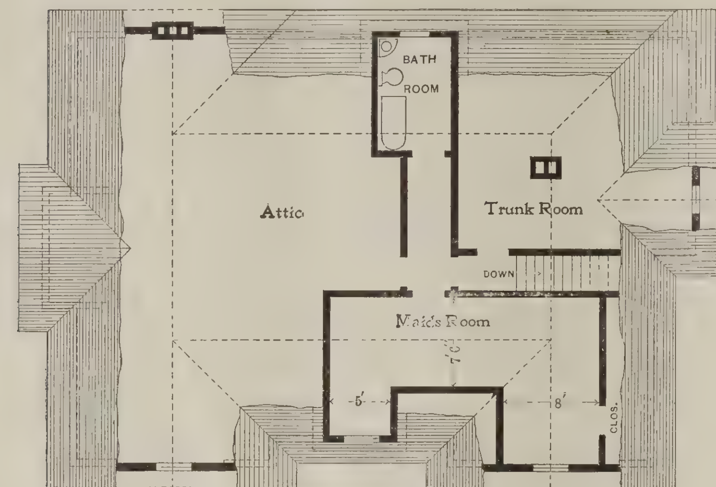
The plastering should diffuse the light. It should, therefore, be tinted some very light color, almost white.

the absolute necessity for grading the hights of the desks in a classroom to suit the pupils. In a classroom of a secondary school three different sizes are commonly met with, and, in my opinion, some such system would be advantageously applied in the furnishing of our elementary schools. The failure to adjust the desks to suit short-waisted children is a neglect of duty to care for the eyesight.

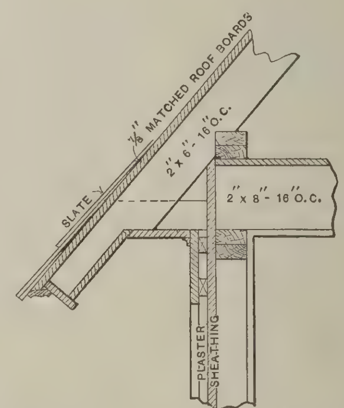
The architect's part in the remodeling of old buildings is an important one. A judicious application of the following questions might do good:

1. Are all obstructions, such as buildings, trees, etc., so dealt with that they will not deprive the children of seeing the sky?

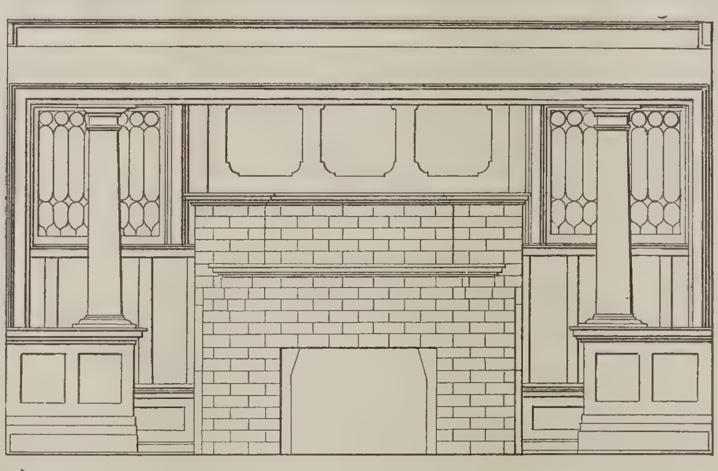
2. Is light where it is wanted?

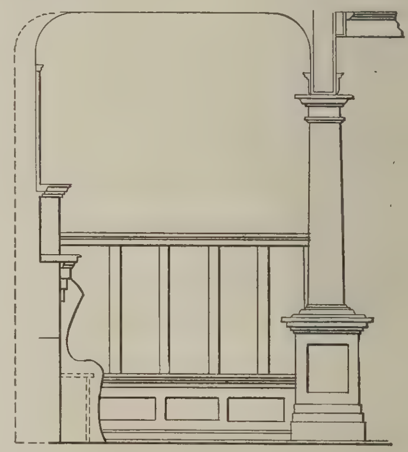


Attic and Roof Plans—Scale, 1/16 In. to the Foot.



Details of Main Cornice—Scale, ½ In. to the Foot.





Elevational and End Views of Nook in Living Room—Scale, ¾ In. to the Foot.

Residence of Brick and Cement Plaster on Metal Lath.—Miscellaneous Constructive Details.

Blinds are essential when a room is exposed to the sunlight, but these should never be made of heavy or dark material. Dark blinds will ruin the whole system of lighting. A light sage is a very good color, or cream.

When the style of window will permit the blind rollers should be hung at the center of the windows, each fitted with blinds, one being pulled up and one down, so as to screen the whole window.

In furnishing a classroom special care should be paid to securing school desks of practical construction. The eyesight of the pupils may be seriously impaired, the desks may be too high or too low, and the advantages of having a good building may be counterbalanced by this mistake.

Some little time ago the writer was called upon to report very fully on the question of adjustable desks for secondary schools, and some valuable statistics were volunteered by various principals, who all agreed as to

3. Is the ratio of window glass to floor surface one in six?

4. Are the windows on the left side or in such combinations that the children will not be compelled to face the light?

5. Are the tops of the windows more than 6 in. from the ceiling?

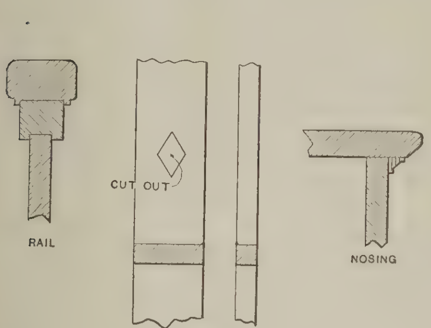
6. Have all large piers between the windows been done away with?

The defect of light from the wrong direction can be easily overcome by an adjustment of the desks. Left and front lights can be easily changed to left and rear, and right and front lights can be changed to left and rear, and so on.

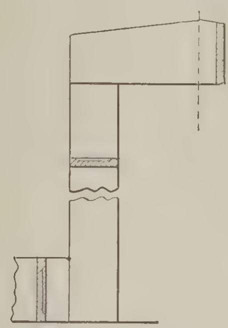
It has been stated that the most perfect architectural plants will not make the children immune from defective vision without a more decided co-operation with the architect in his scheme for the lighting of the rooms. This is often shown in a careless and ignorant manipulation of the blinds, especially in the cutting off of high light or in a failure to attend to the varying conditions of sun and cloud.

Mammoth Concrete Buildings

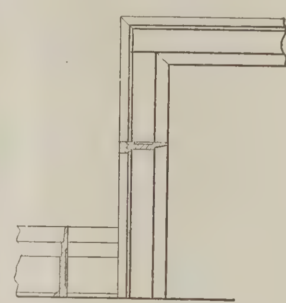
One of the notable improvements in immediate prospect in the city of St. Paul is the erection of a plant for a firm of wholesale grocers, which will probably be



Some Stair Details—Scale, 1½ In. to the Foot.



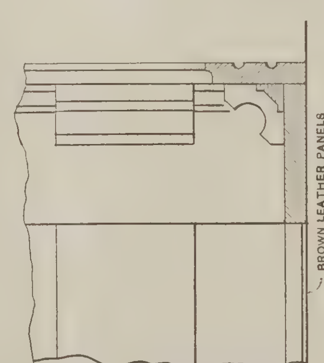
Detail of Dining Room Finish—Scale, ½ In. to the Foot.



Detail of Finish in all Rooms Except the Dining Room—Scale, ½ In. to the Foot.

Elevation of Main Stairs with End View at the Right, Showing Style of Trim—Scale, ¼ In. to the Foot.

Elevation in Dining Room, Showing Built-in Buffet—Scale, ¼ In to the Foot.



Detail of Plate Rail—Scale, 1½ In. to the Foot.

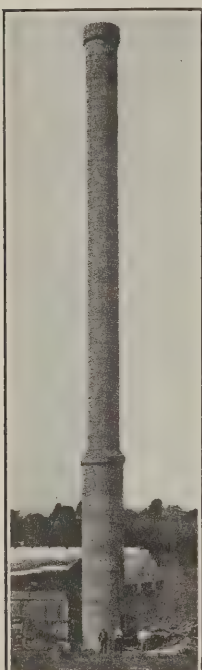
Residence of Brick and Cement Plaster on Metal Lath.—Miscellaneous Constructive Details.

the largest of its kind in the country. According to the plans which have been drawn by Reed & Stem, the factory and warehouse building will cover 13 acres, bounded by University and Fairview avenues and Aldine and Thomas streets. All the buildings will be of concrete fireproof construction with concrete roofs. They will be equipped with modern plumbing and fitted with the latest improved machinery for the manufacture of crackers, preserves, candies, syrups, spices, pickles, etc. A feature of the plant will be the arrangement by which all the trackage connected with it will be under roof, with accommodations for 30 cars.

It has finally been decided to improve the site of the old Ashland House at the southeast corner of Fourth avenue and Twenty-fourth street, New York City, with a 20-story loft building, which will cover an area 99 x 150 ft. and cost in the neighborhood of $960,000. According to the plans prepared by Architect William C. Frehme, the building will be of the modern Renaissance type of architecture, with facades of brick trimmed with granite and limestone. There will be three tiers of large bays on the avenue side, crowned with a loggia three stories high. Beneath the main cornice Doric pilasters will carry ornately carved capitals. The six upper stories will contain offices; the ground floor will be devoted to stores, while the intermediate floors will be occupied as lofts.

PLACING A CONCRETE JACKET ON A CRACKED CHIMNEY

CHIMNEY construction very often involves points of considerable engineering interest, and when it comes to a question of repairing a cracked chimney the method of doing the work always commands more than usual attention. A job of rather peculiar character and one offering practical suggestions for handling work of a similar nature, was that of placing a reinforced concrete jacket around a cracked and leaky chimney at the plant of the Winchester Repeating Arms Company, New Haven, Conn.



The original chimney was of reinforced concrete, but it had developed large vertical cracks which allowed the escape of smoke and at times the inflow of air, both of these actions being harmful to the efficiency of the draft. This chimney rested on a brick foundation, which was part of the power house building. Above this foundation it was about 80 ft., spread to an outside diameter of 8 ft. at the bottom, and 6 ft. at the top; it was 4 ft. in diameter, inside, and was unlined. The old concrete, forming a wall about 4 in. thick in the cylindrical part of the chimney, had proved seriously defective, aside from developing cracks. It had been laid as a stiff, dry mortar, without stone, and by the time the Aberthaw Construction Company, Boston, Mass., took hold of the job, the mortar had become so soft and "punky" that it crumbled easily under a blow, and came away from the reinforcing metal with dangerous readiness.

The new concrete jacket put about the old chimney by the Aberthaw Company was 5 in. thick over the whole surface of the old structure. The vertical reinforcement consisted of four sets of square twisted steel bars, with 32 in each set, equally spaced, and with the ends of the successive sets lapped. The lowest set of bars, 5/8 in. thick and 20 ft. long, were upset at their lower ends to 3/4 in. diameter, and were screwed into an anchor ring 4 in. wide by 1/2 in. thick sunk in the brick work at the base of the chimney. The other three sets of vertical bars were 1/2 in. square and 24 ft., 22 ft. and 20 ft. long respectively. Outside this system of lapped vertical bars were placed a series of horizontal hoops of 3.8 in. square twisted steel, spaced 6 in. The concrete of the shell was mixed 1:2:4, with the stone small.

Old Chimney Wrapped With Asbestos

Before the first section of the concrete jacket was applied the old chimney was carefully wrapped with asbestos felt. This served a double purpose, acting first as an expansion joint between the old and new structures, and serving also to protect the green jacket against too rapid drying by the heat of the inner shell, and against the drawing of moisture from the green concrete into the old chimney.

The other aspect of the work, which is of especial practical value, was the ingenious construction and operation of the "form" used by the Aberthaw Construction Company on the cylindrical portion of the chimney. The form proper consisted of a cylinder of 16-gauge iron, 5 ft. high, with an inside diameter of 5 ft. 8 in. This was made in three equal sections divided vertically. The horizontal framing consisted of three 2 x 2 x 1/4 in. angles rolled to a true circular arc. Each section of the form proper therefore constituted a cylindrical surface of 120 deg. braced horizontally by the curved angle bars, one at the top, one at the bottom and one midway between. Extending horizontally from the top of each of these sections was built a platform raised diagonally to the bottom of the form section with 2 x 2 x 1/4-in. angles, and resting on horizontal angle bars running to the upper corners of each section of the form. These three sections of form and staging were fastened together by bolts running through angle bars on the vertical edges of each section of the form and through the pairs of adjacent angle iron supports under the platform. The form and the working platform were suspended by heavy ropes from three 12-in. single blocks, which were themselves hung from a heavy ring set on top of the overhang of the chimney. The cylindrical portion of the jacket, in which the form was involved, was made in the following manner: The asbestos having been applied over a hight of about 5 ft. from the top of the cylindrical form, the form was then raised, and concrete was filled into the space between the form and the chimney, and closely tamped about the reinforcing steel. The next forenoon the asbestos and steel were extended farther up the chimney, and the form was hoisted a distance of 4 ft. 10 in., leaving a lap of 2 in. on the concrete placed the day before. The concrete of the second day's work was placed in the afternoon and was allowed to set until the next morning, when the form was again raised 4 ft. 10 in., and a new ring of concrete was placed that afternoon. The form and platform were prepared for hoisting by loosening the bolts in the facing angle bars which formed the three joints. This allowed the form to swing a little free of the new concrete and allowed of easy movement.

How Steeple-Jack Reached the Top

An interesting feature of the preparatory work was the method by which the steeple-jack reached the top of the chimney. One of the largest cracks in the old structure ran from top to bottom, and this furnished a good place for driving in stout hooks. At the start, the steeple-jack climbed up a ladder resting on the roof of the power house, and, reaching up on the chimney, drove a stout hook into the big crack. From this hook he then hung a small block carrying a rope. This combination made it possible to hoist a second ladder, which was allowed to lap on the first ladder, to which it was lashed. Climbing to the top of the second ladder, the steeple-jack drove a second hook into the crack in the chimney, reaching up as far as possible. Putting a block and line on this second hook, he was able, after getting down to the power house roof, to raise another ladder, which was lashed to the second ladder. From the top of this third ladder he drove a third hook into the crack, and so extended his track another space upward, and so on. The ladders had hooks at the ends, which held them away from the chimney. They were held firmly in one direction by lashings to the hooks, and the combination was stayed by ropes carried round the chimney every 15 ft. The ladders were taken down by reversing the process of erection.

The popularity of concrete for use in connection with the building of small structures is demonstrated in improvements which are being made at the extreme eastern end of Long Island, opposite Shelter Island and overlooking Gardiner's Bay, where arrangements have been made for constructing 82 concrete bungalows. Each will cover a plot 22 x 50 ft. in size, contain six rooms and bath and have a commodious veranda extending across the front, supported with wooden columns. According to the plans prepared by L. C. Maurer, 1495 Broadway, New York, the entire operation will involve a cost of fully a quarter of a million of dollars. The erection of the buildings will be carried out by the Hudson-Fulton Construction Company, 1493 Broadway, New York.

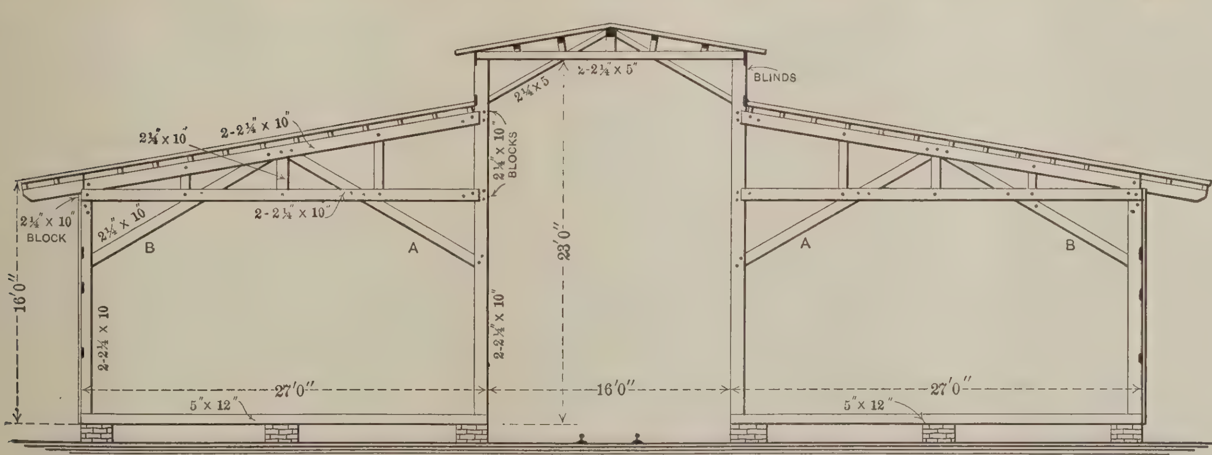
A LUMBER STORAGE SHED CONSTRUCTED OF WASTE MATERIAL

THERE has just been completed in the vicinity of Chicago a lumber storage shed that is unique in many respects, but principally from the fact that it was constructed from what might be termed refuse material from wrecked freight cars. It is of modern plank-frame construction, occupying an area 70 x 200 ft. in size and the entire scheme of framing was devised and the plan accepted in less than half an hour after the order to build the structure was given.

The half-tone engraving shows the appearance of the building when the skeleton frame work was nearly completed, while the sectional views indicate details of construction. The work was done under the direction of L. H. Hand, Chicago Heights, Ill., who furnishes the following account of the interesting features in connection therewith:

Every sill, nail tie, plate and purlin was cut and framed by the same pole—16 ft. 7 7/16 in. long. There is not a brick, stick or board that was bought with a view to erecting such a building and, in fact, we had no intimation that such a structure was to be erected until about 3 o'clock on a Saturday afternoon and by 3.15 all preliminary sketches were submitted to and approved by the superintendent of the works. At 7.30 on Monday morning workmen were laying the sills in position. The foundations are of brick which came out of an old boiler furnace and had been lying in an unsightly heap for two or three years out in the back yard. The sills are 5 x 12 in. and were taken from old gondola cars and were laid with the painted side up. All framing timbers except purlins are 2¼ x 10 in. and were taken from the sides of old gondola cars. The purlins were 4 x 8-in. old intermediate car sills.

Photographic View, Showing the Framing of the Shed in Process of Erection.



Cross-Section Through Lumber Shed, Showing Sizes of Timbers.

A Lumber Storage Shed Constructed of Waste Material.

The lighter stuff was car sides ripped in two. All brace stuff is 2¼ x 5 in. The siding and roof boards were the accumulation of several years of box car building, of shippers' rejects, culls and odd lengths.

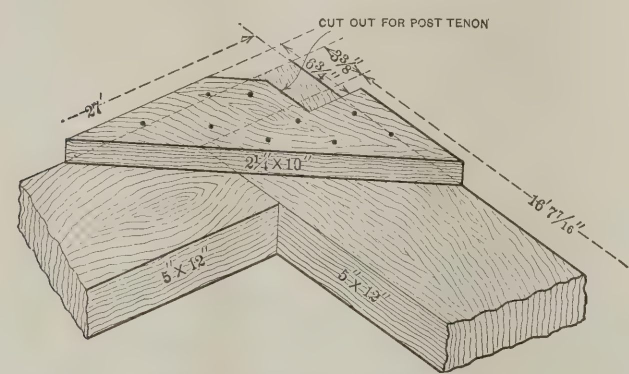
The company for which the shed was built does an immense business in repairing freight cars, so that the entire storage lumber shed was made of what would otherwise have been waste material.

As the ground was very badly frozen at the time operations were commenced, the sills were laid in place on blocking, set so that piers could be built later on. There are no lap splices throughout the framing. The sills were simply cut square to the measuring pole and butted end to end. At the corners the joint was made as shown in one of the sketches. The lap on the end sills was 3⅜ in., or half the thickness of the posts. The diagonal piece was of a scrap from the side of a car spiked with 60d. nails and notched to receive a tenon on the post.

Nearly everything about the building in the way of plates, purlins, sills, etc., was cut double length, namely 33 ft. 2⅞ in., with a center mark, or gain, as the case required. This made a loss on the sills of only ½ in. and on the sides about 2½ in. The sills were spliced by spiking a 5-ft. piece from the side of a car over the joint, which was notched to receive a tenon on the posts as indicated in the details.

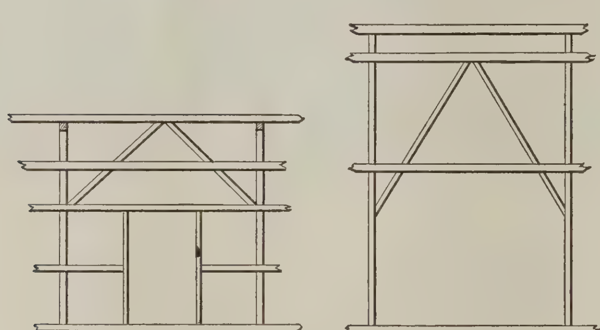
All the work on the building was done by regular employees of the company during a slack time in the car shops, hence it was not to be expected that the men would be experienced builders. To obviate this a bent was carefully framed and put together and then bored for the bolts, care being taken to make enough difference in the bearing of the braces A and B so that they could readily be distinguished by simply looking at the bolt holes. The bent was then taken apart, each piece marked and used as a template for framing out the remainder of the work, so that in case there were crooked timbers it was only necessary to draw it with a chain until the holes matched to square everything up. The bolt holes were laid off by driving a round-ended bolt through the template and a little way into the timber being framed. The timbers in bents were framed in pairs, so that the painted side was out, giving the frame work a rather tidy appearance.

The estimate of cost, which of course came within my province to prepare, was based on the prices of new material, labor, etc., and account taken of weather conditions which obtained at the time the work was done.

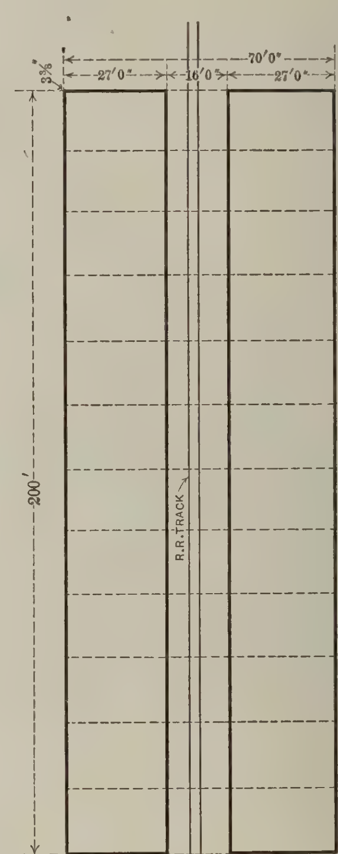


Showing Construction at the Corners.

Method of Constructing the Sills.



Side and Center Bents, Showing Method of Bracing.



Plan Showing Railroad Track Running Through Center.

A Lumber Storage Shed Constructed of Waste Material.—Miscellaneous Details.

A RATHER NOVEL FEATURE in connection with some 10 or 12 houses, to range in cost from $9,000 to $14,000, which will be completed early the coming summer at Larchmont Park, N. Y., is that practically the entire interior equipment and furnishings will be imported. The houses will contain from 8 to 14 rooms, with two bath rooms. For the kitchens glazed white-tile combination stoves will be imported, and the dish and pot closets will be glazed white with Delft inlay. Steam and vapor heating will be used, but the radiators will be articles of furnishing. There will be casement sashes and glazed folding doors, with exposed hardware, lever handles and espanulet bolts to windows and doors. There will be no sliding doors, double-hung windows or knobs. The designs of the houses have been evolved by Henry Blitz, head of the construction department of the company which is making the improvements, and who is said to have built many houses at Vienna and Stuttgart. By co-operation with his architect, V. H. Koehler, the designs have been adapted to conditions existing here. The fronts of the houses will be treated in stucco, in half timber, in pebble dash and in stone. The wall surfaces will be relieved by lattice grilles, projecting window boxes, balconies, etc., and will be further embellished by overhanging roofs, covered porches and terraces.

LAYING OUT PANEL SOFFITS FOR A GEOMETRICAL STAIRWAY

BY MORRIS WILLIAMS.

SOFFITS of geometrical stairways generally are finished with plaster or ceiling board, but occasionally the stair builder is called upon to frame a panel soffit sometimes of a rather elaborate ornamental design containing many molded members. When it is considered that each member will assume a twisted form owing to the winding of the stairway, it is evident that a knowledge of a method for developing each member geometrically becomes a necessity.

The method shown in this article will be found simple and easily understood, especially by those readers who have paid due attention to the articles which have appeared in preceding issues of the paper pertaining to unfolding tangents and curves of face molds for hand rails. We trust that what we have to say will also meet the requirements of the correspondent "A. P. S.," Butte, Mont., whose letter appeared in a recent issue.

Referring to the accompanying sketches, Fig. 1 is a compound diagram containing the plan of stringers, steps and panel work of soffit for a stairway circular in plan. The method here explained will be found adapted to all soffits winding around any and all kinds of cylinders.

Reverting to Fig. 1, it is seen that the stairway contains 17 risers starting from a newel post. Each radii to the center of the plan curves of the inside and outside stringers and placed along the stringer at equal distances.

The soffit framed panel is shown extending from the third riser to the 17th riser, while from the sixth riser to the ninth riser is shown a space covering three steps omitted from the panel framing, which will be the portion of framed panel under consideration in this article. It will be observed that the framed panel complete is made in five sections, as from the third to the sixth riser; from the sixth to the ninth; from the ninth to the twelfth; from the twelfth to the fifteenth, and the last portion covering only the two steps 16 and 17. Between each section is shown what is known as radial bands extending across the stairs from the front stringer to the wall stringer, forming the stiles to the circular rails of the framed panels. The rails are shown shaded in the diagram and are designated as "front," "middle" and "wall" bands.

In Fig. 2 is shown the method of laying out the radial bands. On the right hand of the diagram is shown the elevation for the steps 6, 7 and 8 along the front stringer and on the left-hand side the elevation of the same steps along the wall stringer. The parallel lines marked "soffit" are drawn parallel to the pitch of the steps on each side and at a distance equal to what the soffit will actually be in the finished construction. The heavy shaded portion of the parallel soffit lines shown at *a b* and *m n* represent the thickness and width of the bands, while the squares surrounding them represent the size of stuff required in the rough to meet the necessity of the twisting, growing out of the winding nature of the framework.

In Fig. 3 is shown how the band under the ninth riser in Fig. 1 is twisted. Make the distance between *a* and *b* equal to the distance between the front and wall stringer through the center of the ninth riser. At the end *a* draw the shaded section of the band at an angle to the line *a b* equal to the pitch of the soffit C, Fig. 2, as there shown at *a* and at the end *b* equal to the pitch of the soffit D, Fig. 2, as there shown at *b*. It will be ob-

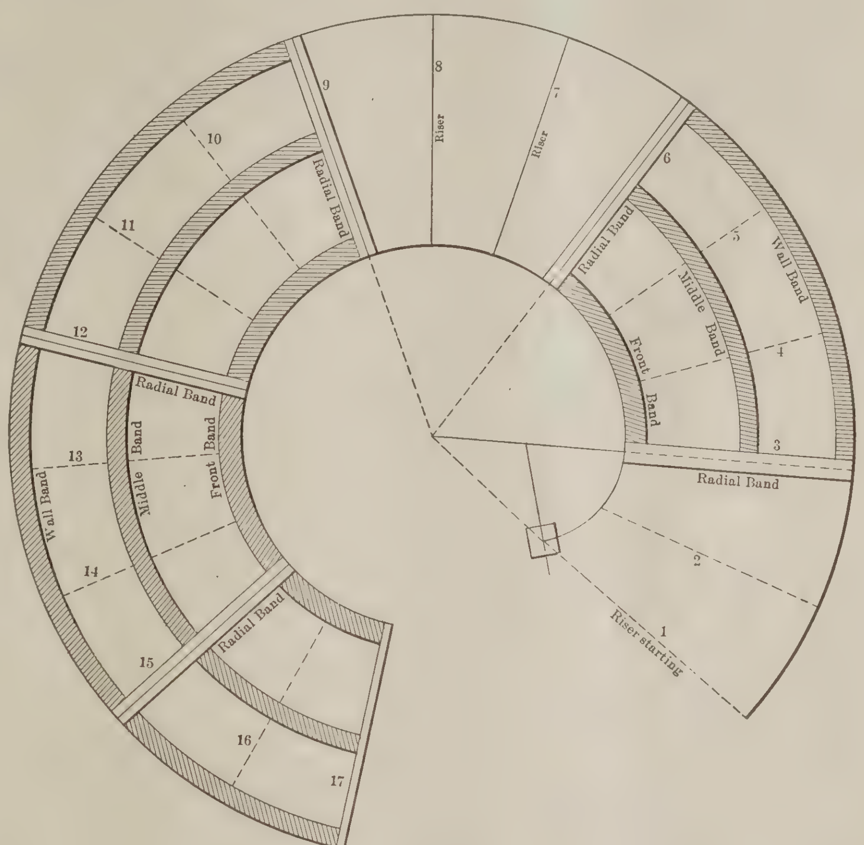


Fig. 1.—Plan of a Framed Soffit for a Circular Stairway.

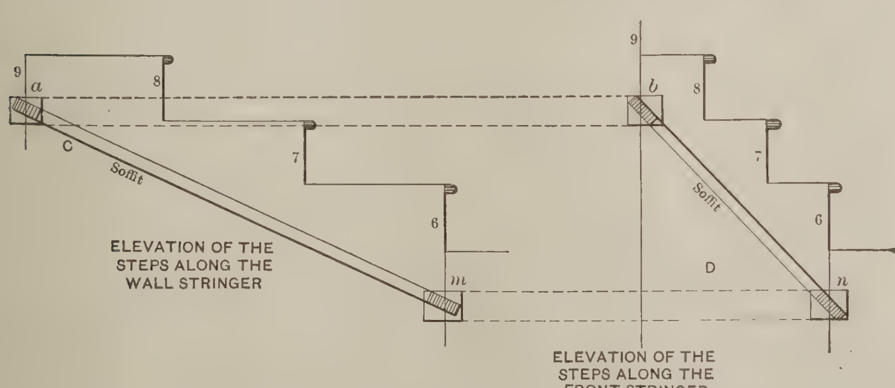


Fig. 2.—Diagram Showing How the Bevels to Twist the Radial Bands are Found.

Laying out Panel Soffits for a Geometrical Stairway.

served that these two pitches are actually the pitches of the respective steps of the front and wall stringers, and therefore that the bevel to twist the radial band may be taken directly from the steps and applied to the material as indicated at *a* and *b* in Fig. 3.

The lower portion of Fig. 3 illustrates the appearance of the band after the twisting by means of the bevels, while Fig. 4 represents the radial band under the sixth riser.

The bevels at *m* and *n* are taken from *m* and *n* of Fig. 2, which, as before stated, equals the pitches of the two sets of steps—*m* the pitch of the wall stringer steps and *n* of the front stringer steps.

The length as shown from *m* to *n* equals the length of the band shown from *a* to *b* in Fig. 3 and a little consideration will show that all the radial bands of the complete soffit are of the same exact length and form and that because each band extends in length from the front stringer to the wall stringer along the center lines of the risers above the relative position of the bands in the soffit.

An inspection of Fig. 1 will show five of the radial bands as under the 3d, 6th, 9th, 12th, 15th and 17th risers and all of the same length. When finished they will all have the same twist, which is the one shown in Fig. 3, procured by the use of bevels equal, respectively, to the relative pitches of the front and wall stringers.

The manner of laying out the circular front, middle and wall bands is shown in the remaining diagrams presented herewith. Fig. 5 represents the portion of the soffit which is shown omitted in Fig. 1 between the 6th and 9th risers, while the shaded portions represent the bands to be laid out.

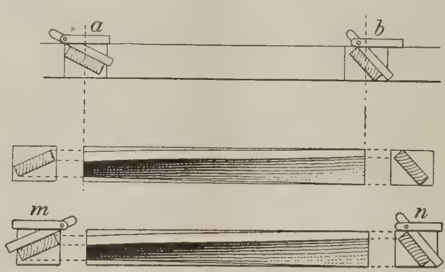
We will commence with the wall band, which in the diagram is shown the longest of the three, and is the one in the soffit that follows the wall stringer. From the center of the band draw the tangents *a a* square to the radial bands as shown. The band and tangents as now presented assume the appearance of a plan and plan tangents of a hand rail, and when it is considered that it is a plan of a member which is to follow the winding steps of the stairway (similar to a hand rail) it becomes evident that the same method used to develop a hand rail will also apply in the development of this member.

In Fig. 6 is shown how this is done. Draw the plan of the band as shown and at the end *c* erect the line *c* 1 2 3 to represent the hight of three risers, which is the hight the band rises from riser 6 to riser 9. From 3 draw the pitch of the wall stringer steps to *m*, bisect this line in *h* and drop a line to *b*. From *d* in the plan draw a line square to *b m* and from where it cuts *b m* draw an indefinite line square to the pitch line *h m*. Now fix one leg of the compasses in *h* and extend the other to *m*; turn over to *w* and connect *w* with *h*, thus obtaining the tangent angle of the band as shown at *h*, the tangents being 3 *h* and *h w* respectively. The manner of finding the bevel to twist the band is shown in the diagram. By finding three points contained in the curve of the band it will be an easy matter to complete it by means of a flexible lath that will bend to touch the three points found. The points 3 and *w* are already determined and the way to find the point *z* may be described as follows: Draw a line from *d* in the plan to *m* and another from *m* to *w*. These two lines are known as directing ordinates. From *b* draw a line to S parallel to the directing ordinate *d m* and from *h* draw a line to *z* parallel to the directing ordinate *m w*; make *h z* equal to *b s* of the plan.

Make the width of the band at *z* equal the plan width and at the ends 3 and *w* about 3/16 of an inch wider. Bend a lath to touch the points thus found to complete the curve. In Fig. 7 is shown the band twisted by applying the bevel reversely at the ends.

The development of the middle band is shown produced in Fig. 8 by means of four ordinates, the process being the same as that in connection with Fig. 6, except in the number of ordinates used.

The method of developing the front band by means of string, pins and pencil, which method may be ap-



Figs. 3 and 4.—Showing How Radial Bands Under the 9th and 6th Risers are Twisted and their Appearance After the Operation.

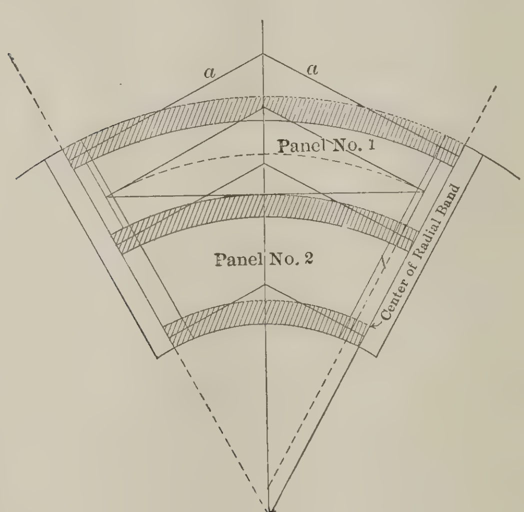


Fig. 5.—Plan of a Section of the Framed Soffit From the 6th to the 9th Riser.

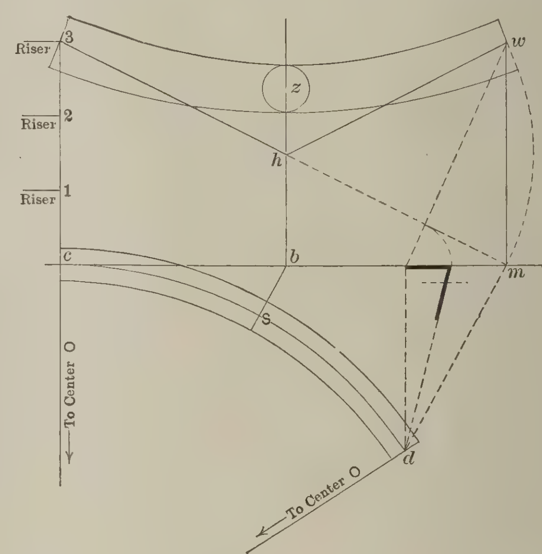


Fig. 6.—Plan and Development of Curved Band of Soffit Following the Wall Stringer.

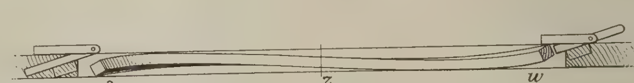


Fig. 7.—Appearance of the Band Twisted, After Application of Bevels.

Laying out Panel Soffits for a Geometrical Stairway.

plied to all the other bands if preferred, is illustrated in Fig. 9 of the diagrams.

Reverting to Fig. 5, the plan of the portion of the soffit under consideration, we will take up the process of laying out the two panels there shown between the bands. Commencing with panel No. 1, draw a line through its center as shown and from each end of this line draw the tangents square to the radial bands. Now transfer these lines to the plan, Fig. 10, and develop each line by either process employed in Figs. 6, 8 and 9 to develop front, middle and wall bands. The width of the developed panel is taken from the plan Fig. 5 and its ends at 3 and w are made square to the tangents. The same process is employed in developing panel No. 2, as shown in Fig. 11. In Fig. 12 are shown the bevels applied to form the twist in panel No. 2 and the cross-section indicates the thickness of stuff required. The developments for all the members are similar, including the panels and bands, and it may be well to remember that they are similar also to the developments of hand rails.

Having thus shown how to develop all the members of the portion of the framed soffit between the 6th and 9th risers, an inspection of the complete plan soffit as presented in Fig. 1 will show that all the remaining portions of the soffit except the top one are duplicates of the one developed, each one covering, as shown, a space equal to the expansion of three steps. It follows, therefore, that the molds developed for the one portion will apply to all the others.

To develop the molds for the top portion proceed as for the others, the only difference being in the length of the panels and curved bands, owing to the shorter space they have to cover. The radial bands will be precisely the same as all the others; namely, the exact width of the plan soffit as shown in Fig. 1.

In conclusion permit me to say that the method presented is not restricted to the plan selected in this article, but is applicable to all winding soffits. Where a soffit as here shown contains a number of similar members a considerable saving in time and material is effected by using one of each member after it is twisted as a drum by means of which to bend the remaining members.

A few thin strips cut out to the width and length of the respective members may in this manner be bent by the use of glue and hand screws and the job when finished will appear equally as good as if the members had each been worked out of solid material.

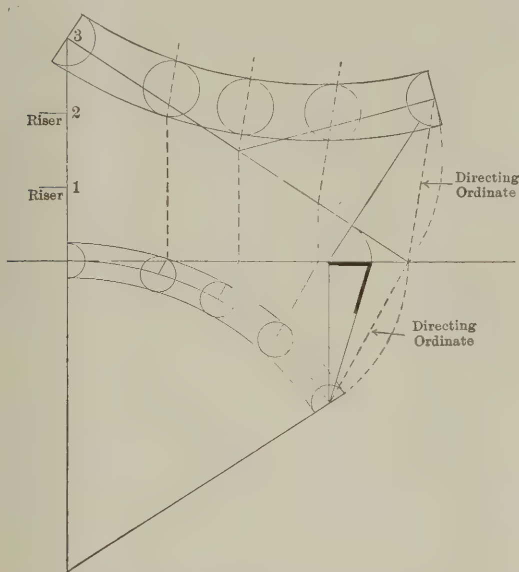


Fig. 8.—Showing How to Develop the Middle Curved Band by Means of Ordinates.

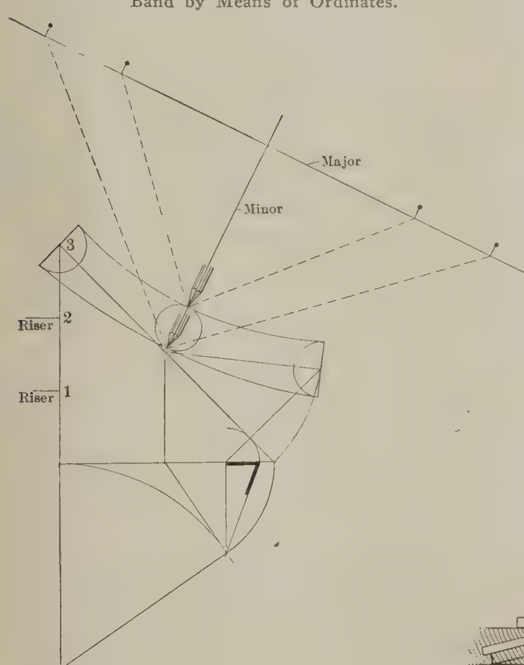


Fig. 9.—Method of Developing Band Which Follows Front Stringer, Using Pins and Pencil.

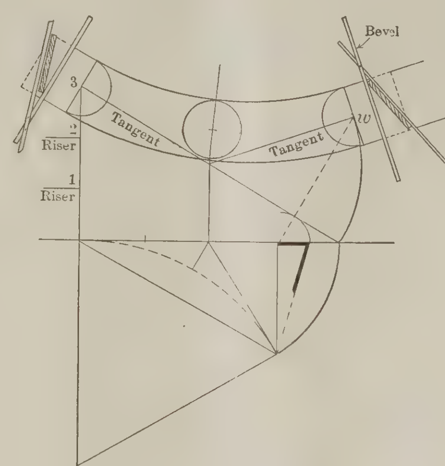


Fig. 10.—Plan and Development of Panel No. 1 in Fig. 5.

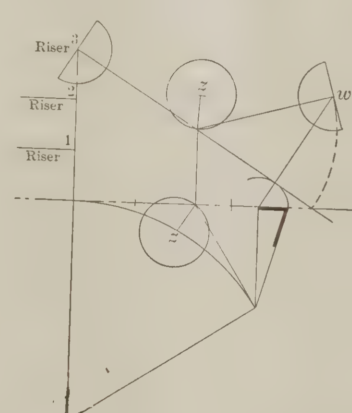


Fig. 11.—Plan and Development of Panel No. 2 in Fig. 5.

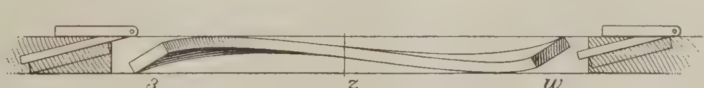


Fig. 12.—The Bevels Applied and the Appearance of Panel No. 2 After it is Twisted.

Laying out Panel Soffits for a Geometrical Stairway.

HOW CARPENTRY MAY AID IN CONSERVATION OF TIMBER SUPPLIES

By E. S. Crull.

WHEN lumber ceases to be a consequential factor in building operations—when the timber supply is exhausted to the extent that lumber shall be mostly supplanted by other materials—the carpenter, as a craftsman, will rank with the shoemaker, who of old was held in higher esteem than that of repairer. To the carpenter, then, more than to any other excepting the lumber manufacturers, should the preservation of forests and the conservation of forest products sensibly appeal.

Timber supply has been a matter of much concern to many interests, and of the Government and the several States. Vast sums are being annually expended for the protection of forests and conserving forest products. More recently, the subject of retrieving the profligate manufacturing and utility wastes has had needful attention.

Use for Odd Lengths

While Mr. Pinchot was chief of the forestry division, he suggested to lumber manufacturers one measure, accompanied with a subtle intimation of legislation to enforce it, that has since been put into effect. It was suggested that a considerable amount of waste could be saved to good purpose in sawing a small portion of odd lengths instead of trimming all to even, in such items as the odd lengths could be well made use of, as bevel siding, flooring, drop or rustic siding, ceiling and finish.

This innovation caused an uproar when it was announced. It was assumed that the motive was purely selfish and that there would be an indiscriminate assortment of lengths with an undue proportion of odd. So deep-rooted is custom that any attempt to introduce a different method is usually rejected regardless of the changed conditions that induce it. The tendency to hold to past practices has ever retarded progress, and custom is a strong leader. It was contended that carpenters and lumber purchasers would not adjust themselves, but would reject the innovation as impracticable and detrimental. This has not proved to be true; many of the more successful and capable contractors and workmen have seen the availability and are making good use of it. That it is economical for all interests goes without question.

What Constitutes True Economy

In all merchandising it is well to recognize this business principle. Selections that eliminate any portion of production, wholly, must take the whole cost of production. Therefore, it is true economy to make use of all that must be produced. In the manufacture of lumber there is an unavoidable production of lengths shorter than 10 ft. which, if discarded as unsalable and undesirable, must be figured in the cost of the total production, and like the prime cuts of beef that are so often referred to as adding to the high cost of living, must bring a price that will cover the whole sum.

There is no true reason, as has been long proved, for not making use of every length that can be suitably, if the buying market will so adjust itself, as will be seen further along, in the matter of using odd and short lengths, as we shall consider the matter from the builder's and carpenter's viewpoint.

Customary practice, and the supposedly unlimited supply of timber products, have encouraged and demanded lumber in multiples of 4-ft. lengths, with an unerring preference that the multiple shall be 16 ft. The reason for this is because of the other established custom of placing nailing ties 16 in. from center to center, as only multiples of 4 ft. will lay over 16-in. centers without waste. Again, it is contended that 16-ft. lengths always afford better cutting divisions, with less waste; though the cutting advantage comes, obviously, not from the specific 16-ft. length so much as from the longer length.

Let us consider these different phases of the matter: First, as to the wastes of the different lengths over 16-in. centers. While, as has been stated above, multiples of 4 ft. are the only lengths that will lay without waste, there has never been any decided opposition, so far as I know, to any of the other even lengths. Yet there is a waste of 8 in. in 6, 10, 14 and 18 ft. as against but 4 in. in 7, 11, 15 and 19 ft. Almost a sufficient argument, and convincing, in favor of the use of odd lengths, if there were not still others.

Taking the cutting next, we find that as a matter of fact 16 ft. will not afford as many cuttings of equal divisions, without waste, as will 15 ft. When equally divided as to pieces and lengths that each longer length will afford, the different lengths, from 4 ft. to 20 ft. inclusive, result as follows: 5, 6 and 11 ft. affords four cuttings; 7, 8, 9, 13, 17 and 19 ft., five each; 10, 12 and 16 ft., six; 14 ft., seven; 15 and 18 ft., eight, and 20 ft., nine. The difference between the even and odd, it is observed, is as five to four.

Using Multiples of 4 Ft.

Now, as it is shown that multiples of 4 ft. can be used on 16-in. centers without waste, then let me ask why not avail more frequently of the shorter multiples as being as serviceable as the longer? The same question, too, may then be asked of the various odd lengths that waste but 4 in., in preference to the even that waste eight. Let it be well remembered, too, that the use of all lengths that can be suitably, rather than of the selected few, tends considerably to a stable and lower price.

It is the purpose of this article to afford the carpenters and builders who have no other opportunity for becoming familiar with the matter an equal chance to make intelligent bills of material that will spell economy for them and enable them to assist the worthy move of conserving our forest products, with as little waste as possible.

Very much more could be written of the numerous odd-length spans that occur with frequency, particularly in dwellings, when odd lengths would save over the use of even lengths, but enough has been here written to bring the matter under all the phases of consderation that will, perhaps, induce intelligent readers and craftsmen to further deductions.

Some rather extensive plain and reinforced concrete work are contemplated by the Pacific Mills at Lawrence, Mass., in connection with the additions which they are making. This work embraces nearly 16 acres of concrete floors and includes in the Printing Building, 720 x 85 ft., two floors and columns; in the Dye House, 994 x 251 ft., one floor and roof; in the Finishing Building, 600 x 90 ft., three floors of "mushroom" construction; the floors of the Power Station, 330 x 85 ft., and a coal pocket. L. E. Locke, of Lawrence, Mass., is the general contractor for the brick and timber work, and Lockwood, Greene & Co., Boston, Mass., are the architects. The contract for the concrete work has been awarded the Aberthaw Construction Company, Boston, Mass.

THE JOBBING CARPENTER AND SOME OF HIS WORK*—XV

By EDWARD H. CRUSSEL.

In connection with the making of a drawing board, mention was made in the last issue that large boards are sometimes fastened to stiff, heavy cleats and merely laid on their supports, while at other times they are fastened directly to the trestles. In the case of the latter a good form of fastening to use is shown in Fig. 102. Here A is the top of the trestle to which the cleat B is first fixed with screws as shown, while C C are the round-headed screws which are passed through the slotted holes in B into the drawing board, holding everything firm. This is a capital fastening, as the board must bend the top of the trestle before it can get out of shape.

In the actual construction of the board shown in Fig. 99, it should be glued up with square joints in the usual way and the grooves cut afterwards. They can be easily made with a 45-plow plane, either by tacking down a strip for a guide or by using a fence on the plow that will drop into the grooves as they are made and thus gauge one groove from another. Where such a thing is available the grooves can be cut very easily with a circular saw.

Neither the size nor the spacing of the grooves is of special importance, but they must be deep enough and close enough together to make the board perfectly pliable, so that there will be no difficulty in making it conform to the surface of the cleats. In our present example the board being ⅞ of an inch thick, the grooves are made ½ in. deep and are spaced 3 in. apart. The under side of the board will of course present a neater appearance if the grooves are spaced equally, but it is better to vary the spacing than to run a groove through one of the glue joints of the board.

The underside of the board ought to be dressed before the grooves are made. After they are made and the cleats in place, turn the board over and make the top side perfectly flat and level. "Shoot" one edge of the board straight and square, gauge the other edge from it—at either end only—and treat it in the same way; then square up the ends. If the edges of the board are straight a steel square will square the end of it as good as any other method, either for a small board, such as the present one, or for one as much larger as you choose to make. In the present instance, by laying the square on top of the board and keeping the tongue even with the edge of it, we can mark a knife line right across the board. With a larger board the square should be placed in the same manner and a light straight edge placed against it, as in Fig. 103, after which the knife line is marked along the edge of the straight edge.

Regarding the foregoing method of squaring the drawing board, the writer wishes to go on record as saying that much unnecessary fuss is often raised regarding this simple matter. All that is required is a *perfectly straight* end to the board for the head of the T-square to work from, and whether this end is at right angles to the other edges of the board or not is of no importance, excepting so far as the item of appearance is concerned. The draftsman does not use either top or bottom edge of his board from which to square his work. He draws his horizontal lines with the T-square from the left-hand end of the board and his vertical lines by means of his set squares or triangles, placing them upon the upper edge of the blade of the T-square for that purpose. The accuracy of his angles therefore depends not upon his drawing board, but upon his drawing tools and, it may be added, his skill in using them.

Drawing boards are sometimes made with a hardwood slip running across the end to provide a smooth, easy edge for the T-square to work upon. This slip is very seldom an improvement. As its direction is across the grain of the board, provision must be made in it to allow of the board swelling and shrinking. This is done by making a number of saw kerfs in it, say about 3 in. apart or one opposite every groove in the board. These saw kerfs of course divide the hardwood slip into a number of small pieces and the strip must indeed have been well fastened in place if sooner or later the ends of some of these small pieces do not project slightly be-

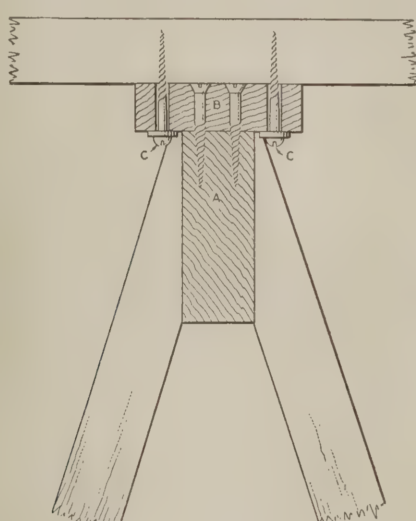


Fig. 102.—Good Method of Fastening Boards to Trestle.

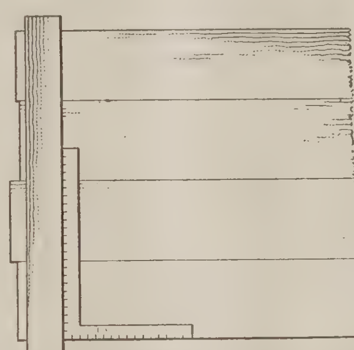


Fig. 103.—Squaring the Ends of the Drawing Board.

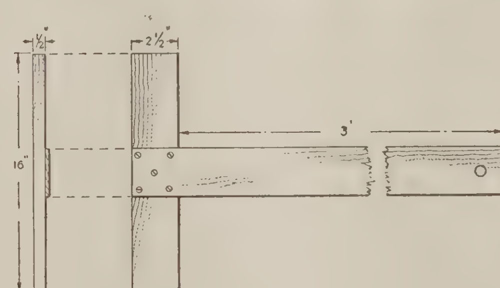


Fig. 104.—Method of Fastening the Blade to the Head of a T-Square.

The Jobbing Carpenter and Some of His Work.—XVI.

* The author of these articles will be glad to discuss any phase of work in the line of jobbing carpentry that the reader may suggest. —Editor, *The Building Age.*

yond their neighbors and spoil the working edge of the board.

Drawing boards have no finish applied to them, but are left in the white. This is an almost universal custom as any sort of finish gives a disagreeable working surface to the board compared with the smooth unfinished pine. For his own use, however, the writer prefers to give the board just one coat of thin shellac, which is afterwards rubbed down with fine sandpaper. This does not affect the surface of the board to any appreciable extent, but it fills the pores somewhat and makes the board easier to free from dust after it has been standing idle for some time.

Making a T-Square

A T-square for the drawing board can be bought cheap enough to bring it within the reach of every one, and as suitable wood for making a square is not always to be readily obtained, it will in most cases be better to purchase one. Where a suitable piece of wood is at hand, however, the making of a T-square is a small job. Pear tree is probably the best material to use, although cherry, mahogany or even maple may serve the purpose. The blade is the first thing to be considered, and for a 36 in. square this should be from 2½ to 3 in. wide and 3/32 of an inch thick. To make a strip like this out of a piece of ⅞ in. material, we first gauge and dress it to the correct width, making it as straight as possible, because it is easier to make it straight before it is cut thinner. After the edges are straight and square rip the strip edgewise, cutting off a piece about ¼ of an inch thick. It will probably cast or warp a little, which is the reason why we do not cut it nearer to the finished size. Now dress this strip down to the proper thickness, planing it first one side and then the other until it is quite straight and flat.

It is easy enough to plane a thin strip such as this square blade if one knows how to do it, which is as follows: After you have worked it in the ordinary way until there is danger of hitting the bench stop or until the strip shows an inclination to buckle on you, take a piece of board with a perfectly flat surface and fasten the strip to it with a couple of brads, driven through that end of the strip which is farthest from the bench stop, so that when planing the strip you are pulling from the brads instead of pushing against them.

It is important that the board to which the strip is fastened has a flat surface, because the strip is now so thin that it will follow the shape of the board on which it rests as the plane passes over it and any irregularities in the board will be reproduced in the strip in an opposite direction. The strip should be an inch or so longer than the required finished length so that the end where the brads were driven may be cut off after the planing is done.

Straightening Edge of Thin Strip

If it ever becomes necessary to straighten the edge of a thin strip, such as this square blade, the best method is to fasten a trying plane upside down in the bench vise and draw the edge of the strip over it toward you. If the sole of the plane is true and the iron finely set a good job can be done in this way.

The head of the T-square can be 2½ in. wide, ½ in. thick and from 10 to 12 in. long. The making of it presents no difficulty, but it is easier to dress and straighten a piece twice this length and then cut it down afterwards.

The blade is fastened to the head of the square with glue and five screws as represented in plan and elevation, Fig. 104. Flat head brass screws ½ in. No. 4 are about the right size, and being so small they are very tender and in hardwood require careful driving. The holes to receive them must be of the correct size and it is necessary to make a countersinking for the heads. To avoid breaking a screw in the square and so spoiling the appearance of it, make some tests on a spare piece of the same kind of wood until you are certain of the correct size of the hole. To fasten the blade put in the center screw first and then adjust the blade carefully with the help of a good steel square and then put in the other screws. It will help some if the head, being made as before advised of twice the finished length, is not cut to correct size until the blade is square and fastened.

Many carpenters have made drawing squares with the blades sunk flush into the heads, and even with the blades mortised in. These, though being more difficult to make, are not really so good as the one illustrated, because they will not permit of the triangles working close up to the end of the board.

All that is now required to finish this square is a hole in the end of the blade by which to hang it. Many a square blade has been spoiled by splitting, whilst the workman was attempting to make this hole. It is the nose of the bit that does the splitting, so we must first make a hole—with a bradawl or automatic drill—through the blade large enough to clear the nose of the bit. Then if we lay the blade on a small piece of wood and pass the nose of the bit through the hole provided for it into the piece of wood, the lips of the bit will cut out the remainder of the hole without any danger of splitting the blade.

Influence of Size of Building upon its Cost

In connection with an investigation of the cost of mill buildings Charles T. Main, mill engineer and architect, of Boston, has established some interesting relations between the size of a building and its cost. He shows that there is an immediate decrease in cost as the width is increased, due to the fact that the cost of the walls and outside foundation, which is an important item of cost, relative to the total cost, is decreased as the width increases.

For example, supposing a three-story building is desired with 30,000 sq. ft. on each floor.

If the building were 600 x 50 ft., its cost would be about 99 cents a square foot.

If the building were 400 x 75 ft., its cost would be about 87 cents a square foot.

If the building were 300 x 100 ft., its cost would be about 83 cents a square foot.

If the building were 240 x 125 ft., its cost would be about 80 cents a square foot.

Of course the exact figures as to cost will vary year by year and with the locality, but the relative values will remain practically constant.

The minimum cost per square foot is reached with a four-story building. A three-story building costs a trifle more than a four-story. A one-story building is the most expensive. This is due to a combination of several features:

a. The cost of ordinary foundations does not increase in proportion to the number of stories, and therefore their cost is less per square foot as the number of stories is increased.

b. The roof is the same for a one-story building as for one of any other number of stories, and therefore its cost relative to the total cost grows less as the number of stories increases.

c. The cost of columns, including the supporting piers and castings, does not vary much per story as the stories are added.

d. As the number of stories increases, the cost of the walls, owing to increased thickness, increases in a greater ratio than the number of stories, and this item is the one which in the four-story bulding offsets the saving in foundations and roof.

The saving by the use of frame construction for walls instead of brick is in somewhat lighter foundations and in the outside surfaces of the building.

OPEN FIREPLACES AND HOUSE CHIMNEYS

BY LAWRENCE S. KEIR.

A HOUSE may be ever so well built, may have all the modern improvements, be elaborately furnished and well heated, but if it lacks the cheer of the open fireplace it is not a complete home. In order, however, that the best results may be obtained the fireplace should be of the right proportions, but how many fireplaces are properly constructed? The percentage is entirely too small. Many a house owner has been disappointed in his fireplace because the architect, the builder or the mason made a guess as to how it should be built and guessed wrong. What here follows has been written as a possible help for the mason and the house owner, and the writer feels sure that if the suggestions considered in connection with the accompanying illustrations are followed, the fireplace will neither smoke nor will all the heat go up the chimney. There need be no hesitation in following these suggestions, as they have all been practically demonstrated and found to give excellent results.

Before building the fireplace it may be well to remember that none will give the same amount of heat as a stove from the same quantity of fuel. This is mainly due to the following reasons: In the first place, a stove has all its sides and usually a section or two of stove pipe exposed to contact with the products of combustion, and therefore radiates a much larger amount of heat than is possible in the case of a fireplace. Then, too, the fireplace draws its supply of draft air directly through the very opening which supplies the heat. Now, while we are forced to acknowledge that the stove is the more economical heater of the two, still the fireplace is an excellent ventilator and the stove can never give us the pleasure which is derived from the cheery open fire; so we will build our fireplace, and while building it let us do it right.

At this point it may be well to state that, excepting for the summer time or use in a mild climate, it is not well to depend altogether on the fireplace for heating purposes. While the fireplace gives sufficient heat for moderately cold weather, it would be an utter failure in very extreme weather.

No piece of masonry, be it ever so well built, will endure as it should unless the foundation is a good one. The excavation therefore for the fireplace foundation should be not less than 4 ft. in depth. The top of the excavation should be 3 or 4 in. larger all around than the plan of the proposed fireplace. This is to allow for any unevenness in the excavation and also to avoid the necessity of building on the extreme edge of the footings, as the edge is never as solid as the masonry an inch or two away from it. Care should be taken to have the sides as smooth as possible and cut slightly under, so that the bottom of the excavation is a trifle larger than the top. This will prevent the frost from getting a hold on the foundation and it also gives a larger bearing on the ground. The bottom of the excavation should be level and the earth packed firm.

Having finished the digging, the next thing to be considered is the footing or filling. There are three good methods of filling. If plenty of good flat stones are to be had, it is perhaps the easiest to lay a wall of stone in cement mortar around the sides of the excavation and fill in with dry masonry in the center until within a few inches of the top or ground level. From this point up the masonry should be solid laid in cement throughout. In following this method care should be taken to keep the outside edges of the walls fairly even and not to allow any stone to overhang as the frost might "lift" on it and cause damage.

Another method is to fill the excavation with 6 or 8 in. of stone. Pack them firmly in place and grout thoroughly with thin mortar mixed in about the proportion of one part cement to four parts sand and continuing until the ground level is reached. The best method of all, however, and the one which should always be followed in wet soil is to fill solid with concrete mixed in about the proportion of one part cement, two parts sand and four or five parts broken stone or

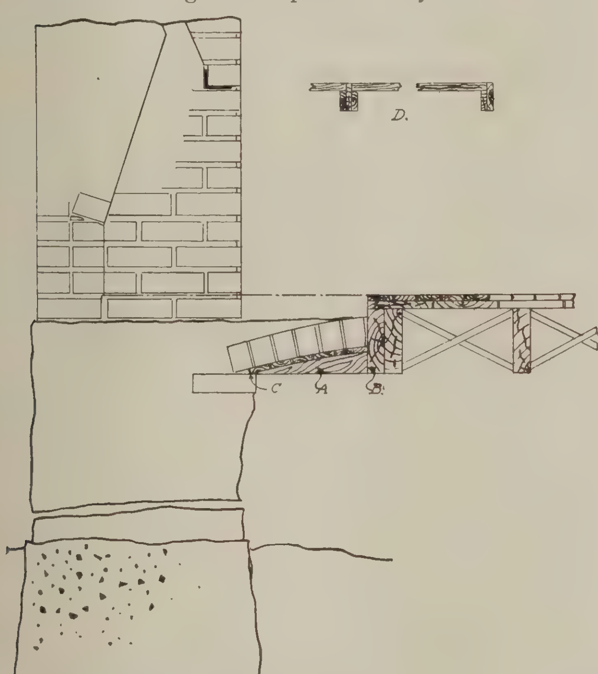


Fig. 1.—Showing Hearth Construction.

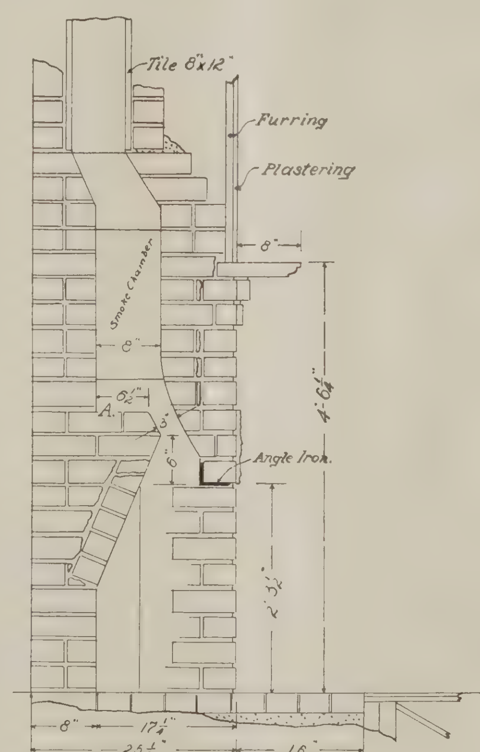


Fig. 2.—Vertical Cross-Section of a Fireplace of Good Proportions.

Open Fireplaces and House Chimneys.

coarse gravel. The distance from the ground level to within a few inches of the finished floor level should be laid up in solid stone or brick masonry.

If the hearth is to be of tile or brick laid flat the foundation should be leveled off the thickness of a brick and mortar joint below the floor level. If the hearth is to be of brick laid on edge, then the thickness of two bricks and two mortar joints should be allowed. In this way it will be easy to have the mantel work start with a mortar joint just even with the hearth and floor level.

The foundation is seldom built out under the hearth all the way from the bottom up, as it would require unnecessary labor and material and often take up valuable space. The hearth is usually held by an arch of brick turned over a wooden center as indicated at A in Fig. 1 of the illustrations. The bottom of the centering is kept even with the bottom of the floor beams, one end being nailed to the header beam B, and the other end resting on a ledge corbeled out to receive it as shown at C. At D is shown a cross section of the centering and the manner of boarding. The latter is best made of strips not over 4 in. wide and laid a trifle scant at the joints. The idea is to prevent as far as possible the warping of the boards and the consequent rupturing of the brick arch. To this end it is a good idea to cover the centering with a piece of tar paper, or, if it is intended to leave the centering in place after the fireplace is finished, then use asbestos paper, this being fireproof.

The usual width of the hearth is 16 in. or four bricks beyond the chimney breast or jambs, but in tile hearths it sometimes varies a little according to the design and size of tile used. It often happens that the fireplace does not have a separate foundation, but rests partly on the house foundation or cellar wall, in which case the whole of the foundation beneath the fireplace should be carried down to the same level in order to avoid uneven settlement.

The proper planning of a fireplace is very important. No matter how well the work is done or how beautiful the mantel, if it is not useful as well as ornamental it is the worst kind of a sham as well as a nuisance. In Fig. 2 is shown a vertical section and Fig. 3 the front elevation of a fireplace of excellent proportions. It is 5 ft. 6½ in. wide, has an opening 2 ft. 9½ in wide and 17¼ in. deep, the arch being 2 ft. 3½ in. high. The back is drawn forward to form a throat 3 in. wide and 6 in. above the bottom of the arch. This assists in throwing the heat forward and also forms the windbreak 6½ in. wide shown at A in Fig. 2. This windbreak prevents down drafts from blowing smoke and ashes into the room. Observe that the flue leads from the center of the smoke chamber, and that the area of the flue should be from one-tenth to one-twelfth of the area of the fireplace opening. Where the chimney is of medium hight, say from 30 to 40 ft. high and the flue is straight, one-fifteenth the fireplace opening sometimes gives good results. But it is best to be sure and a safe rule to follow is to allow one-tenth.

Another good rule is to allow 13 sq. in. of flue area to every square foot of fireplace opening.

Do not build a fireplace less than 16 in. deep. If it is too shallow it is certain to smoke, and, on the other hand, there is such a thing as having it too deep, with the result that we lose heat. It is never necessary to have it over 20 in. deep, even in the largest fireplace.

A fireplace with an opening 3 ft. or less in width should never measure more than 2 ft. 6 in. from the hearth to the center of the arch, unless it is intended to use a grate. An opening about 2 ft. 4 in. to 2 ft. 6 in. wide might be about 2 ft. 4 in. high at the center of the arch. One 3 ft. 6 in. to 4 ft. in width may be 2 ft. 8 in. or 2 ft. 10 in. high.

In building a fireplace it will be found much more satisfactory to construct one of medium size, as a very large one will cause drafts along the floor owing to the large amount of air drawn in. Such a fireplace will nearly blister one's face when standing before it and at the same time freeze your back. Then, too, a great big fireplace burns considerable fuel and the man of the house will be compelled to spend the hours he might have enjoyed by the fire in cutting wood to feed it.

Do not fail to draw the back forward, so as to provide a windbreak and form the throat as shown in Fig. 2. The idea is to draw the smoke together, so that on account of the intense heat it rushes rapidly through the throat and prevents down drafts from working through. The ledge also does its part in this. The cold air flows down back of the smoke chamber until it strikes the ledge, where it is turned against the hot gases and is thrown back. The sloping of the back carries the heat forward and throws more of it into the room than would be the case if the back was carried up straight.

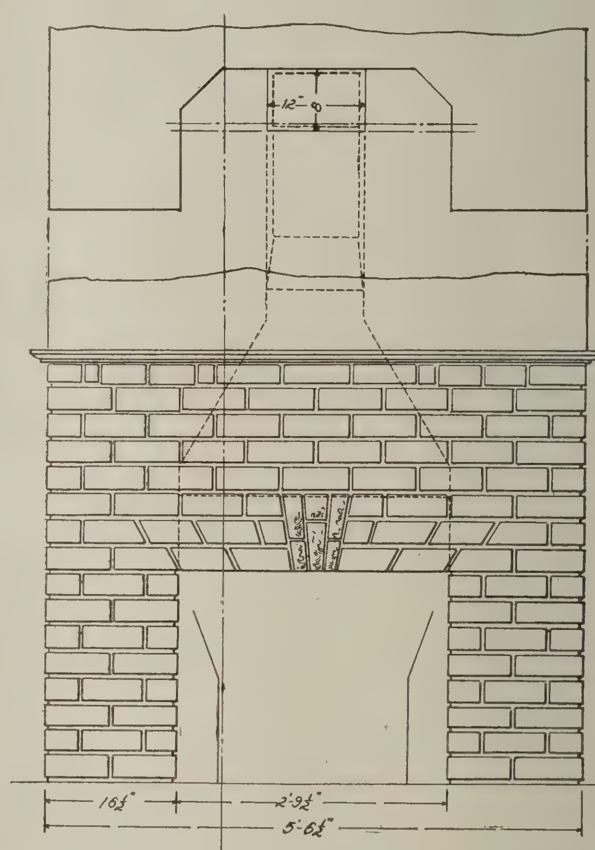


Fig. 3.—Front Elevation of a Fireplace of Good Proportions.

Open Fireplaces and House Chimneys.

Do not make the throat more than 4 in. wide no matter what may be the size of the fireplace. Three inches is wide enough and to make it much larger causes an unnecessary loss of heat. If the throat is too wide the fireplace is liable at times to smoke.

Do not make the bottom of the arch wider than necessary, as the smoke striking it may puff out into the room.

Do not make the smoke chamber too large or too small. If the depth is the same as the chimney flue and the sides are drawn in at an angle of about 30 deg., starting about one or two bricks above the windbreak until the proper width of flue is reached it will prove to be all right. A smoke chamber too large allows of too much cooling of the gases and in this way diminishes the draft. One too small will choke the smoke back into the room.

(*To be continued.*)

NOTES ON PLAIN AND REINFORCED CONCRETE CONSTRUCTION

By PAUL T. LESHER

IF it is not desired to calculate the strength of girders, beams and slabs, the table here presented will be found convenient for ordinary work. It gives the thickness and reinforcement of slabs and dimensions and reinforcement of reinforced concrete beams for a number of conditions which are liable to be met with in common practice.

Rules which are written as foot notes to the table give important directions.

The "forms" for concrete work are generally made of white pine, yellow pine, fir or spruce, although white pine is the best, and it is much better if the timber is green, for if seasoned it is likely to warp and swell when the moist concrete comes in contact. To prevent particles of the concrete from sticking to the forms when removing, it is a good plan to grease the forms with linseed oil, soap, mixed lard and kerosene or petroleum. However, if it is desired to plaster the surface of the concrete, the forms should be thoroughly wet before placing the concrete, instead of being greased. To produce a smooth surface the boards or planks next to the concrete should be planed and the edges beveled or tongued and grooved.

TABLE FOR DESIGNING REINFORCED CONCRETE BEAMS AND SLABS.
PROPORTIONS OF CONCRETE 1:2:4. (See footnote.)

Length or Span of Beam, Feet.	Distance Apart of Beams, Feet.	Dimensions of Beams.			Reinforcement of Beams.					Thickness of Slabs.		Reinforcement of Slabs.	
		Width Inches.	Depth, Inches.	Depth Below Steel, Inches.	Number of Rods Required.	Diameter of Rods, Inches.	Number of Stirrups at Each End.	Diameter of Stirrup Rods. Inches	Spacing of Stirrups.*	Total Thickness, Inches.	Depth Below Steel Inches.	Diameter of Rods, Inches.	Spacing of Rods, Inches.
MEDIUM HEAVY FLOOR LOADING. 125 POUNDS PER SQUARE FOOT													
8	4	6	13	1 1/2	3	1/2	1	5/16	6	3	3/4	5/16	6
	6	7	15	1 1/2	3	9/16	2	5/16	6	3 3/4	3/4	3/8	6
	8	8	17	1 1/2	3	5/8	2	3/8	6	5	1	1/2	7 1/2
10	4	7	14	1 1/2	3	1/2	2	5/16	8	3	3/4	5/16	6
	6	9	17	1 1/2	4	9/16	3	5/16	8	3 3/4	3/4	3/8	6
	8	9	20	2	4	5/8	3	3/8	8	5	1	1/2	7 1/2
12	4	9	16	1 1/2	4	9/16	2	3/8	8	3	3/4	5/16	6
	6	10	20	2	4	5/8	3	3/8	8	3 3/4	3/4	3/8	6
	8	11	22	2	4	11/16	4	3/8	8	5	1	1/2	7 1/2
14	4	10	18	1 1/2	4	5/8	2	3/8	8	3	3/4	5/16	6
	6	11	24	2	4	3/4	3	3/8	8	3 3/4	3/4	3/8	6
	8	13	24	2	4	13/16	4	3/8	8	5	1	1/2	7 1/2
LIGHT FLOOR LOADING. 50 POUNDS PER SQUARE FOOT.													
8	4	5	10	1 1/4	3	3/8	..	..	..	3	3/4	1/4	5 1/2
	6	6	13	1 1/2	3	7/16	..	..	..	3 1/2	3/4	5/16	7
	8	7	13	1 1/2	3	1/2	..	..	..	4	3/4	3/8	5 1/2
10	4	6	12	1 1/4	3	3/8	..	..	..	3	3/4	1/4	5 1/2
	6	7	15	1 1/2	3	9/16	..	..	..	3 1/2	3/4	5/16	7
	8	8	16	1 1/2	3	5/8	..	..	..	4	3/4	3/8	5 1/2
12	4	7	13	1 1/2	3	1/2	..	..	..	3	3/4	1/4	5 1/2
	6	8	17	1 1/2	3	5/8	..	..	..	3 1/2	3/4	5/16	7
	8	9	18	1 1/2	4	9/16	..	..	..	4	3/4	3/8	5 1/2
14	4	7	15	1 1/2	3	9/16	..	..	..	3	3/4	1/4	5 1/2
	6	8	19	2	3	5/8	..	..	..	3 1/2	3/4	5/16	7
	8	10	21	2	4	1/16	..	..	..	4	3/4	3/8	5 1/2
ROOFS. 30 POUNDS PER SQUARE FOOT.													
8	4	5	10	1 1/4	3	3/8	..	..	..	2 3/4	3/4	3/16	6
	6	6	11	1 1/4	3	7/16	..	..	..	3	3/4	1/4	5 1/2
	8	7	12	1 1/4	3	1/2	..	..	..	3 1/4	3/4	3/8	7 1/2
10	4	6	12	1 1/4	3	7/16	..	..	..	2 3/4	3/4	3/16	6
	6	7	13	1 1/2	3	1/2	..	..	..	3	3/4	1/4	5 1/2
	8	8	14	1 1/2	3	9/16	..	..	..	3 1/4	3/4	3/8	7 1/2
12	4	7	13	1 1/2	3	1/2	..	..	..	2 3/4	3/4	3/16	6
	6	7	16	1 1/2	3	9/16	..	..	..	3	3/4	1/4	5 1/2
	8	8	17	1 1/2	3	5/8	..	..	..	3 1/4	3/4	3/8	7 1/2
14	4	7	15	1 1/2	3	9/16	..	..	..	2 3/4	3/4	3/16	6
	6	8	17	1 1/2	3	5/8	..	..	..	3	3/4	1/4	5 1/2
	8	9	18	1 1/2	3	11/16	..	..	..	3 1/4	3/4	3/8	7 1/2

Permission of Atlas Portland Cement Company.

An invariable rule in placing steel is to insert it in the face where the pull will come; that is, where it will be in tension. Thus in a beam or slab it must be close to the bottom. In a retaining wall, to withstand earth pressure, it must be in the face nearest the earth.

(1) Bend, diagonally upwards, one rod in three, or two rods in four, from ¼ points in beam to top of beam and over supports.
(2) Stirrups are made U-shaped, with bent ends.
(3) Slab reinforcement is placed at right angles to supporting beams. Cross reinforcement of slightly smaller rods, or same rods farther apart is also placed in slabs parallel to beams.
(4) Wire fabric or expanded metal mesh may be substituted for rods in the slabs, provided the area of section of metal is kept the same as the rods.
(5) Cinder concrete should not be used for beams.
(6) Cinder concrete may be used for roof slabs if thickness is increased 1 in. over that given in table.
(7) After setting 30 days, test two of the slabs and one beam by loading two panels with sand to a depth of: 18 in. for heavy floor loading; 8 in. for light floor loading; 5 in. for roof loading.
* Place first stirrup in every case 6 in. from support.

Forms may be removed earlier in warm and dry weather than in cold and damp weather, earlier with quick-setting cement than with slow-setting cement, and earlier from under light than from under heavy loads.

The forms for walls in summer may be removed in about two days, in cold weather in about five days. Forms for slabs up to 6-ft. span may be removed in summer in about six days and in cold weather in about two weeks.

Forms for beams and girders and long slab spans may be removed in summer in ten days and in cold weather in about three or four weeks.

If shores are left without disturbing them, the time of removal of the sheeting may be reduced to one week.

Column forms may be removed in summer in two or three days and in cold weather in four or five days, provided girders are shored to prevent appreciable weight reaching columns.

In Fig. 13 is shown a typical column form. Members marked "A" are 2" x 4" timbers, which are used as clamps. The members "B" are 1¼-in. tongued and grooved boards, which are held together by the members "C," which are 1¼" x 4" cleats. Members "D" are boards on the bottom to hold the form in place. Members "E" are triangular fillets, which are used to

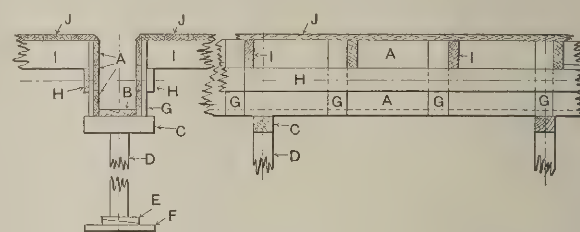


Fig. 12.—Section and Elevation of Typical Beam and Girder "Form."

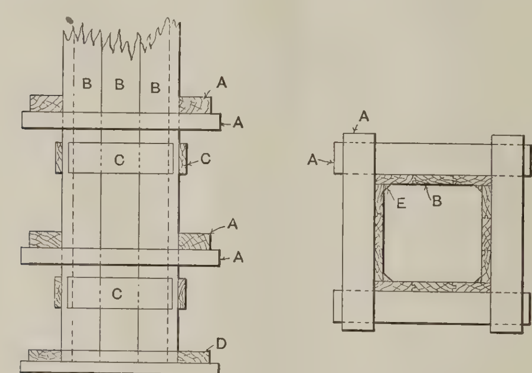


Fig. 11.—Elevation and Plan of Typical Column "Form."

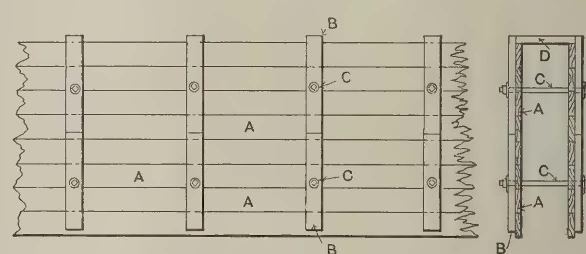


Fig. 13.—Elevation and Cross-section of Typical Wall "Form."

Notes on Plain and Reinforced Concrete Construction.

bevel the corners of the columns and also tend to make a tight joint in the form.

Fig. 14 shows a typical beam and girder form, members "A" and "B" being the sides and bottom of the form and are usually 1¼ in. thick. The form rests upon corbels "C," which are usually 4" x 4" timber and are in turn supported upon the shores or struts "D." The shores "D" rest upon wedges "E," which in turn rest upon a bearing block "F." The members "J" are 1¼-in. panel boards, which support the slabs.

The panel boarding is supported by the members "I," which in turn rest upon the members "H." Members "G" are 1¼" x 4" cleats, which hold the sides together.

In Fig. 15 is shown a typical wall form. The form sections are usually made 2 ft. high and about 10 ft. long. The members "A" are usually 1¼-in. or 2-in. boards held together by the cleats "B." These cleats are made to lap over the top of the form about 2 in., so as to catch the next section placed on top of the one just filled with concrete. This extension also affords a bearing for the spacer "D." The bolts "C" are used to keep the sides of the form in place, and when it is desired to withdraw them they should be loosened by means of a wrench, about 24 hours after concreting, otherwise it will be difficult to remove them.

The cleats "B" are usually spaced 2 to 3 ft. apart. In place of bolts, wire is sometimes used, and on account of its low cost can be left in the concrete.

There are two ways of mixing concrete, one is by hand and the other by machine. Hand mixing is not as satisfactory and economical as machine mixing, except on small jobs. To mix by hand, the usual method is to mix the cement and sand dry, which is accomplished by turning the mixture with shovels three or four times, until the mixture attains a uniform color and each grain of sand is coated with cement. Water is now added and the mortar is mixed before the aggregate (stone, gravel, slag or cinders) is added; after the aggregate is added the mass is turned three or four times with shovels.

In mixing by hand the operation should be well protected against wind and rain, as the rain prevents proper dry mixing of cement and sand, and the wind tends to blow away the fine cement, which is the best material. There are numerous machine mixers on the market, the two principal types being the "continuous" and the "batch."

In a continuous mixer the raw material is fed continuously into the machine at one end, and the mixed concrete is delivered continuously from the other end.

In a batch mixer the raw material is dumped into a cubical box or a drum, which rotates and thereby mixes the materials, which, after being mixed, are delivered in one batch by tilting the box or drum to one side.

It is customary to designate the quantities of cement, sand and aggregate in a concrete by proportion.

Thus 1:3:5 means one part cement to three parts sand and five parts aggregate.

In Trautwine's Civil Engineers' Pocket Book the usual proportions for Portland cement concrete are given as follows:

Foundations, ordinarily, 1:3:6.
Piers, pedestals, abutments, 1:2½:5½.
Reinforced walls and beams, 1:3:6.
Foundation walls, 1:2½:5½.
Conduits, drains, sewers, 1:2½:5½.
Reservoir and tank walls, 1:1½:3½.
Retaining walls, 1:2½:5½.
Stairways and roofs, 1:2:4.
Subaqueous work, 1:2:3.

All concrete should be of a musky consistency and care should be exercised in the placing, so that the concrete is not too thin or the wheel too long, thus permitting settlement and consequent separation of the parts.

Concrete should not be permitted to drop any considerable distance, as this tends to separate the materials and to disturb the even distribution of the same.

In floor and beam work the concrete should be placed to the full depth at one operation. It should not be permitted to wheel over or otherwise disturb freshly laid concrete. All concrete should be thoroughly tamped and exposed faces worked so that a smooth finish will result.

Concrete which is exposed to the sun should be moistened with water each day for about a week. This will allow the interior of the walls to dry uniformly with the exterior and prevent scaling or cracking.

Water tightness can be obtained by mixing wet and using proportion one part Portland cement to one and one-half parts sand to three parts screened gravel and placing in one continuous operation. For the interior of a tank, which will be kept wet while in use, a coat of neat cement may serve to make the concrete more water-tight. This should be put on as soon as the forms are removed and take off forms as early as possible.

Rules for the Measurement of Slate and Tile Roofing

Differences of opinion are constantly arising in the trade as to the proper manner of measuring slate and tile roofing, and the following customary rules therefor as codified and revised by the Standard System of Measurement in London, England, cannot fail to prove interesting to roofers in this country:

Slating.—Net area, after deducting all openings containing 4 ft. superficial or over.

Mansard, vertical, dormer, cheeks, small surfaces under 10 ft. superficial, circular, conical, octagonal or turret roofs to be measured separately.

Eaves.—A lineal measurement to be taken to the equivalent of 12 in. deep.

If irregular or cut to follow drips of gutters, an extra measurement of 6 in. to be taken.

In the case of all random slating add a further 6 in.

If bedded or pointed, to be charged separately.

Verges.—A lineal measurement equivalent to 6 in. wide to be taken at all square verges and secret gutters.

If slate and a half or special wide slates are used, add a further 12 in.

Top Edge.—A lineal measurement equivalent to 6 in. deep to be taken on either side of ridges, under sills of dormers, lanterns, skylights and any openings where top course slates are used.

Square Abutments.—A lineal measurement equivalent to 6 in. wide to be taken where slating adjoins sides of all chimney stacks, dormers, skylights and other openings; also at one end of slope where slating finishes between parapet or party walls.

Circular Cutting.—A lineal measurement equivalent to 12 in. wide to be taken.

Raking Cutting.—A lineal measurement equivalent to 6 in. wide to be taken at all rakes.

Valleys.—A lineal measurement equivalent to 6 in. wide to be taken on both sides of all valleys.

If special wide slates or slate and a half are used, take an additional 12 in. on both sides.

Hips and Angles.—A lineal measurement equivalent to 6 in. wide to be taken on both sides of all hips and angles.

If special wide slates or slate and a half wide are used, take an additional 12 in. on both sides.

Mitre Cutting.—A lineal measurement to be taken for all mitres (in addition to the usual cutting), whether at hips, valleys, or other places where slates are close cut; to include all necessary oil cement.

Ridge and Hip Coverings.—A lineal measurement of all ridges and hips, including setting and pointing in cement.

All splays, cut ends, mitres, intersections and top ends to be numbered and taken separately.

TILING

Tiling.—Net area, after deducting all openings containing 4 ft. superficial or over.

Mansards, vertical, dormer, cheecks, small surfaces under 10 ft. superficial, circular, conical, octagonal or turret roofs to be measured separately.

Eaves.—A lineal measurement equivalent to 8 in. deep.

If irregular or cut to follow drips of gutters, an extra measurement of 6 in. to be taken.

If bedded or pointed, to be charged separately.

Verges.—A lineal measurement equivalent to 6 in. wide to be taken at all square verges and secret gutters.

If on rake, take an additional 6 in.

Top Edge.—A lineal measurement equivalent to 6 in. deep to be taken on either side of ridges, under sills of dormers, lanterns, skylights and any openings where top courses are used.

Square Abutments.—A lineal measurement equivalent to 6 in. wide to be taken where tiling adjoins sides of all chimney stacks, dormers, skylights and other openings; also at one end of slope where tiling finishes between parapet or party walls.

Circular Cutting.—A lineal measurement equivalent to 12 in. wide to be taken.

Raking Cutting.—A lineal measurement equivalent to 6 in. wide to be taken at all rakes.

Valleys.—A lineal measurement equivalent to 6 in. wide to be taken on both sides of all valleys, including all necessary tile and a half.

Bedding and pointing to open valleys to be charged separately.

Valley tiles to be measured extra only, over the usual measurements on both sides.

Hips and Angles.—A lineal measurement equivalent to 6 in. wide to be taken on both sides of all hips and angles to include all necessary tile and a half.

Hip and angle tiles to be measured extra only, over the usual measurement on both sides.

Mitre Cutting.—A lineal measurement to be taken for all mitres (in addition to the usual cutting), whether at hips, valleys or other places where tiles are close cut, to include all necessary tile and a half.

Ridge and Hip Coverings.—A lineal measurement of all ridges and hips, including setting and pointing in cement.

All splays, cut ends, mitres, intersections and top ends to be numbered and taken separately.

Blackboards of Concrete

One of the recent developments in the use of concrete is the concrete blackboard. For years chemists, plasterers and blackboard men have been working on the problem of how a black plastic board could be troweled to a smooth surface without producing a gloss, but without success. A liquid concrete finish has been perfected that when applied to the wall makes a blackboard that is said to be better than slate, writes a contributor of an exchange.

The foundation is concrete applied to an ordinary brick or wire lath wall, and is waterproof. The finish is a cement, and assimilates with the foundation. As the board can be applied either to brick or metal lath, it saves the rough cost of plaster specified where slate is to be installed. The surface of this board is smooth, consumes very little chalk, and eliminates to a great degree the dust, which is the worst problem to be contended with in the school room. A dead finish is produced, giving no reflection, making it possible to see this board from any angle of the room. As it is made on the wall, there are no joints or seams which are insanitary, no unprotected edges to chip off, and it is noiseless.

The walls for plastic boards have been too soft to stand the wear and tear of hard work; holes were easily punched in the plaster, which soon grew larger, and it was impossible to patch them and make a smooth joint. It is claimed that this will not happen with the cement board, as it is too hard to break under anything short of a blow with a hammer.

The Building Age

Formerly Carpentry and Building

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JULY, 1910

Demolishing a Skyscraper

The most remarkable example on record of the demolition of a towering office building of steel skeleton frame construction in order to make way for the erection upon its site and that of adjoining property of a still larger and more lofty structure is that of the 20-story Gillender Building in the heart of the financial district in New York City. This work has just been completed in a trifle less than 45 days, the period allotted the contractors for razing the structure, there being a penalty of $500 for every day exceeding that time. The performance has been the most rapid house wrecking feat ever executed in this or any other country and involved the employment of 250 men in the day time and 100 men at night to clean away the debris. Operations were commenced on May 3 and completed on June 17 and without a single serious accident. Great care was taken with the erection of the scaffolding, which covered not only the sidewalks, but also the full width of Wall and Nassau Streets, so that there should be no chance of any accidents happening to the thousands of people passing underneath every day. The encasing masonry was first removed for a considerable distance ahead of the iron work, and then the steel frames were removed by knocking off the heads of the rivets and driving them out with a drift pin. As the work progressed, the brick backing of the stone work in front became more and more difficult of removal, by reason of its exceeding hardness, and pneumatic guns were freely utilized for the purpose. The same methods were also pursued with the brickwork in the corners. From the third story down was the worst part of the brickwork, and as the demolition approached the street level it was necessary to make use of dynamite to loosen the material. The opinion was expressed by a member of the firm of contractors demolishing the building that the work could never have been accomplished in the short space of 45 days if it had been necessary to depend solely on manual labor. The steel in the Gillender Building, as well as the wrought iron in the old Stevens Building adjoining, were found as the work progressed to be in an excellent state of preservation. An examination of some of the box columns after they had been lowered to the street revealed no signs of rust except a trace within the interior. It may not be without interest to state in this connection that the Gillender Building was erected in 1897 at a cost of half a million dollars, and its hight with the tower was 306 feet. It is the first high modern office fireproof building that has been demolished in this city, although not the first of its type—that having been the six-story Pabst Hotel, which occupied a portion of the site of the present Times Building at Broadway and Forty-second Street, and which was razed in December, 1902, after having been erected only four years.

Model Tenements for Workingmen

Some very interesting information regarding the extent to which model tenements are being provided for laboring classes in the Metropolis and the outcome of the undertaking in a financial sense is found in the 14th annual report of the City and Suburban Homes Company, just made public. There are four groups of model tenements for white people and one model tenement for colored people in the Borough of Manhattan, giving accommodations for an aggregate of 2411 families. In the Borough of Brooklyn there is a suburban estate, comprising about 32 acres, upon which 112 detached houses and 136 houses in rows and two stores with apartments have been erected, so that altogether the company has provided housing accommodations for 10,244 people. That model tenements of the character indicated are a profitable investment is shown by the dividend record, which for the last 12 years has been unbroken. The balance sheet showing assets of $6,276,463.12 takes no account of the increase in ground values, so that in reality the financial position is probably at least half a million dollars stronger than would appear from these figures. The losses from bad debts amount to $1,143, compared with a total of rents collected of $378,965, or .30 of 1 per cent. During the year just past two large improvements were completed, one comprising two buildings on 78th street containing 100 apartments of two, three and four rooms, and the other on East 79th street, containing 200 apartments of two, three and four rooms. Developments now in progress include what is known as the Junior League Building, which will cover the river front between East 78th and 79th streets. Part of it will be used as a residential club for working girls and will contain about 300 furnished rooms, a restaurant, dining room, library, reading room, private reception rooms, together with rooms set apart for bathing, for laundry, drying, pressing, etc. The other half of the building will contain about 110 small apartments with housekeeping facilities for single women who prefer a larger living space and greater privacy. Construction is rapidly progressing on the building in West 63d street, which, when completed, will contain 128 apartments of two, three and four rooms, intended exclusively for occupancy by colored people. A feature of the construction work is found in the fact that as much skilled colored labor as could be obtained is being utilized.

New Method of Sound-Proofing Houses

The latest suggestion for rendering walls and partitions of apartment or flat houses sound-proof and thus prevent the transmission from one room to another of discordant sounds, such as piano playing, the crying of children and others forms of vocal music, is to sheath the partition studs with tin or aluminum. It is a well-known fact that one of the serious drawbacks to life in the present-day apartment house, especially to those people desiring quiet and freedom from nerve racking noises, is the absence of sound-proof walls, floors and partitions. The above suggestion for sound proofing grows out of experiments in acoustics recently made by a writer of an article in a German periodical, who discovered that by lining a wooden telephone booth with tin all noises were excluded and it was possible for a person within the booth to carry on a conversation over the wire without being disturbed in the slightest degree by loud talking or other noises outside the booth. The German writer appeals to architects to introduce tin or aluminum in the walls of houses generally to deaden sound, for he is convinced that if this were done the neighbor's daughter's piano and voice would cease to be a disturbing factor in life, except, of course, in summer, when all the windows are open.

New York's Latest Skyscraper

The new office building which will occupy the sites of the present Gillender and Stevens Buildings, at the northwest corner of Nassau and Wall streets, will, according to the plans just filed with the Bureau of Buildings, rise to a hight of 39 stories, or 539 ft. from the street level to the top of the tower, which will be a windowless affair 94 ft. high. When completed this will be the third highest building in this part of the country, if not in the world.

According to the architects, Trowbridge & Livingston, the new building will have a frontage of 96 ft. on Nassau street, 94 ft. on Wall street; will cost three millions of dollars, and will have a front of granite ornamented with Ionic columns from the second to the fourth floor. It will be the home of the Bankers Trust Company, and with the Manhattan Trust Company, will occupy the three first floors, above which will be offices. As these tall buildings are possible only through the developments which have been made in elevators, it is interesting to note that there will be fourteen of these lifts—six running express and five as locals. There will be one private elevator to the third floor and two private elevators to the second floor for the use of the trust company.

Seattle Builders Meet at "Smoker"

The Builders' Exchange and the Master Builders' Association of Seattle, Wash., were hosts on the afternoon and evening of June 8 to nearly 300 visitors at the new quarters built for the two organizations on Fifth avenue. The spacious rooms on the ground floor were filled with handsome and attractive exhibits of building materials and other supplies, as well as fixtures used in the construction of houses, business blocks and apartment buildings, the exhibit being the largest and best of its kind ever assembled in Seattle.

John McGrath presided and speeches were made by Francis W. Grant, City Superintendent of Buildings; J. W. Maxwell, President of the Seattle Commercial Club; C. H. Bacon, A. E. White, O. A. Powell, A. W. Clark, R. H. McKee, D. J. Myers. The aim of the men who are responsible for the establishment of the new headquarters is better co-operation between architects, material men and contractors.

Baltimore Builders' Exchange Elects Officers

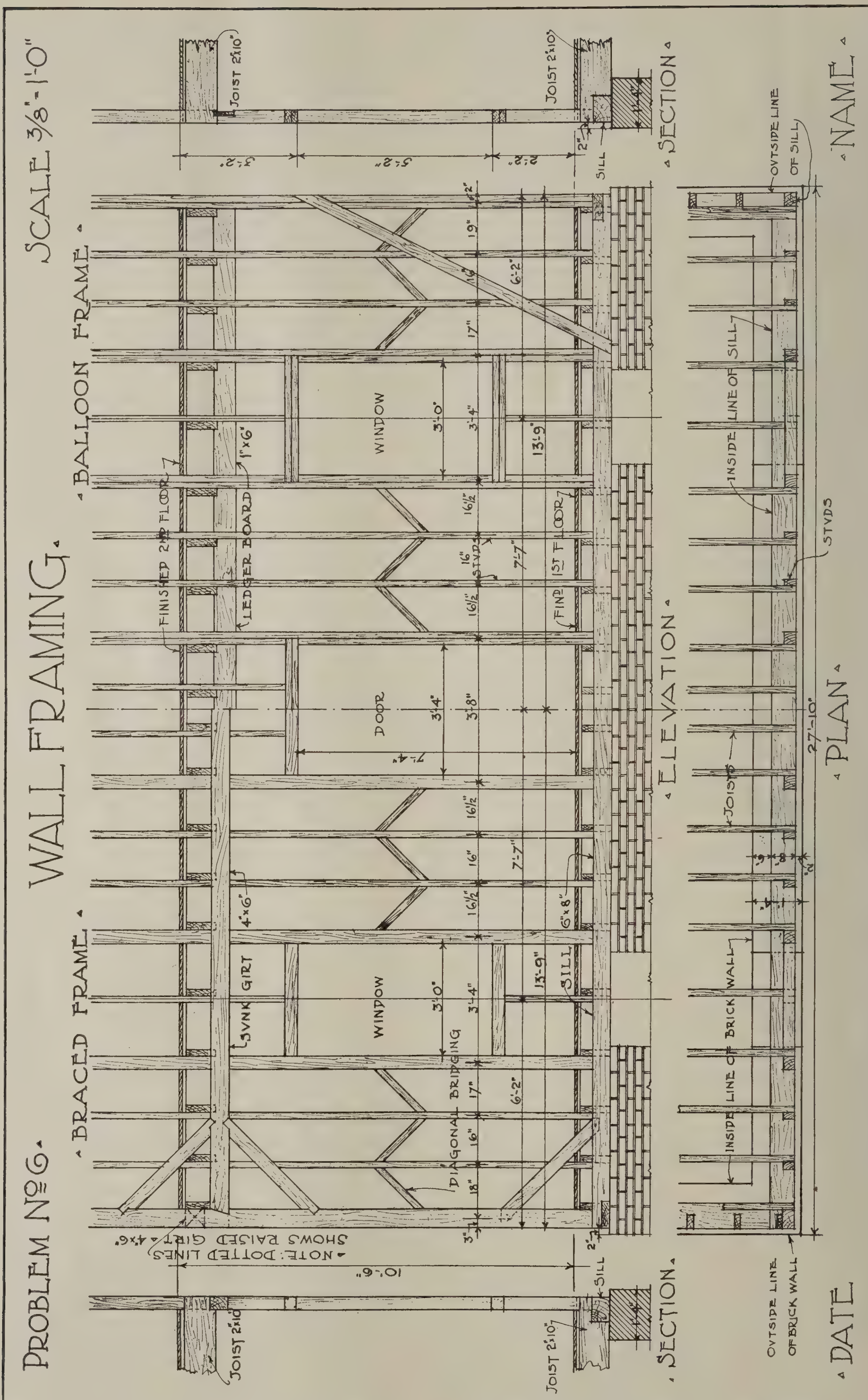
The twenty-second annual meeting and election of officers of the Builders' Exchange of the city of Baltimore was held in the dining room of the Exchange on the evening of June 14. The meeting was called to order by President Chavannes, after which Secretary I. H. Scates made an announcement of the nominations for officers for the ensuing year. Various committee reports were also submitted and several changes in the by-laws of the organization were considered, among which was one to enable the holding of directors' meetings outside of the Exchange building, which was passed unanimously. A further amendment to the by-laws was the creation of two classes of membership—associate and corporate.

After nominations for officers had been made the entire ticket was unanimously elected as follows:

President .... Frank S. Chavannes
First Vice-Pres .... Wm. H. Morrow
Second Vice-Pres .... John K. How
Third Vice-Pres .... M. C. Davis
Secretary .... I. H. Scates
Treasurer .... B. F. Bennett

The Exchange now has a membership of 248, which includes most of the builders and building supply dealers of the city. President Chavannes has occupied the office for two years, while Secretary Scates has held office for five consecutive terms.

THE NEW 16-STORY BUSINESS BUILDING which is being erected next to the corner of Fifth avenue and Forty-fifth street, involves some rather interesting features viewed from the standpoint of the architect and the builder. The plot measures 75 x 100 ft. in area and in the floor construction are 30 ft. spans with only five columns showing on the entire floor, thus giving an almost unbroken space over the entire area. The exterior will consist of granite, limestone and copper for the four lower stories, above which brick, terra cotta and limestone will be used. There will be three high-speed passenger elevators, steam heating and electric lighting systems and on the roof will be located the janitor's quarters. The building is being erected in accordance with plans prepared by Schwartz & Gross, 347 Fifth avenue. The basement, first and second stories will be occupied by G. P. Putnam & Sons, the well known book sellers, above which will be several stories for lofts, while the upper five stories will be divided into offices.



Lessons in Architectural Drawing for Beginners.—Scale of Sheet, Three-Quarters Original Size.

LESSONS IN ARCHITECTURAL DRAWING FOR BEGINNERS

BY ALFRED AUSLANDER

IN our previous lessons we have taken up the various joints used in framing, and have also explained how floors should be framed. In this the sixth lesson we will take up the framing of walls and partitions. A wall in a frame house is a skeleton frame of wood, the term being used for the outside only, while the term "partition wall" or simply partition is used when a wall is common to two compartments; in other words, when a wall is dividing one room from another. A partition is framed similar to a wall, the studding being placed 16 in. on centers and usually resting on the rough flooring, as seen in Fig. 1 of the sketches.

There are two distinct methods of wall framing. The first is known under the name "braced framing" or sometimes called "old-fashioned framing," while the second method is called "balloon framing," this being a modern development and more economical in labor and material.

The "braced framing" consists of heavy corner posts mortised and tenoned into the sill, the plate, the horizontal girts at each story which carry the floor joists, and the "braces" which again are framed into the corner posts diagonally, whenever a horizontal timber as plate, girt or sill forms a right angle with the corner post. For this framing all timber should be fastened together by a mortise and tenon joint, even the ordinary filling-in studs, although this is frequently omitted, and nails are driven diagonally through the foot of the studs.

The rigidity of this framing depends upon the diagonal bracing and the well-arranged system of the mortise and tenon joints. These braces should be the full depth of the studs. For the braced framing horizontal beams called "girts" are framed into the corner posts. The girts which carry the ends of the floor beams are dropped down and are known as "dropped or sunk girts." The other girts are framed into the posts, so that their tops are flush with the tops of the floor beams and are called "raised girts." On the girts the studs of the outside wall are framed so that each story has a separate set of studding and only the corner posts extend from top of sill to under side of plate.

For a balloon frame all studs (very seldom heavier than 2 x 4 in.) are placed 16 in. from center to center and the setting is generally so arranged that one stud is placed beside each floor joist and spiked to it and to the sill without mortising. Even the corner posts are not mortised and consist simply of two common studs nailed together (see drawing on opposite page, right-hand corner). In the braced framing the corner posts only reach from top of the sill to the underside of the plate, while in the balloon framing all the studs run up to the plate. For this reason all windows of the stories above and below should be so arranged as to be able to use the same studding for the openings above each other.

After the studding is set and held in place by a temporary brace the studs are cut to the required hight and the plate laid on top of them. Usually the plate consists of two ordinary studs, laid one above the other, the first being spiked through into the ends of the studs and the second to the first. As already stated, no notching or mortising is done before setting up the frame, but as soon as this is done the inside of the studs are notched about 1½ in. at the second and third floor levels to receive a piece of wood 1 in. thick from 4 to 7 in. wide, which in turn supports the ends of the floor joists. This piece of wood is called "false girt," "ledger board" or "ribbon." The top of the ribbon should be 1 in. higher than the bottom of the beam, so that the beams are notched at this point as shown in Fig. 2. If any of the studs is too short, so that it does not reach to the under side of the plate, an additional piece is set on top and a piece of board nailed on each side. This is called "fishing" and is shown in Fig. 3.

For both methods of framing the sill, the first piece of timber set in place should be 4 x 6 in., 6 x 8 in. or 6 x 10 in. and lay in a bed of mortar spread on top of the foundation wall to receive it. Any irregularities in the top of the wall must be filled up with stone chips or mortar. In this way only can the wind be kept out from under the floor boards. The sill is usually set flatways and the underside painted with a heavy coat of cheap oil paint before laying in order to repell the dampness of the foundation wall.

The corner posts as well as the posts of the intersection of wall and partitions should be so arranged as to allow good nailing for the inside laths, as seen in Fig. 4.

Openings for windows are obtained in the manner represented on the drawing on opposite page. Around openings 4 x 4-in. studs are used in braced framing; for the balloon frame it is customary to double the ordi-

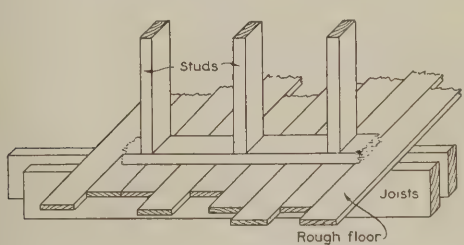


Fig. 1.—Showing Framing at Base of a Partition.

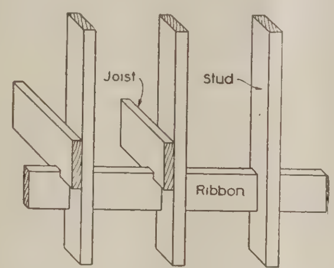


Fig. 2.—Framing Studs, Ribbon and Joists.


Fig. 3.—"Fishing" a Stud.

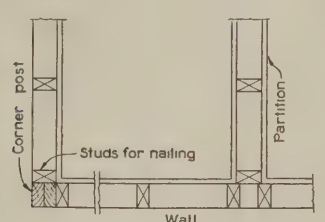


Fig. 4.—Showing Construction of Corner Post and Partition.

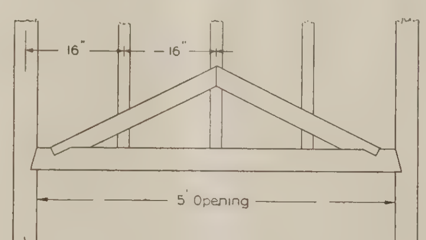


Fig. 5.—One Type of Truss to Be Used over an Opening.

Lessons in Architectural Drawing for Beginners.

nary studding instead. In the drawing on opposite sheet we also show how the studs are framed over the openings of ordinary widths. Over wide openings, however, trusses should be used, so that the weight over the openings will be transferred to the studding on each side of these. Figs. 5 and 6 show two types of trusses used over openings.

In order to prevent the studding from approaching towards each other, short pieces are cut in between the regular studding in such a way as to connect each stud with those on each side of it. This stiffens the wall and helps carry a part of any excessive load of the first stud. There are two methods of bridging, the one called "horizontal," having horizontal pieces 2 x 3 in. or 2 x 4 in. section set between the studding—one piece being above the other as shown in Fig. 7. This sort of bridging is not recommended, although very often used. The second method, called the "herring-bone or diagonal," is shown on the drawing on opposite page. This method forms a continuous truss across the wall and is more effective in preventing the wall from sagging.

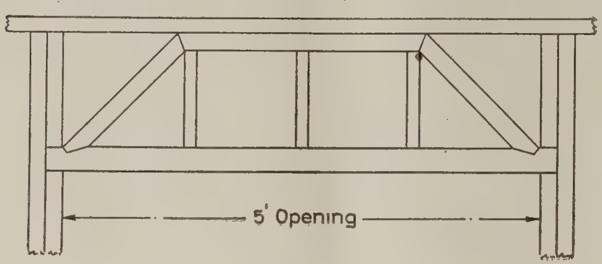


Fig. 6.—Another Type of Truss for Use over an Opening.

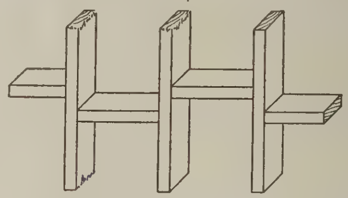


Fig. 7.—Example of Horizontal Bridging.

Lessons in Architectural Drawing for Beginners.

To lay out Drawing No. 6 proceed as follows: Lay down paper horizontal and draw a rectangle measuring exactly 10 x 14 in. Draw a vertical line and measure off right and left of this center line 13 ft. 11 in. to a scale ⅜ in. = 1 ft. and draw lines through these points parallel to center line. These lines will represent the outside line of cellar walls; draw a horizontal line 1¼ in. actual size above bottom line for outside line of brick wall on plan. Draw another horizontal line 2¾ in. from bottom margin line for back line of joists on plan. Start elevation ½ in. above the last horizontal line. This will represent the grade line; above this line draw five brick courses 2½ in. each. Measure off 6 in. above last brick course and draw a line for hight of sill. After sill is obtained, measure off 4 in. for top of 10-in. floor joists and 2 in. above this for top of finished first floor line. The finished second floor line is 10 ft. 6 in. above first floor. Measure from second floor line down 2 in. for finished and rough flooring and 9 in. for the top of the sunk girt, the joists being notched 1 in. at the bottom. Draw the corner posts on top of sill 2 in. away from outside line of brick wall and extend these up to a line exactly 1 in. below upper border line. Draw vertical center lines 6 ft. 4 in. from outside line of brick walls for center of windows and place rough sill 2 ft. 2 in. above first floor. Make clear opening 3 ft. x 5 ft. 2 in. and place at head and sides of windows 4 x 4-in. pieces for the braced and two 2 x 4 in. for the balloon frame. The head of the door, which is on center line of sheet, is to line up with window heads.

Place studding as figured on drawing, showing 2-in. face. Place sections right and left of the elevation, on the right side a section through the balloon, on the left side section through the braced framing. Assume sections taken through the openings for the woodwork only and show brickwork in *section* (16 in. thick) and not through the cellar opening, as this part will be taken up in future lessons. The outside face of studs on sections is 1⅛ in. (actual size) from either border line. Draw all studding on plan first and project same for elevation. Place bridging about 5½ ft. above floor and draw these with 45-deg. triangle. Follow closely all other details, as floor joists, braces, lettering, etc.

OBLIGATIONS OF A BUILDER TO HIS NEIGHBOR

WHEN a man builds a house he incurs certain obligations to his family, his neighbor and to the community in general. It is not always possible for one to fulfill all these obligations, and frequently to better fulfill one he will wholly disregard another. He owes it to his family to make that house safe, comfortable, durable and permanent. He owes it to his family and to his neighbors and to the community in general to make that house attractive in appearance, sanitary in drainage and to eliminate the risk of fire as much as possible.

There are many points like this to be considered when one builds and there are city ordinances that make it imperative that some of these points be considered, but how often we see a house 10 or 15 ft. nearer the sidewalk than all the other houses in that block; how often we see an extremely plain house alongside of one that shows the artistic taste of its owner, and, in this large city of ours how terribly often we see a block of houses built up close, almost touching each other, and all of frame construction, says a writer in an exchange. Just think what it would mean for one of those houses to catch fire some windy day! There is block after block in this city where a little fire on a windy day might easily mean the destruction of a large section of our city, says an exchange.

This is the one point that is mostly forgotten in trying to fulfill the other obligations of the house builder, and yet by giving this point careful consideration, how easily and how surely it will help to obtain all other results desired.

By building of brick you reduce the fire risk to a minimum; you make your house a permanent structure; you give your family a home that is easily kept warm in winter and is delightfully cool in summer; you have a home that will be there for your children, your children's children and their children; your taste for the beautiful may be gratified to any extent in the selection of brick of any surface, color or design; your purse can be suited, for the most elaborate designs and color schemes can be built from the product of the common brickmaker. When you have finished this house of brick your neighbors will be proud to have you alongside of them and the community in general will be glad to shake your hand because you have shown your confidence in the city by the construction of a permanent brick house.

ONE OF THE NOTABLE BUILDING OPERATIONS for which plans were recently filed in the Borough of the Bronx, New York, involves the erection of two six-story high-class apartment houses to cost $300,000.

CORRESPONDENCE

A Small Carpenter Shop

From P. T. L., Steelton, Pa.—I am sending drawings of a small carpenter shop 16 x 10 ft. in plan, which may be found of interest by "R. W. M.," Uniontown, Pa., whose inquiry for suggestions in regard to a building of this kind appeared in the March issue.

I would say that the roof is designed for a load of 26 lb. per square, counting 12 lb. for snow, 10 lb. for wind and 4 lb. for sheathing, roofing, etc. This loading requires 3 x 4-in. purlins spaced 4 ft. on centers and a 3 x 8-in. ridge piece, as indicated on the plan view presented herewith. The purlins and ridge piece should be of yellow pine. On the roof should be used 1 x 12-in hemlock sheathing and this covered with any good roofing satisfactory to the builder. The roof has a rise of 1 in. in 3 in.

In each corner of the building there are 4 x 4-in. yellow pine columns, which are topped with a 3 x 4-in. sill and rest upon a 4 x 4-in. mud sill. The girts and struts are 3 x 4-in. timbers.

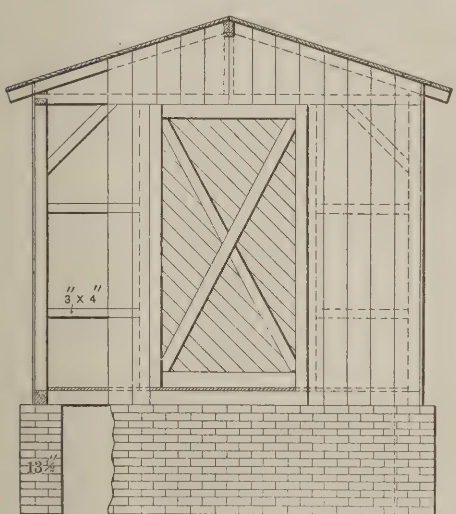
There are five windows in the building of the lifting type and have 8 x 10-in. lights, the sash being 2 ft. 11½ in. x 3 ft. 2 in. Knee braces are provided at each end of the building, as will be seen by reference to the front and end elevations, which tend to stiffen the structure against side wind pressure.

The 4 x 8-ft. door has ⅞-in. sheathing nailed to 4 x 1¼-in. diagonals; 4 x 1¼-in. stiles; 4 x 1¼-in. top rail, and 6 x 1¼-in. bottom rail.

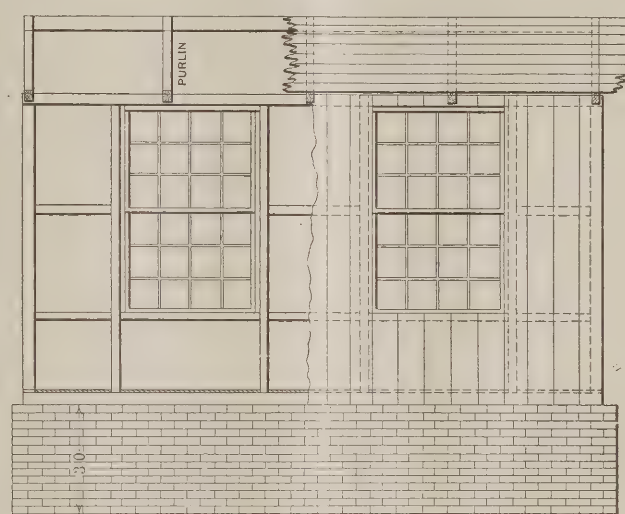
The floor has been designed for a safe load of 90 lb. per square foot, which requires us to use 4 x 4-in. joists spaced 18 in. on centers. These joists are covered with ⅞-in. dressed maple flooring.

The sides and ends of the building are covered with ⅞ x 12-in. dressed sheathing and the joints between boards are covered by ⅜ x 2-in. battens, which give the surface a finished effect.

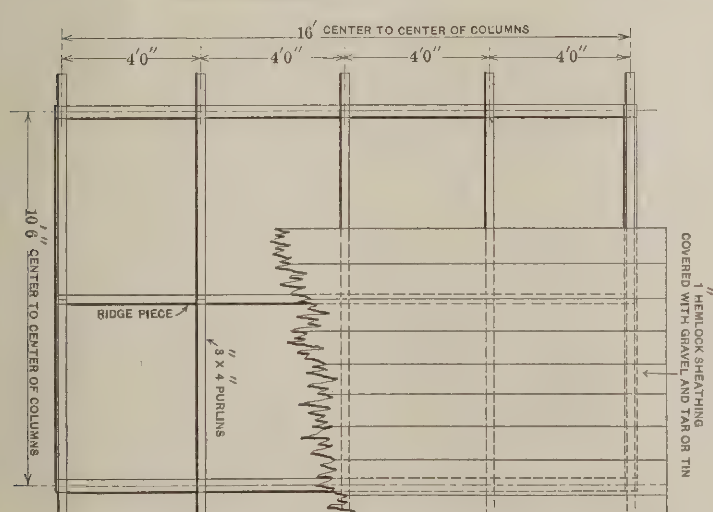
By referring to the elevations it will be seen that the building rests upon a brick foundation which is 3 ft. in depth and 1½ bricks in thickness.



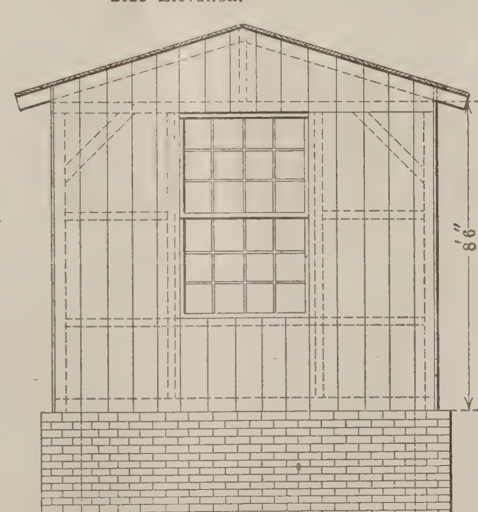
Front Elevation.



Side Elevation.



Plan.



End Elevation.

A Small Carpenter Shop.—Scale 3/16 In. to the Foot.

Truing Up a Level or Plumb Rule

From a Level Maker, Greenfield, Mass.—I note in the March issue of the paper an article from "O. M. B.," New York City, in regard to testing and truing up a level. Now it is most likely due to my density, but I fail to see how a level can be tested in the manner he describes. I quote from the communication of the correspondent as follows: "Simply take two points indicated at 'A' Fig. 2—anything will do, stones or timbers—and set the level on them with the bubble at center; then keep moving the level until the bubble remains at one place. The amount it is to one side or the other of the cross line will represent the amount of the error." Very likely "O. M. B." could do the trick, but I think few young mechanics could do so from these directions and am sure I could not.

The principle of a level is simply that the liquid will always find a level. A level glass is made with a slight curve and the curve is placed up in the stock. When the level is in a perfectly horizontal position the liquid settles evenly and leaves the bubble or unfilled portion at the highest point in the glass and this is marked as the level point. If from use, abuse or accident the relative position of the glass and base line or bottom of level becomes changed the bubble will lead off from the mark to the then highest point of the glass.

To test this out we will proceed as "O. M. B." describes, but we would make the points of contact as small, smooth and true as possible. When we have the level finally set on these points with the mark at the center of the bubble, reverse the level, that is, change the ends and set it exactly on the same points. If the bubble leads the mark either way it is "out." Now, with ink make a mark at the center of the bubble as it stands and the point half way between these marks will be the level point, or theoretically, that is the level point.

In actual practice there are about one thousand conditions under which it may not be absolutely perfect, but near enough for most kinds of work. There is one other thing to look out for after a level has had a fall, and its honesty is in doubt—that is, a loose glass.

When the level is in a level position, take a piece of metal or stick and bear down on the glass first at one end and then at the other. If the bubble is moved by the pressure it is best to have the glass reset before placing too much confidence in it.

Opportunities for an Ambitious Carpenter

From C. H. C., Keremeos, B. C.—"Let us tell the truth and shame the devil." In the March issue of the paper "F. S. B.," White Plains, N. Y., states some stubborn facts and in the May issue he received equally good replies. The writer, however, fails to find any communication that "builders" solicit for tenders for construction, etc., by contract in the hope usually of getting, if not something for nothing, at least the "cheapest work possible," the lowest tender usually securing the contract. Under such circumstances the contractor cannot afford to give "good work" as his compensation is the reverse. "Quantity" rather than quality has to be the rule in his case, which is sometimes carried beyond a safe limit, for occasionally we read of the collapse of buildings in course of construction.

Few tools and but little skill enter into such contests and the builder usually gets as good if not better than he pays for, even if the contractor by force of circumstances is obliged to use basket or hatchet and saw carpenters, if they give him "quantity" providing the quality will pass, which usually is the case now.

With material becoming scarce for carpenter work and high wages, the incentive to greater effort is becoming less year by year in this important industry, so it would appear that one might better strike for the higher order of building construction or turn to more promising enterprises, such, for example, as the automobile industry, especially if he is of a mechanical turn of mind.

Scales Used in Architectural Drawing.

From R. C. H., Brooklyn, N. Y.—Will you kindly answer through the Correspondence columns the following questions:

First.—What are the three methods of indicating the scale of a drawing; which is the best and why?

Second.—What are the two ways of laying off an angle and which is the most accurate?

Third.—What different scales are used in architectural drawing and for what purpose?

In regard to the three ways of indicating scales on drawings, I beg to say that I know of only two, one by simply writing the figures as ⅛ in., ¼ in., ½ in., or whatever it may be, equal 1 ft., and the other by drawing a scale somewhere on the sheet, as they do on maps. What is the third way? The question was asked at an examination for architectural draftsman, and they also asked how could a line *perpendicular* to the drawing board be drawn.

My third question relates to the size or scale of drawings, not to the instruments; that is, I desire to know the usual practice in an architect's office regarding the relative sizes of different drawings. A friend told me they never used the scale of 1/32 in. to the foot, yet I saw one at the exhibit of the American Architectural League.

Answer.—In reply to the above, Mr. Auslander, the author of the series of articles on Architectural Drawing for Beginners now running through the columns of the paper, contributes the following:

The methods of indicating the scale of a drawing are:

First.—By drawing a line divided into a certain number of equal parts (which may indicate feet), each of which is subdivided into other equal parts, which may indicate the inches. The drawing, however, is to be made in the same and true proportion as the original, using above divisions for feet and inches, all as shown in Fig. 1.

Second.—The drawing to be made in true relation to the actual feet and inches, using a certain part of a foot as a foot for the drawing: For example, ¼″ equals one foot means that one-quarter inch on the drawing represents one foot in reality. This is indicated as follows: ¼″ = 1′.

Third.—The third method is the same as the second, but indicated as follows: One inch equals four feet, one inch equals two feet, etc.

In our opinion the best indication is as explained under the second (¼″ = 1′). The certain part of the inch indicating the foot in reality, because everyone can use an ordinary rule to read up number of inches on the rule to obtain the number of feet on the drawing.

In reply to the second question of the correspondent, I would say that in order to obtain the measurements of angles the circumferences of all circles are divided into 360 equal parts called degrees.

Any angle can be laid off, first, by a two-foot rule. In opening the two-foot rule at the middle (12″ mark) you describe an arc forming an angle with the two halves of the rule. The radius in this case if one foot. Knowing the radius and the angle wanted, it is easy to find by figures the arc which is the straight line between the mark on the rule 0″ and 24″.

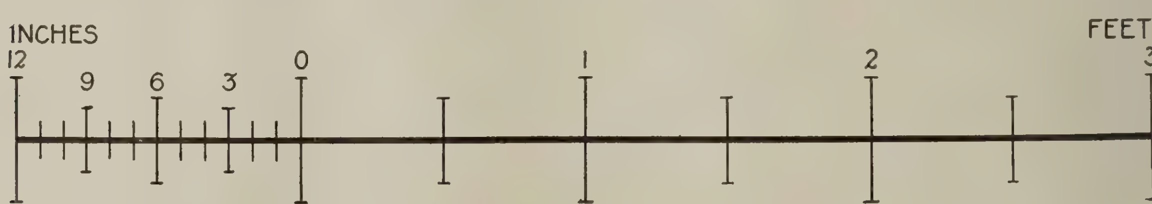


Fig. 1.—Indication of Scale by the First Method.

Scales Used in Architectural Drawing.

A better method of laying off angles is by the steel square, the principle being that one side and all angles of a triangle are given to find the other side of the angle. The idea is shown in Fig. 2, the figures at the right 11 3/16 being taken from the table.

The solution can be found by figures, but the following table will give all figures for this method:

Angle Degrees	Distance Inches
5	2 1/8
10	4 3/16
15	6 7/16
20	8 3/4
25	11 3/16
30	13 7/8
35	16 13/16
40	20 1/8
45	24
50	28 5/8
55	34 1/4
60	41 9/16

Both methods, however, are not very accurate. The most accurate way of laying off angles is by means of a protractor, marked in shape of a half circle showing equal divisions of the circle from 0° to 180°.

Referring to the third question of the correspondent, would say that for working drawings of almost any building consisting of all floor plans, sections and elevations, a scale ¼ in. equals 1 ft. is generally used. For scale drawings, by which is meant all detail drawings to scale (not full size), ½″ = 1′ and ¾″ = 1′ are mostly used. Very important construction should, however, be drawn to a scale of 1″ = 1′; 1½″ or even 3″

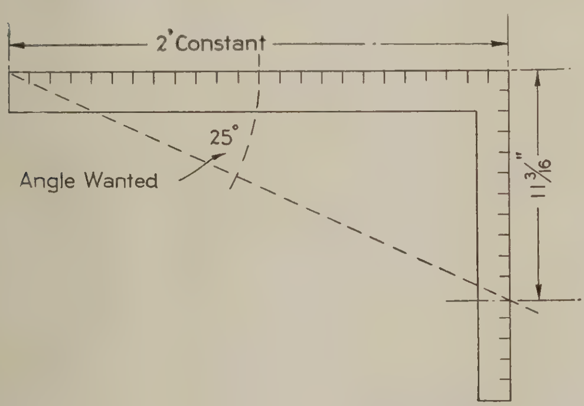


Fig. 2.—Laying Off Angles with the Steel Square.

Scales Used in Architectural Drawing.

equal 1′. Finally, all sections through mouldings, door, windows, etc., are shown full size; that is, 12″ = 1′.

For laying out landscape work, or two or more buildings in relation to each other and the ground, a scale 1/16″ or 1/32″ and even 1/64″ equal to 1 ft. is used.

Before working drawings are made it is necessary in almost every case to make sketches showing, for instance, different arrangement of rooms, location of stairs, etc.; in other words, to work out a scheme. This is usually done to a scale ⅛″ = 1′ for small and 1/16″ = 1′ for large buildings.

Arrangement of a Three-Way Switch in Electric Wiring

From W. J. C., Dallas, Ore.—Will some of the readers of the paper furnish for publication a diagram and description of a three-way switch as used in electric wiring. It is my wish to wire a building in such a way that the lights on the second floor may be turned off or on by means of a switch on the first floor. I also wish to have the lights controlled by a switch on the second floor.

Best Way to Build a Shop

From J. E. D., Milton, Ia.—I am going to build a shop 18 ft. wide by 40 ft. long and with a flat roof. The ceiling will be 10 ft. at the front and 8½ ft. at the rear. I shall use 2 x 6 for the upper joist, placed 2 ft. on centers, sheet it tight with shiplap and cover it with rubber roofing. I shall make the lower joist 2 x 6 in. placed 2 ft. on centers and supported in the center with a girder under them. It will be floored with shiplap.

Nail ties will be used about 3 ft. apart, but there will be no outside sills except two 2 x 6 set edgewise and the joists spiked to them.

I wish to ask the readers if this is a good way to do the work. There will be an 8 ft. sliding door in the front end. The object of the flat roof is to make the shop warmer in winter, but still I do not like this style of roof as I think the gable roof is better, for it gives rooms above the square or upper joists in which to store ladders or pile lumber. A gable roof, however, makes the building much colder in the winter.

If any of my brother chips can give me any advice as to how to build it for warmth of rooms I shall be very glad to have them express their views through the Correspondence columns. Will they also give their opinion as to whether 2 x 6 in. joists are sufficiently heavy for the floors? I expect to use 2 x 4 for nailing ties and to use 2 x 4 for posts, placed every 8 ft. apart, spiking through these into the ties.

If any one has a good idea of a convenient shop I would thank him to send a drawing for publication in *The Building Age*.

I want to say that the paper is a good one for those practically engaged in the building trades, as the Correspondence Department is an excellent medium for the interchange of ideas. There always seems to be some one ready to answer the questions which are presented and I hope that the practical readers will promptly afford the information which I desire, as it may also be interesting to others.

Cleaning a Grindstone

From C. H. C., Keremeos, B. C.—Referring to the inquiry of "J. H.," Jersey City, N. J., in a recent issue, I would say, mark the grindstone with a pencil while it is revolving. If much out of true chip off to the line with a cold chisel, then hold a piece of grindstone against it to finish true or a piece of gas pipe about ¾ in. in diameter. My preference, however, would be for the first named material. While rotating the stone use plenty of water; also use plenty of water whenever the stone is used after it has been trued up.

A Problem in Ropes and Pulleys

From S. H., Sisco, Wash.—Some time ago a correspondent wanted to know the horsepower required to raise 14,000 lb. by means of block and tackle. Theoretically, weight equals power on a single block, so, as there are three parts to a double and single block the power would be 14,000 divided by three times 33,000 equals .1414 hp. As one-half is friction, half of .1414 would be .0707 hp.

$$.1414 + .0707 = .2121 = 1/5 \text{ hp.}$$

Trouble with the Fireplace

From H. T. G., Spokane, Wash.—Referring to the trouble with the draft of fireplace mentioned by "G. H. D.," Philadelphia, in the April number, the reason for the down draft may be found in the fact that when the wind is in the direction to cause the complaint, it must pass over the ridge and as the top of the chimney does not extend much, if any, above the ridge, the air current coming in contact with the sloping roof and then passing over the ridge strikes the chimney flue in a downward direction, thus causing the down draft. This is no theory with me, as I have had the very same problem to contend with.

As for the remedy the best and surest way is to put an arched hood or stone cap over the top of the chimney and thus prevent the air current from intercepting and overcoming the natural draft of the fireplace. I believe this will do the business for our friend "G. H. D.," and obviate the necessity of tearing down the chimney and creating a lot of dirt and confusion in the house. Let the area of the opening be as large as the flue area in order to permit free egress of the hot gases and smoke.

Operating Hod Hoisters and Code of Signals

From H. H., Akron, Ohio.—After reading the article entitled, "Operating Hod Hoisters and Code of Signals" on page 248 of the June issue, I desire to offer a few comments on the code of signals. In my opinion one bell should always mean "stop," and codes having two or more bells to signify "stop" are more or less dangerous. Here is the code I always use on hoists:

One ring signifies "stop." In fact on electric bells make the ring long or until the hoist stops.

Two rings mean "up."

Three rings mean "down" or "lower."

Two long rings signify "care, man on hoist and going up."

Three long rings signify "care, or man on hoist coming down."

I always use electric bells with push buttons on every floor and have the cable marked so that the engineer can stop within an inch of any floor. I also have the cable painted white for a distance of 2 ft. at the engine drum point when the hoist is at top or danger limit, while floor stops are but narrow white rings on the cable. I have operated hoists up to 18 stories and am thankful to say through many years' of work have neither injured nor killed any one, and had only one serious break or drop, caused by overloading, for I generally rush the material up, as for example: In hoisting two barrels of concrete at a time from basement to roof of an eight-story building with single hoist, we handled 48 barrels per hour.

A Contractor's Criticism of Architects

From J. H., Chicago, Ill.—In the interest of the building trades in general and the carpenter trade in particular, I would like to ask through the columns of the Correspondence Department if it be possible for the contractors' and builders' organizations to devise ways and means to curb the arbitrary power of the architects. The way some architects act is almost beyond the endurance of the contractor. We all like to make a good job and the architect, as representative of the owner, has a right to expect it, provided his drawings and specifications call for such, but if he specifies No. 2 material he has no right to expect No. 1. He usually wants a first-class job in material and workmanship at the expense of the contractor.

Suppose, for instance, that the specification calls for No. 2 flooring or sheathing; he has no right whatever to expect the contractor to cut out knot holes, bad places or dead knots, except when so stated in the specifications. As a rule, however, this is not done. No. 2 lumber is specified and the architect wants the contractor to make No. 1 out of it. For the contractor it would be cheaper to use No. 1 at the start, but if he figured accordingly his figures would be too high and he would fail to get the job. It is the same with the siding. The architects want "B" or "C" in the specifications, but require "A" on the house, and so we might continue from basement to roof.

The plans and specifications are the expression of the owner and his architect and they can and have a right to expect everything that is written or drawn in there, but not a blamed thing more. It is certain that where plans and specifications call for a first-class job both in material and workmanship, the contractor's figures will be correspondingly high, and that is what the architect tries to avoid by trickery and he generally succeeds. On the other hand, the architects will claim that the contractors try to skin the job, and I am sorry to say this is also true in some instances, but they have to do it in order not to be swamped, for the architects and owners are so exacting that the contractor is trying to pull his end of the rope. This sort of game, started by owner and architects, sometimes results in their being beaten at their own game.

If the architects would start out to do right, I will wager they will be treated right by the contractors. As an example: Architect "A" has a plan for Mr. So-and-So and he wants "Builder B" to figure on it. "Mr. B," after studying the plans and specifications, gives the architect a reasonable figure. In the meantime the architect has secured figures from "Builders C" and "D," and tells "Mr. B" his figures are too high and that he must try to do it for less, so "B" throws off a hundred or so and the architect tells him to call again after a few days to get his decision. With this lowered bid of "Mr. B" he goes to "C" and tells him the same thing he told "B"; as a consequence "C" lowers his bid in order to get the job, and is told by the architect to wait a day or two to get his decision. Again with the lowered bid of "C" he goes to "D" and repeats the same story, with possibly some additions to it—that the job has to be cheap, even if the material should be of a little less quality. "D" comes down and finally gets the job. As the architect knows that he has at last the bottom price, "D" is started on the job and has material of less quality as the architect told him he could use, but now the trouble commences, for such and such material is specified and has to be used. As a consequence "D" is skinning the job wherever possible.

Instead of opening the bids at a set hour and place in the presence of all contractors and giving the job to the lowest or most able builder, they try to get the better of the contractors and everybody else, which in my opinion is most reprehensible practice. Then, again, they occasionally have another game up their sleeves—which is, that details will be furnished as the work progresses. This is a very unfair practice, as the details are almost always more elaborate than the general drawings indicate. Again the contractor or millman gets the worst of the bargain, but he will try some way to squeeze out or resort to some other trick to get even. It must be insisted upon by the contractors that plans and specifications should be complete before they are to figure on them and should be so plain and correct that no verbal explanation of the architect should be necessary, for it seems to be the habit of the architect to explain it only from his point of view or according to his opinion, at the cost of the contractor's pocket book. According to the general rules in most standard specifications the architect's word is law and final. This is wrong and should be remedied—the sooner the better.

We have in all our large cities contractors' associations. Could they not do something to relieve contractors of this burden?

Again, there is something else that I would like to bring before the readers of this department, which is this: Are the contractors going to stand any more of the architects' mistakes? It is enough to stand for their own and they should not be obliged to be responsible for those of the architect or anybody else. The architects take refuge behind the obnoxious "General Conditions," with which every contractor is familiar. This in my opinion is very unfair and ought to be changed.

It is possible that from the foregoing many readers may think that I have a grudge against the architects, but this is not so; on the contrary, I would like to see every house erected under the supervision of an architect. It would be better for all concerned. The owner would get a better job; the contractor could figure a better price, and it would require a better class of mechanics and artisans, while the "driving" of the workmen that is now going on would cease; but the architect must be an honest, fair-minded man who thoroughly understands his business.

Design for Carriage House and Stable

From L. E. P., Aiken, S. C.—I am sending a photograph of a carriage house and stable which may possibly prove of general interest and possibly be the means of causing other readers of these columns to contribute plans and pictures of attractive stables and carriage houses which they have built or of which they have intimate knowledge. The exterior of the building here shown is covered with 4 x 18 in. cypress shingles put on over No. 2 building paper, the shingles being exposed 4½ in. to the weather. The cornices and other trim are white while the shingles are left natural.

The stable represented in this picture affords accommodation for four animals and has four box stalls situated outside the carriage house, there being two on the right hand and two on the left. The stalls are 8 ft. 6 in. wide by 10 ft. in length and all are provided with hay slides from the loft above where the forage is kept. The stalls have 2 in. wooden floors laid on 2 x 12 beams. The floors are grooved and inclined toward the rear of the stalls, where there is situated an iron trough 4 in. deep and 10 in. wide sunk below the level of the floor and graded to the carriage wash, just in front of the carriage house door.

The carriage room is situated centrally between the two sections of stalls, the floor consisting of 3 in. of concrete, on which is laid 1 in. of cement. In the right-hand end of the carriage house is a harness room 12 x 14 ft. with harness case and saddle racks. At the left end of the harness room is a flight of stairs leading to the second floor where there is a man's room, the remaining portion of the second floor is unfinished.

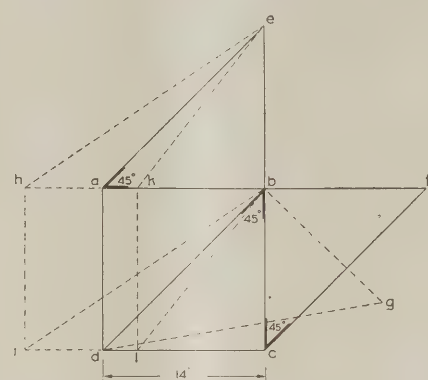
The carriage house and stalls are ceiled on the interior, as is also the harness room. The work was treated with two coats of Berry Bros. hard oil finish, put on after one coat of wood filler. The man's room, on the second floor, is plastered with adamant.

Design for Carriage House and Stable, Contributed by "L. E. P.," Aiken, S. C.

Question in Rafters

From J. Bremner, Portland, Ore.—I notice that the correspondent "W. H. P." by asking a question in one of the issues for last year has created a discussion which has not yet ended. The question, it appears, was "If the common rafter in a roof of 45-deg. pitch represents the run of the hip rafter, why will not the length of the common rafter in a roof of one-third pitch represent the run of the hip rafter?"

One cannot tell from that question whether or not he



Question in Rafters—Diagram Accompanying Letter of J. Bremner.

doubted that a 45-deg. pitch would give the above result, but if he did not ask the question merely to ascertain how many of the correspondents were as well informed on the point as himself and understood it be correct as regards the 45-deg. pitch, he most certainly was ignorant of the reason for it, or he never would have had to ask such a question. It cannot be supposed from the way he puts it that he understood the subject to the extent of intending it as a "catch," or he would have come forward before now with his solution to the riddle or to acknowledge similar solutions from correspondents.

If he had omitted the word "roof" he could have given his question somewhat to the following intent: "If the length of the common rafter of a 45-deg. pitch be equal to the run of the hip, why could not the length of the common rafter of a one-third pitch or any other pitch be equal to the run of its hip?" and, further, he could have correctly added, "and why could not the length of the common rafter of a 45-deg. pitch be unequal to the run of its hip?"

Most certainly the hip run can be made equal to the length of the common rafter of any pitch whatever, and the length of the common rafter of a 45-deg. pitch can be made unequal to the run of the hip. The one question involves the other. To prevent misunderstanding, I will explain:

Suppose the roof had a square or rectangular deck above, with four equal hips running down from the four corners. Set the common rafters, say, on the east and west sides at one-third pitch—that is, an 8-in. pitch or any other pitch whatever, and make the run of the common rafters on the north and south sides equal to the hight of roof, which, as every carpenter knows, will give a 45-deg. pitch to that side. Then it will be found that the hip run is not equal to the length of the common rafter on the 45-deg. face of roof, while the same hip run is equal to the length of the common rafter on the other face or the east and west sides, which is pitched at a one-third or any other pitch, for that matter.

The expression "a one-third," "a one-fourth" or "a one-half pitch," etc., is incorrect, confusing and misleading and should be abolished. The pitch of a roof is not the ratio of its hight to its *span*, but the ratio of its hight to its *run* or half span. Accordingly what is called a one-third pitch is correctly a two-thirds pitch; that is, an 8-in. pitch. Expressing a roof pitch in terms of its span is similar to the other old phrase of expressing the length of nails by "pennies" instead of inches and fractions of an inch. Both are incorrect and should be discarded.

Now suppose this roof was given a uniform pitch all around. The four sides, then the run of all the common rafters on the east, west, north and south sides would be equal to one-half the span of the roof, and the jack plan for one hip being bounded by two east and west and two north and south common rafter runs, all equal to each other, will give a square, the diagonal of which is equal to the hip run.

Now whatever hight you may give to the roof will not alter this square or its diagonal. The diagonal divides the square into two equal right-angled triangles. It is very plain that the only two equal lines or sides which can possibly give to this right-angled triangle this same diagonal (hip run) must be equal each to the run. So to make the length of the common rafter equal to this diagonal, it is necessary to make the hight just equal to the run, as the diagonal of the hight and run give the length of the common rafter. But if the hight and run are equal to the run, it is only the same triangle placed vertically instead of horizontally and then the diagonal is the same in the vertical triangle as in the horizontal triangle—the one diagonal being the hip run and the other equal diagonal being the length of the common rafter. The only way, however, of giving a 45-deg. pitch is by making the hight equal to the run. If it is made lesser or greater then another pitch is put on the roof all around and then the vertical diagonal or length of common rafter will not be equal to the run of the hip, but the jack plan will always be square.

It follows, therefore, as clear as light of day that no pitch whatever except a 45-deg. pitch; that is, 12-in. pitch, can make the length of the common rafter equal to or, as "W. H. P." says, "represent" the run of the hip on a roof of a uniform pitch; that is, having the same pitch on both sides of the hip.

I endorse all the statements contained in the admirable explanation given by "C. J. M.," St. Johns, Newfoundland, on this subject in the May number of the paper. I think, however, that "Parallelogram" must have had the correct ideas in his mind, but may have been impulsive, over hasty or not sufficiently careful in writing them out. He no doubt meant that the length of the common rafter of any pitch whatever is the length of the hip run if the face of the roof on the other side of the hip has a "square" or 45-deg. pitch.

This I have tried to show and it can easily be demonstrated to be geometrically correct by the principle of similar triangles. The parallelogram also shown in the accompanying diagram by dotted lines will also prove it, which probably suggested appropriately the *nom-de-plume* of our correspondent, which would also go toward exonerating him from ignorance on the subject. Of course the pitch can be changed either by a lengthening or shortening of either the run or hight or of pitch in unequal proportions. Here it is the run, as the two roof faces are taken to go up to the same hight, namely points e, f and g of the diagram.

Referring to the diagram the jack plan is the square $a\ b\ c\ d$, the side of which is 14 ft. and is equal to the hight of roof. The hight of roof $= b\ e = b\ f = b\ g$. The length of the common rafter of uniform 45-deg. pitch $= a\ e = c\ f =$ the hip run $d\ b$. The length of the common rafter of 8-in. pitch (⅓) (two-pitch roof) $h\ e$ equals the hip run $i\ b$. The length of the common rafter of 15-in. pitch (two-pitch roof) $k\ e$ equals the hip run $l\ b$.

All the changes given above affect a valley in the same way as a hip. I could perhaps give a more easily understood explanation of the accompanying diagram for a beginner, but I have taken up far too much space already and must close.

If "W. H. P." be a young man I would recommend him to study jolly old Euclid with his "Q. E. D."

What Old Subscribers Say of "Carpentry and Building" and "The Building Age."

From W. H. Blair, Architect, Janesville, Wis.—It had never occurred to me that I belong in the class with the old timers until aroused by the numerous letters on the subject from those who are among the oldest subscribers and which appeared in the June issue of the paper.

I have been a constant reader of *Carpentry and Building* since January, 1879, and with the exception of the volume for 1883 have all the numbers bound. I have received many helpful suggestions from the correspondents on various trade topics which have come up from time to time; in fact, I have nothing in my library on which I place more value than the volumes of *Carpentry and Building*. If I wish to refresh my knowledge on any points pertaining to building I have only to look over the index and I am sure to find a solution of the problem which confronts me. My wish is that the success attained by *Carpentry and Building* may long be enjoyed by its successor, *The Building Age*.

Constructing Wooden Floors on Concrete Base

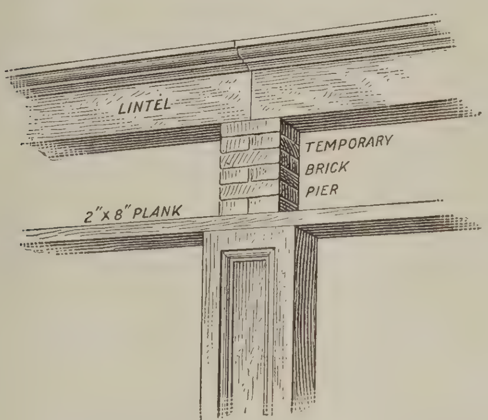
From J. E. D., Milton, Iowa.—There is a brick building here 44 ft. wide by 80 ft. long, divided in the middle by a 12-in. brick wall extending to the second story. The building is being constructed by two persons, each one putting up a storeroom 22 x 80 ft. What I want to know is the best and cheapest way of putting in a wooden floor on the first story, although the builders started with the intention of putting in a concrete floor. There is no cellar under the rooms. The building is completed except the cement floors, and for these they are waiting for the weather to settle.

They are still figuring on the cement floor, but other people object to this kind of a floor for a store room. They are, however, going ahead and putting in the cement floors just the same, and saying that if this does not give satisfaction they will put a wooden floor on top of the concrete.

What is the best way to do this work? The reason I ask is that these two floors will be the first of the kind to be constructed in our town and I hope they will prove satisfactory. The objections are that they will be damp for a grocery store, but if a wood floor has to be put in on top of this, how is the best way to do the work? The building is being constructed by the day and I am doing the work and I expect to put in the wooden floor if the cement floor is a failure. Anyone who has had experience along this line of work will be doing me a favor by telling how to build the wooden floor on top of a concrete floor.

Makeshifts in Building Construction

From Mason, New York City.—Sometimes it is necessary to make use of a temporary expedient when certain details are slow in coming on the job, and a case in point is illustrated by means of the accompanying sketch. As shown, the makeshift consists of a small brick pier intended to hold up the stone lintels or facias over window openings until the arrival on the job of the stone brackets, which rest on top of the stone mullions or separating columns. The sketch so fully tells the story that extended comment would seem to be altogether unnecessary.



Makeshifts in Building Construction.

Run of Hip and Common Rafters

From F. B. W., Aberdeen, S. D.—I am not an old subscriber of your valuable magazine, as I saw my first copy last November, before the change in name. In that short space of time, however, I have derived much pleasure and gleaned valuable information from its pages and am sorry that I did not have the pleasure of making its acquaintance years ago. I read it with relish from cover to cover, especially the Correspondence Department, for I enjoy the discussions created and the opinions expressed by the different readers.

It may seem a little odd for a "newcomer" to rush into print, but I am tempted this time by the letter of "Parallelogram," in answer to the inquiry of "H. W. P.," in an issue some months ago before my time regarding the lengths of runs of hip rafters. As "Parallelogram" has pointed out in the April issue that his original communication conveyed just the opposite meaning which he intended, I will make no criticism of his method, but will give a diagram to show the method I would pursue, as it treats the matter slightly different from what has already appeared, and which may possibly contain some points of such interest as to justify its appearance in the Correspondence Department.

Referring to the diagram sent herewith, the lines A B and C D represent the side walls of a building 24 ft. wide, A C being the end wall, H I the center line of the building parallel to the side walls, and F G the line of the first pair of common rafters nearest to the end of the building. It will be observed that A E lies at an angle of 45 deg. to the walls of the building and also lies under the hip rafter when it is of proper length and properly placed.

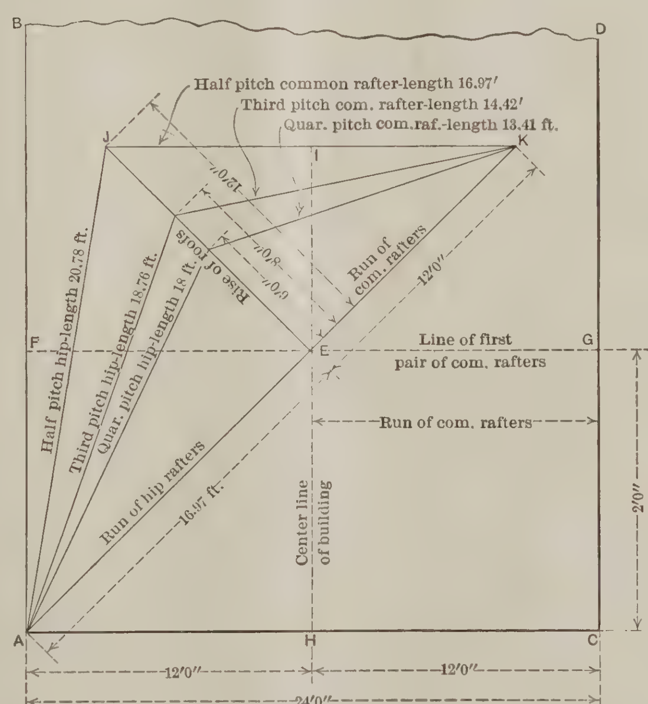
On this line A E, I have erected a perpendicular E J on which are marked the different hights of room one-quarter pitch to one-half pitch or 45 deg. It will also be seen that E K is the same length as E G or half the width of the building, and is the length of run for the common rafters.

Now we will assume that all common rafters of this building—that is, on all sides of it—are the same pitch; but no matter what the pitch may be, the first pair of common rafters will occur on the line F G—therefore that line is a constant and the diagonals A E and C E (imagined) are constants as well as the distances F E and E G the run of the common rafters.

Now by examination we find that the length of the ½ pitch common rafters is the same as the length of the run for the hip of the same roof, but looking further we notice that the length of the ⅓ pitch common rafter is nowhere near the length of the hip run.

The reason is self-evident, the run measurements remain the same, while by changing the pitch of the roof the length of the rafter is changed more or less.

Getting the lengths of rafters is neither mechanical nor geometrical. Most mechanics use the steel square —that is mechanical. Others use the square only for their cuts, while they use geometry for their lengths. It is really a geometrical problem, and for more accurate work geometry should be used, as a square may slip or a pencil make coarse marks. All rafters represent hypothenuses of right triangles and geometry says that the hypothenuse of a right triangle is equal to the square root of the sum of the squares of the base and altitude, or



Run of Hip and Common Rafters—Diagram Accompanying Letter of "F. B. W."

$h = \sqrt{a^2 + b^2}$ in which
h = hypothenuse
a = altitude
b = base.

The triangle A E J is the one from which the hip lengths are taken and the common rafter lengths are found in the angle J E K. The diagonal A E is found in the angles A F E or A H E.

WHAT BUILDERS ARE DOING

It is not altogether surprising that the volume of building operations for the month of May in leading cities of the country should show a slight falling off as compared with the same month last year, when it is remembered that May, 1909, showed the largest total for that month ever recorded. Reports from the leading centers reveal the somewhat singular situation of an increased volume of operations as compared with a year ago in the smaller places, while the heavy decreases occur in the more important cities, of which New York and Chicago furnish the major portion. It is fair to assume that the increased activity which is to be noted is due to the large number of dwelling houses that are being erected in the rural sections in order to provide accommodations for the increased population in the smaller villages and towns as well as in the farming districts. The figures, which are available from nearly 100 cities of the country, indicate a lessened activity as compared with May last year of about 16 per cent. With the building season in full swing, however, it is fair to assume that the year will witness an average total of operations. Thus far the season has been comparatively free from labor troubles sufficient to seriously interfere with building operations, and with the exception of here and there minor differences between contractors and workmen, the outlook is for smooth sailing for some time to come.

Atlanta, Ga.

If the present rate of activity continues, the year 1910 will show a considerable increase in the amount of capital invested in building improvements in the city as compared with the 12 months of last year. During May 398 permits were issued by the building inspector calling for an estimated outlay of $676,517, while in May last year 218 permits were taken out for improvements costing $546,462. The greatest increase in building was in residences, and this class of building accounts for the large gain over the corresponding month of past years.

During the first five months of the year 1935 permits were granted calling for an outlay of $3,253,781, while in the corresponding period of last year 1787 permits were granted for building improvements costing $2,604,145.

The Master Builders' Association of Atlanta held its annual meeting and luncheon at Durand's restaurant May 25. The meeting was a most interesting and enjoyable affair, and among the matters considered were the plans for the betterment of the organization and the outlook for the ensuing year. Officers elected were: President, Frank Pittman; vice-president, R. L. West; and treasurer, C. G. Bradt.

Baltimore, Md.

The report of Building Inspector E. D. Preston for the month of May shows that 174 permits were issued for building improvements to cost $2,186,700, which amount compares with $1,822,250 for April. Of the work projected last month $189,850 was the estimated cost of 130 two-story brick dwellings and $69,500 the cost of 19 three-story brick dwellings. There was one apartment house planned to cost $32,000, a hospital to cost $170,000, a hotel to cost half a million dollars, an office building to cost $600,000, a church to cost $10,000 and 10 manufacturing and warehouse buildings to cost $139,000.

There is a considerable amount of work which will shortly be started but permits for which have not yet been filed. A large amount of work in the suburban sections is also in progress, consisting almost wholly of small dwellings, but being outside the jurisdiction of the city authorities is not included in the permits.

McKim, Mead & White, of New York City, and Baldwin & Penington, with offices in the Professional Building, 330 North Charles street, Baltimore, are the associated architects for the 14-story fireproof building which is to be erected on East Fayette street for Frank A. Munsey, the well-known publisher. The building will cover an area 85.7 by 110 feet and will cost $350,000. The contract has been awarded the George A. Fuller Company.

The plans for the 15-story fireproof hotel of steel skeleton frame construction and tile roof, which is to be erected at Calvert and Baltimore streets, for Capt. Isaac E. Emerson, call for an estimated outlay of fully half a million dollars. Joseph Evans Sperry is the architect and William H. Parker has the contract for the construction.

The Sisters of Mercy will put up a five-story fireproof building 102 by 106½ feet, to cost $170,000, on the west side of Calvert street, between Saratoga and Pleasant streets. The contract has been awarded to John Waters.

Chicago, Ill.

For the first five months of the year ending May 31, building permits were issued in Chicago for 4,764 buildings, fronting 135,255 feet, at an estimated cost of $37,023,000, against 4,867 buildings, with a frontage of 135,984 feet, involving a total cost of $42,189,880 a year ago, a decrease of 123 buildings, 729 feet of frontage and $5,167,180. This decrease is due in large measure to the fact that permits for the City Hall and Chicago & Northwestern depot were taken out during the first half of last year. With proper allowance made for these two structures the figures indicate extensive building and no decrease that can be considered discouraging.

Permits were issued in May for 1,118 buildings fronting 30,543 feet and costing $7,450,000, against 1,054 buildings, with 31,332 feet of frontage and costing $12,609,480 in May, 1909. Definite plans for the erection of a thirty-story hotel to occupy the present site of the Hotel Morrison have been announced. A leasehold on the property just east of the hotel on Madison street has been acquired and work on the new structure will be commenced in the near future. Plans for the new hotel have been drawn by Marshall & Fox, Chicago, and it will be erected at a cost of approximately $5,000,000. It will contain 1,400 rooms, each one having a bathroom attached and will be erected in sections in order that the business of the present hotel may be transferred when the first section is completed. The present building ordinance restricts the height of buildings to 260 feet, but it is believed that this embargo will be removed by the City Council by the time construction work can be commenced.

Cleveland, Ohio.

A good volume of new work in the building line came out in Cleveland during May, although the permits show a slight falling off as compared with April. The total number was larger than during the corresponding month a year ago. Several large building projects are in the hands of architects, and contracts for these will be placed shortly. This work with that already under contract and other building operations pending makes the outlook very favorable.

During May the City Building Inspector issued 781 permits for buildings to cost $1,258,468. Of these 322 permits were for frame buildings to cost $523,976; 64 were for brick, stone and steel buildings to cost $600,075, and 395 were for additions and alterations, the estimated cost of which is $134,417.

Denver, Col.

The report of Building Inspector R. A. Willison for the month of May shows 284 permits to have been issued for new building alterations, additions and repairs estimated to cost $1,615,060, while in May last year 301 permits were taken out for improvements estimated to cost $824,000. Of the total number of permits issued 134 were for brick residences to cost $343,400, and three for apartment houses to cost $90,000. There were permits for 13 business buildings costing $837,000, one power house costing $20,000, one elevator mill costing $25,000, one theatre costing $53,000, one warehouse costing $30,000, 4 terraces costing $18,000, and one church costing $10,000.

For the first five months of the current year 1259 permits were issued, involving an estimated expenditure of $4,963,-350, as against 1502 permits for improvements costing $4,536,823 in the first five months of last year.

Jacksonville, Fla.

Building operations for May in this city broke all previous records, the report of Building Commissioner Prioleau showing that the total value of the building improvements projected was $302,325, as against $217,725 for the month before. In May there were 37 one-story and 47 two-story frame buildings erected; 4 one-story, 2 two-story and 2 three-story brick structures and 3 one-story factory and warehouse buildings. In April there were 62 one-story, 46 two-story and 3 three-story buildings erected, and since the great fire of May 3, 1901, there have been 9223 frame and 665 stone and brick buildings erected.

Los Angeles, Cal.

The building situation in this city continues active, probably more actual work having been done during May than in any previous month in more than a year past. During May 941 permits were issued, with a total valuation of $1,811,160 as compared with 930 permits with a valuation of $3,360,577 for the month preceding.

For the first five months of the present year the record of permits issued reached 5344 permits, with a valuation of $10,182,358, as compared with 3111 permits and a valuation of $4,411,924 for the same months last year, or a gain of nearly 2000 in the number of permits and of nearly $6,000,000 in the valuation.

Lumber arrivals have been fairly free recently and a large supply is on hand, notwithstanding the increased demand. Brick is also plentiful and prices show no tendency to advance. Other lines are without material change.

Among the more important buildings which have been or will be started at once are the following: The Orpheum Theatre building, a five-story structure on Broadway near Sixth street, to cost about $375,000, the excavating for which is now under way, G. Albert Lansburgh architect; the Union League Club building, on the corner of Hill and Second streets, to cost $250,000, the contract for which was let last week to the F. O. Engstrom Company, L. S. Munson architect; the State Exposition building in Agricultural Park, to cost $174,359, the F. O. Engstrom Company contractors; the First Methodist Church and the Clara Barton Hospital, operated by that organization, John Klarquist architect; the Sabichi Estate Building at Eighth and Main streets, to cost $85,000, A. L. Haley, architect; the five-story Hoffman & Meyer building, on Broadway, to cost $75,000, R. B. Young & Son architects; the eight-story Robert March & Co. hotel building, on Eighth street, near Broadway, to cost about $100,000, Fred R. Dorn architect; the five-story W. W. Paden hotel building, on South Olive street, near Pico, to cost $75,000, Train & Willams architects; the four-story Stockwell-Haley fireproof factory building at Alamedo, Fourth and Seaton streets, to cost $100,000, R. B. Young & Son architects; the F. D. Prescott four-story apartment building, to be erected on Hill street, near Tenth, at a cost of $50,000, L. M. Hill architect; and the four-story W. H. Owens apartment house, at Orange and Valencia streets, A. L. Haley architect.

Milwaukee, Wis.

The building situation here in the city is showing improvement over last year and permits are being filed for a wide range of work. In May there were 516 permits issued for building improvements to cost $1,242,442, while in the same month last year there were 526 permits issued calling for an estimated expenditure of $1,145,234.

For the five months of the current year there were 1,621 permits issued calling for an estimated outlay of $3,574,876, while in the corresponding period of 1909 there were 1751 permits issued estimated to cost $4,285,657.

Minneapolis, Minn.

Building operations are on the increase in this city, and the outlook for a continuance of activity is most promising. Building Inspector Houghton predicts that all previous building records will be shattered this year. His figures show that 780 permits were issued for May for building improvements to cost $1,836,290, while in May last year 799 permits were taken out for buildings to cost $1,533,965.

For the first five months of the current year 2689 permits were issued and the estimated cost of construction was $6,585,425. In the corresponding period last year 2422 permits were taken out for improvements estimated to cost $4,366,825.

The high record for 12 months was made last year, when the total was somewhat over $13,000,000. For 1908 the total was $11,500,000, and Inspector Houghton is of the opinion that the increase this year over last will aggregate fuly five millions of dollars.

Newark, N. J.

The value of the building operations projected last month shows a heavy falling off as compared with the same month last year, due, however, to the fact that in May, 1909, permits were issued for the new Prudential and new Firemen's Insurance Company's buildings. Last month 270 permits were taken out for new buildings estimated to cost $993,504, whereas in May last year 284 permits were issued for building improvements estimated to cost $3,715,881.

New Haven, Conn.

The report of Building Inspector Austin for the month of May shows 101 permits to have been issued for building construction to cost $375,000, as compared with 115 permits for improvements to cost $371,092 in May last year.

For the first five months ending June 30 there were 444 permits issued for building construction to cost $1,761,828 and for the same period last year 421 permits were issued, the cost of construction being placed at $1,432,756.

New York City.

The excellent showing of figures for April led to the belief that as the building season developed there would be a corresponding increase in the volume of undertakings for which plans would necessarily be filed with the Bureau of Buildings. While this view has in a measure been confirmed as regards the total new construction work planned in the Borough of Manhattan for May, there is an appreciable decrease in the amount of capital invested as compared with April this year, and also with May a year ago. For the three principal boroughs of Greater New York there is a decided falling off in the number of new buildings planned and their estimated cost as compared with May last year.

In the Borough of Manhattan permits were issued for 109 new buildings to cost $11,482,925, while in May last year 103 new buildings were planned to cost $14,168,671. The important items in the classification are naturally tenement houses, store and loft buildings and office buildings. Of tenement houses 22 were planned in May to cost $2,772,000, against 26 in April costing $5,359,000, and 32 costing $4,977,000 in May last year. Of office buildings 5 were planned in May to cost $996,000, against 3 in April involving an outlay of $3,210,000 and 6 in May last year to cost $2,223,000. Of stores and lofts 30 were planned in May to cost $5,051,200 and 36 in May a year ago costing $5,022,500. Of schoolhouses 4 were planned in May to cost 443,000, against 1 in April costing $50,000, and none in May last year; while of municipal buildings none were planned in May against 2 costing $635,000 in May last year. There were also 8 theatres planned last month to cost $364,000, against 1 a year ago costing $18,761

In the Borough of the Bronx 198 new buildings were planned in May, costing $3,872,805, while in the same month last year 249 new buildings were planned, to cost $4,451,820.

It is not altogether surprising that there should be a falling off in operations in the Borough of Brooklyn, as in May last year plans were filed for over 1,000, growing out of the rapid development of suburban property. Last month permits were issued in this borough for 624 new buildings, to cost $3,393,925, as compared with 1,001 new building, to cost $6,610,350, in May a year ago.

Including new work, alterations, additions and repairs the total for the three boroughs above named for the month of May was $21,206,000, as against $26,177,000 in April, and $25,231,000 in May, 1909.

Two important improvements in what is known as the Mid-Broadway section are the 12-story commercial structures which are under way, one at the southeast corner of Broadway and Astor place and the other on the same side of Broadway one block below, at the southeast corner of Fourth street. The architect of the former building is Francis H. Kimball, who was also architect of the Empire and Trinity buildings, adjoining Trinity church-yard on the south and north, and the cost is placed at $450,000. The architects of the other 12-story loft building are Clinton & Russell, who also are the architects of the new 20-story building soon to be erected at Broadway and Forty-second street. Both of the corners upon which these new buildings will rise have interesting histories.

In the Borough of Queens permits were issued for 462 buildings estimated to cost $1,602,000, as against 411 permits for building improvements estimated to cost $1,561,-000 in May last year. About 45 per cent of the new buildings are detached frame dwellings, and 20 per cent are two and three-story brick structures. Suburban development work is in active progress, as evidenced by the building which is going on in the neighborhood of Whitestone, Malba, Flushing and the new North Shore home sections. For the first five months of the current year permits were issued for 1,844 buildings estimated to cost $6,861,042.

The plans have just been filed for the extension to the eleven-story brick lofts and manufacturing structure at Nos. 243 to 249 West Thirty-ninth street, which will be the same height as the present building and with a frontage of 67 ft., thus giving a total frontage of 193 ft. to the entire building. The facade will be of brick stuccoed, and will cost in the neighborhood of $200,000.

Philadelphia, Pa.

According to statistics compiled by the Bureau of Building Inspection, a falling off in the volume of new business started during May is to be noted, as compared with April, and also with the same month last year. The year to date, however, still shows a gain of $853,870 over the figures for the first five months of 1909. The present lull in new work is not taken as indicative of any decline in building operations, builders and contractors stating it as their belief that 1910 will, in the aggregate, exceed any previous records, inasmuch as the volume of business in sight is large and there is frequently a slight breathing spell at this season of the year.

Statistics show that 945 permits for 1,986 operations were issued by the bureau during May, the aggregate estimated cost for the work planned being $4,482,515, a decrease of about $100,000 from that of last month, and $491,745 less than May, 1909.

Two-story dwelling operations represent the largest item for any one class of building operations, 161 permits for 1,096 operations, at an estimated cost of $2,003,950 being reported; this is slightly in excess of the expenditure authorized in April, and exceeds the total for May of last year by several hundred thousand dollars. Work in three-story dwellings aggregated a total of $531,300, slightly less than that for the previous month. Building work under the classification alterations and additions showed a marked increase, an expenditure of over a million dollars being authorized for that class of work.

All departments of the trade continue very actively engaged. Some agitation regarding wages of carpenters was to be noted prior to June 1. Demands for an advance of five cents an hour, for both inside and outside work, were made. The demands were granted in nearly every instance, the minimum wage rate for inside men being raised from thirty to thirty-five cents per hour, while that for outside men was advanced from forty-five to fifty cents an hour.

Louis C. Hickman, architect, has completed plans for a fire-proof brick and stone apartment house, 100 x 115 ft. in plan, which it is proposed to erect at Thirty-seventh and Ludlow streets. The structure is to be eight stories in height and fire-proof throughout.

John Megraw has started an operation of 66 dwelling houses on Peach street, between Springfield avenue and Warrington street, West Philadelphia, each being 16 x 30 ft. in plan.

Cope & Stewardson have made preliminary plans for a graduate school building for the University of Princeton, Princeton, N. J. The structure is to be of stone, three stories in height, the estimated cost being $500,000.

John R. Wiggins & Co. have been awarded the contract for the new sub station to be erected for the Philadelphia Electric Company on Ranstead street, between Twentieth and Twenty-first streets. Plans are by John T. Windrim, architect, and the estimated cost of the building is $75,000.

It is stated that David Crane, builder, will begin work at once on 88 two-story houses in the Forty-sixth Ward. They will be located in the vicinity of Fifty-sixth and Osage avenue, and measure 15 x 42 ft. in plan. The cost of the operation is estimated at $150,000.

Pittsburg, Pa.

While the amount of new work projected in the building line during the month was appreciably greater than that for April, yet it shows a heavy falling off in the value of the operations for which permits were issued as compared with May, 1909, although the number of operations was practically the same. According to the figures of Building Inspector S. A. Dies there were 379 permits issued last month for building improvements costing $1,885,811, which is an increase of $700,493 over April, but compares with 380 permits for building improvements costing $2,576,359 in May last year, and 423 permits for improvements costing $2,322,315 in May, 1908.

Of the permits issued last month 190 were for new buildings, involving an outlay of $642,981, while 151 were for alterations estimated to cost $1,091,431. Of the new buildings 107 were brick, 30 were frame, 47 brick veneer, 1 stone, 2 steel and 1 concrete.

Rochester, N. Y.

The season is showing a very gratifying degree of activity in the building line, and while the value of the improvements for which permits were issued in May is a trifle less than that for April, it is ahead of every other month thus far the present year, and is considerably in excess of the figures for May a year ago. According to the report for May submitted by Fire Marshal Pierce there were 429 permits issued for buildings estimated to cost $1,119,084, while in May last year 280 permits were taken out for buildings to cost $872,073. An interesting feature of the report for May is that it shows permits for only three buildings costing over $15,000.

For the first five months of the current year the value of building improvements for which permits were issued was $4,154,610, whereas in the first five months of last year the figures were $3,357,526.

Sacramento, Cal.

At a recent meeting of leading contractors of the city an organization was perfected known as the Builders' Exchange League. The board of directors is composed of representatives from the various building crafts of the city and is made up of the following: E. Johnson, G. B. Stahl and T. A. McDougal, who represent the Master Builders' Association; F. J. Geiseke, the plasterers; R. Muddox and E. L. Clark, the cement workers; A. Anderson, the Mill Owners' Association, and F. B. Lastra, the Bricklayers' Association.

The board of directors organized by choosing the following officers for the ensuing year:

President.......................E. Johnson
First Vice-President..................F. J. Geiseke
Second Vice-President...............R. Muddox
Secretary..............................G. B. Stahl
Treasurer...............................E. L. Clark

The object of the Builders' Exchange League is said to be the protection of interests of members from outside contractors, while establishing a closer relationship one with another. The headquarters of the league, at 614 Oak avenue, have been arranged to meet the needs of the organization, and they will be used as a general rendezvous for those engaged in the building business.

San Francisco, Cal.

It now begins to look as though the building situation here had come back almost to the normal after a long depression and a slow but steady climb since the opening of the present year. The building permits for May were 462, with a total estimated cost of $2,447,067, as compared with $2,320,000 for April, $1,830,000 for March, $1,676,000 for February, and $1,170,000 for January. During the month of May, 1909, the aggregate value of the permits issued was $2,680,000, and for May, 1908, it was $2,709,000.

The total value of the building permits issued during the first five months of the year is $9,443,000.

Of the construction work authorized during the month just closed, there was one class A building, to cost $300,000; two class B buildings, to cost $166,000; 39 class C buildings, to cost $1,091,399; 223 frame buildings, to cost $810,000, and 197 alterations to cost $79,002. It is a noticeable fact that very few cheap buildings were given permits. Even in the frame class it is to be noted that the average cost of construction is placed at over $3,600. The cost of the class C buildings averages nearly $30,000 each; of the class B buildings $83,000, and of class A buildings $300,000.

The fact that, notwithstanding predictions to the contrary, there is a gain instead of a loss in the proportion of brick, stone and concrete structures, as compared with frame, is causing some comment among builders. For many months after the great fire the brick and frame construction was about equally divided, and it was predicted that within a year or two, when residence building got well under way again, the proportion would shift back to three or four to one in favor of frame buildings. As a matter of fact, the movement has been in the other direction, until now the building permits show that the value of the concrete and brick buildings authorized foots up to twice as much as that for the frame buildings. The contracts recently let indicate that the permits for next month will show a further march in the same direction. This preponderance in favor of brick, stone and concrete seems to be due to the fact that private residences are not being built to any great extent, and to the further fact that hotels, lodging houses and apartment houses are now practically all of brick or concrete. Even frame flats do not seem to be holding their own with the fire-proof and semi-fire-proof apartment houses.

The architects and builders of California are showing considerable opposition to the State building law as established some year ago and recently amended. At a joint meeting of the San Francisco and Los Angeles chapters of the American Institute of Architects it was decided to appear before the coming State Legislature in an effort to have the law amended.

Among the larger buildings just begun, or which will be started in the near future, are the following: The Sisters of Mercy Hospital, on Grove, Hayes, Shrader and Stanyan streets, to cost upwards of $300,000; the A. B. Spreckles three-story office building, at California and Davis streets, to cost $88,000; the seven-story W. H. Crocker hotel building, at Mission and Seventh streets, to contain 168 rooms and to cost $109,400, Philip Overman architect; the three-story John G. Ills Estate building, on Montgomery avenue, near Washington street, to contain 100 rooms and to cost $50,000, Fabre & Mohr architects; the seven-story William F. Wilson bachelors' building, at the corner of Stockton street and Compton place, to contain 96 rooms, W. L. Schmolle architect; the Dr. W. F. McNutt reinforced concrete hospital building on Pine street, near Jones, to cost $85,000, W. L. Schmolle architect; the Kathleen Farrell five-story hotel building, at the corner of Golden Gate avenue and Larkin street, to contain 120 rooms and to cost $90,000, Will D. Shea architect; the Mrs. McKill apartment house, on Washington street, near Hyde, to cost $55,000, C. M. and A. F. Rousseau architects; the six-story apartment house of the William Wolf Investment Company, on Bush street, near

Mason, to cost $90,000, the Pacific Architectural & Engineering Company architects; the Pockwitz-Rebman building, at the corner of East and Market streets, to cost $50,000, Edward A. Schumacker architect, and McLaughlin & Walsh, contractors, and the six-story A. W. Wilson building, at the corner of O'Farrell and William streets.

The San Francisco Public Library Trustees have asked the Board of Supervisors to arrange for the construction of the proposed public library building, at the corner of Van Ness avenue and Hayes street, at a cost of $600,000. The site has already been secured and the plans for the building have been drawn by Reid Bros.

Seattle, Wash.

The new work planned in the city last month makes a very creditable showing, although it is not quite up to the volume for May a year ago. There was an increased number of frame residences planned, but of a somewhat smaller average cost than was the case last season, while the amount of brick construction was almost double that of last season. The report of Francis W. Grant, Superintendent of the Department of Buildings, shows that there were 1,173 permits issued in May for building improvements to cost $1,327,750, while in May last year 1,526 permits were granted by the Department of Buildings to cost $1,590,045. Of the total for last month 297 permits were for frame dwellings, to cost $404,750, against 241 to cost $553,850 in May a year ago. There were 277 permits for frame business structures, to cost $243,105, and permits for 8 brick buildings involving an estimated outlay of $318,500. Only two apartment houses were planned, their estimated cost being $28,000.

For the five months of the current year the totals are 5,528 permits for buildings costing $6,821,040, while in the corresponding period last year 6,541 permits were taken out for building improvements costing $9,448,108.

St. Paul, Minn.

Although the value of new building construction projected last month is somewhat in excess of that for April, it shows a slight falling off as compared with May last year. There is also a slight falling off in the number of permits issued last month, as compared with April and March, and a heavy shrinkage as compared with May and April a year ago. The season, however, is under full swing, and the prospects are for an average amount of construction unless something unforeseen should occur to check the improvement confidently expected. According to the figures of Building Inspector Cunningham, of the Department of Public Works, there were 377 permits issued in May calling for an estimated outlay of $1,263,048, as against 482 permits for building construction calling for an outlay of $1,324,287 in May a year ago.

The total for the first five months of the current year shows a slight falling off in the number of permits issued as compared with the same period a year ago, but an increase in the amount of capital invested in the improvements for which permits were issued. This is due to the fact that in every month of this year except May the estimated cost of the building improvements projected was in excess of that for the corresponding months of 1909. The total permits issued up to June 1 this year was 1,488, calling for an estimated outlay of $4,222,530, as against 1,569 permits for building improvements costing $3,895,499 in the corresponding period of last year.

Washington, D. C.

The impetus which building operations have acquired caused the month of May to witness greater activity than at any time since the beginning of the year. In a report made to the commissioners it is shown that 566 permits were issued for operations to cost $1,687,957, which is an increase over April of $145,267. Of the total amount $594,800 were for new dwellings of brick construction, and $106,000 for dwellings of frame construction. A feature of the monthly record was permits for 14 apartment houses estimated to cost $444,000.

The greater number of the permits were for operations in that part of the city known as "the county," these aggregating an estimated expenditure of $736,500. The northwest section was next in order, with operations estimated at $604,700.

Number of those prominently identified with the building trades have organized what is known as the Builders and Manufacturers Exchange of the District of Columbia. The objects are to "encourage and protect the building and manufacturing interests of the city; to maintain a labor bureau; to acquire and maintain a library for the education and improvement of members; to establish and maintain uniformity in commercial usages; to acquire, preserve and disseminate useful business information, and to avoid and adjust, so far as practicable, controversies and misunderstandings which are apt to arise between individuals engaged in trade."

Soldiers' Monument of Hollow Concrete Blocks

A most interesting example of the use of hollow concrete blocks is found in the soldiers' monument erected in Casey, Ill., just in time for the G. A. R. decoration and dedication held in the place named on May 28. The monument rests upon a monolithic foundation 18 ft. square and 6 ft. below grade and 18 in. above grade. The monument proper is 10 ft. 2 in. at the base and rises to a hight of 47 ft. Its estimated weight is 225 tons.

The corner stones of the monument were made with a facing of white Portland cement and white sand and are of panel design. The other stones in the monument were made with a facing of crushed blue granite obtained from New Hampshire, and are perfectly plain face laid up with a neat mortar joint. The heavy water tables were made in position in forms.

Soldiers' Monument of Hollow Concrete Blocks.

It is of unusual interest that the monument was designed and all of the stones laid by Joel Weaver, a veteran 75 years of age, and who is seen at the top of the monument in the picture which we present herewith, it being a direct reproduction from a photograph. The monument proper is built from wet process hollow concrete blocks made on an Invincible face-down wet-process machine of the Pettyjohn Company, Terre Haute, Ind. It is erected in a comparatively level country and forms a land mark for many miles around.

MANY OF OUR READERS will be interested in learning that A. H. Fidler, the winner of the first prize in the Bungalow Competition conducted under the auspices of this journal last year, has formed a co-partnership for the practice of architecture under the title of Freeburg & Fidler, 302 and 303 Fenton Building, Jamestown, N. Y.

SUGGESTIONS FOR BUILDING A MODERN DWELLING

BY WILLIAM ARTHUR

PRICES naturally vary in different sections of the country, but the average cost of repainting a seven or eight-roomed house the two necessary coats may be taken at $80, not including the roof shingles. Painting should be done every five years, so that the annual cost may be set at $16. About $4 a year would be enough for a brick house of the same size, and this is a saving of $12, or a fair interest on $200. When comparing the difference in cost between frame and brick or cement-block houses this must be borne in mind. There is the other item of carpentry repairs, amounting often to more than the paint.

The initial cost of a brick house is from 10 to 20 per cent. more than a frame, for ordinary brick construction. The insurance is usually a little cheaper on brick.

It must be remembered, however, that the kind of brick used materially affects the total. With high-priced pressed brick, moulded courses, recessed panels, and so on, a brick house could be made to cost 50 per cent. more than a frame, although the latter can also be run up to extravagant figures. We are dealing with ordinary houses.

If good common brick can be obtained at a reasonable price, an excellent house is possible without buying the pressed kind. The difficulty in many sections is to get common brick that look well and are durable. If soft brick are used on an exposed surface it means a spoiled house in a few years. They are safe enough and strong enough on the inside, if of fair quality.

Cement Blocks

Much of what has been said of brick will apply to cement blocks. In rainy sections there is the same, or even more, trouble with moisture.

The blocks are sometimes made solid, but they are usually hollow in order to lighten the weight, and to stop what the professorial brigade call the capillary action of the rain and damp. The webs in the blocks have to be so thick that the path to the inside is not altogether blocked. The cement stone maker, who naturally wishes for the success of his material, will frankly tell the prospective builder that the walls should be furred and lathed, or treated with waterproofing. If the plastering is done directly on the blocks only a thin coat is used, and when the inevitable damp appears the wall paper is spoiled and there is dissatisfaction all around.

The rock-faced blocks should be used for the best results, and as many different styles as possible put in the wall. They are all cast in a mould, and unless the maker has enough different moulds, the finished wall has a dreary sameness which is much objected to by architects. Sometimes courses of various thicknesses are used to break the monotony; but it is better to keep all the work either rock-faced or smooth. A mixture does not look well for the body of the house.

Plain-surface blocks are often used with rock-faced quoins or corner stones. Although a good house can be built in this way, the rock-faced facade, in general, looks better.

This new material is strong enough, looks well if properly laid, often with red or pure white mortar for a contrast, and with beaded joints. It is cheaper than stone, although, in most sections, a little more expensive than brick, and is making astonishing headway, especially in country districts where brickyards are unknown. It shows to good advantage in basements or foundations of frame houses.

Chimneys and Porch Piers

These are built of cement stone. The porch piers and even the columns clear to the roof are made in a variety of moulded shapes worth about a dollar per running foot when laid.

An amusing blunder is often made when laying the porch piers. From the ground up, naturally, there is a heavy block base, but instead of continuing the column on top of this base the porch floor is laid clear over, and the cement blocks begin again on top of the wood. Now, a little thought would make it clear to any one that a stone column should be continuous, and that it is absurd to use visible inch boards for the foundation of pretentious columns, some of them with Corinthian capitals. Common sense goes a long way in building as in so many other fields.

The principal danger from the blocks is too much sand and poor cement. Only a good brand of Portland cement should be used. What seems to be the best way to make a block is to have two mixtures, one for the face which is exposed to the weather and the other for the inside. So far as strength goes, a mixture of one part cement to four parts sand is ample, and even one to six is enough; but for the face something more than strength is required, and that is fineness of "grain," close pores. Cement is much finer than sand, for the voids in the latter are about 25 per cent. of the mass. These voids should be all filled for the face work, the same as the pores of oak are filled before the varnishing is done. The difference between a block that is filled and one that has too much sand and too little cement is easily seen through a microscope—indeed, it is almost plain without one. Cement costs about $2 per barrel, and sand from 10 to 12 cents. The temptation, therefore, is to substitute sand for cement, and many blocks fail. All through the trade journals the fight goes on against this class of manufacturers who, for the sake of a temporary gain, are giving a bad name to a good material.

A good wearing surface should be about an inch thick, and made in the proportion of one cement to two sand; for the inside, one to four or five of sand and small gravel, about two sand to three gravel. The two mixtures are hammered into the mould at the same time and form one block.

It is essential that the blocks should be properly cured by being kept out of the sun and, if necessary, watered to prevent them from drying too fast.

Much disappointment and loss have been occasioned to owners with unscrupulous manufacturers of cement blocks. Proper proportions, drying and setting—these are imperative.

Waterproofing

Some waterproof compounds have been made, but the authorities are not yet decided as to whether or not they eat out the life of the cement.

Concrete

Many use the regular concrete for a basement wall. It looks almost too rough for a dwelling. A factory and a home are not listed in the same category.

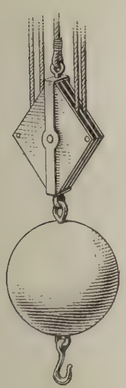
When using concrete, if the earth is solid enough, it is sufficient to excavate to the exact size wanted, make a recess for the foundation underneath the bank, set up a temporary, well-braced plank wall, and pour in the concrete between that and the hard earth. In rainy climates the ground should be carefully sloped away from the house.

(To be continued.)

RAISING LARGE DERRICKS IN BUILDING CONSTRUCTION

BY OWEN B. MAGINNIS

THE interested spectator watching the rapid construction of the steel frame work of towering office buildings in any of the large cities of the country often wonders how the powerful derricks used to hoist the girders, columns, beams, etc., into place are raised to a new level after the iron work of the building has reached a point where the derrick is practically submerged, so to speak, by the net work of the frame. One of the most important operations which must be performed in the construction of these skyscraping edifices is the raising of these large boom derricks from one tier of beams and girders when set, to that above. It is almost needless to state that the work requires the greatest care and circumspection while in progress and must be executed by experienced workmen who are technically termed "riggers" and who, like sailors, are thoroughly acquainted with all the ropes, knots, tackle, hooks, splices, blocks, turnbuckles, etc., essential to the execution of work of this class.



Regarding the first raising of the derrick mast to its perpendicular position the operation is so simple that it is only necessary to state that it is drawn to this position by wire guy ropes, of which there are never less than four and frequently more. The greatest care must be exercised as the pole rises, especially as it approaches the perpendicular. The blocks and tackle for hoisting can be adjusted by means of the boatswain's chair shown in Fig. 1 of the sketches. In the large sketch, Fig. 2, the derrick is shown set on one tier of girders, the boom having been raised to the second floor level above.

After the boom of the derrick has been elevated to the next floor level where it is to be placed, which is done by disconnecting the boom from the pivot shoe on the mast, it is equipped with temporary guy ropes and lifted with a stout rope sling set about half the distance of its hight, use being made of the mast-hoisting tackle. When up to the desired level it is set on and lashed to a solid timber platform placed across the steel beams plumb to an upright position and the temporary guy ropes made fast, thus forming an excellent yet simple expedient for raising the mast to the upper tier, which, as the drawing shows, is done in a somewhat similar manner; that is, by rigging a fall on the boom and a sling on the mast. Now, when the block hook at X and the sling at Y are attached the wire rope fall may be carried to the engine drum and the mast raised to its next position.

The floor beams carrying heavy derricks and loads of this description must always be temporarily shored directly under the blocking from the basement floor up to prevent jar, strain and vibration.

It is usual to raise derricks of this kind through two tiers at least and the mast being, say, 60 ft. in hight and the boom 2 ft. shorter, this can readily be done. There must be a man at each guy rope when raising and the utmost accuracy and care be exercised to screw up all turnbuckles, set all blocking, etc., and all falls and chains must be tested as to their bearing capacity. Finally the work as it proceeds should be superintended by a tried and experienced foreman, so as to avoid accident of any kind.

Fig. 1.—Boatswain's Chair.

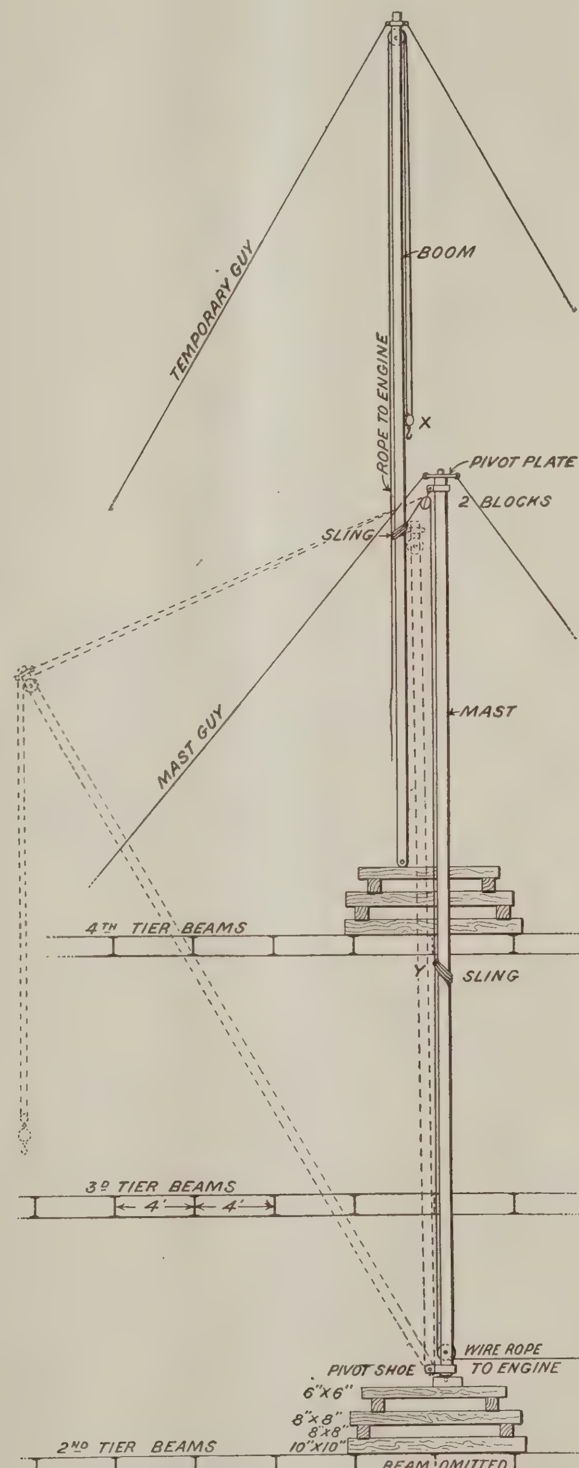


Fig. 2.—Showing Derrick Set on One Tier of Girders and the Boom Raised to a New Level Above.

Raising Large Derricks in Building Construction.

New Publications.

Handbook of Cost Data for Contractors and Engineers. By H. P. Gillette, managing editor *Engineering-Contracting.* 1,900 pages. Size, 4¾ x 7 in. Bound in morocco covers with gilt side and back titles. Published by the Myron C. Clark Publishing Company. Price, $5.00.

This is the second edition of a book of reference, giving methods of construction and actual costs of material and labor on work of various kinds. While in the first edition, which contained the equivalent of about 250,000 words, the author had primarily in mind the contractor, whose concern is to know the most economical method of construction and the unit costs in every detail; in the second edition, which is fully four times the size of the first edition, the author has endeavored to supply the wants not only of the contractor, but also of the engineer, who frequently needs to ascertain the *number* of units in a structure of a given class and size as well as the unit costs. The author points out that this comparatively new study of engineering cost has not only had a pronounced effect upon methods of construction, but has already begun to work a change in designs of engineering structures. Specifications drawn by engineers who are ignorant of the items of actual unit costs are often absurd in their requirements, and hence as a knowledge of cost spreads, we may confidently expect radical changes in designs and in specifications.

The matter is contained in 15 sections. Among those of particular interest to our readers, mention may be made of Concrete and Reinforced Concrete Construction; Timber Work; Buildings, under which heading is discussed the cost of items of buildings by percentages, also per cubic foot, the cost of concrete buildings, the cost of timber work in different kinds of building, the cost of laying and smoothing floors, laying brick masonry walls, terra cotta brick fireproofing, slate roofs, etc., covering practically every phase of work involved in the construction of a building.

Builders' Auxiliary—Estimate and Cost Sheets. Size, 12 x 19 in.; 41 sheets. Bound in paper covers. Published by the Builders' Auxiliary Company. Price, $5.00 per set, complete.

This, as its name indicates, is an aid to the builder in making his estimates and keeping record of cost data in connection with contracts which he may execute. The set consists of the 12 x 19 sheets, together with two smaller books, each measuring 5 x 9½ in., one being intended for a record of the materials used, while the other is a time book. In connection with the larger sheets some very interesting and valuable suggestions are presented, together with hints as to the best method of using them by the contractor. It is pointed out that each heading on the specifications should be taken separately and the corresponding heading on the sheets will contain practically every item covered. The materials should be taken off separately first and the quantities entered in the spaces provided. It is pointed out that the labor should be kept entirely separate if satisfactory results are expected.

The records made by using the Builders' Auxiliary furnish a basis on which future estimates can be figured, as they will deal with conditions existing in the particular locality in which the contractor is doing his work. They also furnish a basis on which to figure any extras which may be called for in connection with the contract. The data on material and labor are given in a form to obviate as far as possible the constant reference to books, which is quite a troublesome part of the estimator's task. The data here presented have been carefully compiled, being taken from actual work, of which the authors have personally made careful notes. No prices are given, as these vary with every locality, but the data has been so arranged that the prices can be easily made up from local conditions.

In connection with various phases of work, such, for example, as preparation of the site, excavation and different phases of construction, the amount of work a man can reasonably be expected to do in a day is given, together with quantities of materials required in connection with a certain amount of work; the quantity of cement, sand and gravel or broken stone required for varying mixtures of concrete; the number of brick required for walls of different thicknesses, and so on through the different classes of work involved in the construction of a building. All of the data given in regard to labor are based on the ability of workmen of average skill at their respective trades and may therefore be accepted as a fair criterion in almost any locality.

Another feature which is likely to attract special attention is found in the dimension lumber sheets, where dimension lumber is listed in what the author considers the best practical form. The number of pieces of any particular size is placed on the line showing the size, and beneath the figure giving the length in feet. The small figures give the number of feet board measure in one piece of the size and length indicated by the square in which they are placed, so that the total number of feet board measure in pieces of the same size and length is found by multiplying the small figures by the number of pieces. This method does away with a lot of figuring or reference to board measure tables, etc., thereby resulting in a great saving of time.

The Material Book is ruled for entries under date, quantity and article and has an index cut in the edges of the pages so as to quickly refer to any material desired. In the suggestions to the foreman it is stated that the time to check over material and make a note of it is when it arrives and not after half of it has been used.

The Time Book is ruled for three columns of names and for rate of wages per hour and total for the week. This has an index cut in the edges of the pages, and referring to the different classes of work in connection with the construction of a building, the first page being for the men engaged in the preparation of the site, the next for the excavation, next the stone foundation, the concrete foundation, the brick foundation or the wood foundation; then piles, stone masonry, brick masonry, concrete masonry, terra cotta, tiles, mosaics, etc., plastering and so on to the completion of the building.

The fact that the authors served an apprenticeship and subsequently were engaged as journeymen, foremen of construction, bench hands, detailers and listers of material, shop foremen, superintendents of construction and architectural designers and structural engineers, is strong testimony of the practical nature of the estimate and cost sheets under review.

Ornamental Concrete Without Molds. By A. A. Houghton. Size, 5 x 7½ in. 132 pages. 30 figures. Bound in cloth. Published by the Norman W. Henley Publishing Company. Price, $2.00.

This book is a practical treatise explanatory of a system of molding ornamental concrete units with wood and metal templates whereby the concrete worker is enabled to mold or model in concrete any cornice, column, pedestal, base, cap, urn, pier or archivolt in a monolithic form at the place where they are to be used. These may be modeled in units or blocks and then built up in accordance with the requirements of the specifications. Full directions are given for making the templates and there is additional information on the proper preparation of concrete for ornamental work, the proportionate sizes of the various units and the reinforcement of the work; in fact, everything that a concrete worker needs to know to turn out perfect work in any style of ornamental concrete without the purchase of expensive molds is fully explained and illustrated.

The book is divided into twenty chapters which deal with the advantages of the system, the construction of the templates, the preparation of the concrete and the use of the templates. These chapters are supplemented by detail drawings giving the proper proportions for the various types and sizes of ornamental concrete work in the different architectural orders and data sheets are appended which give rules for determining the proper sizes of the different parts of these orders. A simple method of fluting and molding columns and building any style of concrete arch is described in two other chapters. In the balance of the book detailed instructions are given for molding any style of concrete monument as well as placing inscriptions on them, how to mold several styles of urns and lawn vases with pedestals, ornamental hitching posts, grave markers, fountains, caps, garden furniture, flower pots and many other forms of ornamental concrete. Illustrated directions are given for making and placing the reinforcement required by these forms.

Death of George Hayes

In the death of George Hayes, which occurred at his late residence, 61 Claremont avenue, Mount Vernon, N. Y., on Monday, May 23, the sheet metal and skylight industry of the East lost one of its most prominent members. He was born in Gloucester, Mass., 70 years ago, and at the age of 28 engaged in business upon his own account, becoming widely and favorably known in the building trades. He was conspicuous in the skylight industry by reason of his many patented inventions relating thereto, and also in connection with metal lath, fireproof windows and other sheet metal work in building construction. He was a member of the Building Trades Employers Association, a past-president of the Roofers' Association and a member of the General Society of Mechanics and Tradesmen. He was also prominent in the Masonic Fraternity and was a past treasurer of the Grand Lodge of New York State.

The sheet metal and skylight business which he conducted for many years at 71 Eighth avenue, Borough of Manhattan, will be carried on by the George Hayes Company, a corporation which he organized several years ago.

Ranken's School of Mechanical Trades

We have just received a copy of the first annual catalogue of the David Ranken, Jr., School of Mechanical Trades, St. Louis, Mo. It is a publication of 34 pages bound in paper covers and profusely illustrated with half-tone engravings showing interiors of work and class rooms connected with the various branches of trade which are taught. The school, it may be interesting to state, is a philanthropic institution, founded and endowed by David Ranken, Jr., of St. Louis, its purpose being the "training and fitting of boys and men for the mechanical and manual trades and occupations." The aim of the school may be summarized as the training of efficient mechanics, who shall take a pride in the proper performance of their work and who shall have such knowledge and such skill as will enable them to meet intelligently whatever demands that work shall lay upon them. While it is not the aim primarily to train foremen and superintendents, it is the expectation that within a few years after graduation many of the students by virtue of the training they have received will be enabled to rise to positions of responsibility or go into business for themselves. The instruction offered in the day classes at present covers carpentry, bricklaying, pattern making, painting, plumbing and steam engineering. In the evening classes instruction is offered in these and in other subjects, according to demands. In the course in carpentry, students work from drawings and blue prints throughout, special attention being given to house building. During the course informal shop lectures are given on such subjects as the proper care of edged tools; the various woods used in building and their proper selection and treatment; the measurement of lumber; framing, shoring and underpinning; roofs, trusses, spans and beams; stairbuilding; woodworking machinery; various kinds of fastening, such as nails, bolts, screws, nuts, pins, straps, etc.; fire prevention devices; paints, shellacs and varnishes, and the building ordinance of St. Louis. The school year runs from September to August, being divided into three terms, the first extending from September to December, the second from January to March, and the third from April to July inclusive.

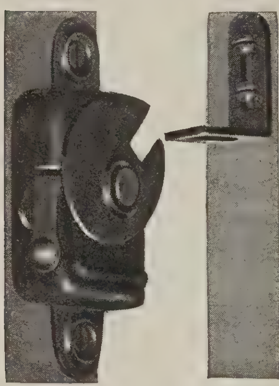
"FIRES: EFFECTS ON BUILDING MATERIAL AND PERMANENT ELIMINATION," is the title of a 20-page pamphlet sent out by Frank B. Gilbreth, 60 Broadway, New York City, reprinted from the *Bulletin* of the American Society of Mechanical Engineers. Numerous illustrations of faulty construction are given and the author presents strong arguments for the use of concrete.

CONTENTS.

Novelties.

New Screen Door Catch

The E. L. Watrous Manufacturing Company, Des Moines, Iowa, has recently placed upon the market a new automatic screen door catch known as No. 21 and illustrated in Figs. 1 and 2 of the engravings. The catch is readily set by any carpenter, as it comes flush on the door and needs no templet or diagram in order for the carpenter to perform the operation. A very desirable feature is the positive lock, which, it is pointed out, makes a secondary fastener unnecessary. The catch is offered both with and without the lock, but the great majority of purchasers prefer the catch with the lock. The company states that the adjustable strike has been retained on this catch, as it proved exceedingly popular with its No. 5 catch. The



Novelties. New Screen Door Catch. Fig. 1.—The Device Locked. Fig. 2.—The Catch Open.

metal is made nearly twice as heavy, so that the catch is really a lock that will stand a great deal of abuse before it can be broken. The claim is made that no mere accident will injure it, and that any one trying to break in would find it easier to break the door than to break the lock. The door catch is of first-class workmanship throughout, and by reason of a special style of embossing the cam cannot drag over to one side and bind. The illustrations clearly show the appearance of the catch and the manner in which it is locked.

Cement Products Exhibition Company

At the annual meeting of the stockholders of the Cement Products Exhibition Company, held at its office, 115 Adams street, Chicago, Ill., at noon on Tuesday, May 10, all the old officers and directors were re-elected for the ensuing year, and the report of the treasurer showed that there was a surplus of $785.08 resulting from the Third Annual Cement Show, held in the Coliseum, Chicago, February 18 to 26, the total expenses of this exhibition having been $41,721.65. Announcement was also made of the dates of the New York Cement Show, to be held in the Madison Square Garden in December, and of the Chicago Cement Show, to be held in the Coliseum next February. The officers of the company are: President, E. M. Hagar; vice-president, Norman D. Fraser, and secretary-treasurer, J. U. C. McDaniel.

Shimer's Improved Cutter Heads

During the years that the Shimer Cutter Head has been upon the market many important changes and improvements have been made until the tool now offered is one to be found in connection with every phase of machine woodworking. At first the cutter heads were made principally for matching, but the idea was extended gradually until now every department of work is covered, resulting in a saving of time on the part of the workman as well as in the making of a more perfect product. Experiments with different metals resulted in the adoption of the steel forging for the head proper. It is claimed that steel with 60,000 lb. tensile strength is forged and shaped under a powerful steam hammer until the grain is further solidified and refined, making a tool of exceptional strength. The Shimer cutter heads are made upon the interchangeable plan for quick transition from one class of work to another without altering machine guides or disturbing alignments. They are also made with a complete expansion feature, whereby the cut of the bits can be expanded or contracted to suit different classes of work or material without taking the heads off the spindles. All cutting bits are of high-grade tool steel tempered to file. The point is made that they hold an edge exceptionally well in working wood of every class, while their circular outlines maintain uniform shapes and patterns of the finished product. Samuel J. Shimer & Sons, Milton, Pa., who manufacture these tools, state that no filing or fitting of the parts other than that required to sharpen the bits is necessary.

Catalogue of Millwork and Building Specialties

A very attractive catalogue, profusely illustrated, bound in colored paper covers and relating to millwork and building specialties, has been issued by the Chicago Millwork Supply Company, Twentieth and Morgan streets, Chicago, Ill. It is known as "Catalogue No. 27" and covers a wide range of goods along the lines indicated, embracing, as it does, sash, doors, blinds, frames, moldings, mantels, tile, grates, screens, dumbwaiters, plasterboard, roofing, store fronts, window plate and art glass, grilles, porch work, stair work, hardwood flooring, wood carpet, kitchen cabinets, sideboards, builders' hardware, etc., etc. The introductory pages are devoted to a comprehensive index alphabetically arranged, with a statement of terms, a few testimonial letters showing the satisfaction which the company's product has given by those who have practically demonstrated their merits, a table of freight rates per 100 lb. from Chicago to leading cities of the country, a table of approximate weights and directions for ordering, and the official grades of sash, door and blinds as graded under the rules adopted by the Sash, Door and Blind Manufacturers' Association of the Northwest. In connection with the numerous illustrations is to be found descriptive text calling attention to salient features, together with tables of sizes, prices, etc. In the case of the designs of leaded glass the printing is in colors, thus affording an excellent idea of the appearance of the designs when actually executed. A number of pages are devoted to plans of moderate cost houses, with brief estimate and specification in connection therewith. A feature of the catalogue is an order or inquiry blank which will greatly facilitate the prospective customer in preparing his order for transmission to the company. The entire make-up of the catalogue is such as to render it of special interest to the contractor and builder, who can secure a copy of the catalogue on application to the company.

Schlueter's Flexible Floor Sanding Machine

The apparatus which we illustrate in Fig. 3 of the engravings has been specially designed and built to meet the demand for a small, compact and easily operated surfacing machine, which can be depended upon to finish the floors of office buildings, apartment houses, or, in fact, any new or old wood floor. The machine can be fitted with direct or alternating motor; has automatic dust collector, which makes it possible to surface floors in the finest residences, offices, etc., without inconvenience or annoyance, and a roller covered with rubber, which forms the cushion on which is clamped the surfacing or polishing materials to be used. This roller is held in place by side plates with

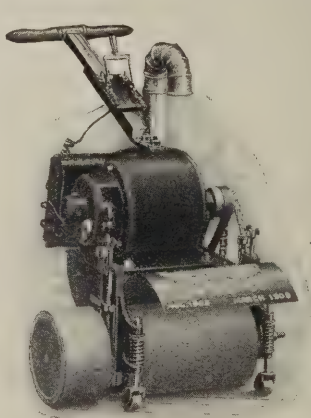


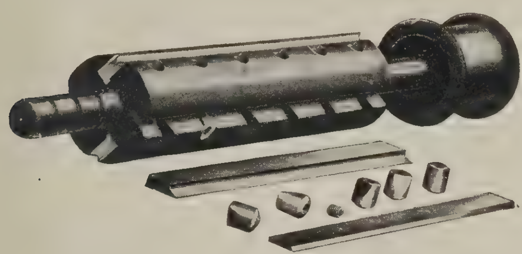
Fig. 3.—Schlueter's Flexible Floor Sanding Machine.

springs above and below the journal box, thus allowing the roller to adjust itself to the floor. By raising the handle the revolving surfacing roller is instantly brought in contact with the floor, thus giving the machine a natural tendency to go forward of its own accord. The edge rollers are easily adjusted to either side. The main roller is 12 in. long and 8 in. in diameter, while the edge roller is 4½ in. long and 8½ in. in diameter. The arrangement of parts is such that when starting the motor the roller cannot grind into one spot on the floor for the reason that the instant the handle is released by the operator the roller is automatically raised from the floor, so that the operator can leave the machine without the necessity of stopping the motor. The machine is made by M. L. Schlueter, 103

North Canal street, Chicago, Ill., who states that the rollers can make 900 revolutions per minute. The machine is especially adapted for use by building contractors, and the claim is made that it will surface about 5000 square feet of old or new floors once over in eight hours. Going over the floor from two to four times will make it perfectly smooth and level.

Crescent Safety Head for Jointers

Mill and factory owners are giving more and more attention to the adoption of devices calculated to safeguard their machine operators, as it is a well-recognized fact that accidents resulting from improperly-guarded woodworking machines, for example, are often exceedingly costly for the owner of the establishment. It is quite probable that



Novelties. Crescent Safety Head for Jointers.
Fig. 4.—General View of the Device.

many woodworkers of the older school would have more fingers to-day had the jointers on which they worked been provided with the modern safety head. In the illustrations presented herewith we show a device adopted by the Crescent Machine Company, 206 Main street, Leetonia, Ohio, in connection with their woodworking machines. It is designated as the Crescent Safety Head, which is provided with a thin, narrow knife, held in place by heavy steel throat piece clamped firmly into position by a number of key-plugs placed at intervals in sockets drilled into the body of the head. Each of these key-plugs is cylindrical in shape, having a flat place milled off on its side, making it wedge-shaped. The arrangement of parts is such that the knife is held firmly in position over its entire width. The point is made that there is no tensile strain on the screws, as, by the method employed, all danger of accident arising from broken screws is eliminated. The space in front of the knife is completely filled by the throat piece, so that there is no chance for chips to drive under the knife, thus overcoming another common source of danger. Another advantage of the Crescent safety head is its large sectional area, giving a steadier running head, it is claimed,

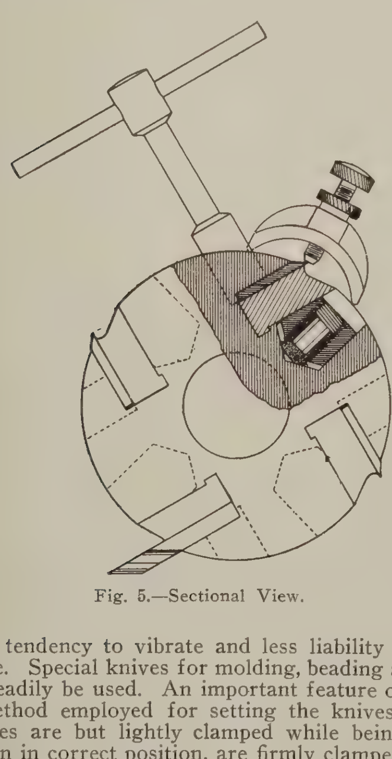


Fig. 5.—Sectional View.

with less tendency to vibrate and less liability to get out of balance. Special knives for molding, beading and grooving can readily be used. An important feature of the head is the method employed for setting the knives correctly. The knives are but lightly clamped while being set, and then, when in correct position, are firmly clamped by tightening the key-plugs. With this arrangement it is as easy, it is claimed, to set the knives on a round head as on the common square head. All Crescent safety heads of $4\frac{1}{4}$ in. cutting circle or over are made with four knives, this applying for the 12, 18 and 24 in. Crescent jointers. All heads of less than $4\frac{1}{4}$ in. cutting circle are made with two knives only, this applying to the 8 in. Crescent jointer and the Variety woodworker. The knives furnished with the heads are of a fine grade of self-hardening high-speed steel. The knives are $\frac{1}{8}$ in. thick and $1\frac{1}{8}$ in. wide. Fig. 4 of the illustrations represents a general view of the round safety head with knives detached, while in Fig. 5 is a cross-section. The point is made that the safety head can be furnished with any size of Crescent jointer at a slight advance in price over the common square head.

The "K-W" Automatic Window

Various have been the methods of constructing windows with a view to permitting the outside of them to be cleaned from the inside of the room, and thus reduce to a minimum the danger of accident to the one performing the work. One of the latest to which the attention of architects, builders and property owners is being directed is the "K-W" automatic window, made by the Cleveland Automatic Window Company, Inc., 1211 Citizens' Building, Cleveland, Ohio. It is pointed out that the arrangement of parts is such that the style of construction is adapted for windows used in all kinds of buildings embracing, more particularly, apartment houses, office and business structures and private residences. Weights, parting strips and window stops are used, thus excluding dust and cold, while the sashes can be raised or lowered as easily as in

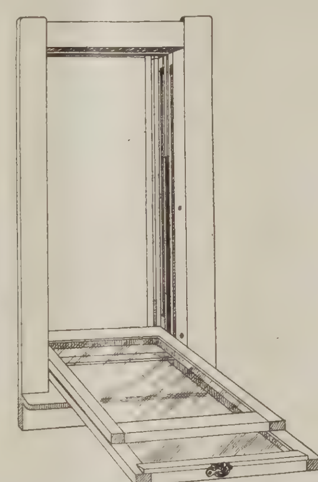


Fig. 6.—The "K-W" Automatic Window.

the case of windows of ordinary construction. In Fig. 6 of the illustrations we present a picture showing how readily the sashes may be removed entirely from the frame and taken to any part of the building without having to disarrange the parts or make use of a tool of any kind. The weight is attached to one end of the cord, and to the other end is fastened a simple but strong device or lock which engages in a groove in the lower corners of either sides of both sashes. When the sash is turned to a horizontal position, it automatically locks this device and holds the weights and supports the sash. When the sash is in a perpendicular position it unlocks, thus releasing the weights, which then operate on the sash as on an ordinary window. The arrangement of parts is such that the top of the lower sash may be swung in as much as desired, thus affording ventilation, but preventing a draft by deflecting the incoming air toward the ceiling. The window stops are adjustable and held tight to the jambs and window sash. The claim is made that this device can also be applied to old window frames and sashes without removing the frames from the building. In the case of public buildings the use of this window enables one cleaner to take charge of a larger number of windows than would otherwise be the case; removes the danger of accidents and consequential damages. The point is made that there is absolutely nothing to get out of order; that it is simple and reliable, and is automatic in its action.

Simonds Mfg. Company Increasing Its Plant

The Simonds Manufacturing Company, Fitchburg, Mass., and Chicago, Ill., is about erecting a new steel mill at Lockport, N. Y., to be ready for active operation by the first of October. It is expected that, by reason of its central location, this new mill will serve as an economical distributing plant to the company's factories in Fitchburg, Chicago and Montreal. It will also double the capacity of the company's Chicago mill, which has not been able thus far to keep pace with the shop demand for plates of the special Simonds steel that goes into all of its varied products. The determining factors in the choice of the Lockport location were labor, power, land and water. The electric service direct from Niagara Falls assures the flexible power the company desires and its adaptability to the peculiar needs of a steel plant. The mill will be located between the tracks of the New York Central and the Erie railroads, having direct connection with both and a private siding a mile long for the company's special use. Furthermore, the Erie Canal runs directly along the Simonds property, and delivery from its 1000-ton barges meets another requirement of selection.

There will be built at once 50 houses for the employees of the company, these being designed in accordance with the best lines that can be found for dwellings of the type desired, and the settlement will be brought up to date in point of equipment, and every provision made for the health and pleasure of the employee tenants. This is in line with the Simonds policy in its co-operating relations with its employees, as at the Fitchburg plant the company maintains a clubroom, recreation room, baths, gymnasium and medical service for its many hundred hands. It has also established a complete pension system for its employees in its several plants, embracing both operatives and office force.

Daisy Floor Scraper

A floor scraper embodying a number of interesting features of construction is the Daisy, illustrated in Fig. 7 of the engravings, and made by the Daisy Manufacturing Company, 120 North Michigan street, South Bend, Ind. This scraper is referred to as a practical machine for the practical workman, and in its construction something of a departure from ordinary methods has been made. The blade instead of being placed parallel with the machine producing a bearing on the floor of only the thickness of the blade is placed at an angle so as to make a shearing cut and giving a 4¼ in. bearing on the floor. By this arrangement the claim is made that the Daisy will do a waveless work. It also permits the operator to scrape the floor either with or across the grain. The handle of the machine is adjustable to suit the operator, and the weight of the machine is such as to assure great stability. The roller is divided into two sections, each operating on its own axle independent of the other. This, it is claimed, allows the operator to turn the machine sharply and with no apparent effort, and as there is a heavy rubber tire on each roller there is nothing about the machine that can mar the most highly finished floor. In operating the machine the company suggests that the floor be first scraped with the long single blade for the purpose of truing it up. After this has been done, the long blade is removed and the triangular piece is attached to the head of the machine, this being done by using two bolts. When finishing the floor two of the short blades are used, which, when attached to the machine, cut on opposite angles at the same time. The machine, as illustrated herewith, shows it arranged to give

Novelties. Fig. 7.—The Daisy Floor Scraper.

the double shearing cut. Great emphasis is laid upon the point that by simply attaching the triangular piece at the head of the machine the latter is converted from a single shearing cut with one 10-in. blade into a double shearing or V-shaped cut for which two 5-in. blades are used. The claim is made that the use of this machine leaves the floor in better condition than could possibly be done by hand, and, at the same time, does the work of at least ten men.

"New Century" Metal Shingles, Ceilings, Siding, Etc.

We have received from the Chattanooga Roofing & Foundry Company, Chattanooga, Tenn., copies of a series of interesting catalogues which it has issued from the press illustrating and describing its varied lines of sheet metal specialties, which include the New Century metal shingles, Southern ornamental metal ceilings, siding, etc. One catalogue, known as No. 28, carries illustrations of sheet metal store fronts in a great variety of design, cornices, ridging, cresting, skylights, metal roofing, chimney tops, elbows, heaters, andirons, grates, cast iron columns, girders, lintels, sills, wall ventilators, timber hangers, joist anchors, manhole rings and covers, coal chutes, interior stairs and stair railings, veranda or balcony railings, window guards, awnings, etc. The very attractive catalogue setting forth the merits of New Century metal shingles is illustrated in profusion with half-tone engravings made directly from photographs of buildings in connection with which the company's shingles or other specialties have been used.

Gilford's Improved Adjustable Mitre Box

A mitre box, which embodies many interesting features from the standpoint of the carpenter, builder and cabinet maker, has just been introduced to the trade by F. E. Gilford & Son., 77 South Main street, Concord, N. H., and in Fig. 8 of the accompanying illustrations we show the mitre box with saw in position. The arrangement of parts is such that the operator is able to obtain any angle, from 0 to 75 degrees, and do it accurately and quickly. The

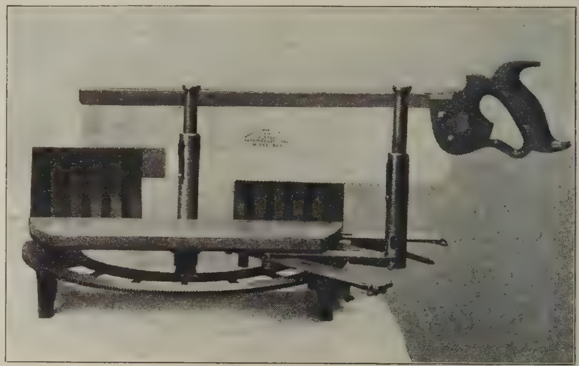


Fig. 8.—Gilford's Improved Adjustable Miter Box.

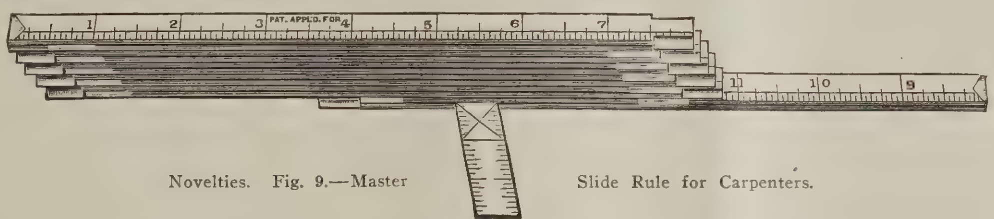
mitre box is equipped with stops for holding up the saw and gauges for sawing to different depths. The circle is notched and graduated every degree from 0 to 75. There are two sizes now manufactured, No. 3 being intended for a saw 22 x 4 in., and No. 4 for a saw 28 x 5 in. In order, for example, to obtain any known angle set the box at 45 degrees, then tighten the clamp and set to the angle desired. For unknown angles adjust the bevel square to the angle desired, then adjust square to the box, tighten the clamp and set the box at 45 degrees and the correct mitre is obtained. The mitre boxes are supplied by the manufacturers, regularly equipped with or without saws, as may be preferred, and are guaranteed to accomplish all that is claimed for them. Messrs. Gilford & Son have issued a very neat and attractive catalogue, in which the merits of the mitre boxes in question are set forth at some length, reference also being made to the combination hammers which are manufactured, and also to milling cutters. A copy of the catalogue can be secured by interested readers upon application to the address mentioned.

Catalogue of Mechanics' Tools

Millers Falls Company, 23 Warren street, New York City, and works at Millers Falls, Mass., has just issued from the press Catalogue No. 31, consisting of 102 pages profusely illustrated and bound in paper covers. In issuing this catalogue it has been the aim of the company to illustrate its tools clearly and plainly, grouping illustrations and descriptions of articles of a kindred nature in the belief that the users of the catalogue will prefer to have the matter arranged in such a way as to be easy of reference rather than too ornate and extended. Since Catalogue No. 30 was issued the company has produced a few new tools and made many important improvements in those which were illustrated in previous editions. Among the new tools to which attention is invited, mention may be made of several braces, a bench hook, a breast drill, a bit gauge, a lathe chuck, hack saw frame, several magazine hack saw frames, glass cutters and a spoke trimmer. In addition to illustrations and descriptive particulars, price lists are given not only of the goods already referred to, but of fancy woods, planed to various thicknesses, these woods being specially adapted for scroll sawing work, etc. The goods are illustrated and described in a way to render their salient features readily understood and the entire makeup of the catalogue is such as to make it an interesting work of reference for those having occasion to use mechanics' tools of any description.

Master Slide Rule for Carpenters

A device which every practical carpenter will find convenient for his kit is the master slide rule, shown in Fig. 9, and made by the Dahl Manufacturing Company, 154 Fifth avenue, New York City. The numbering on one side is similar to that of any ordinary rule, while the other side, as shown in the engraving, is numbered for inside measurements and indicates at all times the exact number of inches and 16th parts extended. For small spaces, wherein 8 in. cannot find room, the small folding clasp shown open in the cut can be used, and it will also be found a handy tool for taking a 45 degree or square line. The illustration presented herewith shows one of the company's 3-ft. master slide rules partially extended. The rule can be immediately extended to full length if desired, or instantly reclosed to the original 8-in. length. The company manufactures the rule in all sizes from 2 to 12 ft. or more, and the point is made that it will be found especially convenient not only for carpenters in getting the inside measurements of doors and window trim, for example, but glaziers, plumbers, shademen, and in fact all mechanics having occasion to take off measurements. It is speedy in operation and practical for all classes of work.



Novelties. Fig. 9.—Master Slide Rule for Carpenters.

Willis Skylights and Ventilators.

The Willis Manufacturing Company, Galesburg, Ill., has just issued from the press what is known as "Catalogue B," illustrating and describing the leading lines of skylights and ventilators made by this concern. It is stated that the company has made a study of skylights for 20 years, and its product is of such a nature as to command widespread attention. The bars are so constructed that the largest possible glass area is obtained, and for large skylights the bars are reinforced in such a way that they will not sag. The point is made that all the skylights are set up in the shop and then "knocked down" for shipment when practical to do so, thus reducing freight charges and insuring safe delivery. The claim is made that it is possible to erect these skylights without the use of any tools other than a hammer and screwdriver; that no soldering is necessary, and that they are watertight without setting the glass in putty. In connection with the illustrations of the various styles of skylights manufactured are brief descriptive particulars, together with list prices. Special reference is made to sawtooth skylight construction and to photographers' skylights. Willis ventilators occupy several pages in the catalogue, following which attention is given to louvre ventilators, fireproof metal windows and to the Willis veneer and wall ties. The entire make up of the catalogue is neat and attractive, and a copy of it will be sent to any architect or builder who may be interested.

Change in Staff of Berger Manufacturing Company.

The death of W. W. Wallace, of the advertising department of the Berger Manufacturing Company, Canton, Ohio, has caused some slight changes in the personnel of the staff. G. P. Blackiston (better known as "Live Wire"), of Pittsburg, Pa., has been appointed advertising manager to succeed Mr. Wallace, and it is understood that Mr. Blackiston will take several of Pittsburg's best men to Canton with him, which will merely be an addition to the present large staff comprising the advertising department of the Berger Manufacturing Company. Mr. Blackiston's rise in the advertising profession has been rapid. Just three years ago he was publicity promoter for an automatic machine tool in which he was financially interested. The phenomenal success of the campaign made such an impression that many other manufacturers sought his services in this direction. To-day Mr. Blackiston stands as a sort of consulting specialist in the advertising field, and has controlled the publicity campaigns of some of the largest firms in the country.

The Berger Company covers the entire field of sheet metal products from the sheet to the finished article, and Mr. Blackiston's appointment is a tribute to this well-known mastery of metallurgy. He assumed his new duties June 1.

Montross Metal Roofing and Siding

Montross Metal Shingle Company, Camden, N. J., is sending out a profusely illustrated catalogue in which are set forth at length the merits of the metal roofing and siding turned out by this concern. The relative value of different metals for roofing are discussed and the special merits of Montross shingles and tiles are enumerated, the salient features being pointed out in a way to command the attention of architects, builders and house owners generally. A number of half-tone engravings of dwellings, in connection with which the company's product has been used, are a feature of the catalogue. The concluding pages are given up to illustrations of finials, ridging, cresting, conductor pipe, elbows, gutters, etc., together with directions for applying Montross metal shingles and tiles. Accompanying the catalogue is a pamphlet of pocket size giving a list of names of some of those in the United States and foreign countries who have used, specified and recommended the company's product during the past 19 years. A folder calls attention to Montross Eastlake paint, which is made in four colors and is especially prepared for use on metal shingles, tin and iron roofs, bridges, iron fences, smoke stacks, etc. The illustration on the front cover is striking in the extreme and cannot fail to arouse sufficient curiosity as to cause the recipient of the folder to examine what may be within.

Smith's "Kantpick" Sash Fastener

Frank F. Smith Metal Window Hardware Company, 12 Division street, Newark, N. J., is directing the attention of architects and builders to the sash fastener illustrated in Fig. 10, which it has recently placed upon the market and which embodies a number of interesting features. The arrangement of parts of this fastener is such that the manufacturer states it cannot be picked from the outside, but that it can be locked at any angle and still cannot be pushed open, as the ratchet catch holds it securely. The device is known as the "Kantpick," by reason of the fact that it is a sure safeguard from entering from the outside. The point is made that in order to open the lock it is simply necessary to press down the lever, thus releasing it from the ratchet. The device is meeting with much favor and is being introduced in connection with some of the largest commercial buildings erected. The improved adjustable sash fastener can be fitted to any sash and adjusted so as to secure a good locking. It has sufficient adjustment to prevent annoyance from looseness and rattling of sash, as all wear and tear caused by the action of the elements can be overcome so that the sashes are always drawn close when the sash is locked. The adjustable sash fastener is said to be particularly adapted to metal windows, owing to the adjusting device. The fasteners are made of cast bronze, malleable or gray iron, and in all finishes, while the lock is made in two sizes.

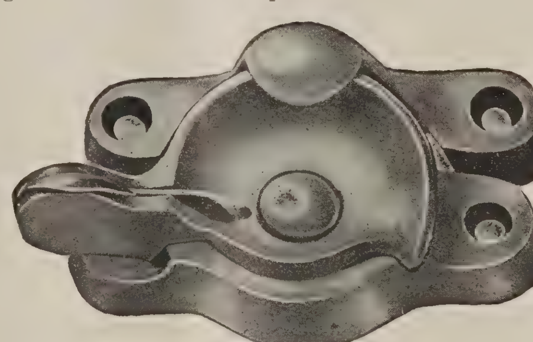


Fig. 10.— Smith's "Kantpick" Sash Fastener.

Crescent Woodworking Machinery

Under the above title the Crescent Machine Company, Leetonia, Ohio, has just issued from the press its 1910 catalogue of Crescent woodworking machinery. It is an attractively printed little work of 96 pages bound in red paper covers and embodies among its new features variable feed planers, round safety head jointers, safety guards for saw tables, 20-in. band saw, improved, safety guards on jointers, etc. Among the introductory pages reference is made to the fact that the Crescent factory is of modern equipment and construction, having been built entirely new in 1906, at which time the former factory was found too small and was abandoned. Again, in 1909, the business of the company having increased to such an extent that the plant was found inadequate to properly meet its requirements, a large warehouse was added. Everything from the raw material to the finished machine is made in one plant under one management, and the entire plant is devoted to the manufacture of woodworking machinery. The descriptive text has been carefully arranged with a view to meeting the requirements of intending purchasers, and in many instances features of the machines are illustrated in detail so as to render everything perfectly understood by the reader. Attention is given to an extended line of woodworking machines, which will be found of special interest to the carpenter and builder who may be operating either a large or a small woodworking establishment. A feature of the closing pages is the statement of horsepower required for different machines, such as band saws, jointers, shapers, planers, saw tables, disk grinders, boring machines and swing saws. There is also a table of freight rates, which is given for the accommodation of the purchaser in order that delivered prices may be approximately estimated. A copy of the catalogue will be sent to any reader who may make application to the company for it.

The Acme Sash Weight

A feature of the Acme sash weight, which is being placed on the market by the Acme Sash Weight & Foundry Company, Calhoun, Tenn., and illustrated in Fig. 11, is the horizontal position for the eye which makes the cord come straight up from the middle of the end, thus causing the weight to hang perfectly plumb. This, it is pointed out, is to prevent catching and bumping, and, at the same time, causes the weight to occupy much less room in the boxing. In connection with this the wire eye is used to give the maximum degree of perfection in size, shape and smoothness. It is said to be impossible for the eye to be imperfect. It is pointed out that the cast hole for the common eye is sometimes partly or wholly filled up and always more or less rough and sharp, which wears and cuts the cord. The advantage is claimed for this weight in that the wire extends downward in the shape of a staple, even with the lower part of the slot, thereby making it impossible to break the casting off at the eye; and the eye is located even with the end of the casting to protect it from being bent or mashed. The number is cast, showing the weight on the end which puts it in view when the weights are packed in bins. The common weights, with the number on the side, have to be taken out of the bins to see the number. The simplicity of molding is offered as the reason which enables the company to turn them out as cheap as any.

Novelties. Fig. 11.—The Acme Sash Weight.

The Boss Wall Plug

A device which is rapidly replacing the old-fashioned method of using wooden blocks as a nailing base for attaching furring strips and the like to all kinds of masonry construction is the "Boss' wall plug, illustrated herewith, and made by the Church Appliance Manufacturing Company, North and Hennepin streets, LaSalle, Ill. The illustration, Fig. 12, represents the appearance of the plug, also its method of application. It will be seen that the plug consists of a steel plate stamped with cross ridges, so arranged that when the plate is folded in the middle the ridges are alternating and bulge on the outer surface of the plug. In building a brick wall, for example, the plugs are laid between the courses at proper intervals and in such

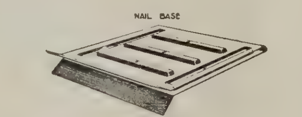


Fig. 12.—The "Boss" Wall Plug.

a way that the ridges or projections of the plug touch the upper and lower courses of brick. The opening of the plug is slightly smaller than the nail which is used, so that when driven in until it reaches the first cross ridge which is lying against a course of brick and will not yield, the nail is obliged to follow the zig-zag course created by the alternating projections of the plug, with the result that the nail, when driven in practically its full length, assumes the appearance shown in the illustration. By reason of the nail taking this wavy course it affords a shoulder grip in addition to the intense frictional grip. The point is made that the use of this plug represents a decided saving owing to the high prices of lumber, and, at the same time, it does not weaken the structure, but rather forms a part of it. Another point is that the plug will neither rot nor shrink, as in the case of a wood nailing base. The manufacturers are anxious to place a sample plug in the hands of every architect and builder in the country, and will cheerfully send one to any address on application. The company also manufactures wall ties, corner beads and other building specialties, all of which are listed in its catalogue, a copy of which will be sent on request.

New Yankee Hand Drill

North Bros. Manufacturing Company, Philadelphia, Pa., has just brought out a new "Yankee" hand drill which is, in effect, a smaller style of the company's breast drill, Nos. 550 and 555, but has instead of a breast plate a handle that can be held in one hand or against the body when in use. The frame is of malleable iron finished in dead black color, while the chuck body is of malleable iron, polished and nickel plated. The jaws are of steel, dropforged and hardened. The spindle is of steel and the gears are cast iron with cut teeth. The driving gears are 4½ and 2 in. in diameter, while the driven gears on the spindle are 1½ in. in diameter. The wooden handle is 4½ in. long, with the large end 2½ in. in diameter. It can be detached from the frame by a milled nut, and thus the interior of the handle can be utilized as a magazine for drills. The extreme length of the drill is 16½ in. The special feature

Fig. 13.—New Yankee Hand Drill.

is the simple mechanism for changing the action of the tool, and is operated by merely moving the shifter on the cylinder between the small gears on the spindle and the simple device for changing the speed. The illustration presented in Fig. 13 represents the double-speed hand drill, with right and left-hand ratchet movement, although the company makes the tool with single speed, thus meeting varying requirements. A close inspection of the illustration will repeal the little slide on the cylinder between the gears and the notches. With the slide in the first notch, that is at the top, the tool is a plain drill; in the second it becomes a left-hand ratchet; in the third notch a right-hand ratchet, while with the slide in the fourth notch the tool becomes a double ratchet, where any movement of the crank forward or backward causes the drill to cut continuously. This will be found not only a time-saving arrangement, but one of great convenience when working in corners where the crank cannot be turned. When the slide is in the fifth or bottom notch the gearing, etc., is locked to open or close the chuck. The point is made that the adjustable ball bearings take all strain or thrust, and that the change of speed, fast or slow, is made by a simple movement of the lever on the hub or gear and without removing the drill from the work. Two styles of single-speed and two styles of double-speed drill are made.

(For Trade Notes see second page following.)

Trade Notes.

An arrangement has just been completed whereby the Marsh Company, 970 Old Colony Building, Chicago, Ill., takes over the entire manufacturing and selling interests of the Miracle Pressed Stone Company, Minneapolis, Minn., the headquarters being at the above address in Chicago. In referring to the matter, O. U. Miracle states that it is with many feelings of regret that he retires from the activities involved in conducting the business of the Miracle Pressed Stone Company, but that for a number of years he has been identified with extensive contracting operations in the Middle West, and from this time forward will give his entire attention to that business.

Lehigh Portland Cement Company, Allentown, Pa., shows in a 16-page pamphlet half-tone engravings of some of the work in connection with which Lehigh Portland cement has been used. The work is of a varied nature, ranging all the way from private dwellings up to concrete elevators, bridges, dams and baseball parks. In connection with each is given more or less information of an interesting nature.

Sharon Steel Hoop Company, Commercial National Bank Building, Chicago, Ill., has been distributing some interesting literature relating to slotted steel studding for hollow and solid partitions, suspended ceilings, silos, etc., etc. The matter is illustrated by means of half-tone engravings, showing some of the work in connection with which this material has been used, and there are also sectional cuts showing details of construction. A full descriptive pamphlet, the company points out, will be sent to any address on application.

The Sanford Concrete Machinery Company, 911 and 913 Jefferson avenue, Toledo, Ohio, shows in an attractive pamphlet, which it has issued, various views of the Sanford block machine, for which strong claims are made. One of the points upon which emphasis is laid has to do with the cone-shaped cores, which make a block that is arched or reinforced from every point to the center and at the same time coring both lengthwise and through the block. Their roundness allows the material under compression to slide over and about them, thus filling every void. The holes in the apex of the cores remove any air that may be in the center of the mold box and serve to relieve any vacuum in opening or removing the cores when the block is finished. This style of core creates a vertical, horizontal air space in each block, which it is impossible to destroy in the wall. The claim is made that furring and lathing are not necessary for plastering with proper wall construction.

Blanc Stainless Cement Company, Allentown, Pa., has been distributing an attractive little pamphlet, in which is set forth the opinions of a large number of architects, builders and contractors who have specified or made use of Blanc cement in connection with work which they have executed. Strong claims are made for the material, which, it is pointed out, is adapted for use in connection with interior and exterior decoration, balustrades, walks, statuary, foundations, columns, vases, pavilions, terraces, swimming pools, table and garden furniture, artificial stone, etc., etc.

Centrifugal Concrete Machine Company, 805 Corn Exchange Bank Building, Chicago, Ill., has something to say in a four-page folder which it has issued about a concrete block practically waterproof without the addition of any waterproofing compound and made by centrifugal force. The machine has a capacity for making 600 blocks, 8 x 8 x 16 in. in size, in a 10-hour day. The Centrifugal concrete machine is claimed to produce an artificial stone and is "simple in construction, rapid in operation and perfect in production, every stone having a great and equal density produced only by centrifugal force." The machines are made of cast steel, weigh 2000 lb., require about 5 horsepower, and can be operated singly or in pairs to advantage.

The National Mixer Company, Rochester, N Y., sets forth in an attractive catalogue the merits of the National self-measuring continuous mixer, heretofore known as the Hercules mixer. The mixer has a steel frame, iron wheels and a mixing drum of heavy sheet steel, hoppers of iron and steel, and a sheet steel housing for the engine. The claim is made that when running at full capacity the machine is practically noiseless, because of the perfect finishing of the working parts. The driving parts are geared directly to the shaft of the engine instead of depending on belts or chains and sprockets. Another feature is the force feed. In the bed of each hopper is a heavy iron plunger that slides back and forth, and anything placed in the hopper must go forward into the drum. The cement being located above the other aggregates, falls equally each way, and enters the drum at the same time, to be carried upward and forward by the deflectors, thus giving a thorough dry mix before coming to the water and preventing any lumping or balling of the cement. Numerous illustrations show the appearance of the mixer ready for use, and also with the drum removed showing the working parts. There are also many illustrations showing work under way, in connection with which a National mixer is being used.

Anchor Concrete Stone Company, Rock Rapids, Iowa, has issued an illustrated folder setting forth the merits of the Standard Anchor Machine, which makes blocks that lay in the wall 8 in. high and 24 in. long, and of widths varying from 8 to 12 in., according to requirements. The machine is equipped with five sets of face plates, and also has extra plates for fractional blocks and for corner return blocks. All blocks are bound together in construction with 4¼ in. galvanized iron rods, 8 in. long, and turned 1 in. at each end. The information given by the folder is of a nature to interest builders and contractors generally.

A leaflet sent out by the Ballou Manufacturing Company, Belding, Mich., illustrates and describes the "Little Giant" concrete mixer. It is stated that where bank gravel is used with cement the Little Giant two-hopper mixer meets all requirements, and stone, sand and cement may be used by shoveling the stone and sand in approximately correct proportions into the sand hopper. The mixer will then automatically proportion with the cement. A maximum output of 15 yards per hour may be obtained, or less than half that amount, according to the setting of the gates. The power is transmitted from the engine by a straight belt, thence by bevel gears to the drum shaft. The power is furnished by 2½-horsepower Marvel non-heating gasoline engine, and the total weight of the outfit is 1500 lb.

R. M. Rodgers & Co., 173 Washington avenue, Brooklyn, N. Y., has issued a four-page folder relating to the Excelsior dumb waiter, which they have placed on the market. The statement is made that the machinery is absolutely self-retaining; that is, any load placed on the car cannot move unless the operating rope is pulled. The guiding sheaves are contained in special iron hangers, which fasten to the same timbers as the machine proper, thus insuring a true running of the rope. The car is of seasoned hardwood and is shipped "knocked-down." The sides are dadoed to take the top and bottom. The shelf cleats are fastened in place and the shelf is ready to hinge. The car is easily put together to fit any ordinary size opening. The company also manufactures a large variety of elevators, sidewalk hoists, hatch doors, invalid lifts, safety appliances, etc.

The Diamond Concrete Machinery Company is now rapidly becoming established in its new plant at Cardington, Ohio, where it enjoys facilities by which it is able to turn out its automatic adjustable wet-process block machines in a manner to more promptly meet the requirements of its trade than has heretofore been the case. The new plant is thoroughly equipped with all necessary modern machinery, which is operated by a powerful gas engine. The company gives employment to a large force of skilled machanics, and its machines are now turned out under the personal supervision of those connected with the concern. A complete line of concrete machinery and molds is being added, and the concrete worker will be able to obtain on short notice all supplies required.

"A Treatise on Hardwood Finishing" is the title of an interesting 32-page pamphlet, sent out by the Tousey Varnish Company, 193 Michigan avenue, Chicago, Ill. The matter contained within the covers of this little work is of an interesting nature for the cabinet maker, the painter and the builder, and those who desire a copy can doubtless procure one by making application to the company in question.

Albert E. Palmer & Sons, Owosso, Mich., have issued a 20-page pamphlet illustrating and describing the Palmer Gluing Clamps for all branches of woodworking. These are made under different patents, the most recent being one granted last year covering certain features of the manufacturers' perpetual revolving clamp, for which strong claims are made. These clamps are adapted to a variety of work, are strongly made, and represent the results of thirty years' connection with woodworking plants.

The last issue of the Advocate, published by the Cortright Metal Roofing Company, 50 North Twenty-third street, Philadelphia, Pa., in the interests of the roofing which it manufactures, contains the usual amount of valuable comment relative to the subject in question. The issue is illustrated with half-tone engravings showing several buildings in the South covered with Cortright metal slates. One of the interesting features of the issue is an article entitled "What a man in a town can do," reference being made to the results accomplished by a local contractor who in a very short time built up a fine business in the company's product.

The Building Age

NEW YORK, AUGUST, 1910.

A Rustic Bungalow in Eastern Pennsylvania

AN excellent example of the rustic effects produced by the use of field stone in building construction is presented in a bungalow erected at Henryville, in the extreme eastern section of Pennsylvania, not far from Stroudsburg. The illustrations which are here given afford an excellent idea of the manner in which the native stone has been utilized for walls and porch columns as well as for the chimney and open fireplace. The plan shows the general arrangement of the interior, while the sectional view indicates the construction employed. The last picture of the series represents the interior of the living room, with its columns made of native trees with stumps of the branches left thereon to serve as hat and coat hooks, and its rustic furniture constructed of limbs of trees. The paneling of the walls is also produced by the clever use of the native woods in their natural state.

View of Bungalow, Looking toward the Living Room and Front Chamber.

A Rustic Bungalow in Eastern Pennsylvania.—Designed by the Owner and Built by A. Y. Hoffman, East Stroudsburg, Pa.

The building is 30 x 54 ft. in area, with an extension on the end 12 x 18½ ft. and on the rear an extension 15 x 30 ft., which is used for kitchen, servant's room, bath room, etc. The building is only one story high, with the front or main portion of the house built of native stone gathered from the place. There is no cellar under the bungalow, but the excavation for the foundation walls was made 2 ft. 4 in. wide and 3 ft. 6 in. deep below grade line and then filled up with small loose stone to within 6 in. of the top of the natural ground. From this point the foundation walls 2 ft. wide were carried up to the line of the floor joist. From that point it was dropped back on the inside to an 18-in. wall.

All stone work is laid in cement mortar to render it a first-class job and to produce a rustic effect. The door sills as well as the window lintels and sills are of native field stone 4 in. thick. The fireplace as shown on the plan is of the same native stone and lined up to the throat with common red brick. It is provided with patent fireplace damper. The flue for the kitchen range is built in the jamb of the fireplace and is carried up separate to the top of the chimney. The chimney on the end of the house is made of brick and topped with creek cobbles.

The rafters are 2 x 8 in. placed 2 ft. on centers. These are covered solid with 1 x 10-in. surfaced hemlock boards, upon which are laid No. 1 white cedar shingles. The roof of the open porch at the rear, which is used as a dining room, is covered with Genasco two-ply roofing. The rafters for the front porch are round birch poles with the bark left on. The inside of the stone walls is sheathed up and down with 1 x 10-in. hemlock boards surfaced on the inside and with white birch poles about 2 in. in diameter ripped and nailed over the joints. The partition between the living room and the chambers is double boarded with birch strips over the joints, this being the treatment of all other partitions as well.

The bottom edge of all rafters as well as the bottom edge of the two cross beams are covered with birch strips. The two large posts in the center of the living room are buttonwood trees 12 in. in diameter and extend to the ridge of the roof, with the limbs left on from 18 to 24 in. long. The two posts and grille work between living room and den are made with white birch poles with the bark on.

The floor joists are 2 x 10-in. hemlock placed 16 in. on centers. The girder under the center is 6 x 10 in. and the joists on each side of the girder are bridged with 1¼ x 2-in. strips. The porch girders are 6 x 8 in. and the porch joists 2 x 8 in. All floors of the bungalow are No. 1 North Carolina pine.

The kitchen, 15 x 30 ft. in size, is of frame, with 2 x 4-in. studding surfaced and covered outside with 1 x 10-in. shiplap beveled cypress siding surfaced on the inside and left rough outside.

The plumbing consists of one 5½-ft. iron-clad porcelain bath tub, an enameled iron basin with 14 x 17-in. bowl, a low-down closet, a sink in the kitchen 20 x 30 in., a set of stationary tubs, a 30-gal. galvanized hot-water boiler, a kitchen range, and a feed tank placed over the servant's sleeping room and holding about 300 gal.

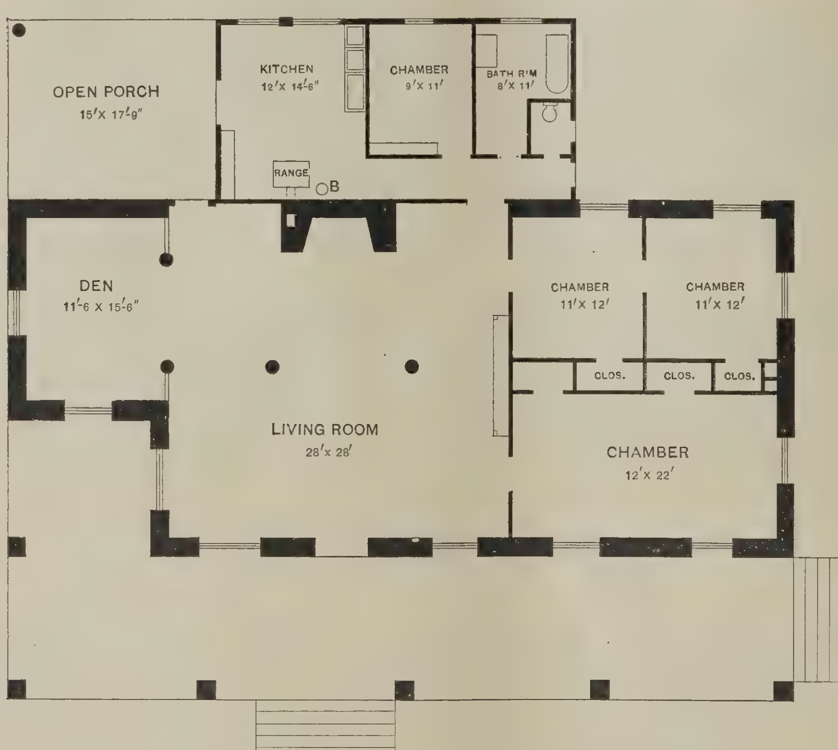
The hardware consists of heavy T-strap hinges and thumb latches for the doors, light T-strap hinges for casement windows and Zimmerman's sash adjusters with brass hooks on the inside.

The front door is double or "Dutch," having heavy strap hinges and heavy barn door thumb latch with Yale lock on the upper part. The door from the living room to the open porch is also of the "Dutch" order with glass in the upper portion, the hardware being the same as the front door except the Yale lock. The back kitchen and the hall have sash doors hung with strap hinges and fitted with rim lock and bolts on the inside.

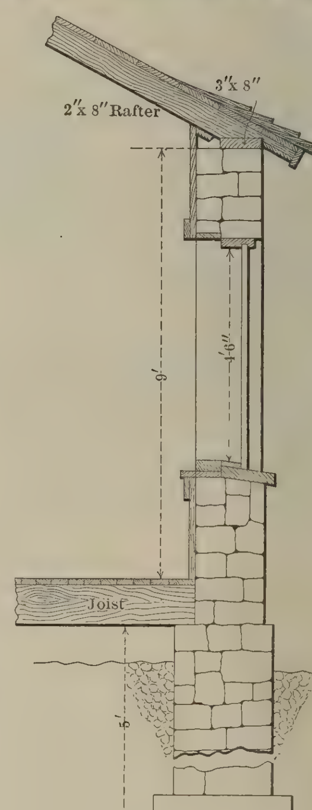
The only painting about the bungalow is the window sash and frames, outside doors and frames and the inside doors and casings.

This bungalow was built about two years ago at a cost closely approximating $3,000, the principal items

Front View, Showing Veranda, with Field Stone Columns and Rustic Terrace.



Floor Plan, Showing General Arrangement of the Rooms



Section Through Main Wall

A Rustic Bungalow in Eastern Pennsylvania.

being as follows: Excavation for foundation and piers, $33; mason work and tenders, $500; cement, $106; lime, $18; sand, $19; hauling stone, lumber, etc., $110; freight on material, $51; lumber, with sash, doors, shingles, etc., $1,175; white birch poles, $70; plumbing, $194; painting, $40; hardware and nails, $35; carpentry work, $450; brick for lining fireplace and flue, $27.

The bungalow is located at Henryville, Monroe County, Pa., and was built for Mrs. Ella L. Hawley, of East Orange, N. J., in accordance with her designs, by the contractor and builder, A. Y. Hoffman, of East Stroudsburg, Pa.

Concrete Foundations for Lumber Piles

One of the latest uses to which concrete has been adapted is for foundations for piles of lumber, experiments having demonstrated that the use of such foundations tends to improve the stability of lumber piles, leaves the yards clear of débris, thus making a better fire risk and at the same time involves a distinct economy. For something more than a year, the matter of using concrete foundations to support the piles of lumber in their yards has been made by Henry Ballou, superintendent for Cobbs & Mitchell, Inc., of Cadillac, Mich., and in a recent issue of *Hardwood Record* appears an account of the manner in which these concrete foundations are made. In the preparation of the mixture he uses four parts of bank gravel and one part of cement, making the blocks of the following sizes:

16 x 16 in.—4 in. thick.

16 x 16 in.—6 in. thick.

16 x 16 in. at the bottom tapering to 12 x 12 in. at the top, 6 in. thick.

12 x 12 in. at the bottom tapering to 8 x 8 in. at the top, 6 in. thick.

In making these blocks Mr. Ballou employs a plank platform made of dressed lumber laid on the ground on which the mixing is done, and a similar platform for moulding the blocks. These forms are made of dressed boards 4 in. and 6 in. wide, without any bottom to them, the forms being laid on the platform, filled with cement flush with the top edge of the forms and the surplus cement scraped off with a straight edge. As soon as the cement is firmly set the blocks are removed from the forms and stacked up for thorough seasoning before using them. It is well to paint the inside of these forms with common black lubricating oil, so the cement will not stick to them.

The bevel-shaped blocks will readily come out of the forms by turning them over, but the cement blocks with the straight edges are hard to remove without taking a hammer and drawing the nails slightly at one corner of the form. The forms for rectangular blocks could be hinged together at three corners and the fourth supplied with a hasp and staple, and readily be released from the concrete.

Mr. Ballou has discontinued using any planking for foundations, and is eliminating the use of timber for blocking as fast as it rots out. So far he has found the cement scheme very desirable. When the lumber is removed from the bottoms each time, he finds there is no rotten plank to handle, and his yards are much more acceptable as a fire risk, as there is no débris to catch fire from sparks that fall from the mill or locomotive smokestacks. The object in making the rectangular blocks in two thicknesses is for building the foundations, as sometimes a 6-in. block will be thicker than will be required for an inner foundation. Mr. Ballou arranges his piling bottoms to slope three-fourths of an inch to the foot in length of pile.

In mixing the cement for these blocks, the mixing boards can be located anywhere that is handy for the delivery of the gravel, cement and a supply of water, and then carried on tramway cars or lumber trucks to the points where they are to be used.

View in Living Room, Looking toward Chimney and Open Fireplace, with Doors to Bath Room and Sleeping Rooms in the Background.

A Rustic Bungalow in Eastern Pennsylvania.

WAGES OF BUILDING MECHANICS IN NEW YORK STATE

IN view of the general conditions prevailing in the building trades throughout the country at the present time and the variations which are to be noted in many of the leading cities, it is interesting to present the prevailing rates of wages in the different branches of this particular line of industry. As showing the wages paid in the leading cities of New York State and those which obtain in some of the leading cities scattered here and there about the country, we publish herewith a table in which the wage scale is compiled on an hourly basis and revised to May 1 of the present year. It was compiled for the New York State Association of Builders by its enterprising secretary, James M. Carter, and in comparing the figures presented in the table with those prevailing in the corresponding branches of trade during the last few years a number of rather marked changes are apparent. In practically every instance where a change has occurred it is in the nature of an advance and some are of a most decided nature. The table of wages sent out by the New York State Association of Builders is in the shape of a folder and constitutes a most interesting and valuable contribution to the literature of the current building business.

	Bricklayers.	Carpenters.	Cement Finishers.	Electricians.	Hoisting Engineers.	Laborers.	Lathers.	Painters.	Plasterers.	Plumbers.	Stone Masons.	Stone Cutters.	Steam Fitters.	Structural Iron Workers.	Sheet Metal Workers.
Albany	60	40⅝	60	43¾	3.00d.	22–32	50	43¾	60½	50	60	62½	50	37½–50	45
Amsterdam	55	45	50	37½	33½	17½–20	2.25M	28⅛–31¼	55	43	55	50	43	50	45
Buffalo	60	45	40	37½–43⅜	$21 wk.	22½–25	2.25M	37½–42½	55	50	55	50	50	50	37½–42
Elmira	50	30½	50	31¼–37½	...	17½	3c yd.	35	50	43½	50	50	43½	...	28
Ithaca	56¼	37½	...	...	...	17–22	...	37½	50	44	56¼	56¼	44	...	35
New York	70	62½	62¼	56¼	62½	37½	56¼	50	68¾	62½	57½	62½	62½	62½	56¼
Niagara Falls	60	45	50	37½	50	20–22¼	3½c yd.	31¼	50	43¾	55	50	43¾	50	43⅜
Olean	55-59	37½	35	30	...	20	3c yd.	35	50	30½	45	40	30½	...	35
Rochester	60	43¾	37½	43¾	3.00 d.	26–28	2.25M	41	60	50	60	57	50	50	40⅝
Troy	60	45	50	3.00 d.	2.50 d.	17½–25	50	42½	60	45	60	50	45	50	$3.00 d.
Utica	55	44½	55	37½	31¼	22–25	40	40½	55	40½	55	50	40½	...	50
Cleveland, O.	65	42½–45	40–50	50	...	25	4.00 d.	37½	62½	56¼	50	56½	50	60	37½
Detroit, Mich.	62½	35–40	35	43¾	30	25–28	45	35–40	60	50	50	50	50	40	35
Pittsburg, Pa.	65	50	35–50	50	50	20–25	47⅞	42½	62½	56¼	55	50	50	50	45 & up
Toronto, Can.	50	35	...	30	35	25–30	...	30	50	42½	50	50	42½	...	33
Grand Rapids, Mich.	60	35–45	...	35–45	...	20–25	...	35–45	50	50	40–60	...	50	...	35–40

THE WORK OF THE "STEEPLEJACK"

THE successful "steeplejack" must possess determination, perseverance and ingenuity. He must solve many a practical problem in hoisting great bodies aloft. He must know how to fasten a hook over the summit of a sky-scraping chimney. He must have the nerve to paint a steeple that sways like a pendulum at the slender top. He must be able to tear down, build up, gild, paint, place electric wires and do many another task that would be difficult enough on the solid earth, says a writer in *Harper's Weekly*. But a steeple is not the most difficult hight to climb. Straight, tall chimneys are the hardest of all. There a man has to work with might and main to lift himself inch by inch from the ground to the top. Sometimes the top is 300 ft. high. When it is reached a hook is placed over the edge, a pulley is made fast, the swinging chair is hauled up and work begins.

When the chair is near the top it is easier to work, because the ropes are short; but when they lengthen, as the ground is approached, there is a tendency to swing, and the wind gives impetus.

The steeplejack's safety depends upon the hook, and until he has raised himself almost to the top it is impossible for him to see whether or not the hook has been properly adjusted. More than once a steeple climber has seen, when within 10 ft. of the top, that corrosion of the iron and the collection of soot have so thickened the wall that the hook is merely balancing on the top, so that the slightest pull in the wrong direction would drag it off. Again, the bricks are often loose at the top, and the hook is likely to tear them away.

One of the natural difficulties to conquer is the swaying of all high steeples and chimneys. In a gale a steeple point will sway a foot and a half. Usually it sways from 7 to 9 in. Painting it means reaching for a spot on the right side, and finding it on the left, and, when making a dive for it on the left, to see it sway back to the right. Yet in spite of the constant danger a born steeplejack exults in his work, and is at home, like the iron worker on the skyscraper, only when high above the world. He can stand triumphantly at any hight, if he can have 2½ sq. in. to bear his weight.

Beams in "Genuine" Mill Construction

"Mill construction of the genuine kind," says F. W. Dean, of Boston, in a recent paper, "and that which the mutual insurance companies seek to encourage, and as far as possible the only kind that they will tolerate, contemplates the smallest possible number of large wood beams for floors and roof, all running in one direction, covered with thick plank. A floor system with bays so wide that beams running at right angles to the main transverse beams are required, is not mill construction and is not desirable. It is not desirable because it is complicated, the supplementary beams are likely to be supported by non-fire-resisting connections, and sprinkling is less effective and more difficult and expensive to install than with the genuine kind.

"Mill construction contemplates the use of wood beams instead of steel because in case of fire the latter when heated lose their strength and the floors fall with great loss to building and machinery. In the case of wood beams the fire is usually put out by sprinklers and otherwise before the beams lose sufficient strength to produce this result.

"The beams of wood floors are of long-leaf Southern pine or Northwestern pine, the latter being used only in the West, Northwest and Canada. The beams are usually planed on three sides and with the lower corners chamfered."

"FORM" WORK FOR CONCRETE CONSTRUCTION

By M. M. Sloan.

WITH the development of reinforced concrete construction, and the extensive use of cement work in building and engineering structures, there has arisen a demand for carpenters who understand the construction of wooden "forms and molds" for concrete work. A considerable percentage of the cost of a reinforced concrete building is in the construction of the wooden forms required for molding the beams, girders and floor slabs of the floor systems.

There has been little difficulty in determining the cost of manufacturing and placing the concrete and of bending and fabricating the steel used in the reinforcement of the concrete work, but the cost of the "form" construction has not been of such ready determination, as the work required was different from any that had heretofore been used in building construction. The difficulty did not exist in the nicety with which the work had to be done, but was because of the peculiar requirements of the wooden form construction. These requirements consisted of securing the necessary strength for supporting the wet concrete with a minimum use of material, and arranging it so as to get as smooth an appearance in the finished work as possible, and likewise so constructing it that it could be readily taken apart and used for the construction of other floors. A saying with those experienced in concrete construction is that the best form constructor is he who uses the least number of nails, and it will be found that the forms which are so constructed as to be held mostly with wedges and clamps are usually the quickest assembled and dismantled, and usually the cheapest to construct.

The carpenter engaged in the construction of forms for reinforced concrete work must have a good knowledge of the weight of the material which is to be supported, and must be thoroughly imbued with the dangers that may result from the improper construction or fastening together of his work. An investigation of the calamities that have occurred in reinforced concrete construction reveals the fact that in nearly every instance the collapse or partial destruction of the building has been due to either defective form construction or to the removal of the forms before the concrete has properly set.

The wooden forms, as frequently erected for reinforced concrete work, upon careful inspection, show a great many weaknesses and inadequacies, and the factor of safety which exists is surprisingly low. There are, however, several accepted types of forms for reinforced concrete construction which have survived the experimental stage and are being much employed, having evidently been found to be the least expensive and the most practical.

Before describing any of these, however, something must be said with regard to the material which is best for use in the construction of forms for molding concrete work. At first thought it would seem that the cheapest material which could be bought would answer the purpose for form construction, since it is to be discarded at the completion of the work, though it may be used for the construction of other buildings by the expenditure of considerable labor to get it in condition. This, however, is not substantiated in practice, as it is found that it pays to buy a good quality of wood, properly selected with regard to the conditions which it has to undergo when used in form construction. The kind of wood which is to be used depends entirely upon the locality and the prevailing stocks in the local yards. In the East it is customary to use for form construction a No. 2 yellow, North Carolina, or sap pine, free from loose knots, shakes and wane edges. There is much difference of opinion whether it is best to use well seasoned and dry lumber or green lumber, the argument being that by using green lumber the wood will not swell and cause the forms to warp and bulge. On the other hand, if dry lumber is used and is driven up tight it is apt to swell and cause bulging of the forms. Green lumber may give difficulty by drying out and shrinking if left to stand too long before the concrete is placed, thus causing rough joints and considerable

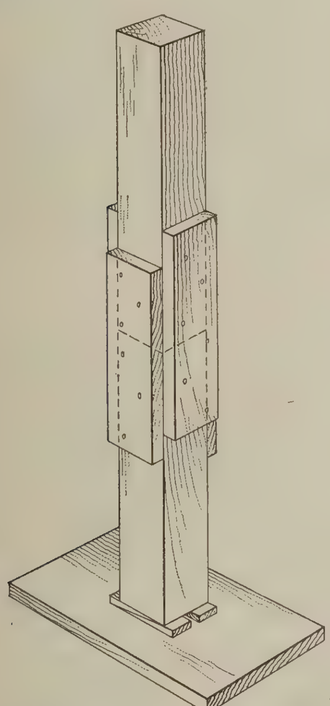


Fig. 1.—Showing How to Piece Out Studding

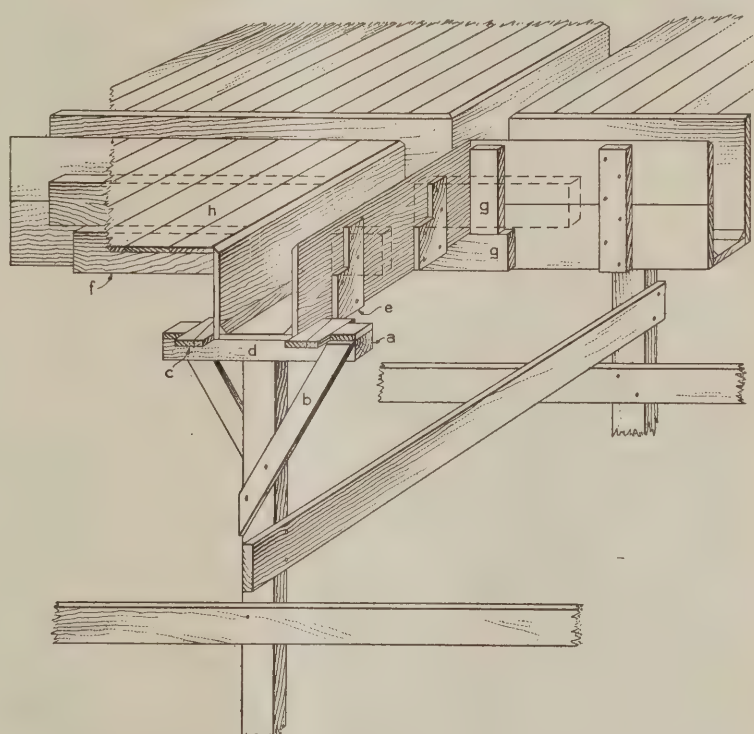
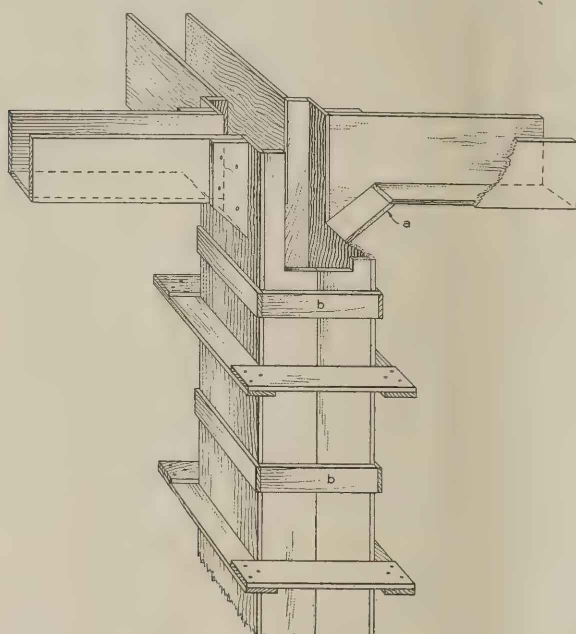


Fig. 2.—One Type of "Form" Construction Quite Commonly Used.

"Form" Work for Concrete Construction.

rough edges to be dressed down after the work is finished. In the writer's opinion it is best to use a natural and well seasoned material, taking care not to drive the work up too close, and to saturate the forms thoroughly several times before the concrete is placed. By doing this the best results are apt to be obtained.

The thickness of the material to be used in the form construction depends, of course, upon the designs of the forms and the distance apart that the supports are to be spaced. One-inch material dressed down to about seven-eighths of an inch should not be used to span a greater distance than 2 ft. 6 in., while 1½-in. material may be used on 3-ft. centers, and 2-in. on about 4-ft. centers. The standard practice in form construction



"Form" Work for Concrete Construction. Fig. 3.—Showing How the "Forms" for Columns Are Cut Out.

is to use 1 in. or 4/4 tongued-and-grooved dressed material for the construction of the centering for molding the soffit of the slab, and to employ for molds or forms for beams and girders 1½-in. or 2-in. dressed material. For the support of the forms any material sufficiently sound may be used and it is customary to employ 3 x 4 or 4 x 4-in. studding, this being properly braced by 1 x 6-in. ledger boards. Where the story is very high, then larger sized studding is sometimes used and it is not unusual to use 4 x 6-in. studding.

Second-hand material, if sound, can be used for the support of reinforced concrete forms. The contractors usually prefer, however, not to use material of this nature, as the cost of getting it into shape, sawing to length and patching soon consume the saving which might at first seem to exist. It is the practice, in supporting the form construction, where studding is used on different floors and the stories vary in hight, to piece out the studding as illustrated in Fig. 1. Unfortunately it is the practice not to observe that the ends of the studding are cut square, and quite frequently the supports for reinforced concrete form work are dangerous from the fact that the ends of the studding and the piece used to make the extension do not bear squarely and are only held from failure by the cleats nailed on the side. When an extension of this kind is made to the studding there should be cleats nailed on all four sides, though it is usual to find that one of these cleats has been left off.

Particular attention should be paid to the piecing out of the studs supporting the form work when they are used in the construction of the upper floors of an exposed building, as a combination of circumstances, such as a heavy wind storm with the wet concrete just placed, might cause a failure of the supports, resulting in a bad collapse with its accompanying loss of property, if not of life.

One type of form construction which is extensively used in reinforced concrete building construction is shown in Fig. 2. This method of building form work is extensively used in several of the large cities. From the illustration it will be observed that the studs supporting the forms have a cross piece of studding or plate resting across their top, as at *a*. This cross piece supports the bottom boards of the forms for the beams and girders and is secured by braces, as shown at *b*. Upon the top of this cross piece at the ends cleats are nailed so that when the form construction is erected the side form boards may be wedged tight against the bottom form boards by wedges, as at *c*.

The studding shown in the illustration is usually of 4 x 4-in. material, and the bottom form board of the beams and girders, as at *d*, is usually of 1½-in. dressed material, though sometimes 2-in. dressed material is used, the sides of the forms being of boards of the same thickness. Where the beam is only 12 in. in depth it is customary to use a single board on the side, but where the beams or girders are 16 or 18 in. in depth, then two or more boards running lengthwise of the construction are employed. These are cleated together, being cut to length, the cleats being nailed on before the sides of the forms are put in place. These cleats, shown at *e*, are cut out and act as a support for the 2 x 6-in. joists which support the form boards of the slab, as shown at *f*. Intermediate cleats are used between the cleats supporting the joist carrying the slab. Where the beam forms intersect with the girder forms the sides of the forms of the girders are cut out and this cut-out is reinforced with cleats on the side


Fig. 4.—"Form" for an Exterior Reinforced Concrete Column in Position and Braced

and on the bottom, as at *g*, to act as stiffeners and to support the beam form.

The centering for the slab panels are put up in sections and cleated together, and where the reinforced concrete work is properly designed the panels between the beams are of uniform size, so that these battened form boards may be used in the construction of several floors.

The form boards for slab construction shown at *h* are generally made of tongued-and-grooved material of four-quarter or five-quarter dressed yellow pine flooring, surfaced on one side.

The principal advantage in the construction of the forms shown in Fig. 2 is that it is possible to take away the side forms of the beams and girders and drop the centering of the slab, leaving the bottom boards of the beams and girders in place supported by the studding. This insures the safety of the structure, for while the concrete may have been assumed as having sufficient strength for the slabs to carry their own weight, it is advisable to leave the supporting studs

"Form" Work in Concrete Construction. Fig. 5.—"Form" for Column and Showing Stud Supports for Bottom Form-Board of Large Girder.

under the main construction for a period of a week longer at least to entirely avoid any danger of a collapse.

It will be noticed in Fig. 2 that bevel strips are placed in the corners of the forms to make a chamfer in the concrete work, and it is the best practice to do this, as otherwise a sharp corner in the concrete will stick in the form and cause a bad appearance in the work, requiring patching and dressing after the work is completed. Also the top edges along the intersection of the slabs and beams are beveled so as to provide a beveled corner in the slab panels. This likewise assists in releasing the forms from the concrete.

Usually with this form of construction the forms for columns are cut out, as shown at *a* in Fig. 3, and where the bracket occurs between the beams, girders and columns the cut-out in the boards forming the column forms must be made to allow for the formation of this bracket.

The arrangement and method of tying in the column forms shown in Fig. 3 are used to a considerable extent. It will be noticed that the batten boards *b b* are nailed to the planks of the form construction and secure them together. The four sides of the column form are tied together at close intervals by 1 x 6-in. cross pieces nailed where they cross at the corners. Such ties as these are not of great strength, and consequently they must be used not further apart than 2 ft. 6 in. for columns of ordinary hight, and should be used closer together near the foot of columns, when the hight is 18 or 20 ft., as the hydrostatic pressure of the wet concrete becomes very great in a high column, and is liable to burst the forms and let the concrete out, causing considerable loss of time and material.

The more secure way of tying in column forms is illustrated in photograph Fig. 4. This shows the form for an exterior reinforced concrete column just having been placed in position and braced. The ties of the column form consist of 4 x 4-in. studs bored through at the ends and the two opposite studs secured by ⅝-in. bolt. In this construction the space back of the bolt is blocked up and wedged as illustrated. Sometimes the ties of the forms are reversed, so that the sides upon which the studs occur alternate. In this way the form is stronger than when constructed as shown in the illustration. In putting up the column forms it is always well to brace them in two directions by braces or stiff legs nailed to the forms and secured to piles of material, or to the floor construction.

The construction of the forms for this column is again shown in Fig. 5. This figure likewise shows the stud supports for the bottom form board of the large girder spanning the front of the building. This girder has been faced up with terra cotta, the concrete having been run into the terra cotta and the entire mass becoming monolithic.

It will also be noticed that the cross pieces at the top of the studs are extended considerably beyond the building line. This is done so as to get a support for the scaffolding and also to brace the back of the form against which the terra cotta was placed, the forms having been removed.

Fig. 6 is interesting, as it shows the column form in position with the braces for the form temporarily secured by cross pieces nailed upon the top of them. This is done before the boards finally securing the forms are put in place. It will also be observed that the column form is arranged with a small opening at the bottom, which allows the form to be cleaned out of chips, shavings and other scraps of material which may drop down in the course of construction.

Observation of this illustration will show also the method of starting the form construction; that is, by

Fig. 6.—The Column-Form in Position, with Braces Secured by Cross-Pieces

erecting the studs and of putting the plate or ledger boards across the top. These run continuously and support the cross pieces, which carry the beam forms, and also act as supports for the girder forms. The forms having been braced, are lined and leveled by intermediate studs which are wedged in place. Also notice that under the large girder spanning the building, this being a roof girder tapered on top, two studs are placed directly beneath the girder side by side. This should always be done where the girders are of considerable span and heavy construction. In all instances the studs are secured in place by small cleats nailed to the sides of the studs and nailed to the continuous plates.

LOW COST DWELLING OF MODERN CONSTRUCTION

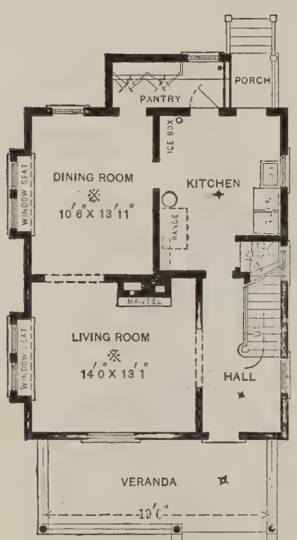
THE plans, elevations and details presented herewith relate to a house designed to suit the requirements of a small family and is intended for erection upon a site of limited dimensions. In localities where land for building purposes is held at high figures, the site is a most important consideration when dealing with the home-building problem. The house here shown is constructed in the manner usual for frame dwellings and is submitted as being of interest to the correspondent recently making inquiry for designs of low-cost houses.

According to the specifications of the architect, W. H. Higginbotham, 353 Walnut street, Yonkers, N. Y., all framing timber used in connection with the work is No. 1 well-seasoned spruce of the following dimensions: The first and second story joists are 2 x 9 in. placed 16 in. on centers; rafters and second story ceiling joists are 2 x 6 in. placed 18 in. on centers. The post and sills are 4 x 6 in.; the girders 6 x 8 in.; the studding 2 x 4 in., the latter being placed 16 in. on centers. The ribbon strips are 1¼ x 5 in. and the floor bridging 1¼ x 3 in.

The exterior frame of the building is covered with ⅞ x 8-in. yellow pine shiplap; the roof and exterior walls of the building are covered with white cedar shingles, those on the walls being stained a brown with the outside finish painted white, while the shingles of the roof are green.

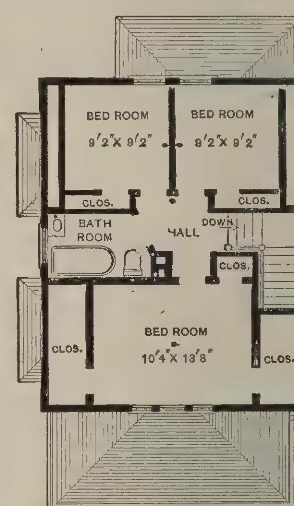
On entering the house from the front veranda one finds at the left of the hall a large comfortable living room, with a broad window seat lighted by a double window. The trim is of chestnut stained a dark brown. The size of the room with its mantel and several windows render it a most attractive part of the house. The dining room, which is connected with the living room by an archway, is finished in chestnut and has the same style window seat as the living room. From the dining room the kitchen may be reached through a door opening directly into the latter or by means of the pantry, according to requirements. The kitchen is of convenient size for the purpose and can be well ventilated in summer by a cross current of air between the pantry and kitchen windows as well as by the rear outside door. The sink and tubs are located near a window, thus giving plenty of light. The pantry contains ample counter space, cupboards, drawers, shelves, etc., with a large roomy china closet above. This portion of the house is finished with North Carolina pine floors and trim.

The stairs leading to the second floor rise to a landing, from which they turn to the left and reach the second floor, thus avoiding the ungraceful appearance made by a straight flight.



First Floor

Front Elevation—Scale, ⅛ In. to the Foot



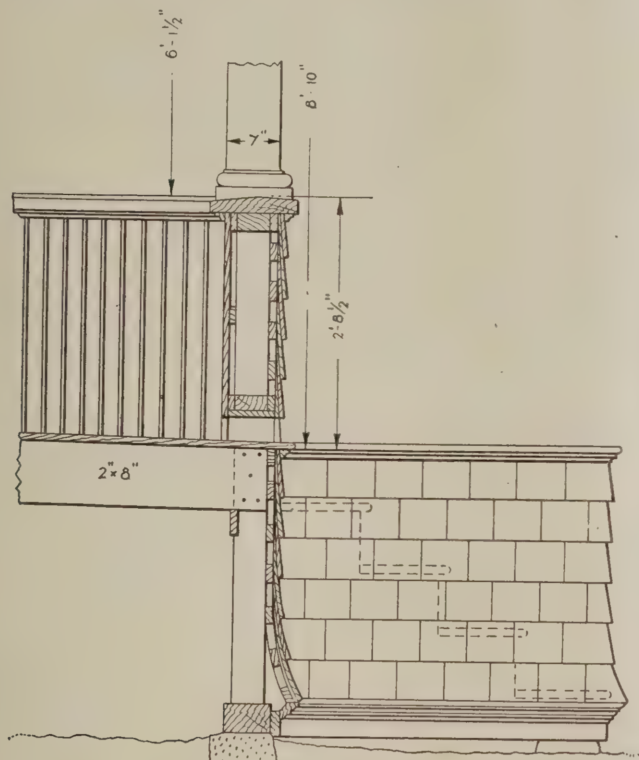
Second Floor

Low Cost Dwelling of Modern Construction.—Floor Plans.—Scale, One-Sixteenth Inch to the Foot.—W. H. Higginbotham, Yonkers, N. Y.

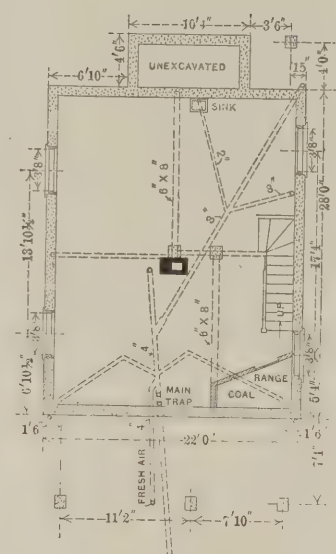
On the second floor are three sleeping rooms and bath, the latter opening directly off the hall, and is easily reached from either of the sleeping rooms. It is amply lighted and ventilated by the large dormer window. The front chamber extends practically across the entire front of the house, the spaces under the roof at the right and left being used for trunk closets. The rear sleeping rooms are of smaller dimensions and are intended for one-half or three-quarter beds.

The house is equipped throughout with up-to-date plumbing fixtures of the Standard Sanitary Company's make. The kitchen sink is of cast iron, white enameled, measures 20 x 30 in. in size and is connected for hot and cold water supply, use being made of ¾-in. galvanized iron pipe. The laundry tubs placed where shown on the plan are of the double compartment type, made of soapstone, fitted with hardwood covers hinged at the back and with brass plugs, strainers, hot and cold water and waste connections. The kitchen also has a No. 88 Boynton's Newport coal range connected with a 35-gal. galvanized iron boiler by 1-in. seamless-drawn brass pipe.

The bath room is equipped with a 5 ft. 6 in. porcelain enameled tub, an 18 x 24-in. cast iron white enameled one-piece apron lavatory with 12-in. back, also a low-down tank, siphon-jet water closet. The bath tub has nickel-plated waste and overflow, hot and cold water supply through ½-in. nickel-plated brass pipes and is fitted with a No. 4½ Fuller patent double bath cock. The water closet has a 6½-gal. copper-lined tank of quarter-sawed oak, highly polished, connected with a ⅜-in. nickel-plated brass supply pipe. The bowl is of siphonic action and is made of English vitreous earthenware, fitted with a quarter-sawed oak seat and lid. The lavatory is connected with hot and cold water



Details of Front Veranda—Scale, ½ In. to the Foot.

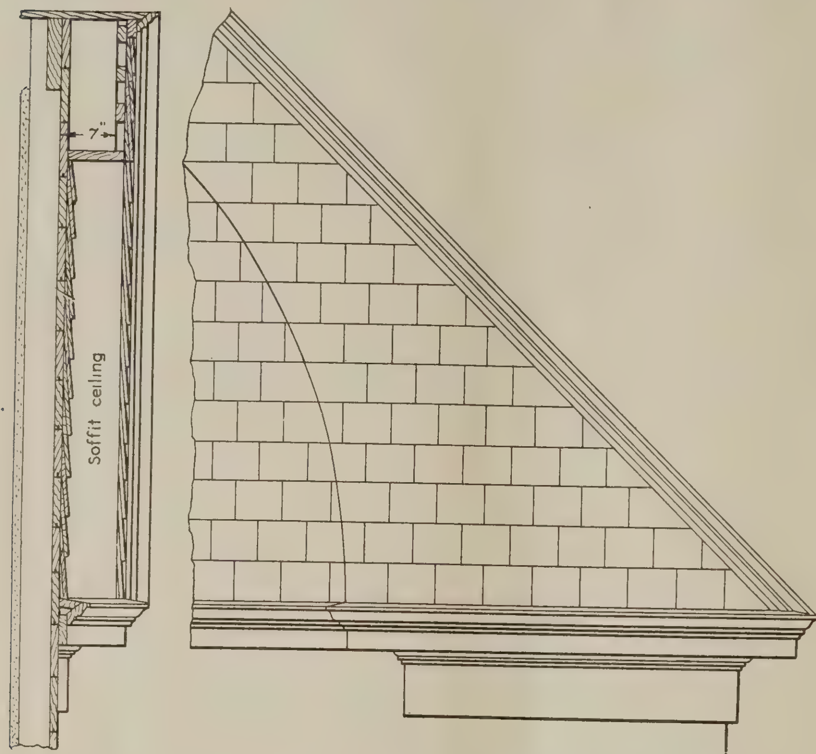


Foundation—Scale, 1/16 In. to the Foot

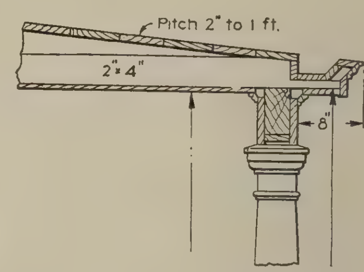
Side (Left) Elevation—Scale, ⅛ In. to the Foot

Low Cost Dwelling of Modern Construction.—Elevation and Details.

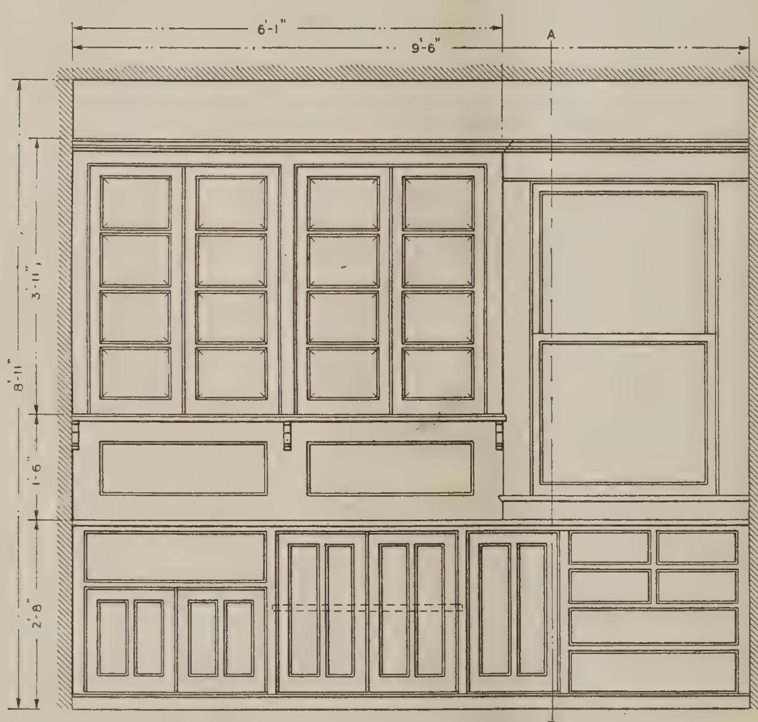
supply through ⅜-in. nickel-plated brass pipes fitted with Fuller patent lever faucets. Such a house as here shown would cost in the neighborhood of $2,500 in this section of the country.



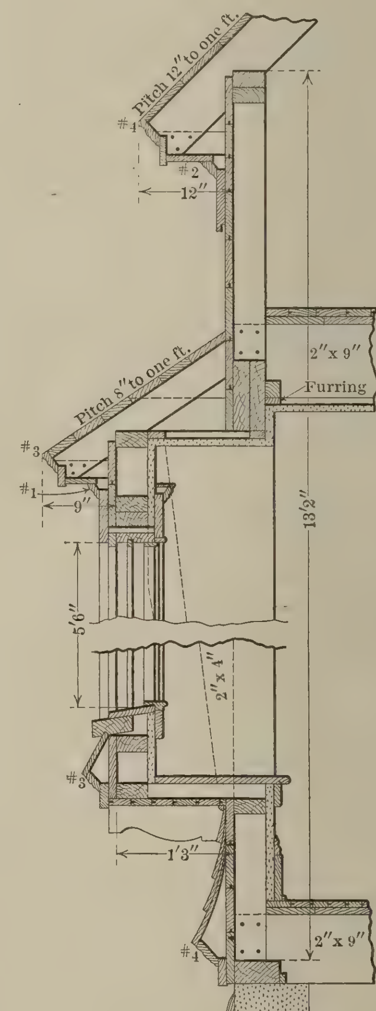
Section and Partial Elevation of Front Gable—Scale, ½ In. to the Foot



Veranda Cornice—Scale, ½ In. to the Foot



Details of Pantry Dresser—Scale, ⅜ In. to the Foot



Vertical Section through Window Seat and Main Cornice of Living and Dining Rooms—Scale, ½ In. to the Foot

Miscellaneous Construction.—Details of a Low Cost Dwelling of Modern Construction.

Employers' Liability

At the recent annual convention of the National Association of Master Plumbers, at Chicago, President De Leon, of the Casualty Company of America, said that the day is not far distant when employers' liability, or some form of compensation insurance, will be as indispensable as the tools of the trade.

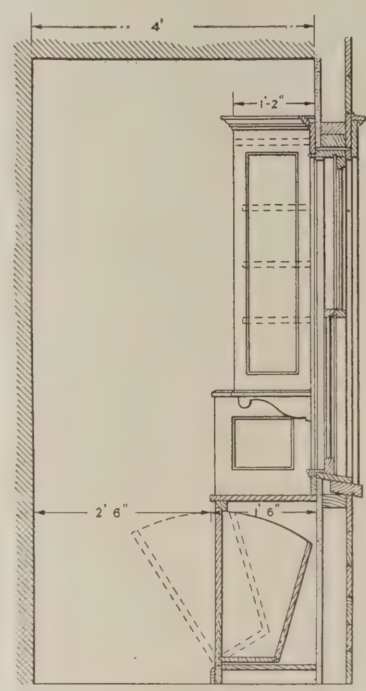
"The doctrines of fellow servant, contributory negligence, and assumption of risk have no place in our economic system, and have been either modified, abridged, or abolished altogether," he said. "The introduction of complicated and hazardous machinery, the subdivisions of labor into various departments or branches of the same industry by the commercial combinations of the present time, and the almost universal change from the individual employer to corporate control by the great 'Captains of Industry' have affected radically the relation of employer and employee, and have created a situation far removed from the comparatively simple conditions that existed when the common law doctrines were first established.

"One conspicuous result of these changes is found in the large field for litigation, which means a display of the subtleties of lawyers and of sympathy by juries in the effort to determine the liability of the employer, and the remedy of the employee. Such a system is necessarily expensive and uncertain, and it is now almost unversally conceded to be unsatisfactory to employer and employee alike. To offset this situation and following the trend of the times two of our great States, New York and Ohio, have recently placed upon their statute books new laws imposing upon employers of labor a greater and wider responsibility for accidents to employees than has ever before been attempted in this country.

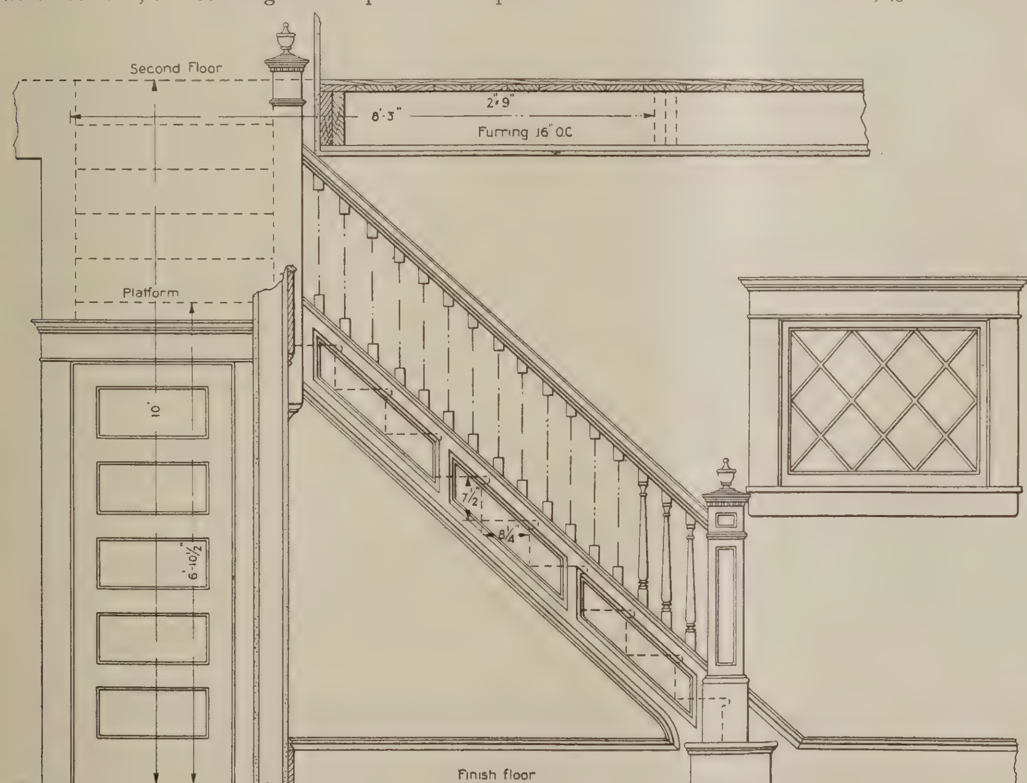
"No member of this association can afford to carry his own risk in these two States in future, but must immediately secure the protection given by liability insurance. Similar legislation is pending in Minnesota and Wisconsin, and the day is not far distant when employers' liability, or some form of compensation insurance, will be as indispensable in your business as the tools of the trade.

"It would, of course, be highly desirable to have uniform State legislation regarding questions affecting labor and its relation to employment. This is extremely difficult to accomplish, however, owing to the difference in local conditions and consequently in local public opinion. The States that are newer in manufacturing and industrial growth are not so ready to approve of legislation that has been enacted and is readily enforced in older States. We may assume, however, that the difficulty of securing such uniform State legislation, while serious, is not altogether hopeless or impossible."

"The law holds you strictly accountable for injuries to your employees resulting from your negligence or that of any superintendent, foreman or other person

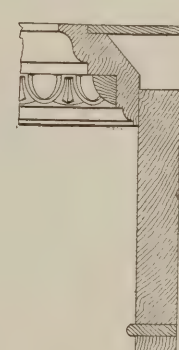


Vertical Section of Pantry Dresser on Line A-B of the Elevation—Scale, ⅜ In. to the Foot



Details of Main Stairs—Scale ⅜ In. to the Foot


Profiles of Various Moldings—Scale, 3 In. to the Foot


Detail of Door and Window Head Scale, 3 In. to the Foot

Miscellaneous Details of a Low Cost Dwelling of Modern Construction.

Concluding his remarks, Mr. De Leon said that the plumbers' association, through the enterprise and foresight of its president, effected a favorable arrangement nearly a year ago, whereby every member of the association was enabled to secure the benefit of employers' and public liability insurance under a broader form of contract and at a considerably lower rate of premium than was ever before offered to the members by any casualty insurance company in America.

in superior authority," he said. "You cannot escape or evade this liability."

PLANS HAVE JUST BEEN COMPLETED by Architects Warren & Wetmore, 3 East Thirty-third street, Manhattan, N. Y., for a $125,000 country house to be erected at Little Neck, Long Island, N. Y., on Huntington Harbor, for William K. Vanderbilt, Jr.

Building Operations in the United States in 1909

According to statistics compiled and just issued by the U. S. Geological Survey, building operations in 1909 represented expenditures of $930,520,713. A comparison of increases and decreases of the operations of 1909 with those of 1908 is held to be unreasonable, because, it is said, 1908 was not a normal year. However, Chicago, which led the increase in 1908 with a little more than eight million dollars, was second in 1909 with an increase of more than twenty-eight millions. New York, which was second in 1908 with an increase of a little more than four millions, led the list for 1909 with sixty-eight millions. Brooklyn, which had reported a decrease of more than twenty-five millions in 1908, came third in the 1909 increases with a growth of $18,402,061.

Of the cities that showed decreases in 1909, San Francisco had the largest, $5,484,273, or 17.32 per cent., the total operations being $26,184,068. Dayton was next, with $1,533,780, or 47.45 per cent., the largest proportional decrease, and Oakland was third, with $1,002,051, or 15.85 per cent. The decreases in these cities may be ascribed to local causes.

New York in 1909 had the greatest number of new buildings; Chicago took the lead in stone structures. She also led in concrete buildings, which were reported to be 1791 in number in 79 of the 128 cities reporting, a considerable gain, which is taken to show the growing use of that material.

Seattle had the largest number of new wooden buildings erected. Chicago, however, built wooden buildings which cost more, and they alone were valued at more than thirteen millions, while Seattle, first in numbers, was third in values. Reading, Pa., was the only city that reported no wooden buildings erected.

New York reported the construction of fire-resisting buildings at a cost of $181,918,337; Chicago was second with a cost of $79,105,500; Brooklyn third, $54,-658,721; Philadelphia fourth, $42,570,770; St. Louis fifth, $22,422,929, and San Francisco sixth, $13,124,987.

The average cost of new fire-resisting buildings in the fifteen cities reporting the greatest cost for this class ranged from $3,151 in Philadelphia to $65,384 in New York. In new brick buildings Brooklyn was second, Chicago third and Philadelphia fourth. In stone buildings New York was second and San Francisco third. In concrete buildings Seattle was second and Philadelphia third.

The numbers of permits issued in 51 cities increased from 174,594 in 1908, when there was a decrease from 1907 of 12,851 to 213,498 in 1909, a gain of 38,904, or 22.28 per cent. The number of permits or buildings does not seem to bear any definite relation to the cost of the operations, and several cities showing increases in cost of buildings showed decreases in number of permits or buildings, while some of those showing decreases in cost showed increases in number of permits or buildings.

The average cost of operations under the total permits issued in 51 cities was $3,616 in 1909, against $3,243 in 1908. In New York the average cost per building was $24,387 in 1909, against $19,305 in 1908; in Chicago it was $4,341 in 1909, against $6,327 in 1908; in Brooklyn $4,672 in 1909, against $4,259 in 1908; in Philadelphia $2,450 in 1909, against $2,107 in 1908; in San Francisco $4,536 in 1909, against $4,706 in 1908.

For the first time an attempt was made to collect statistics of the building operations by character of buildings and also by additions, alterations and repairs to each class of buildings. Figures reported from 128 cities gave details showing the kinds of buildings erected and the additions, alterations and repairs to each class of buildings under 264,536 permits at a cost of $903,385,954, the new buildings constituting 90.3 per cent. of the cost and the additions, alterations, and repairs 9.7 per cent.

Of the cost of these new buildings 73.24 per cent. was for fire-resisting buildings and 26.76 per cent. was for wooden buildings. Of the total cost of additions, alterations and repairs, 65.55 per cent. was for fire-resisting buildings and 34.45 per cent. was for wooden buildings. The average cost in 1909 for new wooden buildings was $2,269; for new brick buildings, $9,522; for stone buildings, $11,679; for concrete buildings, $17,999, and for miscellaneous fire-resisting buildings, $63,890.

Rapid Concrete Construction

Something like a record for speed of construction has been established in the erection of the Manufacturers' Home Building, Vancouver, B. C., the structure having been erected from the water's edge to a hight of 103 ft. in 118 days. There are about 14,500 sq. ft. of floor area per floor. The floors are designed to carry a live load of 175 lb. per square foot, the concrete slabs being carried on shallow concrete beams and girders, which are in turn carried by hexagonal columns heavily reinforced to cut down their sizes to a minimum. The entire floors were finished as the work progressed from floor to floor and were immediately covered with lake sand to protect them from being marred. The building piers rest on clusters of piles; the largest columns in the basement are 28-in. hexagons; the smallest columns in the last story 10-in. square.

The Value of Pintles

In a recent paper on mill construction, Mr. F. W. Dean, of Boston, says of the use of cast iron pintles on wood columns: "There is another important object gained by the use of pintles instead of having the columns butt full size against each other, and that is this: in case of fire sometimes a floor falls and it, or falling machinery, may push the columns below to one side, and pry the beams of the lower floor horizontally, thus forcing the walls of the mill out of place and probably causing that floor to fall also, by causing the beams to drop off the columns or beam boxes, to say nothing of the injury to the walls themselves. When cast iron columns are used, pintles should be used for this reason if for no other. The old-fashioned way of having columns rest on top of beams, and especially when short pieces of beams to spread pressure are used on top of columns is bad construction. Likewise it is bad to butt wood columns end to end because of the difficulty of supporting the beams at the columns, aside from the objections already mentioned."

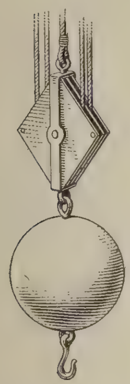
Announcement is made that in the competition for the million-dollar municipal building for Oakland, Cal., the designs submitted by Palmer & Hornbostel, of New York, were chosen. The firm will receive a prize of $5,000 in addition to their compensation as architects of the building in question. The building will be 10 stories in hight and will provide accommodations for the police, fire and tax departments.

An English firm of engineers and geologists has reported the existence at the bottom of certain lakes in Norway of between 200,000 and 300,000 tons of dry Kieselguhr—a fossil substance composed of silicious skeletons of minute animal and vegetable life. It is claimed to be proof against fire, acids, frost and vermin. It is used in Norway as lining for floors, ceilings, etc., as a protection against cold.

AN IMPROVISED IRON OR STONE SETTER'S DERRICK

BY OWEN B. MAGINNIS.

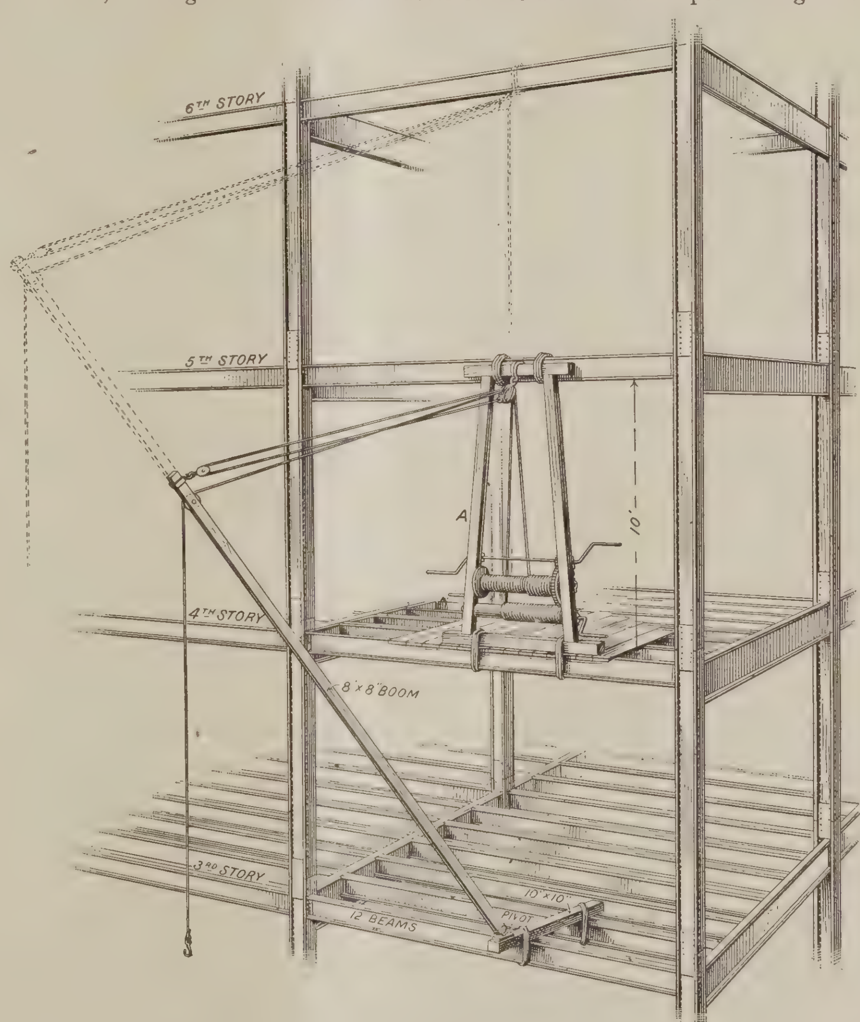
EXISTING high building construction calls forth much skill and ingenuity on the part of mechanics engaged in the work in order to properly cope with any exigency likely to arise during the progress of a building. It is almost always the case that in building up the masonry which encase the front portion of the steel frame of a building an improvised stone setter's derrick is used for lifting to their proper position the blocks of stone which form the facade of the structure. An example of this kind is shown in the sketch presented herewith, which represents the stone setter's derrick in use on the new 18-story Woolen Merchants' Exchange Building, located at the northeast corner of Fourth avenue and Eighteenth street, Borough of Manhattan, N. Y.



As it would obviously be impossible to set the higher stories of stone ashlar with the ordinary iron and stone frame derrick shown secured to the iron girders at two-floor levels even after working from the sidewalk platform, some means had to be devised to set the masonry at the third, fourth and fifth stories, the result being the system of combined frame and boom derrick improvised by the method clearly illustrated in the sketch.

The boom swinging from left to right and *vice versa* is set on a steel pivot which works in a malleable iron shoe placed in a 10 x 10-in. yellow pine timber. The arrangement is such it may be hung and regulated as to hight and position of the wire rope fall and hook either directly from the framed derrick, which is lashed with ¾-in. hemp rope to two succeeding tier front beams in the manner indicated, or by a block lashed to the front beams on one or two floors above, according to the length of the boom.

It will be noted that this form of improvised derrick has a double value, for not only can it be employed for setting stone or iron, but it can be adjusted to hang over the loaded wagons on the street and the material immediately lifted off and set, thus economizing in time, labor and handling. Taking it altogether as an extemporized appliance, it is one of the most ingenious and original we have yet seen employed in connection with building operations of this nature.



Partial View of Steel Skeleton Frame Work of a Building, Showing Arrangement of Derrick for Iron or Stone Setters' Use.

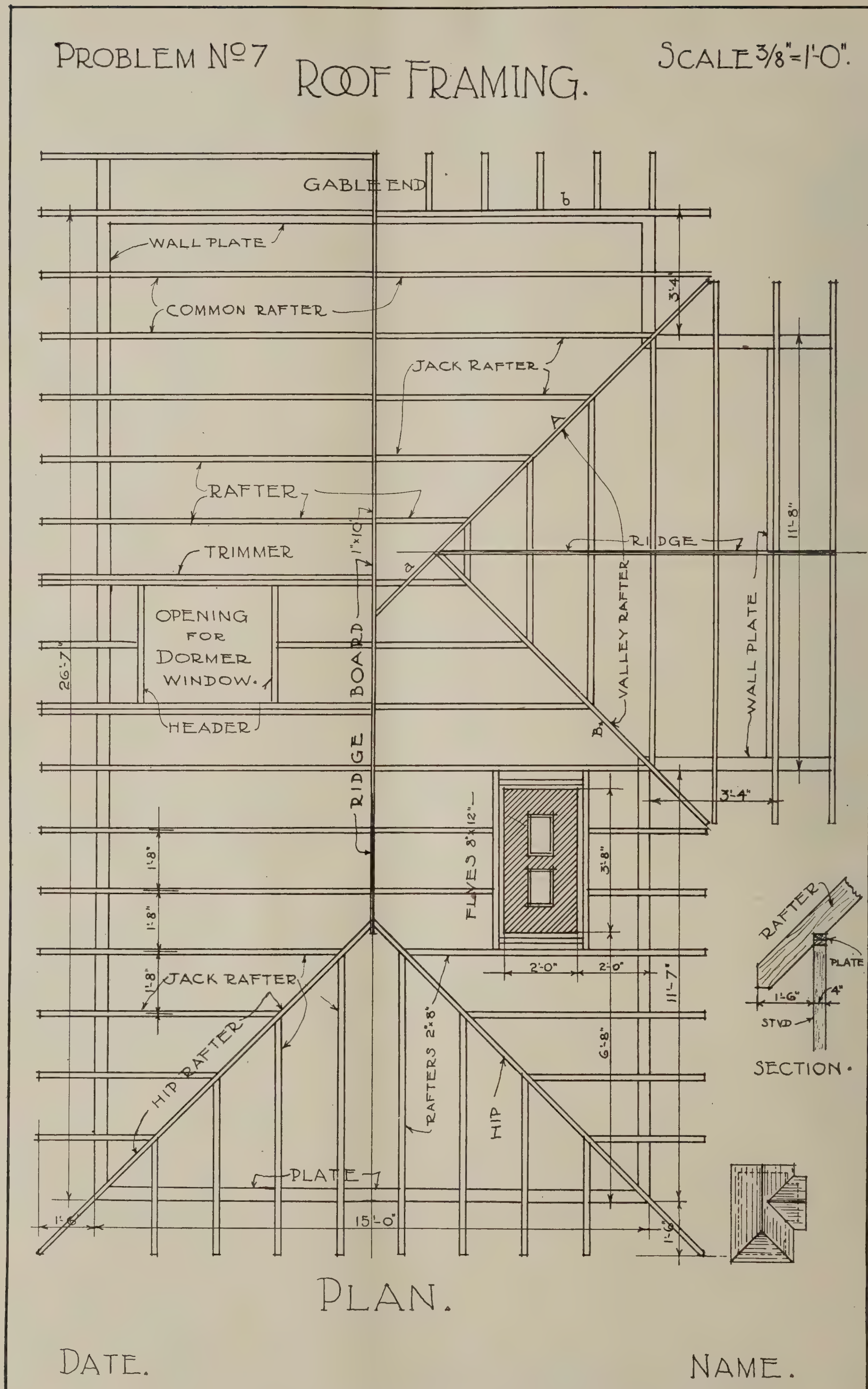
An Improvised Iron or Stone Setter's Derrick.

A Fireproof "Country House"

One of the largest fireproof country houses ever erected in that section is now about completed at New Brunswick, N. J., the house standing on a heavily-wooded plot of ground overlooking the Raritan River. The walls, floors and partitions are of hollow terra cotta blocks, while the exterior is finished in white stucco. In design it is of the "Mission" style, with a center patio or court containing fountain and palm garden. All the living rooms are on the main floor surrounding the court. Under the main floor are a billiard room and a den, while above the living rooms, overlooking the palm garden and fountain, is a gallery surmounted by a wired glass dome 30 ft. in diameter and 30 ft. in hight. Around the base of the dome are 50 electric lights for illuminating the court and gallery. Just off the gallery over the porch is the owner's study—a room 26 ft. long by 18 ft. wide, at one end of which is a large fireproof storage vault of steel and hollow tile. The hollow tile walls have a sand finish, so that they can be painted in any color.

The point is made that the cost of a fireproof house of this character is not more than 10 per cent. greater than that of a frame building of the same size and style, the saving being effected in the shape of lower insurance rates and fewer repairs. The owner of this country house is Watson Whittlesey.

THE UNITED STATES GOVERNMENT awarded the contract for the erection of the post office building at High Point, N. C., and estimated to cost in the neighborhood of $57,000, to R. H. Richardson & Sons, of Hampton, Va. This concern has also secured the contract for enlarging the post office at Danville, Va., at a cost of $65,000.



Lessons in Architectural Drawing for Beginners. Scale of Sheet, Three-Quarters Original Size.

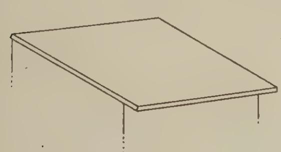
LESSONS IN ARCHITECTURAL DRAWING FOR BEGINNERS

By ALFRED AUSLANDER.

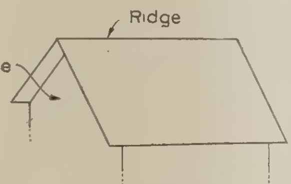
FOR our seventh lesson we will take up the framing of a roof. The student will notice that the subject of framing is really divided into three distinct parts, each a separate subject for itself. The first part is the framing of the floor, the second the framing of the wall and partitions, which we have already taken up, and the third part is the framing, which we are taking up in this lesson. Before proceeding further with this subject, however, it is essential that the student make himself familiar with the terms and definitions used in connection with roofs and roof framing explained in the following lines.

The cover or top of a building, generally of one, two or more sloping sides (though occasionally of other figures), is called the roof. Each roof has a distinct name different from another, which name is determined either by their outline or by their pitch, which is the angle of inclination to the horizontal.

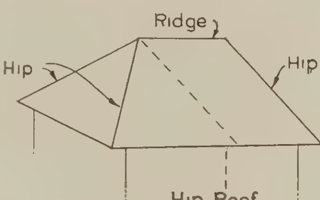
Roofs determined by their outline are, first, shed roof shown in Fig. 1, which has but one slope. This roof is used for sheds, porches, etc. Second, gable roof, as seen in Fig. 2, also called a pitched roof. It has two sloping surfaces meeting at the center and forming a gable at each end of the building. The intersecting line of the two sloping surfaces is called the ridge. Third, the hip roof, indicated in Fig. 3, which has sloping surfaces from all four walls of the building. If the length of all four walls are of equal dimensions, as shown by the dotted line, the sloping surfaces of the roof will form a point at the top. If the walls are not of the same dimensions the slopes will meet at the top similar to a gable roof and form a ridge. The line between two adjacent inclined sides of the roof (slopes) is called hip. Fourth, hip and valley roof represented in Fig. 4. If a gable or hip roof intersects another at a right or some other angle less than 180 degrees, they form an intersecting line, which is inclined and form a trough or gutter. This is called a valley. A roof having both valleys and hips is called hip and valley roof. A roof should have a good pitch, say not less than one-third, or better still one-half. This means that the rise shall not be less than one-third or one-half of the total width of the building. A roof with the latter pitch is less likely to leak; the outward pressure on the walls is less and the exterior appearance, especially for country houses. is better.



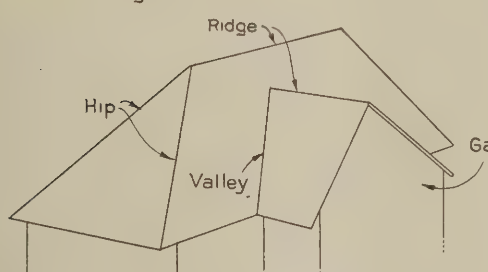
Shed Roof
Fig. 1.



Gable Roof
Fig. 2



Hip Roof
Fig. 3



Hip and Valley Roof
Fig. 4.

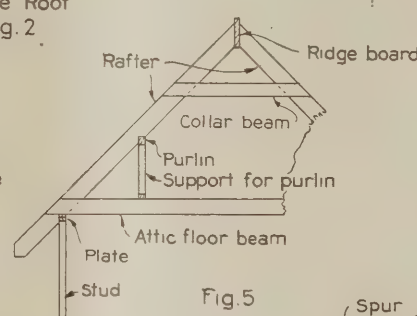


Fig. 5

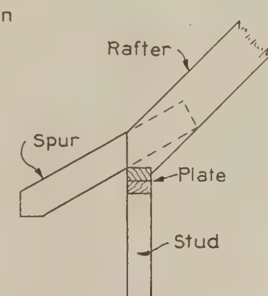


Fig. 6.

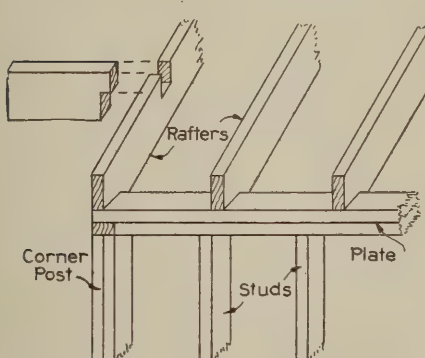


Fig. 7.

Architectural Drawing for Beginners. Various Details of Roof Framing.

The pitch of a roof is generally measured in parts of the span. For example, if a building is 24 ft. wide and the rise of the rafters is 4 ft. the pitch would be one-sixth; if the rise was 8 ft. the pitch would be one-third. Sometimes the pitch is indicated in degrees of a circle. A roof of 30 degrees, 45 degrees, 60 degrees, etc., pitch.

The roof framing is considered one of the most difficult problems which the carpenter has to deal with on account of many bevels which must be cut in order to make rafters frame into one another correctly, although there are not many details for the framing. In some of the previous numbers of THE BUILDING AGE the student will find a full explanation of how to find bevels and cuts of roof rafters.

The rafters are pieces of wood which form the skeleton body of the roof. They vary in size, but should be for common dwelling houses of 2 x 6-in. or 2 x 8-in. stuff, and long enough to permit of generous projection beyond the walls. They should be accurately sawed, to allow of a tight nailing to ridge board and plates, as seen in Fig. 5. The rafters are for the roof exactly what the studs are for the walls or joists for the floor.

The above-mentioned projection of the roof rafters or roof beyond the outer face of the wall is called eaves. The eaves are formed either as stated above by extending the rafters beyond the wall plate, as indicated in Fig. 5, or by cutting off the rafters flush with the wall plate and nailing separate pieces to each rafter. These pieces of wood are called spurs or false rafters and do not necessarily have to continue in the same line with the rafters, but may form an angle with them. Fig. 6 will explain this fully.

A rafter which extends clear up from the plate to the ridge is a common rafter. A rafter which does not extend from plate to ridge but is shorter and is connected at one end to a valley or hip rafter is called jack rafter. In the drawing on the opposite page, which is a framing plan of a roof, we find all kinds of rafters clearly marked, so that no other explanation for this seems necessary. We also show in this drawing two ways of framing the projection at the gable. The projection of the roof at the gable end is formed either by extending the ridge board and plate to support the projecting rafter, as shown in the drawing on opposite page, or by framing small pieces into the last rafter, as shown at C, or as explained by the isometric sketch, Fig. 7.

In laying out a framing plan the student must see that the rafters shall be opposite each other, because two pieces, which are inclined against each other at the top, will hold each other up. Therefore no other support of rafters will be necessary for roofs which cover a narrow building and in which the length of the rafters is small. In roofs of wide buildings the rafters, if not of greater dimensions than mentioned above, would sag in the middle if they were not strengthened in some way. Practical experience shows that it is cheaper and better to use a support under the rafters than to use rafters of greater dimensions than 2 x 8 in. This is done by putting a horizontal piece of timber running parallel to the ridge and supporting this timber by vertical studs resting on the attic floor beams. The horizontal piece is called purlin. Beside the purlin a horizontal piece of timber, generally 1 x 8 in. in section, is nailed to the rafters on opposite sides of the roof. This piece ties the rafters together and is called tie beam or collar beam.

The collar beam should be placed as near to the middle of the rafters as possible, but this cannot always be done, for the space between the attic floor and the under side of the collar beam should be high enough to allow a man to pass through. This is called head room and should not be less than 6 ft. in the clear, as shown in Fig. 5. Wherever a chimney passes through the roof, or where a window is wanted in the roof, an opening must be provided while framing the roof. Headers are framed between two of the rafters, as shown on the full-page drawing. The rafters both sides of the opening are generally doubled and are called trimmers, similar to floor framing around fireplaces and other openings, as stairs, chimneys, etc. All windows in the roof, excepting those in gable walls, are called dormer windows. The construction of these windows will be taken up in one of the succeeding lessons.

To lay out drawing No. 7, proceed as follows: Place paper vertical and draw a rectangle measuring 10 x 14 in. Lay out drawing to a scale ⅜ in. to the foot. Draw a horizontal line representing the outside line of wall marked on the drawing "wall plate," 2 in. (actual size) above the bottom margin line, beginning 1½ in. from left and 2¾ in. from the right border line, and draw vertical lines through these points; the vertical line on the right-hand corner to measure 11 ft. 7 in., and the one on the left side 26 ft. 7 in. The horizontal line to be 15 ft. long. Draw a vertical center line, 7 ft. 6 in., from left line for the ridge. This will represent the main building with two gable ends. Draw extension or wing 3 ft. 4 in. below upper horizontal line 11 ft. 8 in. wide, and 3 ft. 4 in. beyond main wall. The student will now get the outer line of the main building and extension, as seen from top looking down and showing the plate of the walls.

After walls are obtained, lines parallel to all walls, 1 ft. 6 in., from the wall are to be drawn for the projection of rafters. Draw lines at 45 deg. at intersections of walls of wing and main building for valleys, as shown at A and B, and also lines at 45 deg. for hips at lower end of drawing. Project these lines until they meet the ridge line. Note valley rafter A should extend to the ridge board of main house, as at *a*, so that valley rafter B will frame into A. Place chimney as figured on drawing. All rafters to be drawn 20 in. on centers. Start with first rafter at gable end flush with wall, as at C; mark on drawing all common and jack rafters; place figures and other lettering as on plate on page 338.

FRIENDLY RELATIONS BETWEEN ARCHITECTS AND WOODWORKERS

THERE is a lot of useless waste of energy and good feeling between architects and woodworkers for which there seems to be no more reason than there is for the natural animosity between a pet cat and a pet dog, says a writer in a recent issue of the *Woodworker*. The architect hasn't "got it in" for the machine woodworker, neither is he any more of a crank than the woodworker is himself, yet many a woodworker laments the arbitrary manner of the architect and sometimes feels sure he could give the architect pointers and give him a better job by altering his plans here and there. On the other hand, many an architect thinks that lots of machine woodworkers are thick-headed, stupid and contrary, simply because he has difficulty in getting them to realize the importance of certain details in his plans.

When you really get down to the meat of this matter it is more misunderstanding through lack of a closer walk together than anything else. If architects and woodworkers would mingle more in a friendly spirit, both could get better results and also form a better opinion of each other. There are cranks and sore-heads among architects just as there are among woodworkers and in other walks of life, but no more so; probably not so much as in other lines, because architects as a rule cultivate a broad-gaged spirit naturally in connection with their wide range of reading and studying. Sometimes they are unusually busy and have their heads full of so many things that they fret when they have to stop and explain in detail the whyfores of certain specifications, but if you catch them at the right time and in the right mood they usually enjoy these things, enjoy discussing not only their plans, but the work involved in detailing them, and frequently there is enlightenment for the woodworker in these discussions. Also, there is enlightenment for the architect by his becoming more familiar with the woodworking methods necessary to carry out the details of the work he may be planning.

This contrariness, however, this pulling against each other and scolding at each other, is not conducive to a better understanding. What is needed is more friendliness between the woodworker and the architect, just as there is sometimes need for more friendliness between the man at the bench and the man at the machine in a woodworking plant.

STUCCO WORK IN BUILDING CONSTRUCTION

BY ALBERT MOYER, C. E.

THE history of stucco does not furnish sufficient data to be of practical value in the manufacture of the present-day Portland-cement stuccoes. There are records standing 350 B. C. of stuccoes made from vastly different materials than can be economically used in these progressive days, and we find that such stuccoes were almost invariably used in the warm climates, where the action of frost would not tend to disintegrate the rather poor material which was then available. There is every reason to believe that originally these stuccoes were intended to cover up and protect inferior building stone and sand-burned straw brick. The archæology of stucco would tend to show that from an artistic standpoint this method of decoration was a development of the wattled buildings which were plastered with clay and different muds hardened by baking in the heat of the sun. Therefore, in this instance, the use of clay plaster over wattled houses was to protect an inferior building material.

Uses of Stucco

To-day the stucco is used for a similar purpose—that of protecting surfaces and at the same time add somewhat to the pleasing effects. Stuccoes or plaster, however, should never be used as an imitation of other building material. In our opinion only Portland cement stucco should be used for exteriors, as this is the only hydraulic material which will stand the action of the elements.

From the artistic side we would also recommend such surface finish for stucco as will cause both natural color and pleasing texture. It would be well, therefore, to expose to view the aggregates used and avoid as far as possible exposing the bonding material—Portland cement.

There is no artistic reason for allowing only the bonding material to be displayed to the eye. On very large jobs the surface can be cleaned off by means of a sand blast, and on smaller jobs the surface may be cleaned, exposing each grain of sand by means of muriatic acid in dilute solution, 1 part commercial muriatic acid, 4 to 5 parts clear water.

Where white aggregates are used the surface may be cleaned off with a solution of sulphuric acid, 1 part acid, 4 to 5 parts clear water. The sulphuric acid leaves a white deposit and therefore should not be used excepting where the aggregates are white.

Another Method of Finishing Surfaces

Another method is to scrub the surface while yet green, say within 24 hours, with a house scrubbing brush and clear water. This is more difficult than the others, for the reason that if the stucco is allowed to remain too long before scrubbing it will be too hard to remove the coat of neat cement from the outside of each particle of sand or other aggregates; and if scrubbed when it is too soft the surface may be damaged and difficult to repair.

If the character of the available aggregates will not present a pleasing surface when exposed, the following surface treatment may be used:

While the last coat is still thoroughly damp, apply a Portland cement paint composed of 1 part Portland cement, 12 per cent. of the volume of the cement of well hydrated lime, pulverized form, and 1 part of the volume of the cement of fine white sand. Mix with water to the consistency of cream or the ordinary cold-water paint. Stir constantly and apply by using a whisk broom, taking care to throw this paint on with some force.

Keep this finish surface damp for at least six days or longer if economy will permit. Do not allow it to dry out in any one place during the week. If necessary, protect by hanging tarpaulins and using a fine spray of water playing on several times during the day by means of a hose. This will give a pleasing light gray color of excellent texture.

Stucco may be applied to various building materials. There is hardly any reason at the present time for stuccoing stone buildings; the procedure at best is difficult and hardly to be recommended. Our building stone is usually an excellent material and, therefore, does not require either protection or covering to produce pleasant effects.

Covering New Brickwork

New brick may be covered with stucco very successfully. The joints should be first raked out half an inch. The brick must be saturated with water. It is always best to start stuccoing at the top of the wall and work down between the pilasters or corners, finishing a whole strip or whole side wall from top to bottom in one day. Thus no streaks or cracks are formed where one day's work ends and another begins. By this method the wall can be kept wet ahead of the work by means of a hose.

Stucco Applied to Metal Lath

The second coat should be put on as soon as the first coat has stiffened sufficiently to hold in place and stand the pressure of the trowel. This second coat should be well scratched and the finished coat applied while the second coat is damp. The finish coat should then be kept wet, protected from the rays of the sun and as far as possible from drying out. This can be done by hanging wet clothes over same. This rule of keeping each coat moist until the other coat is applied and protecting after applying the finish coat must be observed in all forms of Portland cement stucco.

If the stucco is to be applied to metal lath or wire cloth the metal should be plastered on two sides, so that it is entirely encased in mortar in order to avoid rustling. If this is impracticable then the metal lath or wire cloth should be dipped in a paint made of equal parts of near Portland cement and water. Immediately after dipping, the metal lath or wire cloth should be tacked onto a frame in the position it is intended to occupy. As soon as the neat Portland cement has hardened on the metal, apply the first coat of stucco. Hair should be added to the mortar to be applied on wire mesh or expanded metal. One bag of cement, one pound of hair.

If plaster boards are used they should be nailed on the framework of the building, leaving at least a quarter of an inch joint between each plaster board. This joint to be filled in with lime putty, otherwise each plaster board will cause square cracks on the outside of the stucco the size of each board.

A convenient method of waterproofing plaster boards is easily available. The boards may be painted with two coats of any of the reputable bitumen waterproof paints to which plaster adheres. Then about 24 hours after the bitumen paint has been applied, and within six days, apply the first coat of stucco.

Stucco on Terra Cotta Blocks

For stucco on terra cotta blocks great care should be exercised in keeping the blocks thoroughly saturated with water, for if the blocks are not saturated they will pull the water out of the mortar and it will crack and disintegrate. Portland cement requires water until it has thoroughly hardened, which ultimate hardening usually takes from 14 days to a month. It is not always necessary to play the hose on the wall for a month, although it would be advisable. The dews at night, the dampness in the atmosphere and the rain will furnish the necessary moisture provided the material on which the mortar has been plastered has not too great an affinity for water.

In order to prevent the porous hollow terra cotta tile from sucking the moisture from the stucco and also to furnish waterproofing and an additional bond other than that which would be given by the key, it is good practice to paint the surface of the dry terra cotta blocks after having been erected in the wall with two coats of bituminous paint, equal to such paints as Dehydratine, Minwax, R. I. W. or X-Hydro-Plastic. It is important that the first coat of stucco is placed over this paint after 24 hours and within six days.

Proportions for a good stucco should be 1 part Portland cement, 2½ parts coarse, clean sand (if coarse, clean sand is not available, use only 2 parts of sand). Add 10 to 15 per cent. of well hydrated lime, dry pulverized, of the volume of the cement.

Obtaining Natural Colors

If it is the desire of the owner or architect to use the exposed aggregate method, interesting natural colors can be obtained by using the following materials instead of sand, the same proportions: Green, red, buff, black or white marble screenings all passing a No. 8 screen and all collected on a No. 40 screen. These different colored marble and different colored sand where obtainable can be used singly or in a combination. When exposed by scrubbing or the acid treatment very interesting results are obtained.

In mixing stucco great care should be exercised to obtain the thorough incorporation of cement, sand and the other aggregates. The sand and cement should be mixed together dry until an even color results. This can be done by shoveling and raking while shoveling. Water should then be added, being careful not to add too much water at a time and not to get the resulting mortar too wet, so that more sand or cement has to be added. Be very careful to bring the resulting mortar up to the proper consistency by plastering.

It is advisable to add to the mortar from 10 to 15 per cent. of the volume of the cement of well-hydrated lime. This should be mixed dry with the cement and sand before the water is added. The addition of a hydrated lime tends to fatten the mortar, making it more adhesive and impervious.

Mineral Oil in Wet Mortar

Another specification which we believe will prove of considerable value is by the addition of mineral oil to wet mortar. After the water is added and thoroughly mixed with the mortar add 15 per cent. of mineral oil and remix. If a light effect is to be produced use white oil, such as Oil Petrole. When the oil is to be mixed with the mortar it is always advisable to use hydrated lime, as we thus have a larger amount of emulsifying material.

The color obtained by the scrubbing or acid method is limited only to the available sands or marble screenings; the color will be the color of the aggregates. Excellent green can be obtained by adding 8 per cent. of the weight of the cement of Cromium Oxide. This should be mixed dry with the sand, cement and hydrated lime.

Always keep in mind that the surface to which the mortar is to be applied must be thoroughly saturated with water, each coat of stucco must be kept moist and the final coat must remain moist for at least one week and longer if economy will permit.

Stucco should not be troweled to a smooth surface. The artist painter would never think of smoothing the paint on his canvas by means of a straight edge. Texture and color are necessary if artistic results are to follow. By using the suggestions above outlined, the architect is privileged to select the aggregates from which the stucco is made and has in fact as great play in the planning of the color, tone and texture as has the artist in mixing the paints on his palette.

Rapid Construction of a Department Store Building

The celerity with which the work of constructing the department store building occupying the block front on Sixth avenue from Thirty-second to Thirty-third streets, New York City, has been the subject of widespread attention among contracting builders the country over. The contract was signed April 23, 1909, and work was immediately commenced upon the excavation, which occupied a period of five months. The first steel columns were erected in October, this branch of the work being so well handled that 11,000 tons of steel was erected in 400 working hours, a record entirely without precedent. Fireproof tile was delivered and set at the rate of 250 loads a day. The entire steel shell was completed December 6 and the corner stone was laid December 8, 1909.

The actual erection of the completed structure occupied seven and one-half months, the building being turned over to the owners on June 15, 1910. The original completion date was August 1 of the present year, and the extended completion date, owing to causes beyond control, was October 1, so that the Thompson-Starrett Company, 51 Wall street, New York, which had the contract for the work, was more than 100 days ahead of schedule.

The Gimbel Building is ten stories in hight, with three stories below grade; contains 37 acres of floor space, and is equipped with 48 elevators and a sprinkler system.

Cleaning Stone and Brick Work

A method for washing down white stone walls in buildings, also gray-speckled brick walls, is thus described in a recent issue of *The Painters' Magazine*. If the walls are simply stained by soot from smoke and by dirt, the very best plan is to simply wash them down with scrub brushes dipped into soapsuds, to every two-gallon pail of which has been added a pint of 16 deg. liquid ammonia, and then rinse with clear water liberally. If, however, the stone or brick walls are stained by smoke, which is too stubborn to yield to the soap and ammonia water, proceed as follows:

Take good yellow bar soap, slice it into small chips and dissolve it in enough water to make one gallon of soft soap by boiling, stir into this, while warm, two pounds of pulverized pumice stone, 00 or F, and one pint liquid ammonia of 16 deg. strength and when the mixture has cooled, apply to the wall with a fiber brush, let it remain on the wall, say 20 to 30 minutes, then scrub with stiff brushes until wall is clean and rinse with clear water.

Courses in Forest Problems at University of Wisconsin

The first courses of instruction in wood technology and the mechanical engineering of woodworking plants ever offered at the University of Wisconsin, at Madison, are announced for the ensuing year, as a result of the co-operation of the College of Engineering with the new United States Forest Products Laboratory at the university. The three phases of the problem of saving timbers and using all the present waste from the lumbering and wood manufacturing industries will be considered in the lectures and laboratory practice by the students, including special study of the physical and chemical properties of wood; of preserving and utilizing not only the timbers, but the stumps, small branches, bark, sawdust and all the waste bits, and of the mechanical means of transforming standing timbers into chemical products.

An Attractive Summer House

A delightful feature of most of the landscape architecture in connection with the beautiful parks of our cities is the summer house or "shelter," where visitors may rest awhile, protected from the rays of a noon-day sun or mayhap from the sudden shower which catches them unprepared for rainy weather. In the half-tone picture which we present herewith is shown one style of summer house often found as a feature of public park architecture. It is located at Madison, N. J., is of masonry construction, with the enclosing walls about 3 ft. in hight, above which the space is open except for the square pillars which serve as a support for the handsome tile roof. The setting is picturesque in the extreme and constitutes with the bridge and its approaches seen at the right an excellent example of work of this kind.

View of Summer House and Bridge with Masonry Approach in Park at Madison, N. J.

Interborough Contractors' Association

The new combination among the smaller builders that is being organized to advance the interests of general contractors in the metropolitan district, and which has been incorporated as the "Interborough Contractors' Association," is thus referred to by the *Record and Guide:*

One of the conditions that general contractors are organizing to contend with is represented by the operations of "one-building companies," such as pass out of existence as soon as one job is completed. Should anyone be injured by their methods, he would find it difficult to obtain satisfaction or reimbursement. Certain exactions in the Tenement House Law the new association will also seek to have repealed, and fair treatment will be expected from architects when inclined to play favorites.

In regard to the competition from ephemeral building companies, William G. Solomon, the temporary secretary, 83 Center street, says: "Often by manipulating substitutions, so as to prevent immediate detection, they are able to save at least one-eighth of the expense of the building. A structure that would cost us $8,000 could be put up by them for $7,000.

"This is hardly the fault of the Building Department, as the latter is not omnipresent. As soon as their inspector leaves the job the work of substitution is begun again, and the results carefully concealed. It is principally in the woodwork of a building that the opportunity for employing this scheme presents itself. Inferior wood may easily be used throughout the structure save where it would show too conspicuously. Lighter iron than that called for by the building code is often used.

"In addition to this saving in the use of materials must be considered the possibility for economy in the employment of non-union labor. These companies, who can afford to defy the unions, will pay a carpenter from $2.75 to $3 per day, while an established contractor must give the union wages $5.50 a day. The unions demand $6 a day for mason work, whereas non-union labor may be employed for $3.50. Union painters draw $5 for a day's work, while the freelance gets but $2.50 or $3 a day."

A Delinquent Foreman

He was a twentieth century hustling builder, and under his auspices cottages and buildings seemed to spring up like mushrooms.

"Please, sir," said one of his foremen, rushing up to him one morning in a state of mental collapse, "one o' the new houses has fallen down in the night."

"What?" he roared. "You mean to say that one of my well-built desirable residential houses has come to grief? Ah, I suppose you took the scaffolding down before you put on the wall paper?"

"Yes, sir."

"Well, what can you expect, you rank outsider? Call yourself a foreman! Get off the works! You're sacked!"—*National Builder.*

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AUGUST, 1910

Six Months Building Operations

One of the things which can not fail to impress even the most casual observer, should he roam the Island of Manhattan just at the present time, is the many instances where old buildings have just been or are now being demolished to make room for larger and more pretentious structures, all of which might naturally lead him to conclude that an unusual amount of building was in progress. In certain lines this would be true, but taking the figures as contained in the semi-annual report of the Superintendent of the Bureau of Buildings for the Borough of Manhattan and covering all classes of structures, it is found that the totals are appreciably less than for the corresponding six months of last year, due in large measure to the notable shrinkage which occurred in the construction of what is known as tenement houses, which designation under the law means all buildings having accommodations for three or more families. According to the report in question there were 512 permits issued during the first half of this year for new buildings to cost $62,445,945, while in the same period last year 607 permits were issued for buildings to cost $79,922,046. The falling off in tenement house construction was from 303 buildings costing $39,723,000 in the first six months of 1909 to 132 costing $20,926,000 in the same period of the current year. The five hotels planned the first half of this year were estimated to cost only $900,000, as against six hotels costing $3,397,000 in the first six months of 1909. A class of building which has been erected with great frequency is that designed for store and loft purposes, plans having been filed for 147 of these structures costing $22,433,700 in the first half of this year, while in the same period last year 136 were planned to cost $19,932,600. Nine schoolhouses were planned to cost $1,557,000, and last year in the same time five were planned to cost $510,000. The five municipal buildings for which permits were taken out to July 1 this year are estimated to cost $2,808,000, against four to cost $840,000 a year ago. The greatly increasing popularity of the automobile is reflected in the 35 permits for garages and stables to cost $919,720, against the 18 permits for similar structures costing $1,225,000 in the first half of last year. In the Borough of the Bronx there was a decrease of 288 in the number of new constructions for which permits were issued this year as compared with the first six months last year, although the capital invested was practically the same, the figures being $22,047,335 and $22,092,760 respectively for the two periods named. The most interesting feature of the semi-annual report for this borough is the decrease in the number and cost of dwelling houses costing less than $20,000 each, as compared with a year ago, and the increase in the number and cost of brick "tenements" costing over $15,000 each. In the case of the former class, 189 permits were issued to July 1 of this year, estimated to cost $1,271,900, while in the same period last year 299 permits were issued for dwellings to cost $2,008,300. As regards brick tenements costing over $15,000 each, permits were issued for 467 costing $16,979,000, while in the same period a year ago 369 were planned to cost $14,211,000. Another striking feature of the half year's work in the Bronx is the construction of frame dwellings, which fell from 396 costing $2,034,740 in the first half of 1909 to 165 dwellings costing $762,700 in the first six months of this year. On the other hand, there were 52 garages and stables planned this year to cost $241,355, against 37 costing $92,750 in the same period a year ago.

The Apprentice's Bond

Under the laws of many of the States, the employer in making his contract with an apprentice must himself put up a bond of equal amount to that required of the boy. Under the old common law this was not necessary, but statutory law often requires it. If it is not done, if the employer accepts a bond from a boy to assure the latter's continuation in his apprenticeship, but himself fails to give a bond to guarantee his own fulfilment of the contract, then no contract exists and a boy could legally retire from his apprenticeship and demand of his employer his bond money. In one State an investigation failed to find a single instance where a manufacturer had conformed with this statute. In recent years in this same community the bondsmen of apprentices have been sued and the amount of the bond has been recovered where apprentices had joined in a strike and had therefore violated the terms of their contract. Probably if the bondsmen had been aware of the statutory provisions they could have defied the employers. Some manufacturers have now embodied in their apprentice contract a bond form for themselves as well as one for the apprentice. There is no great hardship in carrying out this statute, for the money put up by the employer is only equal to that required of the apprentice.

Convention of Oklahoma Cement Users' Association

The third annual convention of the Oklahoma Cement Users' Association will be held in Oklahoma City, October 6, 7 and 8 of the present year. During the Oklahoma State Fair, which will be held from September 27 to October 9, there will be a cement show, held in the New Cement Industries Building, which covers an area, 60 x 160 ft., and is finished with cement floors.

Death of John S. Stevens

John S. Stevens, the veteran builder of Philadelphia, Pa., prominently identified for many years with the National Association of Builders and with the Builders' Exchange, died at his home, 4232 Spruce street, that city, on Thursday, July 14. The funeral, on July 16, was largely attended by men prominent in every phase of the life of the city. The interment was in South Laurel Hill Cemetery, where the services were in charge of the Masonic Fraternity.

New York State Building Operations

New York State Architect Franklin B. Ware reports for the six months ending July 1 State building operations aggregating $3,418,182.88. Of this contracts for State hospitals for the insane amounted to $1,395,491; charitable institutions reporting to the Fiscal Supervisor of State Charities, $693,621; State prisons, including Great Meadow prison at Comstock, $627,339; State normal schools, $346,926; work for the State Armory Commission, including rifle ranges at Blauvelt, $205,922, and miscellaneous institutions, such as agricultural schools, Niagara Reservation, etc., $210,883.

Open Stair Model Tenements

The various movements which have recently been carried out in this city with a view to providing model housing accommodations for working people have stimulated a new project on the east side of New York City, and of which, in a measure, the Vanderbilt model tenement houses are the prototype. The new block of tenements being erected will occupy 12 city lots on Seventy-seventh street near Avenue A, the buildings being erected in 50-ft. units. The intention is to commence work at once and finish 100 ft. in six months, the next 100 ft. in about three months afterward and so continue until the block is completed. The buildings will be erected of light brick, with roofs of tile, and so constructed that they may be utilized by the tenants for recreation. The open stair features have been adopted and it is from this fact that the tenements take their name.

The stairs will be of cast iron, with marble treads, and each suite of rooms will have a little vestibule off the open stairs, from which will be available the bath room, the refrigerator space and the kitchen or living rooms, as well as the bedrooms. The suites will consist of two, three and four rooms each with its bath. The only philanthropic idea in connection with the undertaking is that it will help the community if the builders can establish the fact that this type of tenement is really cheaper to build and better to run than the customary type. The architect is Henry Atterbury Smith.

A Triplex Apartment House

A striking example of the recent growth of the cooperative idea in apartment house building is found in the new structure which is being erected in Park avenue, New York City, between Eighty-second and Eighty-third streets. A unique idea to be introduced is the triplex apartment; that is, one in which the suite is divided among three different floors connected by private stairways. This is simply the duplex plan, which will also be used in the building, carried one step further. Some idea of the size of the new building may be gathered from the statement that there will be three triplex and three duplex apartments with separate ground floor entrances, while on the upper floors will be 15 duplex and 33 single floor suites.

The arrangement of the apartments in relation to the elevators will follow the Parisian plan, with only two apartments facing each of the three elevator landings on each floor. The drawing rooms will be grouped about a square entrance hall. The large roof will afford ample room for laundry purposes, while a space 50 x 200 ft. in area will be used as a children's playground. The new building will represent an outlay of something like $2,000,000 and will be erected by the Dudley Construction Company.

The National Association of Office Building Managers and Owners of the United States will hold its third annual convention in Washington, D. C., September 12, 13 and 14. A committee is at work preparing an elaborate programme covering the discussion of many problems in connection with office building management. Baltimore office building managers will contribute to the entertainment of the attending members and guests, plans for which are being made by a committee composed of the following Baltimore Office Building Managers: W. S. Speed, Law Building; Joseph B. Burnett, Union Trust Building; F. G. Lauderman, Calvert Building, and Bradford Rich, American Building.

The new building code which is being considered by the city of Rochester, N. Y., requires concrete block manufacturers in the city to label their product, and manufacturers outside of the city must send samples to the fire marshal's office before it is approved for building.

The general contract for the construction of the six-story and basement reinforced concrete factory building, covering an area 200 x 66 ft., with a two-story garage 20 x 90 ft., for E. Greenfield's Son & Co., 107 Lorimer street, Brooklyn, N. Y., has been awarded the Turner Construction Company, 11 Broadway, New York City. The architect is Henry Otis Chapman, 334 Fifth avenue, New York City.

CORRESPONDENCE

Roof Trusses for a Garage

From P. T. L., Steelton, Pa.—In answer to the inquiry of "C. C. H.," Brookville, Pa., for a design of roof truss for a garage I submit the accompanying details, which may prove of interest to him as well, possibly, as to other readers. The trusses have been designed for a dead load of 23 lb. per square foot and a wind load of 23.7 lb. per square foot normal to the slope of the roof on the assumption that the wind when blowing at its greatest velocity will exert a pressure of 40 lb. per square foot against a vertical surface. In assuming the dead load per square foot 12 lb. was allowed for the snow, 4 lb. for the sheathing, 1 lb. for the roofing, 3 lb. for the purlins and rafters and 3 lb. for the weight of the truss itself. The trusses are spaced 12 ft. 10¼ in. on centers.

Referring to Fig. 1 of the drawings, it will be seen that there are six panel points in the truss and the dead load acting at each point will be 7 ft. multiplied by 12.85 ft. multiplied by 23 lb., or 2070 lb.—the number as shown in the frame diagram.

The stress diagram is now ready to lay out and in scaling off the stresses they were tabulated in the second column of the table of stresses presented in Fig. 3.

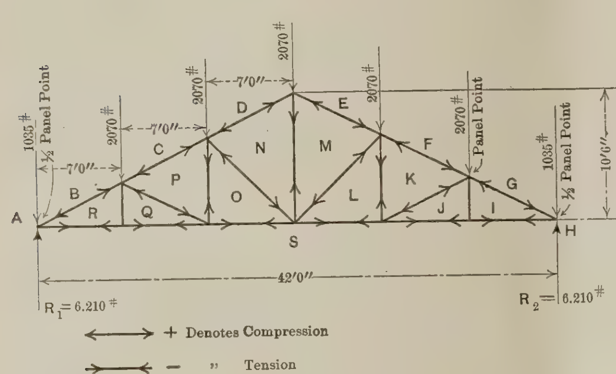
When the wind blows in one direction it exerts a pressure on three panel points in the truss and the load at one panel point will be 7.8 ft. multiplied by 12.85 ft. and this in turn by 23.7 lb., giving a total of 2375 lb., which for convenience we will call 2400 lb., as indicated in Fig. 2. The stress diagram is then laid out and the stresses tabulated in the third column in the table of stresses. The combined dead load and wind load stresses produce the maximum stress and are given in the fourth column in the table of stresses.

The frame and stress diagrams are shown, as they may be interesting to readers who are familiar with graphic statics.

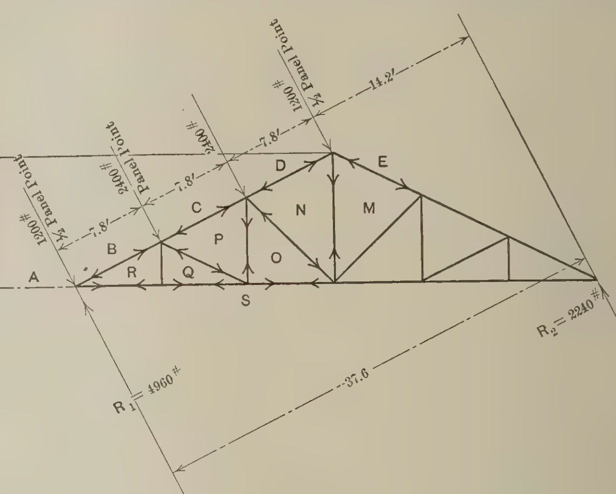
From the stresses given it was found that two timbers 2 x 8 in., bolted together at intervals with a 2-in. space between members, would be satisfactory for the top chord of the truss. The 2-in. space was left on account of framing the diagonals and vertical tie members in between the two timbers. A small filler block 2 in. thick should be provided where the bolts occur.

The bottom chord is composed of two 2 x 8-in. timbers bolted together at intervals and, like the top chord, it has a 2-in. space between timbers.

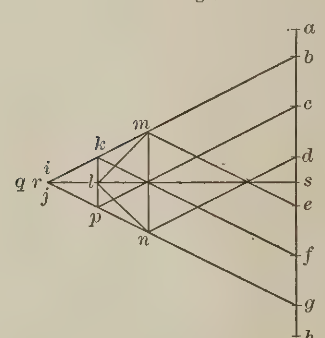
The diagonals are made of 2 x 8-in. timber and the vertical tie members are made of 2 x 6-in. timber.



Frame Diagram

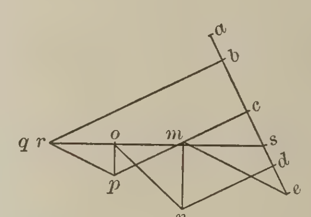


Frame Diagram



Stress Diagram

Fig. 1.—Diagrams for Dead Loads.



Stress Diagram

Fig. 2.—Diagrams for Wind Loads.

Roof Trusses for a Garage.—Contributed by "P. T. L.," Steelton, Pa.

The purlins are placed at every panel point and are composed of two 2 x 8-in. timbers securely spiked together, and upon these rest the 2 x 6-in. rafters spaced 3 ft. on centers. On the rafters is laid ⅞ x 12-in. sheathing, and this in turn is covered with Ruberoid roofing. The connection at the end of the truss between the top and bottom chords is made by bolting a 2 x 8-in. timber on each side of the chords and also using a 1-in. bolt providing plate washers for the bolt that covers the width of the members. The top chord at this point is also notched into the bottom chord.

For anchoring the truss to the building two bolts are used, one at each end. These bolts are 1 in. in diameter and 3 ft. long, made with a hook end, and they should be securely cemented into the building pilasters. The bottom chord is spliced and is plainly shown in the detail of the truss.

The connection of the top chord of the truss at the apex of the truss is made by bolting a 2 x 8-in. timber on each side of the top chord.

The rise or slope of the roof is 6 in. to the foot. It will be noticed that ¾-in. bolts are used throughout in the construction except at the places otherwise marked on the detail drawing. The elevation, Fig. 4, will show the general arrangement of the various members.

I trust that this will meet the requirements of "C. C. H.," and if not, a request for further information through the Correspondence Department will have attention.

TABLE OF STRESSES.

MEMBER	DEAD LOAD STRESS	WIND LOAD STRESS	MAX. STRESS
BR	+ 11,250 *	+ 7,700 *	+ 18,950 *
CP	+ 9,000	+ 6,000	+ 15,000 *
DN	+ 6,750	+ 4,250	+ 11,000 *
EM	+ 6,750	+ 4,750	+ 11,500 *
FK	+ 9,000		+ 9,000
GI	+ 11,250		+ 11,250
SI	− 10,000		− 10,000
SJ	− 10,000		− 10,000
SL	− 8,000		− 8,000
SO	− 8,000	− 6,000	− 14,000
SQ	− 10,000	− 8,700	− 18,700
SR	− 10,000	− 8,700	− 18,700
IJ	0		0
KL	− 1,000		− 1,000
MN	− 4,000	− 2,750	− 6,750
PO	− 1,000	− 1,200	− 2,200
QR	0	0	0
JK	+ 2,250		+ 2,250
LM	+ 3,000		+ 3,000
NO	+ 3,000	+ 3,750	+ 6,750
PQ	+ 2,250	+ 3,000	+ 5,250

Fig. 3.—Table Showing Stresses.

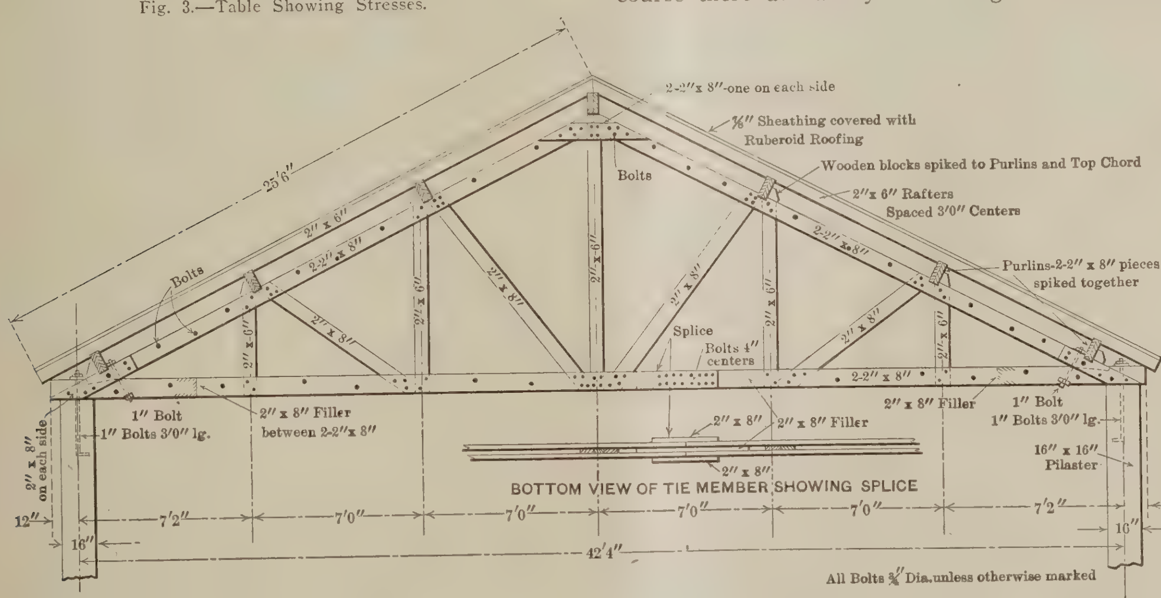


Fig. 4.—Elevation of one of the Trusses, Showing the General Construction.

Roof Trusses for a Garage.—Contributed by "P. T. L.," Steelton, Pa.

Opportunities for an Ambitious Carpenter

From J. L. Shawver & Bros., Bellefontaine, Ohio.—I would say to "F. S. B.," White Plains, N. Y., whose letter appeared in a recent issue, "Keep on doing the best you can and some day you will find your reward." I wish we could have met when doing a job near White Plains some years ago; we might have given you a lift, as we have done scores of other able young men. When I started in the trade I resolved to give my employer full value for every dollar he paid me. Now for thirty odd years I have been an employer and I am always ready to recognize and reward merit in an employee. In going from place to place as we do with a new set of men at each place, we find too many who waste a good part of the last hour before noon and evening in looking at their watches. This class we dispense with just as soon as we can do so. They are poor hands as a rule and dear at any price. At a prominent city in New York State we had some men who wanted to begin 30 minutes early morning and noon in order to get certain cars from the north. Others who came from the south were frequently 15 minutes late, but never wanted to make up for the lost time. We arranged to work both classes, but gave each credit for the actual time worked. I believe that Providence will help those who help themselves, and that with the same certainty Providence will punish those who cheat or steal time or property.

I have never known what it was to be without employment. Sometimes it may not be so profitable as I would like, yet I have made it a rule to keep busy. I have taken six years of the Chatauqua reading course by having a book in my pocket or suit case and when trains are late or when waiting for meals the time was spent in study that would otherwise have been lost. If "F. S. B." will give me his full name and address I may be able to give him a lift that will help him over some of his difficulties.

From James Bremner, Portland, Ore.—Under the above heading I notice in the June issue a few very truthful remarks regarding the utter business incapacity of many foremen put over building work. Of course there are always some cogent reasons for it, not known to or discernable by the outsider, but the silly remark about "basket men" is ridiculous. Why, a good carpenter's basket is the lightest, handiest and most convenient means of carrying carpenters' tools around the building that can be imagined, although a locking box is best for large quantities. It is not in what a man carries his tools or part of them, but how he can use them.

Another statement by one of the correspondents comparing the superior or alleged superior appreciation of merits in the West to the opposite which prevails in the East is not of much value. The same thing exists all over—North, South, East and West. The railways and population are rapidly leveling the whole, so that allowing for advantages and disadvantages, climatic or otherwise, there will very soon not be any excessive advantage or opportunity, monetary or otherwise, in one quarter more than another. One correspondent just hits it square on the head when he says that money is power—merit nowhere.

I am much surprised and pleased to notice the great and increasing quantity of valuable information always collected into *The Building Age.*

Interesting Problem in Eaves Trimming

From C. J. M., St. Johns, Newfoundland.—A man is not likely to work very long at the carpentry business before he will some day meet with a piece of work, the like of which he has never done before. A short time since, while making detailed drawings for a veranda, I was confronted for the first time with the difficulty presented in the accompanying sketches—that of intersecting the raking cornice of a pediment with the level cornice where no break occurs, the raking cornice springing directly from the level one. Referring to the sketches, Fig. 1 represents the plan and Fig. 2 the elevation of the cornice of a veranda having two pediments, one of which is shown. An inspection of the sketches will reveal the fact that there is a break at one side of the pediment as shown by C D E of the plan, but there is none at the other side "A." It will be observed that the crown molding of the level cornice forms an eave gutter, the crown molding on the raking part being worked out as shown at F in Fig. 2 to intersect with it at B of the same figure. Now the difficulty presented itself how to intersect the moldings G A H at "A" as shown in Fig. 2. They could not be intersected by bisecting the angle G and H because one molding being wider than the other, the members would not meet properly.

By a little study of the plan Fig. 1, it will be seen that if the portion marked D was taken away and the Part C brought forward to E the joint C would fit exactly the joint E. Upon this principle the work was done. The part H was cut as if for an internal angle and the piece G as if for an external angle. As a result the intersection was perfect.

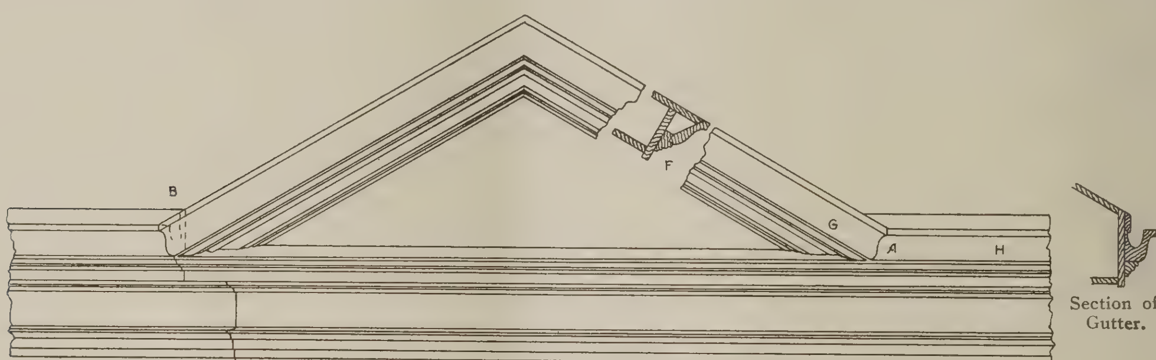


Fig. 2.—Elevation of Pediment.

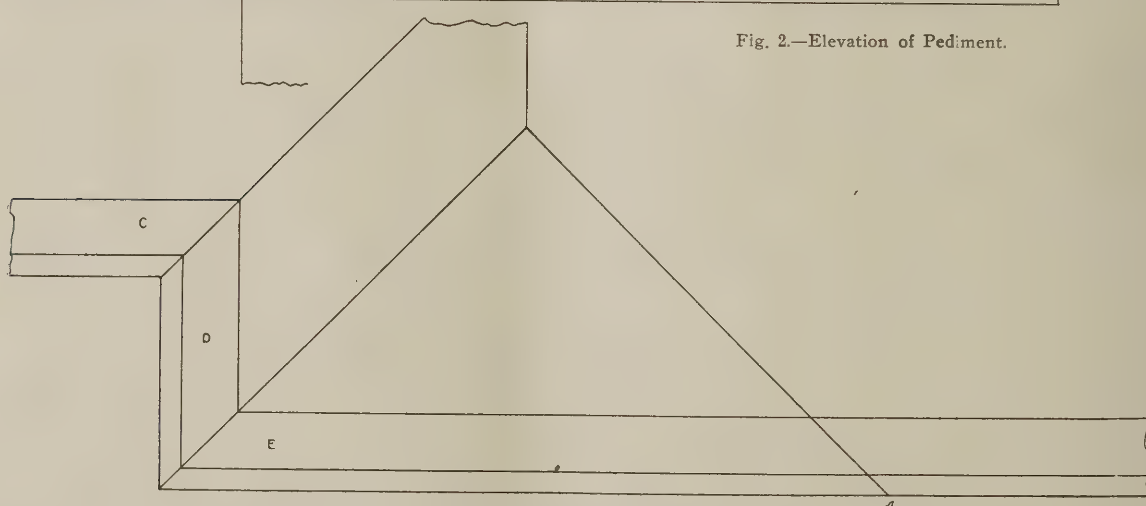


Fig. 1.—Partial Plan of the Roof, Showing the Position of the Various Parts.

Interesting Problem in Eave Trimming.—Contributed by "C. J. M.," St. Johns, Newfoundland.

Practical Value of the Paper

From A. L. W., Carbondale, Pa.—I have been very much interested in reading the article of my brothers of the craft in *Carpentry and Building* for the past 25 years. I find that I have been reading its columns since 1885 and no reasonable amount of money could buy my copies.

I fully endorse all that Morris Williams has had to say in the February number of *The Building Age* and wish to state that his contributions have been very valuable to me as well as to many others.

I never saw the time since I began taking *Carpentry and Building* that I could afford to do without it. Every mechanic good or poor should take it and profit by every page of it, and if more would do this there would be a whole lot of better mechanics in this country than there are to-day. There is one reason why there are so many poor mechanics and that is because they will not buy technical books and use their time in order to improve their knowledge of their trade.

How many carpenters do we personally know of whom it may be said that they practically know nothing about the steel square? One young man in one of the large cities told me that he had asked at least 100 carpenters to explain the figures on the steel square and each one told him they could not. Now is there any excuse for such ignorance?

If every carpenter having his own interests at heart would take *The Building Age* and just draft out each problem presented, there would soon be more first-class mechanics and less lumber spoilers. When a contractor sends out a man to do a job of work the contractor likes to see that the mechanic is qualified to do the work.

I wish to say that many times one article alone contained in *The Building Age* is worth ten times the cost of the paper for the whole year.

Some Comments on the Construction of Outside Stairs

From W. B. Gray, Louisville, Ky.—Recently while erecting a pair of outside stairs which I was endeavoring to do so well that renewing them would not be necessary in my time, it occurred that some results from outside stair work, stated from actual experience, and a few remarks about the work in hand would be interesting to the readers of *The Building Age*. Too much care cannot be taken in selecting outside stair material, whatever wood may be the lumber, and more than ordinary skill can and should be brought to bear in the erection, too.

The writer has on his premises one pair of outside steps, every part made of white pine, which have been doing service for 33 years, lacking three months. They were first put together with cut nails; remained in the original position for 20 years and then had to be hammered apart. They were erected again in another place, the same parts being put together with wire spikes and nails. Four years afterwards they were moved again and slightly modified. They were found to be all but ready to fall apart, as the nails had become a stack of rust, except a core of sound iron about the size of a coarse sewing needle. Six years afterward they were moved once more. The wire nails were again found to be rusted in about the same manner as they were the time before. In their present location these stairs have been serving nearly three years. The wood is sound and treads well worn, but the nails are probably again half rusted off.

Another pair of outside stairs were moved by the writer after they had done 20 years' service and reerected in another place. The carriages were clear yellow poplar. In the new location, one new carriage was necessary and one of yellow pine was put in, but not painted until the steps were completed. After nine years the yellow pine carriage is rotted out and must be renewed while the old poplar ones are still sound.

In another case of outside stairs the material was yellow pine throughout. The treads were selected and sawed to length and thoroughly painted on the bottom, top and ends in the shop. The carriages were sawed on the job and the treads placed on them before the carriages were painted. After eight years' service the carriages were too rotten to be allowed to remain and were replaced with cypress. The treads, however, having been originally well painted in the shop before being sent to the job, are still sound and were again used. The new carriages were also painted in the shop before being sent to the job. It is a question how long the yellow pine treads will last.

Telephone and telegraph companies have in a great measure abandoned painting their poles, claiming that paint holds moisture in and causes the interior to rot. Many builders argue the same thing about outside stair work. It is likely that if poles were amply protected at the top end and painted, they would last longer than when exposed to the weather. Moisture gets into stair carriages at the saw cuts, and if painting is to be abandoned at any point, I would prefer to soak the saw cuts full of oil and pigment, so as to keep moisture from going into the sap pores and leave the sides and bottoms unpainted. It will take more evidence than the writer has met with so far to induce him to abandon painting any kind of outside wood work all over before it is put up.

The life of stair treads seems to be longer when heart boards are placed with the edge nearest the heart toward the front, being careful to put the side down that was nearest the center of the log from which the board was cut, all as shown at Y in Fig. 1. This causes water that does get in above to drift with the annular rings more or less and thus protect the wood below. The salient features of the stairs just erected are briefly stated with the aid of the sketches: Stubs, red cedar; carriages, cypress (yellow poplar could not be had of right length); treads and all other parts, yellow poplar; wood all well painted after being made ready to put together. The top tread face of the carriages were flashed with galvanized iron as shown at X, in the detailed sketch A, of Fig. 1, as an extra pre-

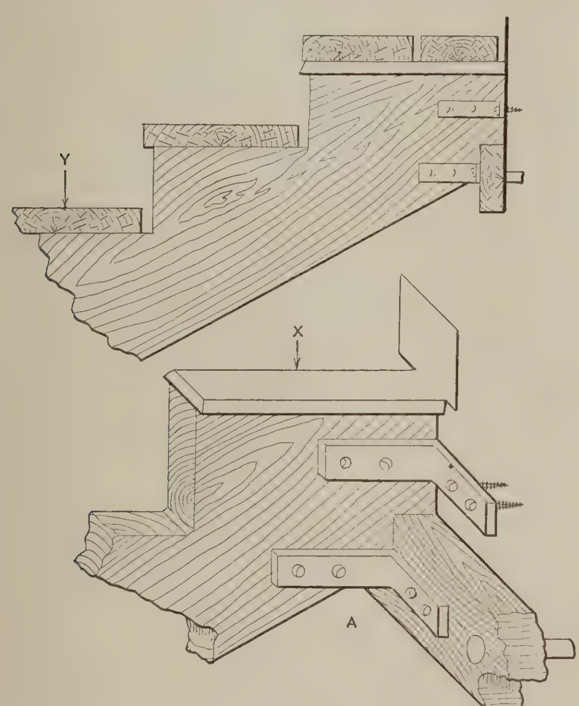


Fig. 1.—Showing Tread Construction.

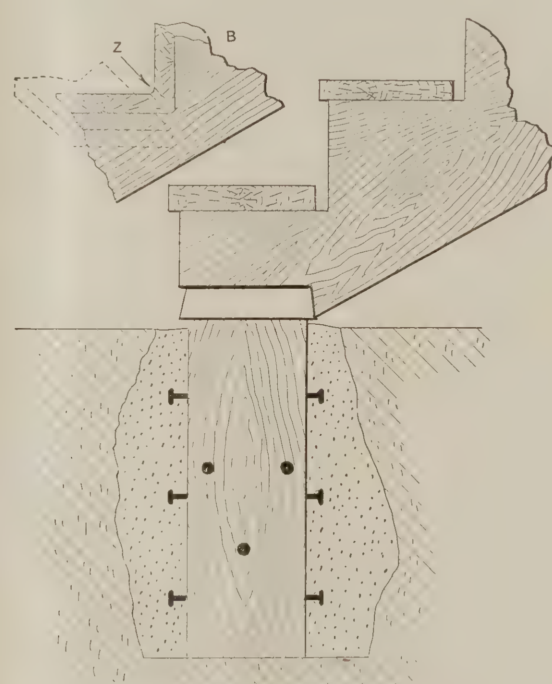


Fig. 2.—Construction at Base of Carriage.

Some Comments on the Construction of Outside Stairs.

caution against moisture from water pouring over on the top step from the floor, the top tread itself being secured to the carriages by angles underneath. The wall strip on which the carriages hang was bolted to the wall. The carriages were secured by wrought angles and brass screws as shown in sketch A, there being no danger of brass screws rusting out.

The bottom end of the carriage is shown in Fig. 2. Cedar stubs were put down on clay and the space about filled with Portland cement mixed in equal parts with coarse, sharp sand. To tie the stub to the cement and give a bearing surface equal to the whole of the bottom of the hole, spikes were driven into the stubs as shown in the sketch. The stubs were capped with galvanized iron. In sawing the carriages care was taken not to saw quite the entire depth of the angle, allowing a little place to split off with the grain as shown at Z, in the detail B, of Fig. 2. This is better than sawing too deep in the least.

The capping of the stubs is intended not only to keep the water out of them, but also to stop it from possibly gaining access between the post and cement, where it might corrode the spikes. The earth was dry, hard clay, and it was thought better to set the stubs on it than to embed them in a pocket of cement.

Figs. 3, 4, 5 and 6 tell their own story. The keeper strips are on the inside of standards and cannot be pushed off by pressure from the stair side. They are

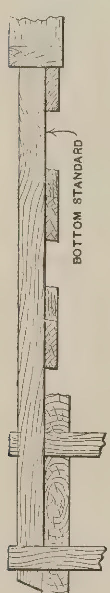


Fig. 3.

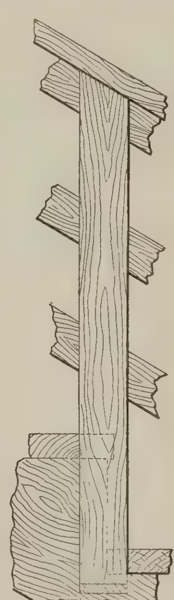


Fig. 4

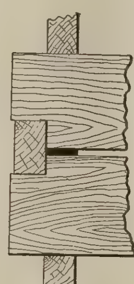


Fig. 5


Fig. 6.

Fig. 3.—End View of Bottom Standard.
Fig. 4.—Side View of Intermediate Rail Standard.
Fig. 5.—Plan View at Standard.
Fig. 6.—Ball Finish on Top Post.

Some Comments on the Construction of Outside Stairs.

placed there, however, because there is less chance of the nails corroding, as the prevailing weather is from the outside. There is but one rail necessary for these stairs. If a rail had been required for the other side also, its keeper strips would have been placed on the outside of the standard, so as to protect *their* nailing. All nails were cut, sunk, primed and well puttied over as soon as the work was done.

A Question in Rafters

From Hee H. See, Sacramento, Cal.—Thus far I have refrained from pressing upon the readers of these columns my views regarding the above subject. The original question propounded by "W. H. P." was: "If the common rafter in a roof of 45-deg. pitch represents the run of the hip rafter, why will not the length of the common rafter in a roof of one-third pitch represent the run of the hip rafter?"

Or to put the same sort of a question in plainer language, if 2 times 2 equals 4, why will not 3 times 3 equal 6? There is as much sense in one question as the other and the answer is the same in both cases, because it won't.

It is quite probable that there are many readers of these pages who know that 3 times 3 do not equal 6, and equally probable that some of them could give a clear and logical explanation as to why it does not, but are there any amongst them bold enough to come forward with the statement that 3 times 3 *does* equal 6, merely qualifying their statement with the remark that to have 3 times 3 equal 6 you must be careful to so arrange matters that 6 equals the product of 3 times 3.

This appears to me to be the stand taken by "Parallelogram," and more recently by "J. Bremner," of Portland. As Mr. Bremner's communication is the more recent, and as I consider it the more misleading of the two, I will confine my few remarks to it.

Mr. Bremner says: The length of the common rafter of a one-third pitch, or any other pitch, is equal to the run of the hip rafter for the same pitch, if we make the run of the hip equal to the length of the common rafter. These are not his exact words, but they convey the same meaning. What follows are his exact words: "Most certainly the hip run can be made equal to the length of the common rafter of *any pitch whatever.*" The Italics are mine. Now let us see how this works out in practice.

Some time ago we built a brick storehouse—the size does not matter—but I will just mention that it was 25 ft. wide by 80 ft. long. It was covered with a tar and gravel roof which had a pitch of 1 in. to the foot. The roof was hipped and the rafters had a projection of 1 ft. on all four sides of the building. Will Mr. Bremner please draw another diagram showing the proper location of the hips according to his system of roof framing—the run of the hip equal to the length of the common rafter?

Or if there are no flat roofs in his section of the country, let us take another example. I have a hip roof to put on a small tower, the tower being 8 ft. square and the roof two-thirds pitch; that is, it rises 16 in. to the foot run—no uncommon pitch for a tower roof. Now I find the length of the common rafter to be 6 ft. 8 in.; taking this for the run of the hip, the combined runs of the two diagonally opposite hips equal 13 ft. 4 in. So far so good; but the diagonal of the tower measures only 11 ft. 3½ in. Now how the mischief am I to crowd that 13 ft. 4 in. into that 11 ft. 3½ in.? This system of roof framing has certainly got me guessing.

There is one other statement in the communication of the correspondent to which I wish to call attention; that is, where he says: "The pitch of a roof is not the ratio of its hight to its span, but the ratio of its hight to its run, or half-span." The deuce it is; then for the last 20 years I in company with many another reader of these pages have been framing roofs and making mistakes right along without knowing it. Roofs that we thought one-third pitch are two-third pitch, and those that we thought quarter pitch are one-half pitch.

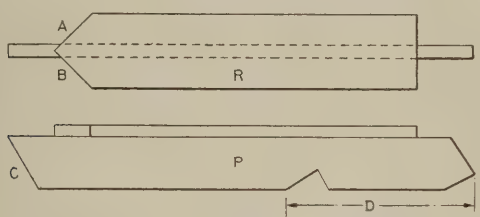
All of our capable present-day writers on the art of roof framing and all of the old fellows back to the days of Peter Nicholson and beyond him have made the same mistake, and it has remained for Mr. Bremner, of Portland, Ore., to set us right on the subject. Well, "the world do move"! It reminds me of the old Scotch prayer, "God gie us a guid conceit o' ourselves."

I am opposed to criticism as a general thing, having neither the time nor inclination for it, but some of the statements contained in Mr. Bremner's letter are so utterly at variance with the facts that I do not think it right to let them pass without comment. In conclusion

I would advise the correspondent in question to take a little of his own advice and "study jolly, old Euclid with his 'Q.E.D.'" Euclid might not be able to teach him much more about roof framing, but it might teach him to be a little more careful with his statements and see that they are approximately correct before putting them in print.

Template for Cutting Jack Rafters

From Web, Concord, N. H.—I enclose a sketch with brief explanation of a template which I have found convenient sometimes when cutting jack rafters. I do



Template for Cutting Jack Rafters.

not know as the idea is new, although I have never seen any one else use such a device. Probably all foremen have been bothered by workmen who are not careful to keep bevel squares set right or use the same piece for a pattern every time and then are very much astonished because the jacks do not fit, resenting any intimation from the foreman that they were to blame. The template is made of ⅞-in. boards about 3 ft. long. The "back piece" being wide enough, each side of the pattern piece to cover the thickness of the jacks and the "pattern piece" the same width as the jacks. An inspection of the sketch will show that the template carries all bevels necessary for cutting jacks of a hip roof. The same principle can be adapted to valley rafters by using the level cut instead of the "tail" cut on the "pattern piece," if one roof is built on the other instead of using a valley rafter.

Referring to the sketch, the back piece is shown at "R," with bevels "A" and "B" for the side bevels of the jacks. The pattern piece is shown at "P," with bevel "C" for the plumb cut of the jacks and pattern "D" of the "tail" of the rafter.

Taking Hewn Timber Out of Wind

From J. W. B., Dushore, Pa.—Will some of the practical readers kindly explain through the Correspondence columns of the paper the best methods of taking down timber out of wind by the use of the steel square or by any other method that may be most convenient for the purpose?

Questions in Barn Construction

From John L. Shawver, Bellefontaine, Ohio.—I notice in the June issue of the paper that "J. E. D.," Milton, Iowa, makes several inquiries about barn construction, and as our experience now reaches into every State and province we offer a few suggestions.

The hight of loft joists over horse stables is usually 8 ft. If the stables can get the advantage of part of the wall, let down the joists to correspond, for this gives abundance of room for ventilation and in cold weather it must be warmed by the animal heat. The width of stalls will depend somewhat on the size of the horses, as an 1800-lb. horse needs more room than one that weighs only 900 or 1000 lb.

We usually make double stalls 10 ft. wide and single stalls 5 ft. or 5½ ft. For large draught horses we make single stalls 6 ft. wide. The distance from the rear stall post to the back wall should be 5 to 6 ft., to allow of the passage of the horses without rubbing the harness that may hang in the rear or getting too close to the other horses' heels. Cramped stables are dangerous both to horses and attendants. We make the spans for horse stables 16 ft., which, after allowing for harness pins and mangers, will allow fully 12 ft. in the clear.

Make the mangers 16 in. wide at the bottom, 28 in. wide at the top, 28 in. high on the stable side, 30 in. high on the feed room side and 40 in. from the top of manger to stable floor.

Make the stable doors at least 42 in. wide and 84 in. high. Some prefer them 48 in. wide and for 1400 to 1800-lb. horses this is preferable. Spirited horses are frightened if the harness rubs against the doors when they pass in or out.

One very nice feature about horse barns is the placing of all oat, chop and bran bins on the loft floor, so as to save space on the stable floor, then have the feed conducted by wooden chutes to small boxes directly in front of the mangers. Thus the bulk of the feed is up out of the way and yet there is always a supply right at hand, where it takes but a moment to reach it.

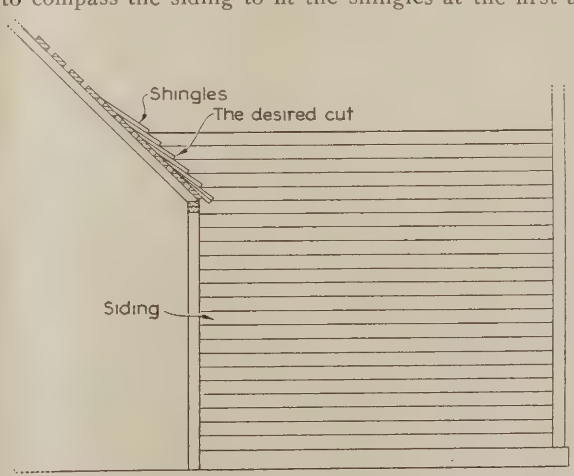
Design Wanted of Truss for Roof

From J. S. W., Tallulah, La.—I have been a reader of your paper for more than two years and find in it much valuable information. I now come to the practical readers for help and would ask those who can do so to furnish a sketch of a roof truss. The building in question is 75 ft. long and 25 ft. wide, the roof having a fall of 4 ft. from front to rear. The space between the ceiling and the roof at the front of the building is 6 ft. and at the rear the space is 2 ft. The roof runs lengthwise of the building.

How far apart should the anchor irons be used that are spiked to the joists, so as to keep the walls from spreading?

Bevel of Siding at Intersection with Shingled Roof

From G. W. W., Des Moines, Iowa.—I have been a reader of the Correspondence columns for some time and have learned a great many things therefrom, but I now come to my fellow craftsmen for information regarding a matter which I feel will interest others who may possibly have work of a similar nature to do. The question relates to the cut or bevel of siding intersecting the shingles of a roof. I want to know just how to compass the siding to fit the shingles at the first attempt, so as to save time as well as material. The sketch which I send represents a section of the roof, with a few courses of shingles in position and also the side or end of the building with the siding intersecting the shingles. I shall be glad to have my fellow workmen discuss this question and throw as much light upon it as they possibly can.



Bevel of Siding at Intersection with Shingled Roof.

OPEN FIREPLACES AND HOUSE CHIMNEYS

By LAWRENCE S. KEIR.

DO not start to draw the chimney to one side until a few inches above the top of the smoke chamber. If this precaution is taken the fire will always burn evenly.

Do not draw the flue abruptly to one side, as anything which tends to drag on the uprushing air lessens the draft.

Never consider it economy to build a chimney without tile lining, at least until well above the roof, and preferably to the very top. Square tile are measured on the outside, so that an 8 x 12-in. brick flue is about an inch smaller all around when lining is used. Owing to the extra smoothness given by using tile, however, the flue will be found to give about the same amount of draft. Do not run fire risk to save the cost of tile. Of course chimneys two-brick thick do not need them.

Do not use the same flue for a fireplace and also for a stove. Each should have its own separate flue in order to give the best results, and in some cases to give any good results at all.

The shelf usually is bedded in mortar on a ledge formed to receive it. The brick back of the shelf is cut back to give a deeper and firmer hold. After the shelf has been bedded and leveled it is pointed snugly along the back edge or, in the case of a wooden shelf, is generally nailed to the plaster furring.

Wood is not entirely satisfactory for mantel shelves, as it is liable to warp, and marble or suitable stone cannot always be easily obtained, so we may fall back on our old standby—cement. In Fig. 4 is shown just how the cement shelf is built, A being a section through the shelf and showing the "form" in position. At *b* is an iron rod or piece of gas pipe bedded in the cement, about an inch from the bottom. A piece of stout wire as shown at *c* in the partial plan view is carried along and fastened around near the ends of each iron, the irons being spaced not more than 12 in. apart. The joints in the masonry next to the cement work should be well raked out to give a better key.

In making the "form" leave the heads of the nails sticking out, so that the form can be taken apart without the necessity of hammering or prying. See that the form is perfectly smooth and is well greased before the cement is put in or else the finished work will be rough. When the form is in place, dampen the masonry that is to come in contact with the shelf until it does not absorb water readily. Then give it a good coat of cement paint, made by mixing Portland cement in water to form a mixture about as thick as cream. Next mix a sufficient quantity of mortar—two parts cement and one part sand—and cover the bottom and sides of the form. Pack it firmly in place. The form is then filled to within ¼ in. of the top with a mixture of one part cement and four parts sand, all well tamped in place. Do not have the mortar so soft that water will run down the brickwork and stain it. Be careful to tamp well around the iron bars.

The top is finished level with the same mix as was used for the bottom and sides. When the cement has sufficiently hardened the shelf may be troweled smooth. It is a good plan to work the top edge back with the trowel, as shown at *d* of Fig. 2. At *a* is shown a strip of cove molding laid in the form to give the shelf a more finished appearance. After the shelf has been smoothed up cover it with wet bagging and keep it wet until the cement is thoroughly hard. After removing the forms point up any unevenness in the work and give it a coat or two of thin cement paint.

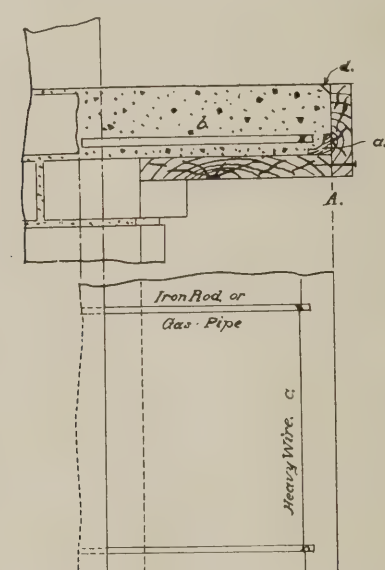


Fig. 4.—Showing how a Cement Shelf is Built.

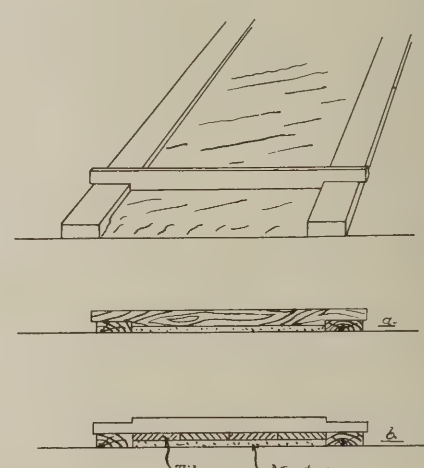


Fig. 5.—Method of Constructing the Hearth.

Open Fireplaces and House Chimneys.

When everything else has been finished we are ready for the hearth. Clean out all the fallen mortar and chips, making sure not to forget the windbreak above the arch. This ledge should have been covered with strong paper, one edge hanging down a few inches and once or twice a day during the construction of the chimney should have been drawn out and the mortar cleared out. If the mortar is allowed to gather in large quantities it is sometimes very difficult to remove it. Thoroughly clean the hearth foundation, wet down and paint with cement, after which fill up and level even with the finished floor, after the same manner as in connection with the cement shelf.

If brick are used for the hearth they should be simply bedded in mortar composed of one part cement and two parts fine sand. If rough brick are used the edges of the bricks must be buttered with mortar as they are laid, but if pressed or glazed brick are used the joints may be slushed full after the brick are laid and the surplus mortar wiped off. If the hearth is to be tiled it will be necessary to fill to within 1 in. of the floor line with 1 to 4 cement mortar. The filling should be made perfectly level, so as to avoid any unevenness in the bedding mortar which might affect the finished work. When the filling has become perfectly firm it may be covered a small section at a time with about one-half an inch of 1 to 2 cement mortar screeded perfectly level between two guide strips as shown at *a* in Fig. 5, and the tile laid and tamped firm and level, using a light hammer and a block of wood for the purpose. The same guide strips used in bedding the mortar can be used to level the tile as shown at *b* of Fig. 5.

When the face of the fireplace is to be tiled the brick work should not be pointed. If it is already pointed the joints should be raked out to give a good key for the plaster coat. After the brick have been well washed and moistened and painted with cement, plaster the surface to be tiled with a good, heavy coat of 1 to 2 cement mortar. Scratch this coat slightly to form

Mortar stains may be removed from brickwork by washing with a solution of one part muriatic acid to 15 or 20 parts water. Use a stiff brush and keep the hands as dry as possible. After washing with the acid solution go over the work a second time with pure water to wash off the acid. If grates or portable fireplaces are to be set it is best not to commence operations until the metal work arrives, then follow the manufacturer's instructions and save all trouble and worry.

Jamb hooks and cranes are sometimes fastened in place with expansion screws, but usually they are built in as the fireplace is constructed.

Fireplaces built of cement brick or blocks or solid concrete give excellent results if good material is used and proper care exercised in the mixing and curing of the concrete. A mixture consisting of one part Portland cement to four parts well-graded sand makes a durable concrete for fireplace use. Good cement blocks may be used for chimneys, and good cement brick are equal to if not superior to common clay brick. Solid cement chimneys if properly made are

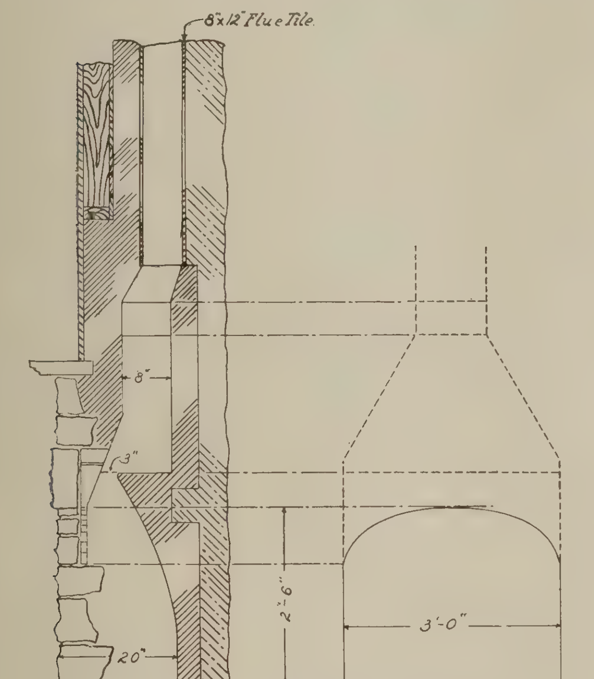


Fig. 6.—Sectional View of a Fireplace of Good Proportions.

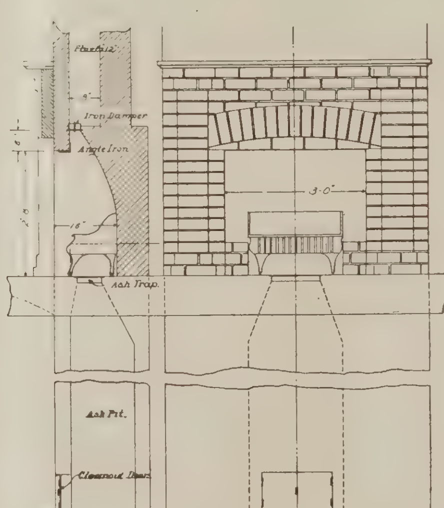


Fig. 7.—Section and Elevation of Fireplace Showing Chute for Delivering Ashes to the Pit in the Cellar.

Open Fireplaces and House Chimneys.

a key for the bedding mortar and allow the plaster coat to set for one day.

The tile are then laid in the same way as in the case of the hearth, except that the bedding mortar will be applied ¼ in. thick on the scratch coat and ¼ in. thick on the back of each tile as it is laid. When the tile are laid fill the joints with pure cement and wash clean with water and a sponge or soft rag. The edges of the face tiles are usually protected by metal strips which come for the purpose and are held in place with expansion screws or by having the ends bedded in the masonry.

The hearth should be given plenty of time to thoroughly set before a fire is ever built on it.

Except on outside work in damp weather all brick and tile should be dampened before they are laid, because if they are very dry they absorb the moisture from the mortar before it has had time to set.

For fireplace work only a very small portion of lime should be added to the mortar to make it work well, and in the best practice none should be used. Lime cannot stand the heat and gas of the fire as well as cement, and for general fireplace work a 1 to 3 Portland cement mortar is the best.

excellent, but it is not well for the novice to attempt the job, because if not properly constructed they are sure to crack.

In Fig. 6 is shown a vertical cross section of a fireplace of good proportions, together with a diagrammatic representation of the front elevation.

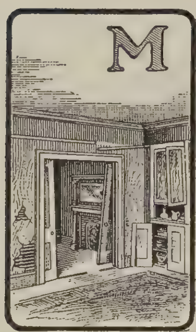
Fig. 7 represents a sectional view and front elevation of a brick fireplace, with basket grate in position, and indicating the ash chute for the purpose of delivering the ashes from the fireplace to the ash pit in the basement. A cleanout door at the base of the chute permits of the ready removal of the accumulated ashes.

(*To be continued.*)

The Peoples Building & Investment Company, of Charleston, S. C., are to erect through Thompson & Frohling, New York, architects, a modern bank and eight-story office building. This building is to be heated and ventilated by the Harrison Engineering Company, of New York City, the system to consist of a fan and direct "fuel-to-air" heater. This "Aertube" heater takes the place of the steam coils commonly used with a fan system and gives the desired ventilation without steam or water.

THE JOBBING CARPENTER AND SOME OF HIS WORK*—XVII

By Edward H. Crussell.



MOST of the items considered thus far in these articles have been one-man jobs, but frequently when the work is on a larger scale a man is sent out from the shop to obtain measurements and other data for such fixtures and pieces of woodwork as are needed to bring the job to completion. These fixtures may perhaps be made in the shop or procured outside, depending upon whether they are stock patterns and also upon how many pieces are needed. Whichever course is followed it will be necessary to get the size and pattern of them; therefore this chapter is written with the idea of affording some information regarding work of this kind. The item of taking measurements is an important one, but after a number of years spent in the business not only in taking measurements himself, but also being responsible for the measurements and mistakes of others, the writer finds that about all the information he can offer on the subject is this: Keep your mind intently upon the matter in hand and make a careful, complete check of your figures as many times as may be necessary for you to be certain they are correct. The best teachers of all in this matter are the mistakes every one of us is liable to make, and it is quite probable that many mechanics do not grasp the importance of this simple subject until they have through carelessness made some serious mistake in measurement, which cost the boss time and money, and at the same time lower their own percentage as able workmen. Some men without doubt fall into habits of carelessness in this matter because whatever they are working upon is close at hand and they can, if at all in doubt at any time, make a new measurement.

In the work we are at present considering, however, a second measurement is out of the question, as the job is often a considerable distance from the shop and may sometimes indeed mean a long railroad journey. But as a general thing, before a man will be trusted with this class of work he must have proven his ability for it, so that these few remarks should be merely considered as caution signals for the younger members of the craft who have not as yet attained that position.

Although most of our American rules are made left handed or upside down, it is only the novice who is liable to make a mistake by reason of this, the finished workman seldom reading the figures. He calculates the measurements mentally from the joints of his rule and knows, for instance, that the second mark beyond the center joint is 14 in., though the figures on his rule read 10. This is one reason why it is easier for most people to measure with a rule than with a steel square, the joints in the rule helping to locate the measurement. Indeed, for all practical purposes the numbers on a 2-ft. rule might as well be omitted altogether, the division marks being the only things that are looked for by the mechanic. This is proven by the fact that if a man who has used a 2-ft. rule for a considerable time commences to use a 3-ft. one he finds himself, at the start, continually taking the joints in his new rule for the distances represented by the joints of his old one.

We have stated that a mechanic is not liable to make the mistake of taking the wrong figure on his rule, but there are other mistakes for him to make. Ask two different men to mark off with rule and pencil a distance of 20 ft. Will the two measurements match exactly and will either of them be exactly 20 ft.? There is a doubt about it. Try this little experiment; measure off with rule and pencil a distance of 20 or 25 ft. Then get an extra rule and go over the same measurement, not making marks, but laying one rule down and placing the second one against it; then lifting the first and placing it at the end of the second, and so on until you have again gone over the entire measurement. If you are not familiar with this little scheme the result at the end is liable to surprise you.

Serious mistakes are sometimes made by reason of a minor error being constantly repeated. A slight mistake in the measurement of a 10-ft. pole will assume noticeable proportions when the pole is used for measuring the side of a large building. Take the well-known method of setting out a right angle shown in Fig. 105; that is, 6 ft. on one side, 8 ft. on the other and 10 ft. across. You will not get your structure square if there is even the slightest inaccuracy in any of these measurements.

The moral of all this is: for long and accurate measurements use a tape. A guaranteed steel tape is the

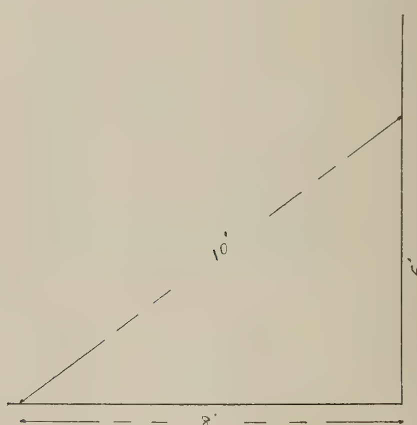


Fig. 105.—Method of Setting Out a Right Angle.

Fig. 106.—Pattern Showing Wall and Room Angle.

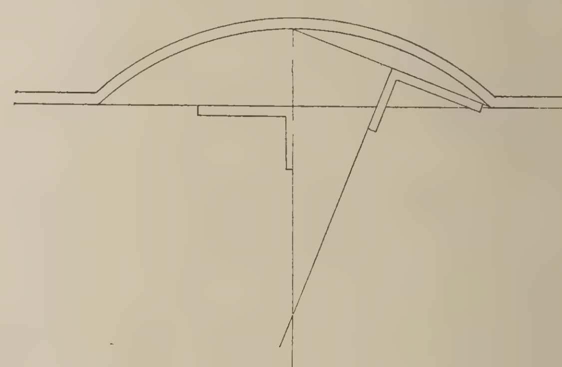


Fig. 107.—Device for Finding Radius of Any Segment of a Circle.

The Jobbing Carpenter and Some of His Work.—XVII.

* The author of these articles will be glad to discuss any phase of work in the line of jobbing carpentry that the reader may suggest.—Editor *The Building Age*

only one worth considering. There may be linen tapes that will hold their accuracy under all conditions, or that will not show a certain amount of elasticity, but thus far they have not come to the writer's knowledge. Besides, length for length the linen tapes are larger and clumsier than the steel ones.

Measuring with a tape is simple enough and should not require any explanation, though cases have been known where the figures on the tape were read upside down, 29 being taken for 26 and so on. The ring at the end of the tape is another source of error, and when in making measurements you call outside assistance to your aid, be sure it is understood that the end of the ring is the end of the tape, for there are many people who look upon the ring as being nothing but a handle. The tape can of course be used single-handed by fastening one end of it with a nail, or what is better yet, with a brad awl.

Wherever possible, it is a good idea to make the measurements and arithmetic check each other. For instance, supposing you are to lay off an opening 3 ft. 1½ in. wide in the center of a recess 7 ft. 9 in. wide, the half of 7 ft. 9 in. will be 3 ft. 10½ in.; measure 3 ft. 10½ in. from each side of the recess and the two marks coming together will prove that you have the correct center.

Now the half of 3 ft. 1½ in. is 1 ft. 6¾ in.; measure 1 ft. 6¾ in. from the center one way and from the point thus obtained measure 3 ft. 1½ in. in the opposite direction. If this second mark measures 1 ft. 6¾ in. from the center one, both your measurements and your arithmetic are correct.

It is best in all cases to do as little arithmetic as possible—make your measurements direct. To deduct 3⅝ in. from 21 in., let the rule stand past the work 3⅝ in. and mark at 21 in.; or, as another instance, supposing a railroad structure is to be erected 20 ft. from the center of the track. The distance between the rails (standard gauge) is 4 ft. 8½ in. The half of 4 ft. 8½ in. is 2 ft. 4¼ in. Hold the 2 ft. 4¼ in. mark of the tape to the inside edge of the nearest rail and the 20-ft. mark gives the location of the structure. Mention is made of this item because quite lately the writer saw a workman cut a piece of board in between the rails and make his measurement from the center of it. He has also known of others who deducted the 2 ft. 4 in. from 20 ft. and erected the building 17 ft. 7¾ in. from the nearest rail. Now all of these methods give the correct distance, but the first one is easier and less liable to error than either of the others.

There are of course other items besides measurements to be considered, such, for example, as the profiles of brackets and moldings, the angles of various rooms, the shape of arched openings, etc.

It is generally possible to obtain small pieces of the moldings to be used as samples, but failing which a thin piece of card can sometimes be inserted in one of the joints and on it the shape of the molding can be marked. The various wall and room angles may be obtained with a bevel protractor or a permanent pattern can be made by nailing two strips of wood together at the proper angle as shown in Fig. 106. The radius of any segment of a circle can be found by the method illustrated in Fig. 107. This is not the most scientific method, but it is as accurate as any and is probably the most easily remembered. Knowing that some of the readers have an antipathy for the A B C's of geometry, I have left them out and endeavored to make the sketch understandable without them. The steel square is applied to the center of the line in each case.

To obtain the shape of an elliptical space or opening, proceed as illustrated in Fig. 108. All that is required is a piece of board a little longer than the opening is wide and a pointed lath. Place the board against the opening as shown in the sketch and apply the lath to as many and varied positions as possible, marking on the board along one side and end of the lath. The lath is shown in position in the sketch and the various points already taken are indicated by the dotted lines. After the lath has been applied all around the curve, remove the board and place it in the same relative position against the board that is to be used as a pattern. If we now apply the lath to the marks on the board and prick off each time the position of the point of it we will obtain a series of dots or marks through which the original curve may be drawn. This is a good scheme to know about, for by means of it one can get the shape of any space that is not too large, no matter whether it be curved or angular, regular or irregular.

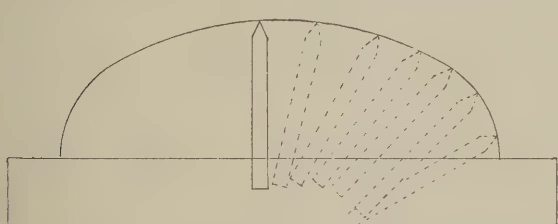
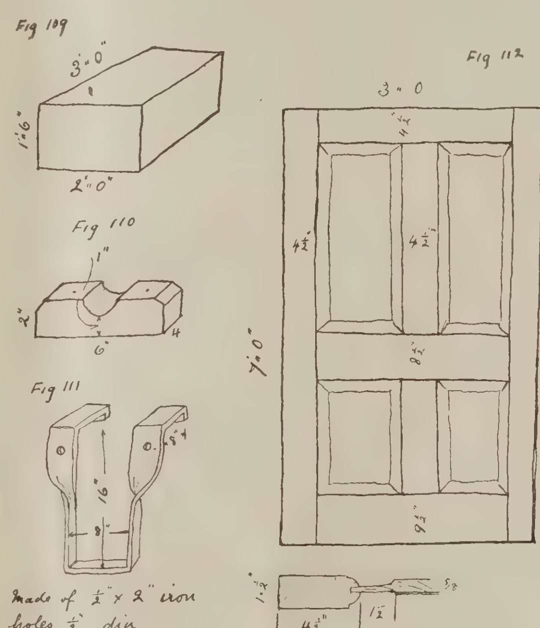


Fig. 108.—Method of Obtaining Shape of an Elliptical Space or Opening.



Figs. 109-112.—Direct Reproduction of the Author's Sketches.

The Jobbing Carpenter and Some of His Work.—XVII.

An important consideration in work such as that under discussion is the matter of making rough freehand sketches of the work in hand. It has been said that "drawing is not only a universal language, but the shortest of all shorthands." There is truth in the statement and for a man to obtain any proficiency as a mechanic it is necessary that he have some small knowledge of this important subject. This does not mean that he must be a finished draftsman, but he certainly ought to be able to make such rough sketches of common objects as will enable him to record their shape and size in a smaller space than would otherwise be the case.

Having a good idea of his own limitations, the writer does not for a moment presume to set himself up as a teacher of drawing, but he has asked of our worthy editor (as a special indulgence) that the sketches Figs. 109 and 112 inclusive be reproduced exactly as they were drawn in order that the readers may see how rough a sketch may be and still answer its purpose. Fig. 109 shows the fundamental principle. It may be made to represent almost anything that has square corners, from a brick to a tool chest or kitchen table. Stand it on end and it becomes a cupboard or wardrobe. Almost any one can draw a figure of this kind and it should take but little practice to enable him to fill in the detail and change the block into a box, table or cupboard, as the case may be, which makes it possible for him to show all the several measurements of an article in one sketch.

Figs. 110, 111 and 112 are copied at random from one of the writer's old note books. Fig. 110 has a special significance, because it is the sketch which first started him making sketches of his own. Years ago when he was a "cub carpenter" he was employed upon the construction of a large manufacturing building. One day the superintendent paused in passing; picked up the cub's level, drew the original of Fig. 110 on one side of it, and, handing the level back, he said: "That is a support for 2-in. pipe, I want fifty of them; make them out of rough 2 x 4-in., and was gone. The whole incident did not take more than a minute and the cub said to himself: "Gee! I wish I could do that."

Fig. 111 is a sketch of a beam hanger or stirrup and if to the novice it appears a little difficult he has only to remember that the shape of it is contained in the sides of the block shown in Fig. 109. It would have taken three sketches to have shown all the dimensions of this article by any other method, and even then it is doubtful if the idea would have been as clear.

Fig. 112 is the sketch of a door that had to be made to match the balance of those in the building and regarding it we expect to have more to say later.

Mention of the fact that these sketches were copied from one of the writer's note books affords opportunity to remark that it is much better to have a note book for keeping a record of these sketches than to mark them on odd pieces of paper. Entered in the note book they are not so liable to be lost and may at some future date prove valuable for reference.

This habit of carrying a note book in which to mark small notes and sketches concerning items of daily work is a good one for the mechanic to form. In it should be entered not only the things with which he is directly concerned, but anything at all that comes to his notice which he thinks may at some future time be of use to him in his daily calling; such as a good design for a bracket, a new idea in a cornice, a new method or shingling hips, and so on. Many a young man starts out with the idea of carrying all of these things in his memory, and at first it is comparatively easy to do so, but as time goes on and the years roll on there are so many new things to be remembered that a number of the old ones are bound to be forgotten and instead of becoming a part of his stock in trade are lost to him forever. Apart from its other advantages, the constant use of the note book will in time create a habit of observation which is in itself a fine thing to have, it being the item that makes all the difference between mediocrity and success in any calling one may choose to mention.

WHAT BUILDERS ARE DOING

A SURVEY of the building situation, as revealed by reports from leading cities of the country for the month of June, shows comparatively little change when contrasted with the same season a year ago, statistics indicating simply a slight lessening in activity, which is not surprising, considering the fact that the same tendency is noticeable in many other lines of industry. Leading cities showing increased activity last month over a year ago in the cost of building improvements for which permits were issued include Atlanta, Cincinnati, Denver, Omaha, Pittsburg, Portland (Ore.), and Memphis, while among those showing a decreased activity are Baltimore, Brooklyn, due to the heavy shrinkage in dwelling construction, Philadelphia, Los Angeles, Milwaukee, Kansas City, St. Paul, Richmond, Va., and San Francisco. Many of the smaller cities, especially in the interior, show undiminished activity, and dwelling construction is being conducted upon a large scale. The situation is comparatively free from labor disturbances, and operations have therefore suffered little if any check on that score. The outlook is for an average volume of business, but it is not probable that many records will be broken.

Atlanta, Ga.

The total value of the building improvements for which permits were issued in June established a new record for that month, as it showed a gain of $75,000 over June, 1906, which up to the present year held all records for the month named. The total for the month was $715,822, and brought the aggregate for the first six months up to $3,980,713, which is far ahead of the first six months of any year in the history of the building inspector's office.

The banner year as regards the volume of building operations in the city was 1909, and the total for the first six months of that year was $3,036,111.

Baltimore, Md.

The lull in general business conditions is reflected in the building line, the permits issued being 208 and calling for an outlay of $593,200, while in June last year there were 257 permits issued for buildings to cost $675,275.

Plans have recently been completed by Architect Otto H. Simonson for Public School No. 2, to be erected at Stiles and Gough Streets, Baltimore, Md. The Engineering-Contracting Company has been awarded the general contract, and the Raymond Concrete Pile Company, of New York and Chicago, the contract for the foundation.

Buffalo, N. Y.

The number of permits issued by the Bureau of Building for the month of June was 395, and the estimated value was $1,082,000. The aggregate of Buffalo's building operations for the fiscal year ending June 30 was $10,205,000, being the largest of any year in the history of the city.

Among the more important buildings under way are the six-story and basement wholesale paper warehouse for the Alling & Cory Company, to cost $60,000; a ten-story store and office building, Main and South Division Streets, to cost $200,000; a seven-story store and light manufacturing building, Pearl and Huron Streets, $110,000; store and manufacturing building, Franklin and Huron Streets, $50,000; store and garage building, Main and Goodrich Streets, $100,000; garage and manufacturing building, Main and North Streets, $60,000; Majestic Theater, William Street, $50,000; a country club house for the Buffalo Automobile Club, $30,000, and a club house for the Columbia Turn Verein, $28,000; an addition to the plant of the Sowers Manufacturing Company, $26,000, and a factory for the Kimo Shoe Polish Company, $28,000.

A large amount of building is under way also at Niagara Falls and Lockport, N. Y., including for the former city a large manufacturing plant for the United States Light & Heating Company, $300,000; a plant for the National Carbon Company, $150,000; several new buildings at the plant of the Hooker Electro-Chemical Company (rebuilt after fire), $300,000, and a warehouse for the Cliff Paper Company, $25,000, and at Lockport the extensive plant of the Simonds Manufacturing Company, comprising six buildings, which will cost approximately $500,000.

Chicago, Ill.

There is little change to note in the building situation in the city, and the volume of operations is much the same as in June a year ago. The number of permits issued last month is a trifle less than during the month named, but on the other hand the vested capital is somewhat larger. According to the figures of the Building Department there were 1,057 permits issued last month for new work to cost $8,495,600, while in June last year there were 1,198 permits issued calling for an outlay of $8,271,050.

For the six months ended June 30 building operations were the second largest on record. Permits for 5,821 structures were issued, with a street frontage of 146,758 feet, to cost $45,518,600. These compared with permits for 6,185 structures, a street frontage of 165,268 feet, to cost $50,460,930, for the same time last year. The reduction was due mainly to the fact that the permits for the City Hall, $4,500,000, and the $5,000,000 terminal building of the Chicago & Northwestern were taken out last year.

Cleveland, Ohio.

The building situation in this city continues very satisfactory, and the total amount of new construction work during the year is expected to equal that of 1909. During the first six months there were 3,611 permits issued by the City Building Inspector for buildings to cost $6,421,857, as compared with 3,703 permits issued during the same period of 1909 for structures to cost $6,667,014. This is a decrease of 3.68 per cent. Permits have not yet been secured for some large work about to start, and these will swell the total for the last half of the year.

During June there were 768 permits issued for buildings to cost $1,388,341, which is a gain of $130,000 over May.

A very successful summer outing was conducted by the Builders' Exchange, of Cleveland, on June 21 to 24 to Conneaut Lake, Pa. Members of the Exchange and their families to the number of upwards of 200 enjoyed the outing, leaving Cleveland on a special train over the Lake Shore & Michigan Southern Railroad on Tuesday, June 21, arriving at the destination after a pleasant journey in time for luncheon. Headquarters for the outing were at the Hotel Conneaut, the entire capacity of the hotel being assigned to members of the party. From the time of arrival until the departure a lively programme of entertainment was followed. On Tuesday afternoon the members took a delightful ride around the lake on a chartered steamer, and in the evening music and other entertainment were provided. On Wednesday the annual game between the material dealers and the contractors was held, furnishing no end of amusement to the crowd, and resulting in a victory for the material dealers. In the evening a dancing party was held in the large dancing pavilion of the resort, all members and their ladies participating in this feature. On Thursday trips to surrounding points of interest, including Saegertown and Cambridge Springs, were taken, and in the evening a fireworks display and Venetian Night proved a prime attraction not only for the builders but for local people for miles around. The party reached Cleveland on Friday evening in time for dinner, all hands declaring that the outing was in every respect a most satisfactory affair. The weather conditions were ideal, the accommodations were ample and of a high class, and the general impression was that the trip of 1910 was certainly one of the best taken by the Exchange. The affair was in charge of the regular entertainment committee, comprising Messrs. A. C. Klumph, chairman; E. T. Holmes, F. J. Dresser, T. W. McAbee and Lawrence A. Slatmyer.

Hartford, Conn.

Activity in the building line continues, and last month 108 permits were issued for new work of an estimated value of $674,590, while in June last year there were only 79 permits issued calling for new work of an estimated value of $312,820.

For the period from January to July of the current year 543 permits were issued, and the estimated value of the work is placed at $2,644,381, while for the first half of last year 424 permits were issued for work valued at $1,667,830. During the first six months of this year provision was made for the erection of many private dwellings and tenement houses, new factory buildings were erected as well as school houses and churches, all tending to show that Hartford is constantly growing, even though the 1910 census will not show the population to be as large as many had expected.

Los Angeles, Cal.

Building activity in Los Angeles showed a further easing off in June as compared with the previous months of the year, though it showed a gain of slightly more than 50 per cent as compared with June last year. During the month just ended there were 848 permits issued for new buildings to cost $558,891, as compared with 941 permits for buildings to cost $1,811,160 during May, and with 611 permits for buildings to cost $1,000,722 during June, 1909.

The building figures for the fiscal year ending June 30 mark a new record in the building history of the city. During the year the record showed 10,064 permits for work estimated to cost $19,441,610. Of this total, 6,192 permits for work estimated to cost $11,741,249 are to be credited to the six months beginning with January 1 of the present year.

Just what the second half of the present year has in store for the building trades is a little questionable. The fact that the last two months have shown a sharp drop from the high mark of April is to be noted, but this is more than offset by the fact that month by month the present year is running ahead of last year as well as by the fact that the past six months has a building total practically equal to that of the whole of 1909. A more serious thing than the apparent drop in the months of May and June is the labor troubles that are now afflicting the city. Los Angeles has heretofore had the advantage of low wages and the "open shop," but the labor organizers are making a desperate attempt to change this. Already there is a serious strike in the iron industry, in which line the labor unions are determined to force this city to the same hours and wages as prevails in San Francisco. This strike, together with the fear that the trouble may spread to lines directly connected with the building trades, has already operated to check new building. It has also made general business conditions bad and will thus be felt indirectly for several months.

Aside from the labor situation, conditions for building are favorable. Materials are abundant and cheap, and money has been quite abundant for building purposes.

Among the buildings to be built in the immediate future are: The Los Angeles Country Club building near Santa Monica, for which the general contract has just been let to H. J. Goetz, the architects being Hunt, Eager & Burns; the J. O. Downing apartment house on Locust Street near Seaside Boulevard, to cost $16,200, A. L. Haley architect and Rowland & Pruess contractors; the Harry Ainsworth residence at the corner of West Adams and Cimarron Streets, to cost $200,000, for which plans are now being drawn by Pemberton & Kent; the 99-room apartment house of the Boston Building Company at Pasadena, to cost $33,350; the Arlington Heights Grammar School, on Seventh Avenue near Washington Street, to cost upwards of $20,000; the grammar school at Inglewood, to cost $45,000, and the Locke & Haug apartment house at Whittier, to cost $25,000, E. M. Wheatland architect.

New Bedford, Mass.

The semi-annual report of Inspector of Buildings J. L. Gibbs shows 694 permits to have been issued for building improvements estimated to cost $4,537,600, while in the corresponding period of 1909 there were 515 permits issued for building improvements costing $2,223,200.

In the first six months of the present year 396 new dwellings were constructed as against 301 in the corresponding period of last year.

New Haven, Conn.

The permits for the Sloane Laboratory, to cost $300,000, and for the Truman Street School, to cost $100,000, brings the total estimated cost of building operations for June up to $708,700, as contrasted with $263,360 for June last year. There were permits for eleven one-family frame houses, thirteen two-family frame houses, six frame tenements and six brick tenements.

For the six months ending June 30 of the current year there were 543 permits issued calling for an outlay of $2,370,528, while in the first half of last year 535 permits were issued calling for a total expenditure of $1,596,116.

New York City.

The cost of the new work projected in June in the Boroughs of Manhattan and the Bronx shows a little heavier than was the case in June last year. It is, however, so slight as to carry no significance, as the difference is only about half a million dollars. As compared with May this year the June figures are about $2,000,000 less.

The report of Building Superintendent Miller, of the Borough of Manhattan, for June shows that plans were filed for seventy-six new buildings to cost $9,379,050, as against eighty to cost $8,849,125 in June last year.

In the Bronx 164 permits were issued last month for buildings to cost $3,033,300, and in June last year 171 permits were taken out for improvements to cost $2,855,600.

Among the plans recently filed with the Bureau of Buildings were those for the new home of the New York Plate Glass Insurance Company, which will be erected from designs by Clinton & Russell, of 32 Nassau Street. The proposed home will be a twelve-story store and office building of limestone and terra cotta, with granite trimmings, estimated to cost $125,000. The structure will be erected at No. 91 William Street, extending in an L to No. 63 Maiden Lane.

Plans have just been filed for a new twelve-story fireproof loft building to cost $360,000, which will occupy a site on the north side of Thirty-eighth Street opposite the Hotel Navarre. The new structure will have a frontage of 120 feet and a depth of 90 feet, while the facade will be of limestone, granite and faced brick.

The new twelve-story Commercial Building opposite Madison Square Garden, which has been designed by Carrere & Hastings, will be of fireproof construction throughout and contain all modern conveniences. Each floor will contain about 8,000 square feet of space, which will be obstructed by only two columns extending through the floor. The building is L-shape, facing about 50 feet on Fourth Avenue and 40 feet on Twenty-sixth Street. It extends around the five-story structure on the corner, which has been leased for a period of years, thus insuring plenty of light and air on both sides of the new building overlooking the corner.

Among recent plans filed were those for an eight-story apartment hotel on the north side of 121st Street west of Amsterdam Avenue, estimated to cost $350,000. The facade will be of brick with small canopy balconies of Spanish tile, while the style of architecture will be Spanish. It will have a frontage of 150 feet and a depth of 81 feet, with accommodations for 109 families.

In the Borough of Brooklyn there has been a heavy shrinkage in building operations as contrasted with June, 1909, due to the falling off in dwelling construction. There were 578 permits issued calling for an outlay of $3,029,750, while in June last year there were 1,353 permits issued calling for an expenditure of $6,962,159.

In the Borough of Queens permits were issued in June for eighty structures estimated to cost $1,325,015, which compare with 324 buildings to cost $1,327,235, which was the best previous record established. Builders are inclined to think the law will soon be modified so that the Tenement Department will have no jurisdiction over three-family dwellings.

Philadelphia, Pa.

While general building has been somewhat less active the volume for the first six months of the year shows a gain over a like period in 1909. The total for the past six months was $22,283,030, while that for the same term last year was $21,894,755. From the rate of activity during the past few months the trade is not so sanguine that the year will break previous records, although there is considerable work in sight, which is expected to develop during the fall months. There has been a gain in dwelling-house operations, although not as large as generally anticipated. During the first six months of the year permits were issued for 5,076 two-story dwellings, costing approximately $9,775,625, as compared with 4,908 operations at $9,375,815 during the same period in 1909. In three-story dwellings the difference is extremely slight; the expenditure this year totals $3,150,925, against $3,139,070 last year.

Statistics compiled by the Bureau of Building Inspection shows that 834 permits for 1,594 operations, at an estimate cost of $3,688,060, were issued during June, a decline of nearly $800,000 in value when compared with the previous month and $468,630 when compared with June last year.

The trade is busy in every branch, the volume of work under way is large and sufficient to keep everything going at full capacity for some time ahead. The labor situation is quiet, recent difficulties in some of the trades having been satisfactorily adjusted.

C. F. Michaelson has been awarded a contract to build twelve two-story flat houses, 19 x 70 feet, at Forty-sixth and Sansom Streets, for Charles Carver, Jr., from plans by De Armond & Ashmead, architects.

Frank K. Stahl has just began work on thirty two-story houses in the Twenty-second Ward. These will measure 15 feet 3 inches x 45 feet on the ground plant, and will be located on Morris and Penn Streets, Germantown. The aggregate cost will be about $65,000.

Melody & Keating, builders, have taken out building permits for a one-story church, 80 x 180 feet, to be erected at the northwest corner of Twentieth and Rittenhouse, at a cost of over $200,000. La Forge & Morris were the architects.

Three fairly large dwelling operations were started late in June. The Girard Estate began work on a three-story apartment house, 69 feet 8 inches x 44 feet 6 inches, at 1800 to 1806 Shunk Street. Charles E. Biddle started operations on forty-four two-story dwellings at Sixty-fourth and Elmwood Avenue, while John Loughran broke ground for sixteen two-story dwellings at Old York Road and Lycoming Avenue.

E. Alan Wilson, architect, has began work on a number of two-story family flat houses, 19 feet 8 inches and 20-foot fronts and 64 feet deep, on Chestnut Street west of Fifty-fourth Street. The cost will be about $60,000.

Edgar V. Seeler, architect, has been commissioned to draw plans for a seven-story office building to be erected on a site 63 x 84 feet on the northwest corner of Fourth and Walnut Streets, for the Fire Association of Philadelphia. The building is to be fireproof and cost approximately $200,000.

Pittsburg, Pa.

The volume of new building projects for June was greater as regards the amount of vested capital involved than for any previous month this year, and is also ahead of June last year by more than $200,000, although in June, 1909, four permits alone called for over $1,000,000. Last month 517 permits were issued for building improvements estimated to cost $2,520,153, of which totals 269 permits were for new buildings to cost $1,156,416. There were 183 permits for alterations and repairs to cost $1,109,894, while the remaining permits were for additions.

For the first half of the current year there were issued from the office of the City Building Inspector 2,069 permits for building improvements involving an estimated outlay of $7,644,153, while in the corresponding half of last year 2,149 permits were taken out for improvements estimated to cost $8,576,839.

Portland, Ore.

Building operations in June showed a total of 550 permits for construction work to cost $1,564,325, as compared with 400 permits for work estimated to cost $865,300 during June last year.

The total value of permits issued for the first six months of the year reaches $8,486,292, as against $6,205,435 for the same period last year, a gain of 37 per cent.

Architects and builders report that there is now enough work in plan to give the remaining months of the year a very fair chance of running ahead of the months already past. The only danger is the fear of labor troubles. The strike in the metal trades is already having some effect, and the strike of the union teamsters may become even more serious to the general welfare of the city.

At the last meeing of the City Council the new building law, which has been under consideration for more than a year, was adopted. It will go into effect on January 1, 1911. It is largely a copy of the Cleveland, Ohio, building law. It sets aside, within the regular fire limits, a district restricted to absolutely fireproof buildings, and provides for fireproof schools, theaters and hotels.

Rochester, N. Y.

While a trifle more building was planned last month than was the case in June a year ago many of the buildings have been delayed in construction by reason of the strike of carpenters and interior woodworkers. According to the report of Fire Marshal Herbert Pierce there were 332 permits issued for building improvements to cost $1,095,201, these figures comparing with 325 permits in June last year for buildings estimated to cost $1,081,268. Out of 332 permits issued last month all except a very few were for dwelling houses ranging in cost from $2,000 to $5,000. Some of the larger work included the addition to the city hospital costing $325,000, a business structure to be used for store purposes to cost $12,500, a garage to cost $10,000, a hollow tile dwelling on Westminster Road to cost $10,000, an addition to the Seward Street school house to cost $13,000, and a factory building to cost $10,000.

For the six months of this year the total value of the building improvements for which permits were issued was $5,249,811, and for the corresponding period of last year $4,438,894.

San Francisco, Cal.

Probably the amount paid out in wages and for materials during June was greater than in any previous month in the year. There is no scarcity of either men or materials, but the surplus appears to be smaller than usual. Nevertheless, the actual showing for new contracts let and for new buildings projected shows some drop from the month preceding. June is usually a light building month as far as new work is concerned, owing largely to the holding up of projected improvements until after the close of the fiscal year on June 30. During the month just closed the number of permits issued was 480, with a total valuation of $2,216,631, as compared with 462 buildings with a total valuation of $2,447,067 for the month preceding, and $2,853,173 for June, 1909.

As in the previous months of the year it is frame construction that is dragging, the value of the brick and concrete buildings running up well. During June the permits included one Class A steel frame brick building to cost $750,000; four Class B buildings to cost $130,000; eighteen Class C buildings to cost $579,700; 207 frame buildings to cost $629,723, and 250 alterations to cost $120,708.

The belief is current that the next few weeks will be rather active ones in building. Materials are still at the lowest point yet reached, as far as quotations are concerned, though both lumber and brick are somewhat stronger, with indications of a slight advance later on. The close of the fiscal year, together with the fact that San Francisco promises to be freer from labor disturbances than any other Coast city, is expected to throw additional capital into the building line here. Advices from the pine and redwood lumber sections of the Coast show that the mills are sold up more closely than for some time, and the statistical tables issued show that the shipments, both domestic and foreign, have been considerably larger during the past few months than they were for the same months last year. This has led to some talk of higher prices, but it is hardly likely that for some time to come this will amount to more than a firmer holding to published prices than is now being done. There is still some cutting in the prices of fir lumber, but most holders who felt obliged to shade prices in order to turn stocks have now reached a position where they can afford to hold for established rates.

Common brick prices are still very low, the price being quite general at $6.50 per thousand; but as few plants in this locality can afford to manufacture at that figure, and as those that can are not able to supply the market, it looks as though a rise in price is certain to come in time. There is, however, still a considerable accumulation in various yards, and this can probably be counted on to go into use at approximately present figures. Though it has been more than four years since the great fire, there are still large quantities of more or less serviceable second-hand brick available from the ruins, and this is probably a factor in holding down the price of new brick. The second-hand article comes into competition with the new in foundation and in cheap work generally.

With the demand for a cheaper sort of fireproof and semi-fireproof buildings has come a revival in concrete construction. Probably as many reinforced concrete business buildings as brick buildings are under way within the fire limits at the present time. There has been an advance of 10 cents per barrel in the price of cement, though the supply seems to be ample. Steel bars are steady at 2½ cents, as for many months past.

Building construction contracts are now quite generally taken on a flat basis instead of on a percentage basis, as was the case for several years after the great fire.

Section 23 of the Tenement House Act of the last Legislature, which required that on a lot fronting on two streets, or a street and an alley, no apartment house could be consructed without a clear space across the middle of the lot, has been declared unconstitutional by the Superior Court of San Francisco, and it is not believed that the decision will be carried to a higher court. It was found that the law operated so as to compel the construction of two buildings on one lot no matter how small, thus degrading half of the lot to a rear frontage, aside from necessitating double expense for elevators, stairways, etc.

Among the larger buildings planned for immediate construction in this city are: The five-story Wells-Fargo-Nevada Bank Buildings at the corner of Montgomery and Pine Streets; the Morris Theater Building on Ellis Street; the three-story Hornlein Investment Company Building at Stockton, between Ellis and O'Farrell Streets, to cost $60,000; the Anton Rulfs flats on Broadway near Polk Street, to cost $35,000, C. M. & A. F. Rousseau architects; the five-story and basement fireproof University of California Building, on First Street near Market, D. H. Burnham & Co. architects; a three-story apartment house to cost $35,000 for the Crance Investment Company, T. P. Ross and A. W. Burgren architects; the G. W. Dickie apartments on Pine Street, between Hyde and Larkin, to cost $39,000, William Beasley, architect; the five-story brick and steel Isaac Grand hotel building on Bush Street near Mason, N. W. Sexton architect; the W. A. Halstead & Co. Class C undertakers' building on Sutter Street, between Polk and Larkin, to cost $50,000, Arthur J. Laib architect, and the new plant of the Pacific Pipe & Steel Company, a subsidiary company of the Doak Sheet Steel Company in South San Francisco.

Seattle, Wash.

The report of Francis W. Grant, Superintendent of the Department of Buildings, covering the month of June, shows a very creditable volume of building operations in progress, although the totals are not quite equal to those of the corresponding month of last year. It shows 1,087 permits to have been issued by the department for improvements estimated to cost $1,519,955, as contrasted with 1,357 permits for improvements involving an estimated outlay of $1,656,425 for June, 1909.

Of the permits issued last month 246 were for frame residences to cost $336,880 and four were for flats and apartment houses to cost $35,700. There were 224 permits for frame business buildings to cost $171,155 and seven were for brick buildings costing $371,500. There was one permit issued for a reinforced concrete building to cost $135,000, and one for a fireproof steel frame building to cost $300,000.

For the first six months of the current year 6,615 permits were issued for improvements calling for an estimated outlay of $8,340,995, while in the first half of last year the department issued 7,898 permits for improvements costing $11,104,533.

St. Louis, Mo.

There was a slight falling off last month in the value of building improvements for which permits were issued as compared with June a year ago, although the changes are not particularly significant. The report of Building Commissioner Smith shows the aggregate of all permits issued last month to have been $1,884,013, of which $1,415,618 was for new buildings and $468,395 for alterations.

In June last year permits were issued to the value of $1,901,254, which it will be observed is only slightly in excess of the total for last month.

LAW IN THE BUILDING TRADES

OWNER'S LIABILITY TO SUBCONTRACTORS

In a suit by subcontractors to enforce a mechanic's lien the extent of the liability of the owner of the property and of the lien in favor of the plaintiffs is in no way limited or affected by the state of the accounts between the owner and the contractors at the time of the abandonment of the contract by the contractors, but depends upon the amount due by the owner to the contractors at the time of the service of the cautionary notice upon the owner and the amount due the subcontractors for labor performed and material furnished, but not to a greater extent than the amount of the original contract. The owner may not defeat the right of subcontractors to recover by merely showing that he has settled in full with the contractors. Subcontractors did not waive or forfeit their right to a mechanic's lien by taking the promissory note of the contractors for what was due them, unless the parties agreed that the note should have the effect of extinguishing the lien or such was their intention. (Florida Supreme Court, Stringfellow *vs.* Coons, 49 Southern Reporter, 1019.)

PRIORITY OF MORTGAGE OVER MECHANIC'S LIEN

A mortgage on land takes precedence over a mechanic's lien for the erection of a building thereon when given before work or material is furnished under the contract, notwithstanding the fact that the contract was executed before the mortgage. A mortgage given to enable the mortgagor to provide funds to complete a building has equal rights with liens arising after the mortgage is given. (Indiana Supreme Court, Ward *vs.* Yarnelle, 91 Northeastern Reporter, 7.)

RIGHTS UNDER BUILDING CONTRACTS

A provision of a building contract that payments should be made only on architects' certificates was waived by the owner's payment of installments and executing notes therefor, without requiring such certificates in so far as those installments were concerned. Neither a complete nor a substantial performance of a building contract can be predicated on facts showing omissions, deviations or defects amounting in value to at least 15 per cent. of the work. A contractor cannot recover on the contract where there have been deviations or omissions of a material nature, unless a sufficient excuse or waive be pleaded and proved. The owner of a building by taking possession does not thereby accept the work and become obligated to the contractor on his construction contract. Where one of the specifications for a building required French sheet glass in the front windows, and another specification provided that all glass to be used in the windows should be of the best clear American cylinder glass, the two should be construed together, and the contractor required to use clear American glass in all the windows except the front ones; and use of translucent glass was not a performance of the contract. (New York Supreme Court, Appellate Division, First Department, Fuchs *vs.* Saladino, 118 New York Supplement, 172.)

CONTRACTOR'S RIGHT TO CREDIT FOR DELAYS

Where a building contract to be performed on or before a fixed date contained a stipulation that in case of failure to complete the building the contractor should pay liquidated damages at a certain rate per diem, but should be given an extension for delays not due to causes or casualties beyond his control, the contractor was not entitled to an extension for rainy days, holidays or for time lost by the failure of his subcontractors to furnish materials or perform work; but delays caused by the owner or by the municipal authorities should be credited to the contractor. (Louisiana Supreme Court, Cook & Laurie Contracting Company *vs.* Denis, 49 Southern Reporter, 1014.)

SECTIONAL STEEL MOLDS IN CONCRETE CONSTRUCTION

ONE of the important items of cost in connection with the construction of concrete walls is that relating to "form" work, as time sheets and material bills often show the cost running up to a relatively high figure per cubic yard. This waste in lumber and material has been a serious drawback in many instances to the adoption of monolithic concrete for light construction work and was encountered by Milton Dana Morrill, a young architect of Washington, D. C., in the construction of model homes for workingmen, a matter to which he has been giving much study, and as intimated in a previous issue of this journal, was

Sectional Steel Molds in Concrete Construction—Molds of a House Set up Ready for Pouring the Concrete and with Window and Door Frames Dropped into Position.

awarded the first gold medal at the late International Congress on the Prevention of Tuberculosis for his model sanitary concrete house. In a paper read before the late convention of the National Association of Cement Users, Mr. Morril said: "It has seemed to me that in concrete work we have been designing in styles suited for wood or brick and constructing in concrete with shapes unsuited and unnatural to the material in hand. This has, of course, made work difficult and expensive." In his designs straight simple lines and good proportions and color are studied to give results, and dimensions and details are standardized as far as possible.

The mold plates, making up the equipment which Mr. Morrill has developed, are pressed from 12 gauge sheet steel into flanged sections 24 in. square. Upon the completion of the footing course the plates are locked to the cement spacing blocks and form a trough about the walls into which the mixture is poured. The cement spacing blocks are left in the wall and the plates are strongly locked together with these blocks or spools and drawn to perfect alignment on the inside. The effect is to give a very rigid and firm construction when erected, the corners giving alignment to keep the work straight and plumb.

The plates are two tiers in hight, each tier being clamped together in series and attached by a hinged rod so that the lower tier is unlocked and swung to its new position on top each day, there being no loose parts to fall. All parts are of pressed steel, so that if a bolt should fall and bend it may be easily straightened. Galvanized iron or wood fillers are used to take up odd dimensions. The plates are locked together in the same way for the floors, the spacing blocks giving the exact thickness of the slab, while reinforcement rods are placed and accurately secured to these blocks by wire with ends protruding for this purpose. All joints are held by steel wedges, which make for speedy erection.

A slight ridge or pattern is left at the joining of the mold plates and the spacing blocks show slightly. This has been treated as wall decoration and with the rosette cast on the spacing blocks a very interesting pattern is formed and it is possible to leave the wall without further finish inside or out, unless a brush coating be applied to give a more uniform color and as a further safeguard against dampness. As the plates are cleaned and greased each time they are raised, and as the concrete is a very wet mixture, a very smooth surface is obtained, requiring no plaster and little patching. A small percent of clay is added to the mix to give a homogeneous damp-proof wall and prevents the settling of the aggregates. The mixture used is about the consistency of molasses.

A slush or wet mix is used in the molds, requiring stirring only, but no tamping. This is referred to as the best and cheapest way to make a damp-proof concrete. A brush coat of white cement is used to give a uniform color and serves as an additional precaution against dampness. In cold climates an inexpensive waterproof insulating board is bedded in the middle of the walls, this preventing condensation and giving a warm house in winter and a cool one in summer.

The window and door frames are made the thickness of the wall and have a dovetailed strip nailed on the back so that they are dropped into he molds and the walls cast around them. Steel molds cannot be employed to advantage when surfaces are cut up or curved, but wherever straight construction is concerned they can be economically used.

The whole equipment for house construction has only ten different parts, and as it can be used indefinitely, the cost per house is not great.

The first building to be erected in accordance with this plan has just been finished at Virginia Highlands, a few miles out of Washington, where Mr. Morrill is planning a garden suburb of model fireproof homes. The first illustration upon this page shows the molds for a house set up ready to pour the concrete and the windows and door frames dropped into place. The second picture shows the walls of the building after

Appearance of Walls after Molds Have Been Removed.

the molds are removed, showing the rough pattern formed by the plates. The joints are rubbed down to a uniform hight and treated as wall decoration.

An Ancient Cement House

A dispatch from Mexico City states that one of the most important discoveries which has been made in many years is the recent unearthing by Professor Ramon Mena, the noted archæologist of Mexico, of the ancient Texcocab city of Otumba, which is located about five miles from the present city of Otumba and about fifteen miles from San Juan to Teotihuacan. Two houses were unearthed, the first of which is of stone, with stone walls, or what is left of them, about 6 ft. in hight. The other house, probably the residence of some priest of very high rank, was of cement; floors of cement and walls of cement, the latter being frescoed in red and blue—the whole being in a perfect state of preservation. This house contains three rooms and a cellar. The cellar also contains several rooms, all with floors of cement.

SUGGESTIONS FOR BUILDING A MODERN DWELLING

By William Arthur.

WHERE good quarries are near, and one is content with plain work, well-laid stone is an excellent building material—which is about equal to saying that bread is good for eating. Is the experience of the race not to count?

Stone walls do not a mansion make unless they are protected from damp the same as brick.

But stone work can be so poorly built as to be of little value. Good mortar is required, but often poor mortar is used. What chance has such work to last? I know houses hundreds of years old where the thin joints are still full of mortar, almost as hard as the stone itself, but much mortar nowadays becomes almost worthless after 20 or 30 years. There is plenty of Roman mortar 1600 to 2000 years old. We have learned much, but also gorgotten quite a good deal.

Old Houses

We are now coming to see, however, that it is not quite so desirable to have houses several hundred years old. Perhaps our descendants will no more live in our houses than wear our old clothes. We have been learning about bacilli.

The microbes have always been busy, but what a man does not know does not hurt him, and it is only in recent years that we have come to understand how consumption and other diseases may belong to a house as well as to the plaster and the wall paper that nurse them. The very stones are now looked upon with suspicion.

Sunlight kills the germs in a few minutes, but many women are afraid of their rugs. There are other enemies in the home than the burglar kind who sometimes infest it.

In some States the old wall paper must always be taken off before the new is put on. What, then, must be the condition of a house that was in its prime when George Washington was a boy? Frame houses should last for a century, so far as structural considerations go—who knows, taking it all by and large, but what it is just as well that they go to pieces in half the time? If you, reader, live in such a rented one, go build a new home for yourself.

A Firm Foundation

If a frame house is, say, 26 x 32 ft., the size over the masonry would be a trifle less than 26 ft.—2 in. by 32 ft.—2 in. The sills would be kept back seven-eighths of an inch, so as to bring the sheeting even with the masonry, and the wood base on the outside would extend down far enough to cover the joint and keep out the wind.

A hight of 28 in. from the surface of the ground to the top of the front porch floor is reasonable, and allows for three steps outside of the porch line and four risers. If there is a fall to the rear of the lot this gives room enough above grade for a cellar light, although some might prefer a few inches more. It is better to have the full frame above the ground, so that an area wall is not required. If a lot has fall enough to the rear to make room for a double window it is advisable to put one in. It is of as much value there as in the kitchen. The cost is a trifle more than for the ordinary cellar style, but the better light and ventilation are worth it. When a high basement wall is not only possible but necessary, it is a serious mistake not to use regular double-hung windows.

In localities where masonry is high priced and carpentry is cheap, another way of building a wall where the ground has heavy slope is to leave the masonry several feet below the first floor and run the studs down to rest upon it. This system is sometimes used for a basement of a bungalow. The masonry need not rise more than a foot above the surface of the ground. Occasionally it is stepped down to suit the slope of the lot.

The difference between the width of the wood and the masonry is shown on the inside, but if there is a finish this is easily overcome. Or, if desired, the studs may be set flush on the inside and a curve made at the base of the wall on the outside.

Thickness of Walls

The ordinary brick foundation wall below a frame house is only 9 in. thick, and 8-in. cement blocks are used. It stands to reason that a thicker wall is better, especially if a basement is put in. But for a foundation only, a 9-in. wall is strong enough if it is well built. A long wall with a full basement and no bracing in the center should be at least 13 in. thick.

Sometimes a compromise is made. The wall is built 13 in. to the ground level and 9 in. above, the offset being made on the outside, where it is not seen. There is thus a saving of one course of brick from the ground up. It is not much, but every little helps.

The masons of a century ago when they built stone walls for such foundations made them at least 16 in. thick. But with stone it is usually more expensive to build a 12-in. than a 16-in. wall, for there is additional trouble in making two faces in a thin wall. With the thick wall the stones can be worked from the two sides with less fitting. Thus a stone with a sharp corner 14 in. away from the straight face would have to be trimmed for the thin wall, but could be used untouched on the wider wall. This holds true to-day as well as a century ago.

Cements and Mortars

A 9-in. wall is thin, but if it is well laid in a mortar composed of Portland cement one part, and sand three parts, it will stand as long as the house, especially if there are cross walls, projecting angles, basement stairs or any features that stiffen it. A good deal depends upon the laying. Sometimes the earth is so packed against a green, unbraced wall that it sags inward before the masons are finished. Sometimes a torrent of water is allowed to wash in between the wall and the earth.

What are known as the natural cements—Rosendale, Utica, Mankate, Louisville, Milwaukee, etc.—make a much better mortar than the ordinary lime, and strong enough for any residence work, unless ruined by too much sand, but are not so good as Portland, which is rapidly gaining in favor.

In an ordinary foundation for a house 26 x 30 ft. there are about 6000 brick in the outside 9-in. walls. Portland cement would cost approximately $14, and lime or natural cement about $6; and for a full hight of basement wall with 10,000 brick, $24 and $10. It is for the owner to decide whether the extra expense is justified. The bricklayer in addition would charge at least 50 cents per 1000 extra for labor on cement work.

The trouble with much lime mortar is that it loses its "life." I recently examined some only 20 years old, and it was so far gone that it could be raked out from between the brick for several inches deep with an ordinary nail. It might have been that there was too much sand used. No matter how good a cement or lime may be, too much sand will ruin it. If an owner allows the mortar for his home to be ruined by this worst kind of adulteration, he might as well be prepared for expense and dissatisfaction in the future. A good policy is to supply all the cement or lime, and so take away the temptation that proves too strong for many. There is really more danger with lime than with the cements, for if these are made too "short" the extra labor of laying devours the saving in the material. For this reason lime has to be doubly watched.

Proportions

After experiments conducted by the United States Government, it was found that the best lime mortar is composed of one part lime paste to two parts of sand. In the model building code compiled by the National Board of Fire Underwriters the section relating to mortar reads, "Slaked lime mortar shall be made of one part of lime and not more than four parts of sand." Just about midway is safe if the lime is good, but what if it is of an inferior brand?

The code further reads, "Cement mortar shall be made of cement and sand in the proportion of one part of cement to not more than three parts of sand, and shall be used immediately after being mixed." Cement mortar becomes worthless after standing, while lime mortar may be retempered.

A good mortar is made by mixing cement, lime and sand. By itself Portland cement is hard to work, and the addition of a little lime makes easier work for the mason and smoother joints. Sometimes lime is tempered with cement, and again cement is tempered with lime. The chief danger is from the sand pile.

If a color is used it should be mixed separately and added to the other mortar.

But whatever kind of mortar is decided upon, Portland cement should assuredly be used to plaster the outside walls below the grade to keep out water in rainy sections. The proportion should be about one cement to two and a half sand. The cost of this protection is trifling, but many houses are kept damp because it is neglected. Rain and melted snow flow in between the ground and a porous wall, and the natural result follows. Sometimes a coat of asphalt is used on the outside also, but ordinarily this is not required if the plastering is carefully done to a thickness of about three-eighths of an inch. For old walls that leak there are now several preparations to be applied on the inside, but the outside protection keeps the water out of the wall altogether.

The advantage of using Portland cement mortar and outside plastering is not only on account of strength, but as a protection from damp. This is the only kind of cement that is specified for marine work, deep, wet foundations, and so forth.

A good foundation costs more than a poor one, but it is worth the extra expense. Some wretchedly bad brickwork is done with lime mortar, or, rather, sand mortar.

Excavation

With hard earth it is possible to proceed in the same way for brick, etc., as described for concrete in a recent issue. Excavate to the exact size and push the masonry against the bank. If there is any danger from water, however, the excavation must be made large enough for plastering. A couple of inches is enough for this, as the work is done as the wall rises.

There are heavy frosts in some sections of the United States, and such a semi-tropical climate in others that "winter" is merely a convenient division of the year, and has no reference to the weather. The model code already spoken of calls for all foundations to be set at least 4 ft. below the ground, except when rock, etc., is struck. This is to guard against frost and is a proper precaution in Northern States, but not necessary in Southern California or Florida.

From 3 to 4 ft. is the general depth used. Some trust to luck and go only a foot down. When the frost commences to work the ground is heaved up and the cracking begins. Probably even the plaster suffers. I have seen a heavy store floor so lifted by the frost that it was necessary to cut out a course of brick with a chisel.

Footings

No matter what thickness a wall is, the footing course has to extend on each side to give a large enough base. This base differs in width according to the nature of the ground. A 9-in. wall is usually made 17 in. at the bottom, and a 13-in. 21. If the base is made too narrow the wall cracks.

Thickness of Walls

If a brick or cement block house instead of a frame is built the foundation wall has of course to be more than 9 in. The stone house, as already explained, takes care of itself in the way of thickness. In most cities a minimum thickness of 13 in. is obligatory for a foundation of a masonry house. The first story is usually made 13 also, and the top story 9. If there is only one story above the basement, that may be 9.

What has been said about mortar and plastering of walls in the foundation of a frame house naturally applies to a house of any other material.

For a foundation the hardest brick are usually called for in a specification. In reality, the softest brick are safe enough if laid on the earth for the lowest footing course. As a matter of theory, the lowest course should be just a little harder than the soil upon which it is laid; and each succeeding course should increase in hardness up to the best brick at the top of the footing to receive the 9-in., 13-in., or other thickness of wall. This last hard course receives all the weight of the structure.

Even if the first course laid on the earth were as hard as steel, it would merely sink in the softer bearing. It would require a hardness of steel to resist steel. If the bearing is hard enough to receive the weight—as in rock foundations, for example—there is no spread footing required. Theoretically, with a spread footing, the weight is tapered off from the hardest course at the junction of the main wall to the softest, which rests upon the earth. But, as a matter of fact, architects properly specify hard brick only for a foundation, for they last, and soft ones crumble. Only it is well to understand the theory, for a few soft brick are not nearly so injurious as some believe, and it will not do to lay the cracking of some poorly designed buildings to an occasional wheelbarrow load of soft brick.

A new brick wall is like a piece of rubber. When masons used to build them only 4 in. thick they sometimes shook them to a straight line before they were hardened. Many a wall has been swung into the cellar by the packing of earth against it on the outside while it was yet green. A cost of 50 cents would ordinarily be sufficient to brace a foundation. Technical knowledge is good; practical knowledge is better; but what some call "horse sense" would often seem to be ahead of anything.

Bearing Power of Soils

It is best to err on the safe side—better to be safe than sorry. It is not such a very hard matter for even John Smith and Mary Smith, his spouse, to figure out the weight of their new home. In general, this does not need to be done, but some soils make it necessary.

The following table is generally used for the bearing power of various soils:

	Tons per sq. ft.
Dry clay on thick beds	4 to 6
Moderately dry clay on thick beds	2 to 4
Soft clay	1 to 2
Gravel and coarse sand, well packed	8 to 10
Sand, compact	4 to 6
Sand, clean, dry	2 to 4
Quicksand, alluvial sand, etc	½ to 1

A good ordinary soil will easily hold 2 tons per square foot. Baker says, "Experience in Central Illinois shows that if the foundation is carried down below the action of the frost the clay sub-soil will bear 1½ to 2 tons per square foot without appreciable settling." *(To be continued.)*

New Publications.

Mission Furniture, How to Make It. Part 2. Size, 5 x 7 in. 120 pages. Profusely illustrated. Bound in board covers. Published by Popular Mechanics Company. Price, 25 cents.

This is the second volume which the Popular Mechanics Company has brought out on this subject and is Known as No. 3 of its 25-cent handbook series. It consists of explicit instructions how to make 32 pieces of furniture of neat design, together with detailed drawings on which the dimensions of the various parts are marked. In most instances half-tone illustrations show the appearance of the finished articles. The matter has been prepared by experts and revised by the editor of *Popular Mechanics*. There are special instructions telling how to produce the different finishes and methods of making joints and bending wood are given. The matter is arranged in a way to prove attractive to the cabinet maker, as well as to the mechanic who is clever with his tools and is inclined to utilize what might otherwise be waste time in making articles suitable for the household.

Estimating Frame and Brick Houses, Barns, Stables and Outbuildings. By F. T. Hodgson. Size, 5 x 7 in. 252 pages. Numerous illustrations. Bound in board covers with gilt side and back titles. Published by the David Williams Company, 14 and 16 Park Place, New York City. Price, $1.00, postpaid.

This is the eighth edition of a work dealing with a subject which is of never-ending interest to the builder and contains within its covers a fund of information which cannot fail to prove of great value to him in his business as contractor. The matter contained in previous editions has been thoroughly revised and brought in touch with present methods and current prices of builders' work. The aim of the author in this edition has been to make the work as generally useful as possible and one that would be of value to every builder in the country as a basis for making his estimates. Although the rules given may not conform with those of any particular locality, yet they will be found to meet the requirements in general of forming a basis for estimating the nearest possible cost of the different items in builder's work.

The author points out in this preface to the eighth edition that in the preparation of estimates of the various departments of builders' work there are certain elements which must always be borne in mind in connection therewith. First, as regards the material, its accessibility to the building site and the expense of carriage. Then there is the labor entailed in its preparaton previous to being fitted up or built and the necessary time and material required for doing this in accordance with the specifications. Some kinds of material are more easily wrought than others, so that due allowance must be made for any extra labor that may be employed in the manipulation of very hard classes of material. The season of the year in which the work has to be done, as well as current prices of material and workmanship, must also receive careful consideration, otherwise these contingencies may cause a serious loss if not taken into account. The author very properly emphasizes the fact that there should be no "guess work" in estimating, although this is very often the case.

The work contains a detailed estimate of a $5,000 house, beginning with the excavation and going through the various stages step by step, so as to render everything perfectly clear to even the novice. One section deals with suggestions in estimating brick work, another estimating the cost of a stable, still another deals with estimating a barn, this being followed by a chapter on details in estimating, in which reference is made to the necessity of considering separately all the details of the various departments of work to be done in connection with a contract, particularly as regards the cost of the production of the material, its manipulation for the specified job, the labor expended upon it in preparation and in the building or fitting up in the structure to be erected. There is also given a Form of Tender and also a Form of Contract.

Coming New York Cement Show

The Cement Products Exhibition Company, 115 Adams street, Chicago, Ill., is distributing a 24-page prospectus relating to the coming New York and Chicago cement shows, presenting rules and regulations governing them, together with diagrams and prices of space. As already announced, the first annual New York show will be held in Madison Square Garden, December 14 to 20 of the present year, while the fourth annual Chicago show will be held in the Coliseum, February 17 to 23 of the coming year. Various contracts have already been awarded in connection with the exhibition and it is expected that by October 1 all arrangements for the show will be completed. It is expected that the New York Cement Show will have a somewhat different aspect from previous cement exhibitions, as practically all of those who expect to exhibit are making plans for elaborate and artistic displays. Many of the larger construction companies have become interested and as a result will have unusual and valuable exhibits with the idea of emphasizing in the minds of business men and the public generally the advantages of reinforced concrete construction.

Cost of Building in 1712

By W. J. Hydon.

In looking over an old book, Mortimer's Husbandry, published in 1712, I found the current prices of house work of all kinds and rules to apply on same which I thought might interest the members of the craft.

Barn Work

For a barn that had a single stud or one hight of studs to the roof the price was 2 shillings (50 cents) per foot.

For a double stud and girt it was 2 shillings 6 pence per foot, measuring barn on one side and one end.

For example, suppose a barn is 60 ft. long and 20 ft. wide, making 80 ft. To hew the timber, saw it out, frame it and set it together, the price was 2 shillings 6 pence (62½ cents) per foot, and 10 pounds ($50) if the carpenter furnished the timber.

The House of 1712

Upon a good foundation two bricks, or 18 in. thick for the heading course, is sufficient for the ground work of any common structure and 6 to 7 courses above grade to the water table. Where the thickness of wall was dropped off the thickness of a brick or 2½ in. on each side.

For Houses of Three to Five Stories.

The wall of such from foundation to water table should be three courses of heading brick or 28 in. in thickness and at every story a water table and offset on inside for joist to rest on; the joist to extend in wall one-quarter part for the better bond. For partition wall one and a half brick thick and upper stories one brick or 9 in. thick.

To dig foundations one brick wide and 1 ft. deep the price was one penny per foot.

Where it was 2½ ft. it was 2 pence per foot and so on.

Brickwork

Bricklayers' work was measured by the pole square of 16½ ft. square. Taking out the door and window openings where a bricklayer has 2 shillings 6 pence per day, the laborer 20 pence and the price of brick is 14 shillings per M, lime 4½ pence per bushel, roofing tile 2 shillings 6 pence per 100, the average price for bricklayers to furnish everything is 5 pounds ($25) a pole square of 272¼ sq. ft.; that is, for house work. For walls the price is 4 pounds 10 shillings. To furnish material, for the labor only, it is 1 pound 2 shillings per pole square of 272¼ sq. ft. one and a half brick thick.

Brick Thick

If a wall is more or less than one and a half brick thick it must be reduced to a brick and a half by multiplying the length and hight by the number of half bricks the wall is in thickness and divide the product by 3 and that by 272¼. Bricks were 9 x 4½ x 2½ in size; 4500 will do a pole square 25 bushel of lime.

Brickmaking

To burn a clamp of brick of 16 thousand 7 ton of coal was allowed (2000 lb. to the ton), or 10 bushels of coal per thousand of brick, and the workman got 6 shillings per thousand to make them. A square yard of clay per 7 to 8 thousand brick.

Roofing Tile

Roofing tile is measured by square 10 x 10 ft., 3 shillings 6 pence per square for the labor. To furnish all but the tile it is 12 shillings. To furnish everything it is 1 pound 6 shillings per square.

Roofing tile in England was laid in mortar or cement or lath. Three bushels of lime per square. The cement was laid on the first course of tile near the middle and next course bedded in it and pointed on the under side. One hundred lath and 500 nails per square. Nails were hand made and counted.

Thatching roofs with straw was done from 2 shillings 6 pence to 3 shillings per square of 10 x 10 ft., and with reeds, 4 shillings per square. One thousand reeds will cover three squares of roof, which cost about 15 shillings. Two good loads of straw will cover five squares. Thatch is tied on with ropes or widths.

Timber Sawings

All sawing of lumber was done by hand in the saw pits. The price was 2 shillings 8 pence to 3 shillings per 100 sq. ft., measured at the middle length of the log.

Lath

Heart lath of oak are 1 shilling 10 pence per 100. Sap lath of oak are 1 shilling 8 pence per 100. Fir lath 12 pence per 100.

Carpenter Work

Carpenter work is done by the square, 10 x 10 ft. = 100 sq. ft.

At London, England, they will build a house four stories high for 40 pounds ($200) per square if built of oak, and 30 pounds if built of fir. This includes mason work, etc. The price of carpenter work in the country to frame a house if he furnished the timber was 7 to 8 shillings per square, if the carpenter pays the sawing; if not, it was 4 shillings 6 pence.

Plastering

Is done by the square yard. For lathing, laying and setting is 8 pence per yard. Rendering on a brick wall is three (3) pence per yard. Stopping and whiting is 1½ penny per yard.

Whiting, 1 penny per yard, but lath laying and setting with oak laths is 10 to 12 pence per yard. To daub a partition wall with clay on both sides, 3 pence per yard; to rough cast a wall on the outside and render it on the inside, the price was 4 pence per yard in the country.

Leaded Glass

Glaziers' work is done by the square foot.

English glass is 6 pence per foot.

French glass is 1 shilling per foot.

Crown glass is 1 shilling 6 pence per foot.

To take down a quary of glass, to scour, sod, band and set it up again is three half pence per foot.

The House of the 18th Century

Certain rules were made to govern the size of rooms. One was that a room should be in width two-thirds the length and in hight the same as the width, and the hight of a square room should be two-thirds of its square. The hight of an ordinary room at that time was about 7 ft. 6 in. to 8 ft. for a common house, and the rooms in finest houses were 10 ft. to 14 ft. high.

Test of Girderless Reinforced Concrete Floor

An interesting test was recently made of a panel of a girderless reinforced concrete floor in a new storage building where the floor was supported by columns 20 ft. 6 in. on centers, the column heads flaring at the top to a diameter of 56 in. The slab was 8 in. thick of 1:2:4 concrete and reinforced with strips 9 ft. wide made of seventeen ½-in. rods running at right angles, parallel and diagonal to the lines of the columns. The rods extended well over the column heads, which were further reinforced with eight 1-in. rods extending 4 ft. down into the columns and radially out into the floor slab 3 ft. 9 in., so that their ends were on the circumference of a circle about 8 ft. in diameter.

The test was made about 90 days after the concrete was placed and one panel was loaded with castings weighing 120,000 lb. or 286 lb. per square foot. Although this was nearly double the live load, the floor was designed to carry it only showed a deflection of 3/32 in. at the center of the panel. The test was conducted by the Aberthaw Construction Company, Boston, Mass., who had the contract for the erection of the building in question.

CONTENTS.

NOVELTIES.

Sharpening Auger Bits

It might be assumed that every carpenter and cabinet maker knows the right kind of sharpening for an auger bit from the wrong kind, and no doubt many do, but, nevertheless, it is important that in sharpening the bit a little wrong use of the file should not be allowed to destroy the correct planning of the manufacturer, who has devoted much time and attention in experimenting with angles, cutting edges and screw threads in order to develop a perfected bit. For this reason it may be profitable to many workmen to have summarized in what follows some of the directions which are contained in an illustrated booklet on "How Bits Should Be Sharpened" that is soon to be issued by the Russell-Jennings Manufacturing Company, Chester, Conn., well-known makers of auger bits.

The first work of a bit is, of course, done by the screw on the tip. It is part of the business of this screw point to center the hole, but even more to lead the broader cutting edges—the lip and the spur—into the real work

Fig. 1. Fig. 2. Fig. 3.

Novelties—Sharpening Auger Bits.—Fig. 1.—Single-Thread Screw Point.
Fig. 2.—Double-Thread Screw Point.
Fig. 3.—Square or Diamond Point.

of boring. For ordinary uses and woods that are not excessively hard or extremely gummy, the worm has a double thread of carefully calculated pitch. The Russell-Jennings quick-boring bit, however, has a single thread point, Fig. 1, the thread having a steeper pitch than that of the double thread point, Fig. 2. Because of its more prominent and steer single thread, the quick-boring point leads the bit effectively into the gummiest woods, or into the hardest, like lignum vitæ, with perfect ease. In softer woods this worm insures very fast cutting, and bits of this type are therefore particularly well suited to electrician's work. A third style, the square, or "diamond" point, Fig. 3, is provided on bits for use on machines with forced feed.

Sharpening the worm is hardly practicable except with the diamond point, though the skilled manipulator of a fine three-cornered file can do a good deal in the way of

Fig. 4.—Sharpening the Spur.

restoring a worm point that has got battered in a collision with a nail. But it is with the lips and the spurs that most can be done in the way of sharpening, and it is most important to sharpen these in a way that shall preserve to the utmost the efficiency of the brand-new bit.

The spurs should be sharpened with a flat, second-cut file, used on the inside of the spur, never on the outside, and the general shape of the spur should be maintained as in the new bit. The dulling comes only on the front or cutting edge of the spur. In filing, Fig. 4, it is not necessary to sharpen the back edge, simply reduce the front edge until this edge becomes sharp, and file back far enough to keep the original shape. Filing only a small portion of the inside surface next the dulled edge would leave a shoulder which would make the turning of the bit take much more force than is needed with proper sharpening, and would besides reduce the cutting effect of the edge of the spur.

For sharpening the lips, Fig. 5, the proper file is a half-round, second-cut. Use the flat side of this file on

Fig. 5.—Sharpening the Lips.

the side of the lip that is away from the screw point, never on the side next to the point. The slope of this face of the lip that is next the tip is essential to the proper action of the lip in diving into the wood, and so must not be changed. In sharpening the edge of the lip, file away from the edge toward the shank of the bit. This leaves the edge clean and free from any feather edge.

For bits 5/8 inch and larger six-inch file should be used; smaller files for bits of less than 5/8 inch diameter. For the lip the half-round file is necessary. The same file may be used for the spur, provided care is taken not to

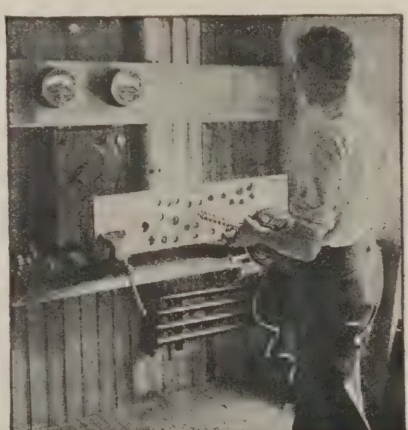


Fig. 6.—Method of Testing Auger Bits.

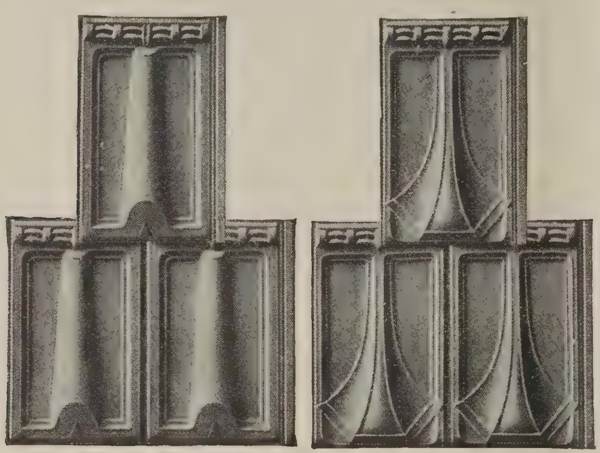
let the edge of the file cut a furrow in the lip. Nothing but a really good file is of any use on a tempered bit. The method of testing the bits is shown in Fig. 6 of the illustrations.

Alpha Portland Cement

An exceedingly attractive example of the printer's art is the book bound in heavy paper covers just sent out by the Alpha Portland Cement Company, Easton, Pa., the aim of which has been the "compilation of concise, authentic information on Portland cement for the convenience of architects, engineers, contractors, dealers and all who may have occasion to explain the advantages and uses of Portland cement in popular language." Valuable comments are presented on the subject of aggregates; proportioning the ingredients; the amount of ingredients required per cubic yard of concrete when composed of different mixtures; the comparative cost of brick work and concrete; how the concrete should be mixed to give the best results; atmospheric influences; forms for concrete construction; concrete surfaces; reinforced concrete; fireproofing; concrete blocks; waterproofing; together with an interesting chapter on what cement can do for the owner of the home, the farm and other real estate. One page is devoted to definitions in popular language of various terms used in connection with concrete construction. There are also extracts from the report of the committee of the American Society for Testing Materials, which will be found of special interest to the architect, the contractor and the engineer. A large portion of the book is devoted to beautifully executed halftone engravings, one group representing the mills at various points of the Alpha Portland Cement Company, while in the center of the book is a double-page group representing bridge work in connection with which the company's cement has been used. Following this are many pages devoted to illustrations representing construction work of all kinds and scattered over an extensive territory, thus showing the widespread use of Alpha Portland cement by leading architects and contractors of the country.

Reeves' Embossed Metal Tile

Architects and builders are likely to be interested in the two new styles of embossed metal tile for roofing purposes which have recently been placed upon the market



Novelties—Reeves Embossed Metal Tile—Figs. 7 and 8.—Clusters of Styles "A" and "B."

by the Reeves Manufacturing Company, Canal Dover, Ohio. These tile are especially adapted for private residences, school houses, churches, public buildings, etc., of all kinds and sizes having roofs of a pitch of 6 inches or more to the foot. The claim is made that the tile are water tight and more artistic and durable than shingles or slate. They are equally suitable for siding, and in some sections of the country are used for such purposes. The two styles of embossed metal tile are represented in clusters in Figs. 7 and 8 of the accompanying engravings, the former representing what is known as style "A," while the latter shows style "B." The point is made that these tile are easily laid, will not break or become loose from any cause, neither will they crack and fly off; that they are constructed with patent joints which permit each piece to contract and expand while still remaining weatherproof; that they can be successfully laid by any workman with a hammer and a pair of snips who will follow the printed instructions, and they can be taken off and relaid on another roof without damage or waste. The tile are durable as well as ornamental, and can be given any desired appearance by the color of the paint used. The embossing permits of the free and uninterrupted circulation of air on the under side of the tile, preventing the accumulation of moisture with its consequent rust and corrosion.

The company has issued a very attractive catalogue of 32 pages illustrating and describing the leading lines of metal products turned out by it in such variety as to meet many requirements. The tile are printed in colors and the general arrangement of the matter is such as to make a very attractive publication. In addition to the tile in question special reference is made to hip and gable finials made from galvanized iron, painted tin or copper, finishing ends for hip moldings, continuous ridge and hip moldings, cresting blocks, improved ridge finish, valleys, corner finish, porch flashing, etc. Not the least interesting features are directions for applying metal tile and other sheet metal specialties, a bird's-eye view of the company's plant at Canal Dover, and a price list.

Insisted on Having Cabot's Shingle Stains

Apropos of the present-day tendency to suggest "something just as good" for a specified article for which inquiry is made there recently appeared in the department of "Advertising Talks" in the New York *Evening Mail* the story of a man who desired to use Cabot's creosote shingle stains for staining the shingles of his new country house. As the story goes, he was led to use these shingle stains "largely through the good impression created by the advertising of Samuel Cabot, Inc., Boston, Mass.," this advertising supplemented by a booklet being convincing to him, inasmuch as it guaranteed the durability of the stains when properly applied. It appears that his architect had not specified Cabot's stains, a fact which the owner had not at first noticed, but when discovered that another make was specified a struggle by the owner to secure what he wanted ensued. The building was well under way and almost ready for the shingles. The builder referred the matter to his painter, who wanted to mix his own stains, which he claimed would be "just as good," the "same thing," etc. This would have given an extra profit on the job, which, however, was not mentioned to the owner. The time required for delivery from Boston was then used as an objection to Cabot's stains, the owner being told that two or three weeks would be lost, whereas the painter could mix his own stains and proceed with the work at once. The local dealer, when consulted by the owner, preferred to sell another make, which the dealer considered "just as good," but did not mention the matter of extra discount for himself on the substitute article. Some little investigation on the part of the owner showed that Cabot's stains had been kept off the shingled roofs and sides of the houses in that town, but he found two houses on which the stains had been used and had stood the test of time. This was enough to make the owner insist on having what he wanted regardless of all opposition. He therefore placed an order for 150 gallons of Cabot's stains to be shipped to the local dealer, who was given the opportunity to make his legitimate profit in the shape of the regular trade discount. The delivery was promptly made—four days from Boston to the Jersey town, forty miles from New York. The owner states that the shingles have been stained and put on his house; that they look well, and he confidently expects satisfactory results, for which he states he has the Cabot guarantee, which is entirely satisfactory to him.

We understand that the makers of Cabot stains knew nothing about the publication of this experience in the *Evening Mail* until attention was called to it by some one not at all connected with the paper; in fact, the publishers of the *Evening Mail* did not communicate with the manufacturers in regard to it in any way, but merely inserted it as an excellent concrete example of the substitution evil.

Gilford's Combination Hammer

A tool which has been carefully designed to meet modern requirements is the new combination hammer illustrated in Fig. 9 of the accompanying engravings and manufactured by F. E. Gilford & Son, 77 South Main street, Concord, N. H. The hammer represents a combination of

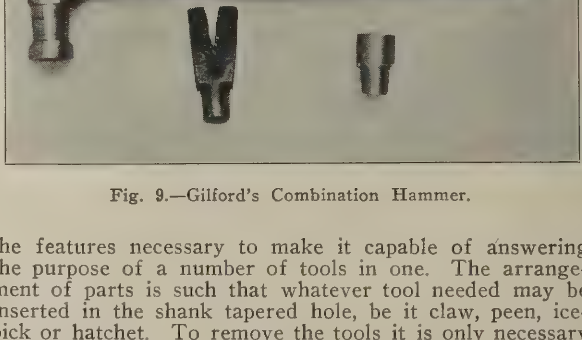


Fig. 9.—Gilford's Combination Hammer.

the features necessary to make it capable of answering the purpose of a number of tools in one. The arrangement of parts is such that whatever tool needed may be inserted in the shank tapered hole, be it claw, peen, ice-pick or hatchet. To remove the tools it is only necessary to take the pin from the handle, the pin being tapered, and drive it through the hole at the bottom of the shank. The illustration which we present herewith shows the nail-hammer, claw-hammer, ice-pick, copper hammer, hatchet and peen hammer. The tool is neatly finished, is readily adjusted, very compact and easily carried. It is referred to as being especially adapted for household use and sportsmen's outfits.

Willis Wall and Veneer Tiles

In the construction of double-brick walls, with an intervening air space, a metal tie is used to bind the walls together, this tie varying in shape and style according to the concern putting it upon the market. A form of metal tie that is proving very popular with builders is that made by the Willis Manufacturing Company, Galesburg, Ill., and illustrated in general view in Fig. 10 of the engravings. It consists of a piece of galvanized metal of No. 26 gauge or heavier, as the case may be, 1 in. wide and about 7½ in. long. At intervals from each end, and extending for a distance of 2¾ in., is a series of five corrugations, so as to afford opportunity for the mortar to take a firm grip upon the tie when in the wall. The company also makes a tie for use in binding the brick work to the frame of a building in the case of brick veneer construction, and this is shown in

Fig. 10.

Fig. 11

Novelties—Willis Wall and Veneer Ties—Figs. 10 and 11. General Views of the Two Styles of Ties.

Fig. 11. In this case the metal tie is about 5 in. long, and has a corrugation running lengthwise of the strip for 3½ in., as shown in the illustration. The other end, for a distance of about 1¼ in., is intended to be bent at right angles to the corrugated portion and is nailed to the studding of the framework, the nail being driven through the hole shown in the tie. The other part rests on the wall between courses of brick, the same as in the case of the ordinary wall tie.

Sanitary Slate Fixtures

We have received from the Keenan Structural Slate Company, Bangor, Penn., a copy of an 84-page catalogue illustrating and disclosing a most interesting line of sanitary slate fixtures adapted to a wide range of requirements. The printing is on a fine grade of paper, and the binding is in neat covers of effective design. The illustrations are of such size as to clearly indicate the construction of the goods, while the descriptive particulars cover the salient features of interest to the archcitect and to the contracting builder. Special reference is made to genuine Bangor slate urinal stalls, which are shown in many styles, special single and double ventilated slate urinals for schools and public buildings, side wall slate urinal troughs, combination slate urinal and slop sink stalls for janitors' quarters in public buildings, slate barbers' stands, range slate closet stalls, special single and double ventilated slate closet stalls for schools and public buildings, range double slate shower bath stalls, shown with and without dressing-rooms, special range slate bath room stalls for hospitals, bath houses, etc., slate lavatories for schools, factories and public buildings, kitchen sinks and laundry tubs, single and in combination; brass fixtures in great profusion, slate blackboards, etc., etc. The brass work shown in the catalogue, the company states, is made in its own foundry, the entire fixtures being set up, carefully drilled, fitted and adjusted before shipment, thus insuring satisfaction in all respects.

Catalogue of Sheet Metal Specialties

We have just received from the Braden Manufacturing Company, Terre Haute, Ind., a copy of the very attractive 62-page catalogue of sheet metal products which it has issued from the press. This is the second edition of the company's catalogue, and in it the endeavor has been made to give as much information as possible in regard to its line of sheet metal products and roofers' supplies. Special attention is directed to the roofing department, mention being made of the fact that the company turns out all of the standard kinds of roofing as well as special designs of its own. Among the specialties mention is made of corrugated, V-crimp and multi-V-crimp roofing, pressed brick siding, weatherboard siding, standing and lock seam roofing, beading ceilings, conductor pipe, eave trough, box gutters, hip shingles, etc., etc. The goods are illustrated by means of clearly defined illustrations, while the accompanying text is such as to cover the salient features. The entire makeup is neat and attractive, and the catalogue will be found a ready reference book for the builder and sheet metal worker. A feature is a number of tables giving length of sheets for corrugated roofing and siding. V-crimp and standing seam roofing, discount sheets for conductor pipe and gutters, also price-lists of other specialties.

Acme Woven Wood Lath

Something of a novelty in the way of lath for plastering is a woven wood lath made of veneer strips and put together in sheets or squares to facilitate handling and applying it. The claim is made that the slight arching of the strips in alternate directions, due to their being woven together, gives strength to the body and constitutes a better holding ground for the plaster. It will be found of special interest in connection with concrete stucco construction, in connection with which the cement user occasionally has trouble by reason of the walls containing lath cracks or buckles. The Acme Woven Wood Lath Company, with general offices in the Bank of Commerce Building, St. Louis, and factory at Poplar Bluff, Mo., points out that this lath solves the great problem of exterior concrete work—that of durability. The point is made that ideal results have been obtained with Acme Woven Wood Lath on exteriors, as it is not affected in any way by acids or climatic conditions. It is self-furring, easily applied, and is claimed to be much stronger and tougher than sawed lath. We understand that concrete workers as well as others interested can obtain samples of the lath by addressing the company.

The Economic Woodworker

A machine which is of special interest to contractors, builders, cabinet and pattern makers, and for use in sash and door factories, planing mills, manual training schools, etc., is the Economic Woodworker illustrated in general view in Fig. 12 of the engravings, and which is being manufactured by Loveland & Monahan, 527 West Van Buren street, Chicago, Ill. It is in reality a compact equipment of heavy, high-grade woodworking machinery, embracing

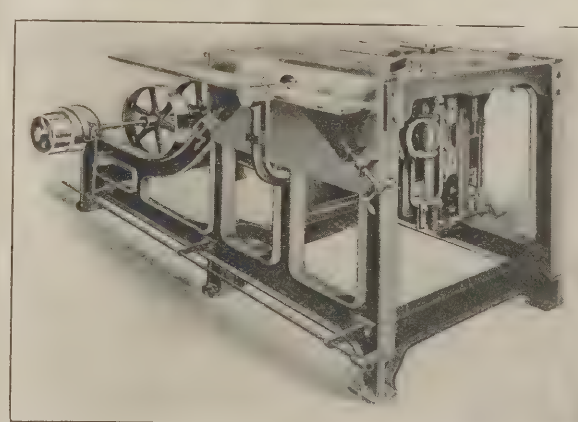


Fig. 12.—The Economic Woodworker.

variety saw table, jointer, shaper or edge molder, router, boring and mortising machine, together with extra attachments for the disc sander and emery grinder. The frame is of I-beam and channel design, strong, rigid and symmetrical, the different parts being so securely fastened together that there is no vibration. The saw table is of iron, well ribbed, and can be adjusted by means of the hand screw shown in front of the machine and clamped in any desired position. It can be used for either kind of sawing, two cross-cutting gauges and one ripping gauge being furnished. The ripping gauge is of the manufacturer's latest improved design and can be adjusted to any angle for beveling. Any diameter of saw, up to 24 in., can be used. The saw slot is sufficiently wide to allow of the use of a dado or grooving head. The table can be used for ripping, cross-cutting, mitreing, gaining, dadoing, grooving, rabbeting and beveling. The shaper or edge molder and router is of the regulation single-spindle type. When not in use the spindle can be lowered below the table, a circular plate fitting into the aperture, thus making a perfectly flat table top. The router bit fits into a hole on top of the shaper spindle, and will, it is claimed, do the heaviest kind of work. The shaper can be used for molding, grooving, matching, beading and for shaping irregular work, both with and against the grain. The arrangement is such that Shimer cutter heads may be used when desired. The jointer is furnished in two sizes, 6 in. or 14 in. The tables are sufficiently long and securely supported throughout as to permit of no vibration. The maker's improved tilting fence is used, which can be set at any necessary angle for beveling. The tables are adjustable for hight and for wear. The boring and mortising machine is of the horizontal type, adjustable, both horizontally and vertically, and the bits, of which any size can be used, fit into the end of the saw mandrel. A circular which the manufacturers have issued shows a picture of the machine and gives, in addition to a general description, tables of dimensions, weights and speeds.

Sheet Metal Rack for Trade Papers

A sheet metal case, which affords a convenient rack in which trade and technical papers may be filed for ready reference, is shown in Fig. 13 of the accompanying illustrations. It was designed by C. H. Krebs, advertising manager of the Milwaukee Corrugating Company, Milwaukee, Wis., and was constructed in the company's shop. In addition to being a useful fixture for any office it affords a neat receptacle for trade papers, where they may always be found instead of being scattered in various places throughout the office, as is unfortunately often the case. Such a case is not expensive, and can readily be made by any ordinary mechanic. The case designed by Mr. Krebs was made from galvanized iron, with a row of the company's Titelock Shingles in front, and was made to fit a given space on the wall. The length is approximately 83 in.; the width from point to rear 16 in.; the height in front, 10 in., and in the rear 19 in. There are five rows of pockets, eight pockets in each of the two rows in the front and nine in the next three rows, making 43 pockets in all. Each pocket will contain from 10 to 20 odd papers, according to the size.

Novelties—Fig. 13.—A Trade Paper Rack Made of the Sheet Metal and "Titelock" Shingles.

The "Haven" Floor Planer

The Haven Manufacturing Company, Racine, Wis., is bringing to the attention of carpenters, contractors, builders and others having to do with the finishing of floors a device which is referred to as a floor leveler, with the mechanical principles of the plane and simple and correct in construction. It is known as the Haven floor planer and its essential features consist of "a tool-carrying lever mounted on a carriage confined to operate in a horizontal plane by a true and level-track way." The machine is made up of a rectangular frame which rests upon the floor and maps out, so to speak, a given area to be dressed before it is shifted into a new field. The frame is held firmly on the floor at one end by a weight supported by the frame itself, and at the other end by a foot-piece upon which the operator places one or both feet while manipulating the planer. The sides of the frame are so constructed as to form a true and level track way, upon which is mounted a reciprocating carriage carrying the lever and provided at one end with the dressing tool. The lever is hung from the front axle of the carriage and is provided with a swivel-joint, so that by swinging the handle to the right or left a shearing cut is made. The dressing tool is brought in powerful contact with the floor simply by lifting upon the handles. When necessary the tool can be easily removed through the medium of a clamping screw. The lever also serves to move the carriage to and fro over the confining tracks, and as the work progresses the lever may be moved laterally over the carriage axle and the floor area between the tracks is dressed. In order to give steadiness and firmness to the pull and produce a more level surface the lever is provided with an adjustable stop just beneath the rear axle of the carriage to regulate the descent and pressure upon the tool. In working the machine the operator stands with one or both feet on the foot piece and grasping the handles lifts upwards, thus bringing the tool in contact with the floor, and then he makes the stroke by pulling backwards as if using an ordinary drawshave. After the area between the tracks has been dressed the operator draws the machine backwards into a new field and operates as before.

Furnace Heating For Dwellings

One of the important points to be decided before a dwelling is erected is the method by which it shall be heated—whether by steam, hot water, hot air or by a combination of hot air and hot water. The question is one involving serious consideration on the part of the builder or prospective house owner, for whichever method is finally adopted, provision must be made for its adequate installation while the building is in course of erection. Some decidedly interesting information bearing upon the subject of heating, and presented in a way to appeal strongly to the architect, the builder and the house owner, is found in a supplement to its regular catalogue of heating specialties just issued by the Excelsior Steel Furnace Company, 34 to 44 West Monroe street, Chicago, Ill. Reference is made to the principles of hot-air heating; the source and direction of the air supply; the size and character of the cold-air duct; the construction of the foundation or pit for the furnace, and the location of the wall pipes and registers in order to insure the very best results after the work is done. Reference is also made to the heating of stores, churches, schools and public buildings, the point being made that what has been said in regard to heating residences applies in a measure to buildings of the character enumerated. The method, however, of heating differs somewhat, owing to the fact that in such buildings the spaces to be heated are much larger, while fewer and larger pipes and registers are used, and the subject of circulation and ventilation becomes even more vital than in the heating of dwellings. The advantages of combination heating; that is, by hot air and hot water combined, are pointed out and different kinds of heating are compared.

A number of pages in the catalogue are devoted to heating appliances, the position of the pipes and registers being clearly indicated. A short chapter on ventilation is of interest, as are also tables showing the capacity of round and square pipes and registers, also size and capacity of double wall pipe. Extended reference is made to various combinations of Excelsior double pipe and fittings, together with diagrams and dimensions, which will be found of value in ordering for special requirements. Naturally, considerable attention is given to the Excelsior furnace, and to the merits which it possesses for the heating of buildings.

(*For Trade Notes see second page following.*)


We Initiate---Never Imitate
A GOOD TIP
The Greatest Improvement in Butt Construction in Recent Years.
Exclusively "National"
The tip is threaded and screws into the butt. It is also slotted for a screw-driver, making it easy to remove the tip and affords ready access to the pin. Also indicates instantly which is the bottom of the butt.
Ask for Catalogue "B" and Give Dealer's Name.
National Mfg. Co.
Sterling, Ill.

New Warehouse of Milwaukee Corrugating Company

The extensive warehouse which has been in course of construction for a number of months at Kansas City, for the Milwaukee Corrugating Company, has been completed. This will double the capacity of the Milwaukee people at Kansas City and enable them, with their exceedingly large stock, to serve the trade through the Southwest and the territory adjacent to Kansas City to greater and better advantage.

Trade Notes.

E. W. Edwards, president of the Edwards Manufacturing Co., Cincinnati, returning from a trip around the world, was tendered a banquet by his associates and employees at the Zoo Club House in that city. Marius R. Ribas welcomed Mr. Edwards on behalf of the employees, and Mr. Edwards responded. Among those participating were: H. W. Edwards, G. R. Edwards, W. A. Edwards, O. S. Larkby, W. E. Larkby, G. D. Myers, J. M. Reynolds, H. E. Moomaw, Frank Wilfrit, James Tracey, H. W. Woodward, T. R. Chunn, A. J. Pearce, O. Kline, L. R. Hildreth, A. E. Watson, G. Doll and Marius R. Ribas.

Simmons Hardware Company, Inc., St. Louis, Mo., is making building mechanics an offer of two special slim taper files free of charge, provided the applicant encloses the coupon found in connection with the company's announcement in our advertising pages this month. It is the desire of the company to have every building mechanic who is a reader of this journal test the files on his fine tooth saws. Very strong claims are made of the superiority of these files, and a case is cited where one file sharpened 35 saws, while in numerous other cases a file has sharpened 15 to 20 saws. The slim taper files are of a whitey-gray color throughout, which is said to be a sure indication of uniform temper and every tooth will be found of the same depth, which means a maximum cutting efficiency. Any reader who will fill out the coupon referred to will receive the two special slim taper files free of charge.

A Lag Screw Expansion Bolt of the double expansion type is being placed on the market by the Brohard Co., 1624 North Ninth street, Philadelphia, Pa. Both the nuts and the bolts expand, and it is from this feature that the term double expansion has originated. The cases and the nuts are of malleable iron, with the outer surfaces of the cases roughened so that a firm grip may be secured. In ¼ to ½ in. sizes, they are made with a two-side expansion, while the larger sizes have a three-side expansion. The nuts are sectional, being either in two or three parts, corresponding with the expansion of the cases. Each nut section has an interlocking lip to insure its return to a proper position when the expansion is released. A rib is provided in the inner side of the case fitting into a groove in the back of the section to hold the nut in proper position in the case all the time. When assembled, the cases are maintained in position by two spring wire clips. Any standard lag screw bolt is said to fit these cases.

The Accident and Liability Department of the Ætna Life Insurance Company, Hartford, Conn., is distributing a very interestingly compiled publication, the object of which is to call attention to certain matters in connection with the care and operation of elevators, which should not be overlooked or neglected if accidents are to be prevented. The first phase of the subject considered is the importance of the equipment of passenger and freight elevators and their care in operation. Reference is made to the necessity of thorough inspection of elevators at regular and frequent intervals by an expert; to the responsibility resting upon both owner and operator of an elevator for the safety of its passengers; to the engineer in charge of the building; to the care which should be taken in employing an elevator operator, and to the safety of the equipment. There is much useful information presented in regard to the subject indicated, and numerous half-tone engravings show different forms of elevator construction and equipment. The pictures of elevators and machines relate largely to the product of the Otis Elevator Company. Those who are interested in elevators can obtain a copy of the book referred to by applying to the company.

THE HEATH & MILLIGAN MANUFACTURING COMPANY, paint and color makers, have published an interesting little booklet on paint, which should prove of interest to architects, engineers and builders. The subject-matter concerns itself with Mindura paint, a natural preservative. The matter is treated in a technical yet clear and concise manner. There is an interesting treatise on the electro-chemical process on the corrosion of steel and the preventative by proper painting. This booklet can be secured upon application to the company at 170 and 172 Randolph street, Chicago, Ill.

Western Sheet Metal Works, Ltd., 1247 to 1257 Howe street, Vancouver, B. C., show in a catalogue, just issued, an attractive line of fireproof windows in which the sashes and frames are of metal and the glazing with either polished or cast wired glass, as may be desired. Several classes of windows are manufactured by the concern, but the makers recommend only the automatic closing and fixing sash, built under the standard specifications of the National Board of Fire Underwriters and approved by their surveyors. The makers state that they attach their nameplate only to windows of this kind. In addition to a varied line of windows the concern turns out all-metal fireproof doors, which are of special interest in this connection. Details of window construction are presented in a way to render the operation readily understood by the architect, the carpenter and the builder. The closing pages are devoted to half-tone illustrations of some of the many buildings in which the fireproof windows have been installed.

The Heppes Company, 4501 Fillmore street, Chicago, Ill., points out that its Utility Wall Board is waterproof, can be easily applied by any handy man, and that as soon as it is nailed to the studding it is ready for the decorator. The claim is made that it is non-odorless and that through its use there are no cracked walls, no falling plaster and no dirt. It can be papered, painted or kalsomined according to requirements, and its use effects a saving of both time and labor. The company has issued special circulars relating to this wall board, copies of which they will send, with samples, to any architect or builder who may make application for them.

Diamond Velvet Caster Company, 56 North Mill street, Grand Rapids, Mich., presents on another page of this issue an announcement in regard to Diamond Velvet casters, which cannot fail to prove of interest. The claim is made that these castors will carry 2000 lb. across a polished floor without marring it; that they are noiseless, squeakless, need no oiling, and are so made that they cannot fall out. Heavy furniture fitted with these casters may readily be moved about with a slight push. The company states that it is in need of more men to take orders for this new invention.

E. C. Atkins & Co., Indianapolis, Ind., has been sending out to those carpenters likely to be interested in the subject a handy booklet, entitled "Saw Sense," which has met with a wide popularity. The Atkins silver steel saw, one of the popular products of this concern, tapers all the way from the tooth edge to the back, being thickest at the tooth edge, and therefore does not bind or buckle in the wood. It is fitted with the Atkins perfection handle, which prevents wrist-cramp, although any one preferring can have the old style handle. A carpenter who has used the silver steel saw states that in cutting out a stairway through a floor that was made from 2 x 4s and overlaid with maple flooring he cut through forty-seven 20d. nails and a good many 8d. ones, which is certainly a severe test of a saw.

Mani Manufacturing Company, Box 112, Peoria, Ill., is offering the Mani folding scaffold bracket free for a 30 days' trial. The claim is made that set will pay for itself on the first job, this being the experience, it is said, of Peoria contractors. The construction is such that lateral motion is prevented and the plank cannot slip from the end. The brackets are light, strong, easily adjusted, and the weight of half a dozen crated for shipment is only about 75 lb.

Globe Ventilator Company, 203 River street, Troy, N. Y., emphasizes the point that the Globe ventilator is particularly adapted for residences because it draws the foul air without a draft, thus keeping the air of the rooms fresh and pure. It is claimed that the Globe is a sure cure for a smoky chimney or a sluggish fire.

W. F. & John Barnes Company, 71 Ruby street, Rockford, Ill., refers to its new hand and foot power circular saw No. 4 as being strong and powerful and especially adapted for ripping, cross-cutting, grooving, graining, dadoing and rabbeting. The table is of iron and is planed perfectly true. This machine is especially adapted for carpenters and builders, and the merits of this as well as other machines turned out for woodworkers are set forth in a catalogue which will be sent free to any address on application.

The Dahl Manufacturing Company, 156 Fifth avenue, New York City, includes in its specialties a sanitary, white-enameled sheet metal medicine cabinet, which is handsome in appearance, durable in construction and can be supplied to builders in a number of sizes. The point is made that these cabinets add to the value of any building in which they may be installed, and as they are nickel trimmed they are ornamental as well as useful.

The Building Age

NEW YORK, SEPTEMBER 1910

A Shingled Dwelling in a Boston Suburb

A FEATURE of many of our present-day dwellings, more especially those which are to be found in the suburban sections in proximity to the larger cities of the country, is a broad piazza or veranda extending nearly, if not entirely, across the front of the building, and having as a roof the second story of the house extending forward until it is flush with the front of the veranda. This arrangement permits of the full utilization of the ground area by providing rooms of larger size and more of them on the second floor than would otherwise be the case. An interesting example of this type of dwelling is illustrated by means of the half-tone engraving presented herewith and by the elevations and floor plans on the following pages. Noticeable features of the building are the covered veranda extending nearly across the front of the building, the shingled exterior and the peculiar roof construction indicated by the end elevation.

On the main floor is a commodious living room with open fireplace and bay window, with box seat, and dining room, with beam ceiling, and communicating with the kitchen beyond through a well equipped china closet and spacious hall which divides the house in the center, and the open veranda beyond the living room which may be reached from the rear of the main hall. Under the main flight of stairs is a lavatory and beyond are flights of stairs leading to the cellar and also to the second story, where are located three sleeping rooms, a den, a dressing room, bath room, and servant's room with ample clothes closets.

General View of Residence of Mr. Charles H. Flood, as Reproduced from a Photograph.

A Shingled Dwelling in a Boston Suburb.—Loring & Phipps, Architects, 53 State Street, Boston, Mass.

According to the specifications of the architects the foundations are of field stones, the wall being 18 in. thick laid in 1–3 cement mortar above grade. The underpinning is of selected Brighton stone laid in 1–3 cement mortar, with joints pointed on the outside and finished with raised lines. The foundation wall has a cobblestone drain extending under it 6 ft. deep at one end and pitching to 12 in. at the lowest corner or to the sewer drain. The chimneys are plastered outside from the first floor to the under side of the roof boards, and all flues have 8 x 12-in. clay lining from the first floor to the roof. The fireplace in the living room has backs, jambs and facings of 1½ x 12-in. red bricks and plain red tile hearth. In the bottom of the fireplace is a dumping grate and all fireplaces are provided with Murdock patent throats and dampers.

The cellar floor is graded and has a layer of cement and coarse gravel 2½ in. thick, the cement used being American Atlas.

The frame of the building is of spruce, with sills 6 x 8 in.; girders 8 x 8 in.; posts 4 x 8 in.; first floor joists 2 x 10 in.; the second floor joists 2 x 12 and 2 x 10 in.; the third floor joists 2 x 8 in.; collar beams 2 x 6 in.; the studding 2 x 4 and 2 x 3 in.; the girts 4 x 8 in.; the plates 4 x 4 in.; the rafters 2 x 6 in.; the veranda sills 6 x 6 in., and the veranda joists 2 x 6 in. The studding for outside walls are 2 x 4 in., placed 16 in. on centers and enclosed with ⅞-in. matched spruce planed to a thickness and secured with 9d. nails. Over the sheathing boards are two thicknesses of black Neponset sheathing felt, which in turn is covered with cedar shingles laid 5 in. to the weather.

The roofs are framed with 2 x 6-in. rafters placed 20 in. on centers and spiked at all bearings. These are covered with ⅞-in. hemlock boards, over which is laid one thickness of three-ply tar sheathing felt well lapped. All roofs are covered with extra quality cedar shingles laid 4¾ in. to the weather. The valleys are laid close and have pieces of 9-oz. zinc 10 in. square laid in with each course of shingles. There is an extra width of three-ply tar sheathing paper on the roof next to the gutter. Galvanized Swede iron nails were used for these shingles, no wire nails being used in the frame or outside. The flashings are of zinc, the upper end of the pieces being turned up 6 in. on the wall and the lower end being turned down over the shingles where the roof joins the wall. Where the roof joins the chimneys, pieces of 9-oz. zinc are laid in to turn up 6 in. on the brick and pieces of sheet lead are laid into the brickwork and turned down over the zinc.

Partition studs are placed 16 in. on centers and braced once in their hight with 2 x 4-in. pieces. All partitions have 3 x 4-in. caps of hard pine. The studs at all openings are doubled and trusses are cut over all openings. All ceilings above the cellar are furred with 1 x 3-in. pieces placed 16 in. on centers and all ceilings of bays and alcoves are furred down to within 6 in. of the window heads. The ceiling of the dining room has pieces of 2 x 4 in. cut in between the joists 16 in. on centers.

The front entrance doors are 1⅞ in. thick of white pine hung with selected hardware, while all other doors in the first and second stories are of white pine 1¾ in. thick, four panels.

Walls, ceilings and partitions in the first and second stories and the finished part of the attic are lathed and plastered, the lath being laid to break joints every 10 lath on the walls and every 6 lath on the ceilings. All walls have the plastering carried down to the lining floors, the plastering consisting of good lime, sand and hair mortar with a skim coat of fine sand and lime putty. The dining room is plastered between ceiling beams. The walls of the bath room and of the dressing room are plastered with hard plaster below the chair rail.

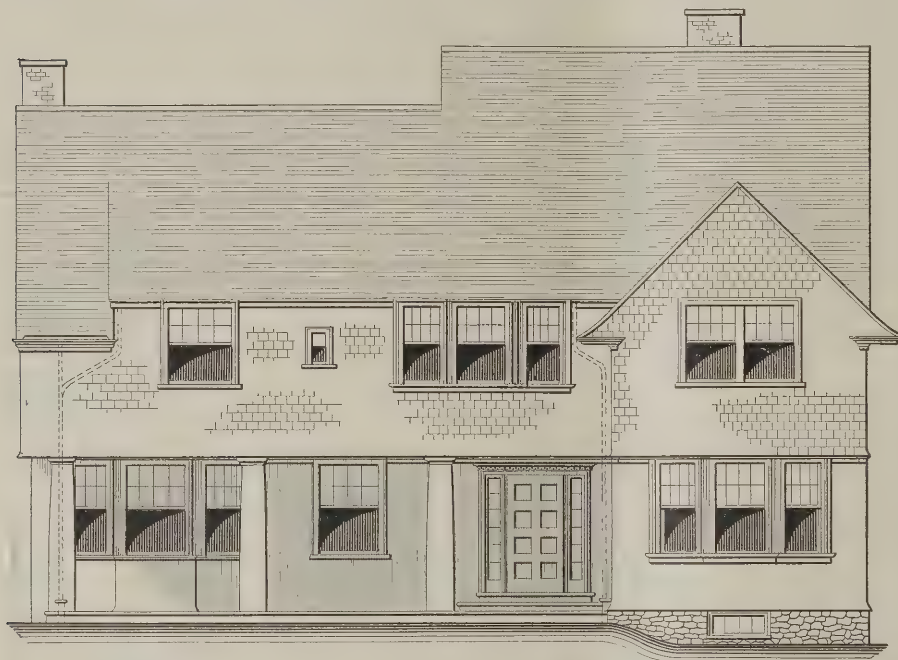
All inside finish is of white wood hand smoothed. The kitchen is finished in selected spruce and has a wainscoting 3 ft. high beaded in equal widths of 2½ in. and with cap at the top. The bath rooms are finished with a 3-in. chair rail 5 ft. from the floor and with base 8 in. high. The seats where shown have tops hung with brass hinges. All finish and floors about the plumbing are fixed with brass screws, while all drawers are fitted with bronze pulls.

The front stairs or the main flight have treads, risers and platforms of ⅞ in. oak and posts, balusters and all other finish of white wood. The rail is of selected mahogany, with ¼-in. end pieces of plain oak. The back stairs have a 2-in. hand rail on iron brackets, while the cellar stairs have a plain pine rail and posts.

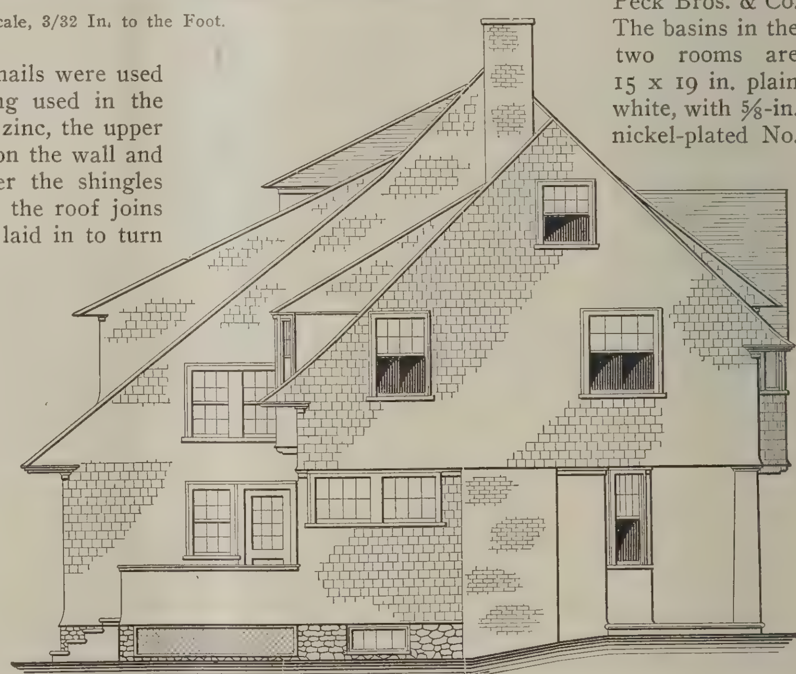
The house is piped for gas, the sizes conforming to the requirements of the local gas company. There are also electric wires for lighting and bells.

The bath room is provided with a 5½-ft., and the dressing room with a 4-ft. roll-rim porcelain lined cast iron bath tub known as "Newport," and made by Peck Bros. & Co. The basins in the two rooms are 15 x 19 in. plain white, with ⅝-in. nickel-plated No. 20 compression basin faucets of Peck Bros. & Co. make, with dished Italian marble slab 1¼ in. thick and 12 in. back. The slabs are 32 x 20 in., supported on nickel-plated brackets. The bowls have nickel-plated "Triumph" waste and nickel-plated trap. All supply and waste pipes are nickel-plated.

The water closet in the toilet room is Peck Bros. & Co.'s "Nymph," with wash-down siphon action, low tank and nickel-plated connections. In the corner extending 16 in. on each side is a 11 x 14-in. bowl and



Front Elevation.—Scale, 3/32 In. to the Foot.



Side (Left) Elevation.—Scale, 3/32 In. to the Foot.

A Shingled Dwelling in a Boston Suburb.

6-in. back. The water closets in the bath room and dressing room are Peck Bros. & Co.'s jet siphon "Fort Hill," with mahogany seat and tank 21 x 10 x 10 in., with nickel-plated connections.

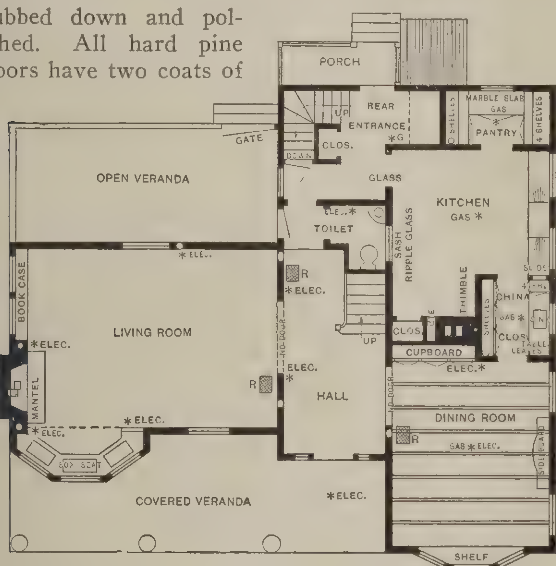
In the kitchen is a 40-gal. Hicks & Son's copper boiler on cast iron stands and fitted with brass connections; also a 42-in. soapstone sink, with brass compression bibbs for hot and cold water. The tank in the attic is 2 x 2 x 3 ft., lined with 16-oz. planished copper. From the rising main the tank is supplied with ⅝-in. brass compression ball cock and 6-in. copper float, with 1¼-in. boiler valve. In the laundry is a set of three soapstone wash trays.

In the china closet is a 16 x 20-in. tin-lined oval bottom copper sink, with ½-in. pantry cocks, nickel-plated, and 1¼-in. lead waste and 4-in. lead pot trap.

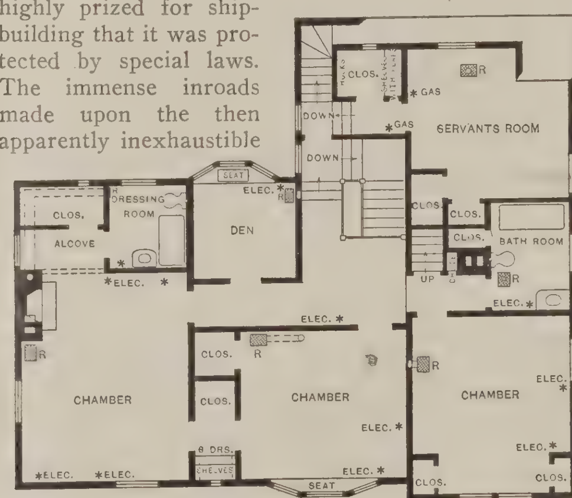
All white wood finish in the hall, living room and dining room has five coats of lead and oil and one coat of Bigelow's "Vitalene" varnish rubbed down with pumice stone and water. All other inside white wood finish has four coats of lead and oil. The kitchen, servant's room, back hall, pantry and china closet are shellaced one coat and have two coats of Bigelow's "Vitalene" lightly rubbed down.

All oak floors have a filling and two coats of Butcher's floor finish rubbed down and polished. All hard pine floors have two coats of shellac and one coat of wax well rubbed down. All outside pine finish has three coats of lead and oil. All shingles on the walls and roofs are left natural. The plastered walls of the kitchen, pantry, china closet and the rear entries on the first and second floors have four coats of lead and oil and were sized before painting. The veranda floors have three coats lead and oil. The plastered walls below the rail of the two bath rooms and the front hall have one coat of sizing and four coats of paint to match the other finish of the rooms.

The dwelling here shown was erected for Charles H. Flood in Brookline, Mass., in accordance with drawings prepared by Loring & Phipps, architects, 53 State street, Boston, Mass.



Main Floor.



Second Floor.

A Shingled Dwelling in a Boston Suburb.—Floor Plans.—Scale One-Sixteenth Inch to the Foot.

Scarcity of White Oak Timber

It will surprise many of those who profess to know something about oak to be told that the so-called white oak timber of our markets is often a mixture not only of various species of the white oak group, but also of other species, such as the red oak. This generally unknown fact is reported by the United States Department of Agriculture, which, as a part of its forestry work, is frequently called upon to pass judgment upon the identity of market woods in dispute.

Foresters divide all the oaks into two distinct groups—the white oak group and the black oak group. One way of distinguishing the two is by the fact that the black oaks require two years to mature their acorns, while the white oaks take but one. The woods of the two groups of oaks are also structurally different. The true white oak, known to botanists as *Quercus alba,* is merely one of the species which make up the white oak group. Red oak, on the other hand, belongs to the black oak group. Red oak has a number of other common names, among them mountain oak, black oak and Spanish oak.

There is so much confusion in the ordinary use of names of the oaks that it is almost impossible to keep them straight without resorting to the scientific names, but the marketing of wood of the black oak group as white oak is hardly fair to the consumer. Red oak, for instance, is now much more abundant than white oak, grows faster and is generally regarded as inferior. The two species often grow together and occupy the same general region.

In the early days of its abundance market white oak was derived almost entirely, it is safe to say, from *Quercus alba,* the true white oak. This species combines approximately the utmost strength and toughness of any of the timber oaks, excepting possibly the southern live oak, which in the Colonial days was so highly prized for ship-building that it was protected by special laws. The immense inroads made upon the then apparently inexhaustible white oak forests, which stretched from the Atlantic seaboard to about Missouri, gradually so reduced the supply that the use of other species became inevitable.

At the present time it is almost impossible to obtain a consignment of white oak that does not contain pieces of some other species. Of the white oak group those most used, in addition to the true white oak, are bur oak, chestnut oak, chinquapin oak, post oak, swamp white oak, cow oak and overcup oak; of the black oak group, Texas red oak, red oak and spotted or water oak.

Real white oak timber of number one quality is very largely cut into quarter-sawed boards, while a combination of one or more white oaks and red oak may constitute other cuts of "white oak." In many markets the term "cabinet white oak" is now understood to include a mixture of white oak and red oak, while it often signifies red oak only.

The question "What is white oak?" is now coming up among consumers and manufacturers of commercial oak timber. The above-named white oaks are distinct but closely related species, which together must be depended upon for the future supply. For the ordinary purposes for which true white oak is used, practically all the trees of this group yield woods that can be interchanged and will serve equally well.

"FORM" WORK FOR CONCRETE CONSTRUCTION

BY M. M. SLOAN.

ARCHITECTURAL designers very frequently require the columns in reinforced concrete buildings to be cylindrical in shape instead of square, with beveled corners. When the contractor is required to construct the forms for these columns he can use either forms constructed of wood or of sheet metal.

There are several ways by which such column forms may be constructed. It is usual and customary to build them up with staves, worked out at the mill with beveled edges. Sometimes the forms are built up in half sections after the manner shown in Fig. 7, the centering for the staves being constructed of 1½ in. stuff sawed to shape and held together as indicated in the figure.

When this construction is used it is necessary to hold

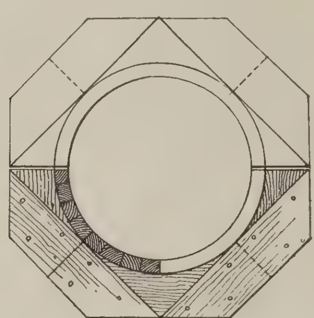


Fig. 7.—"Forms" Built Up in Half Sections.

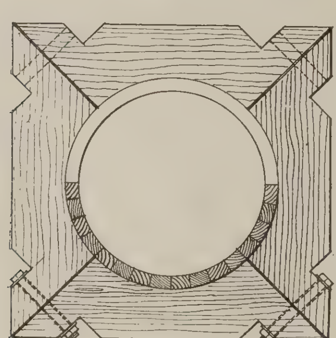


Fig. 8.—A Better Type of "Form" Construction for Cylindrical Columns.

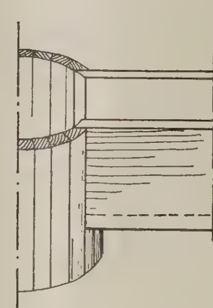


Fig. 9.—Showing How to Fit the Bottom Boards.

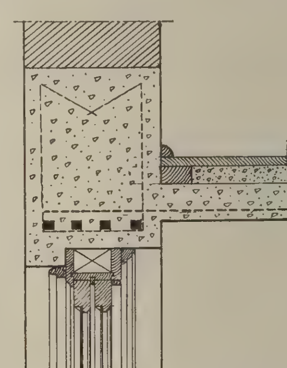


Fig. 10.—Showing How the Lintels Over Window Heads Are Designed.

"Form" Work for Concrete Construction.—Various Details.

the two halves of the column form together by means of heavy yokes of wood to fit the outside of the staves, or else by means of iron strap bands wrapped around the column form and properly secured with nails. Usually these bands are of the material used to reinforce boxes.

A better type of form construction for cylindrical reinforced concrete columns is shown in Fig. 8. Here the column is made up in quarter sections, and the forms to which the staves are nailed are sufficiently heavy to form the yoke. These yokes are made of 3-inch material and are checked out as shown at the corners in Fig 8, so that they can be bolted together.

It is usual in the construction of these column forms to fit the bottom boards of the forms of the beams and girders around them, as shown in Fig. 9. It is necessary to do this in order that the column forms can be removed before the beam and girder construction, the advantage consisting in the fact that by this means the work may be started upon these column forms for use in the construction of a floor above.

The two methods of form construction for cylindrical columns just described are those generally employed, but the disadvantage consists in the fact that they leave the column marked with the joinings of the staves. While this offers no objection where the concrete work is to be plastered, and, in fact, is not really objectionable where the concrete work is exposed, yet in order to get a very smooth column sheet metal forms are sometimes used for molding when the columns are to be cylindrical in form.

The sheet metal form can either be constructed by lining, rough wood form blocks, or else they can be made in halves or quarters of No. 16 or 18 metal, with angles along the edges for securing the several sections together. It is best in employing column forms for cylindrical work to oil them well with crude oil, so that they will come away from the concrete work readily.

In factory and warehouse buildings of reinforced concrete, it is very desirable that the windows be so designed as to obtain as much light as possible. In order to do this the heads of the window frames are brought as close to the under side of the floor slab as possible, as shown in Fig. 10.

The lintels over the window heads must, of course, be made sufficiently strong to carry the floor load and the weight of the spandel wall above. If the lintel is made only as high as the top of the floor slab it usually does not have sufficient strength to carry the load, so that it is necessary to design it, as shown in Fig. 10, which brings a considerable portion of the lintel above the top of the reinforced concrete floor slab.

In order to form concrete in this manner over the heads of the windows it is required to arrange the construction of forms, as shown in Fig. 11. The necessity of making reinforced concrete lintels in this manner requires a great amount of work in the construction of the forms, for, as will be seen by referring to Fig. 11, the inside form board, the bottom of which must be at the top of the reinforced concrete slab, should be supported "over-hand," as shown in the illustration.

Always in lintel construction it is necesary to cantilever the studding and supports for the forms, as shown at *aa* of Fig. 11. This is required in order that the boards forming the face of the lintel can be back-braced, as illustrated at *b*. The form board to make the inside face of the lintel is indicated in the figure at *c*, and this is held in place by extending studs over the top of the outside form board and supporting them by means of the battens *d*, holding the end of the studding by means of a tie piece as at *e*. In order to hold the inside form board *c* rigidly, the studding is extended and the board is back-braced, as shown at *g*.

Much of the material and labor of construction is saved when the lintels do not extend above the floor; then the form work is constructed as shown in Fig. 12. In this figure the studs are wedged up on the top of the floor or spandel wall below, and the studs forming the outlooker run over the top of this and are extended into the building, and either secured to the form construction or else they form a support for the beam and girder forms.

These outlooker beams are shown in the figure at *a*. Their purpose, as previously described, is to form a means by which the outside form board may be braced. Generally the outlooker beams are supported by means of stud braces, or else by 1 x 6-in. braces nailed to the sides of the outlooker beams and to the sides of the studs. In the figure now described it will be noticed that the lintels are of such a depth as to require the use of two boards in hight. These have to be well battened and securely back-braced.

The application of the methods of form construction thus described are well illustrated in Fig. 13, which is a photograph of the "form" construction for the top story of an entirely reinforced concrete building. From the photographic view it will be noticed that most of the stud supports are still in place for the second floor construction, and that one stud has been left in place for security beneath the second story spandel.

The column forms for the top story are still in place, though the ties have been removed. The illustration clearly shows the method of extending false work in order to form a scaffolding to work from and which in some instances are used to back-brace the construction.

An observation of the form work in this illustration also shows the method of constructing the forms for the overhanging roof slab, both along eaves and along the rake of roof. At the end of the building some of the back braces for the support of the forms are in place.

In the various descriptions and illustrations of form and centering construction given in these articles, the forms were shown as supported by vertical studs. While this is the customary way of supporting the forms, sometimes to save material and at the same time in order to brace the studding, the supports for the forms are differently arranged. Instead of using a number of vertical studs or supports to the length of each beam, only two are used and the intermediate supports are obtained by cutting in oblique braces on each side of the upright. Where the supports are arranged in this manner the vertical piece is generally made of about a 4 x 6 in. piece, while 4 x 4 in. or 2 x 6 in. pieces are used for the braces.

The braces are cut to the proper bevel to fit the underside of the bottom form board, and at the lower end to fit against the vertical. They are wedged to the vertical against a cleat and nailed in order to prevent any possibility of their slipping. The upper ends of the oblique braces are securely wedged in place so as to bring an initial weight upon them and are then secured from slipping by cleats and further wedging.

There is a decided advantage in this method of stud centering, and that is, that the oblique braces stiffen the story construction laterally and prevent any dangerous vibration or swaying when the fresh concrete is in place. Little attention is paid to this danger, as a rule, but with works carried on in exposed localities subjected to considerable wind pressure, at times it is a menace that is well guarded against by some such means as just described.

Before describing several other systems of "form" construction which have been used in building construction successfully, it will be of interest to show some of the centering and form work required in the construction of special concrete work used extensively in certain structures.

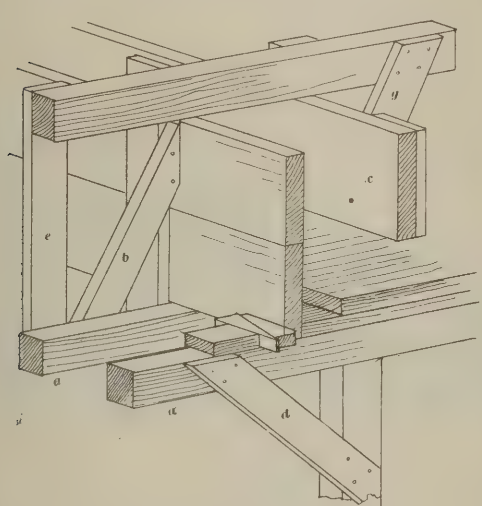


Fig. 11.—Showing How the Studding and Supports for the "Forms" Are Arranged in Lintel Construction.

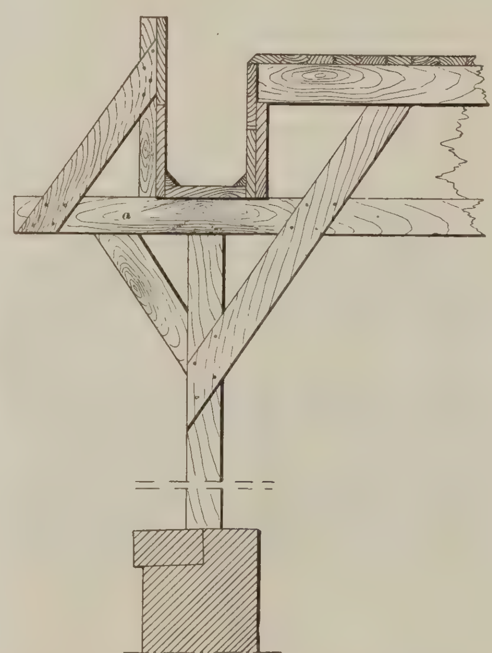


Fig. 12.—Arrangement of "Forms" When Lintels Do Not Extend Above the Floor.

"Form" Work for Concrete Construction.—Various Details.

The illustration Fig. 14 shows the centering in place for the concrete work of an "ore" yard. It will be noticed that the foundations have all been constructed of concrete and that the tunnels or galleries with the concrete walls between them are formed by constructing a series of unit forms so arranged and spaced that their sides make the forms for the concrete walls and the tops of the units form a centering by which the arch construction is molded.

The ribs forming the centers were sawed out at the mill and erected on vertical studs, as shown to the left of the picture, being braced as the work progressed. The ribs of the centering were constructed on about 3-foot centers, well braced at the spring of the arch, the uprights being secured at the bottom and intermediately and a sufficient number of oblique or diagonal ties introduced in order to brace the centering and to prevent it from being distorted by the weight of the concrete work.

In work of this kind it should always be borne in mind that the pressure on the concrete on the vertical sides of the forms is very great, owing to the hydrostatic head, and it is only by making the forms very stout that they will retain their shape and without bulging, and may be used again for the construction of other portions of the work.

It will be noticed that $1\frac{1}{2}$ in. plank was used in sheathing in the centers, and this was tongued and grooved. The illustration is also interesting, as it shows the position of the steel reinforcement with reference to the face of the forms.

(To be continued.)

The Responsibility of Building a Home

In discussing the question of building a house for one's own occupancy, an architect in the Northwest points out the necessity of starting right, as "well begun is half done." Putting up a modern home is an art rather than a science, according to Arthur C. Clausen, a prominent architect of Minneapolis, and what he has to say as to the responsibility of building a home appeals so strongly to every prospective house owner that we present the following extracts:

Few people realize the responsibility of building a home. It involves more than the expenditure of a considerable amount of money, for if properly invested the returns are far greater than can be obtained through investing in any other way. The building of a modern home is more than a science. It involves more than the mere structural problems to be worked out along well-defined lines. It is an art, and there is no limit to art, as there is to science.

The design of a modern home can vary according to one's means and preferences, expressing through the medium of a competent designer one's ideals, tastes and social standing. This explains why so many different designs of entirely different styles and appearances can come from the drafting board of a single architect. It is because of his having to deal with so many different phases of human character and has so many different tastes to please.

After the prospective home builder fully realizes the importance of the investment he is about to make, its financial obligations and the time and thought which he will have to take away from his business in order to give the building of a home the attention it merits, the next thing is to decide what the family requirements are, making a detailed list of them, and then take them to a competent architect, working the remainder of the problem out through him.

Many people waste months in trying to determine the kind of plan best suited to their requirements, the size of their pocketbook and the advantages of location given by the lot on which they will build. The more they study into it the more perplexed they become, and when they finally surrender and go to their architect for advice they are little nearer to a complete solution than when they began. Sometimes they think they have worked out the complete solution, and in some rare cases where a home builder has more than the average artistic talent the proper arrangement is worked out before the architect is engaged to lay out the plans in a systematic manner.

These instances are very few, however, and most people would save considerable time and annoyance by taking the matter directly to "The Man Who Knows," and who is capable of seeing the entire situation almost at a glance, or, if not, can soon work out the problem upon giving it careful study. Like all professional men, architects are not made but are born, with the fundamental principles of their profession strongly emphasized in their mental makeup. If they have added to their artistic talent and constructive ingenuity, technical training and the experience of practical application they can solve intricate problems of plan or design in a very short time when a homebuilder unaided might never find the best solution.

This is an age of specialists. The "jack of all trades" belongs to the past. If a man amounts to anything in his chosen vocation, he is too busy to give attention to matters to which he has received no training. This is why the average carpenter and contractor makes a total failure when he attempts to plan a modern home. If he is called upon to build a home exactly after the plan of one that is already built, this he can do fairly well, but when it comes to laying out the plans and designs for an original home to meet the varying requirements of a family, he invariably makes a botch of the home, both from an artistic and practical standpoint. It is a significant fact that all of the principal contractors of every city invariably engage the best architect in the city to plan their homes. Since they are in a better position to judge of the advantages and economy of a systematically prepared set of plans than is the average homebuilder, this fact ought to emphasize the inadvisability of a man attempting to prepare the plans for his own home.

One of the advantages of having properly prepared plans is that the owner knows definitely what he is going to get in the finished structure and is able to take competitive bids and let his contract on a systematic basis, saving a long list of extras, sometimes amounting to several hundred dollars, for things that are usually not specifically arranged for when the building is started without plans. If you can afford to build at all, you can afford to build right, for it is both expensive during the construction of a house and in the long run to build otherwise. Bear in mind that system always means economy, and start right.

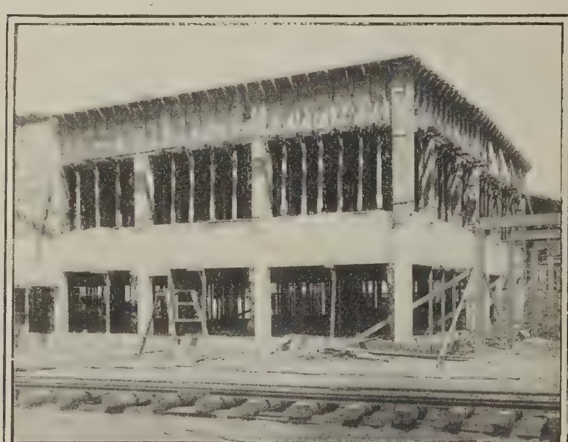


Fig. 13.—One Application of the Methods of "Form" Construction.

Fig. 14.—Centering in Place for the Concrete Work of an "Ore" Yard.

"Form" Work for Concrete Construction.—Showing Some Applications of the Methods Described.

PORTABLE SCAFFOLDS IN ENGLAND FOR STEEL FRAME BUILDINGS

By A. G. H. Thatcher.*

BRITISH scaffolding is diverse and complex. Broadly speaking, it may be divided into two classes, the northern and southern systems. The line of demarcation at one time was very clear, the northern method being confined to Scotland, but during more recent years the interchange of ideas due to the press and cheaper facilities in traveling as well as other ways has caused the northern system to obtain a vogue in England. It is somewhat curious to note that pole scaffolding is chiefly used in England; that square timbers used in a type of scaffolding known as the Gabbard is principally Scottish in application, and that this latter closely approximates to the French system greatly used in Paris. It is possible that the historical connection between Scotland and France which existed at one time to the exclusion of England may account for this. The history of nations may be read in their architecture. The impermanence of the means of building may be the sufficient cause of preventing the engineering development of a country.

In considering the matter of British scaffolding in general, we shall first discuss portable scaffolds as used in England for steel frame buildings. While structures of this nature cannot now be considered new, nevertheless they are so sufficiently modern that the scaffolding for the steel erectors is not yet systematized. So far, however, as experience has guided, a general agreement has been reached that scaffolds supported on steel hangers afford the readiest means of carrying on the work.

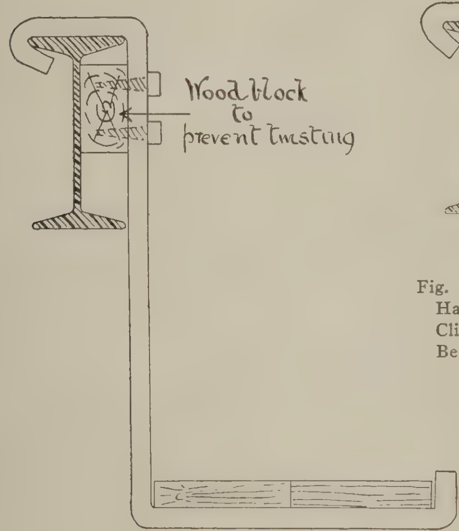


Fig. 1.—Ordinary Wrought Iron Hanger 18 In. Wide.

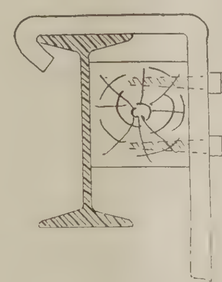


Fig. 2.—Showing How Hanger Too Deep in Clip for Flange Can Be Used.

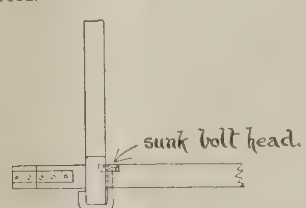


Fig. 3.—Method of Fastening Platform Boards to Hanger.

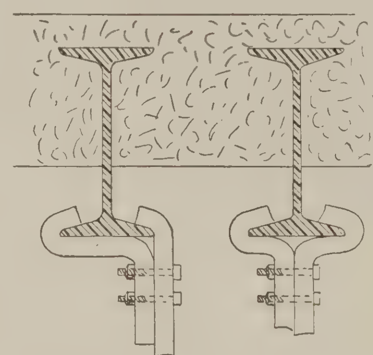
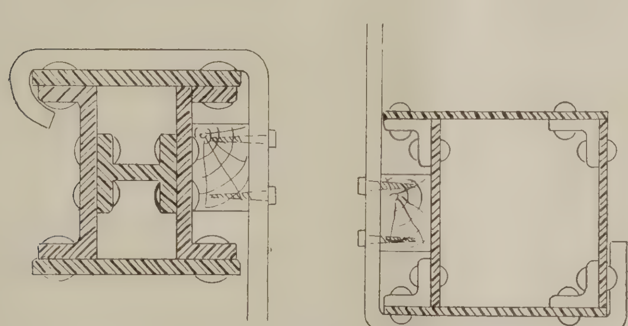


Fig. 4.—Clips that Are Used When Top Flanges Are Not Available.



Figs. 5 and S.—Methods Adopted in the Case of Compound Girders.

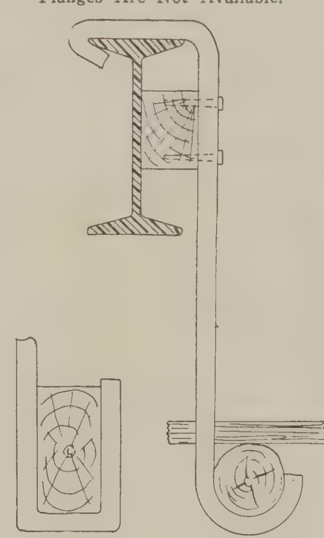


Fig. 7.—Method Used When the Platform Is Laid at Right Angles to the Girder.

Portable Scaffolds in England for Steel Frame Buildings.

The English practice is for the steel erection to proceed much in advance of the filling in, consequently pole scaffolding is not greatly in request until most of the steel is in its place. There are reasons for this, one of the principal being that steel is at all times difficult to handle. It is unsymmetrical in that the length of the members is considerable in proportion to the other measurements. This difficulty necessitates the builder giving space in order to move his material freely, and as it is obvious that pole scaffolding minimizes this greatly, the practice has developed of doing the work with the least possible extraneous erection.

Steel hangers can be practically of any design, as they are easily made and of great adaptability. A platform width of 18 in. is usually given, but this can be increased. The illustrations presented herewith show those most generally in use. Fig. 1 represents the ordinary 1⅛ in. or 1¼ in. square wrought iron hanger 18 in. wide. The hook end in this case has just sufficient depth to clip over the top flange of the girder. If simply hung in that position there would be a tendency for the hanger to roll or twist when loaded. To prevent this a wooden block is placed where shown on the sketch.

In Fig. 2 is shown how a hanger too deep in the clip for the flange can be used and kept firm. This is achieved by using a block of sufficient thickness to take up the superfluous depth of the hanger. In this instance the screws are absolutely necessary, as the liability of the block to move is increased.

In many cases the boards for the platform are simply laid on the hangers, being lapped in their run. This method is often sufficiently secure, but if any doubt

* The author of this article is Inspector of Factories, and has charge of the buildings in course of construction in London, England, for the purpose of preventing building accidents.—Editor *Building Age.*

arises the boards can be fixed by means of a clip, as shown in Fig. 3. If the bolt projects at all it might prove a cause of tripping, and to avoid this in thicker timbers the bolt head can be sunk as shown.

In Fig. 4 are illustrated clips which are useful where top flanges are not available. As will be seen, the hanger need not be immediately under the center of the girder, but either to the right or left, as circumstances may require. In the diagram the haunching which supports the flooring is supposed to be cut away to free the lower flange. Similar methods can be adopted for compound girders, as shown in Figs. 5 and 6.

At times it may be found useful to lay a platform at upwards to carry a guard rail or rope and permit an edge board being fixed. The edge board is particularly necessary on steel construction work as bolts, nuts, spanners and other tools often fall, owing, no doubt, in part to the extremely narrow platform on which the men work. To prevent this in a practical way nothing better than an edge board has been used in this country, although matting is used abroad—notably in Northern Italy.

The ordinary hanger, as already stated, is usually made to carry two boards, and this platform, with its loads, is considered sufficient for its strength. If, therefore, three boards are wanted, additional support

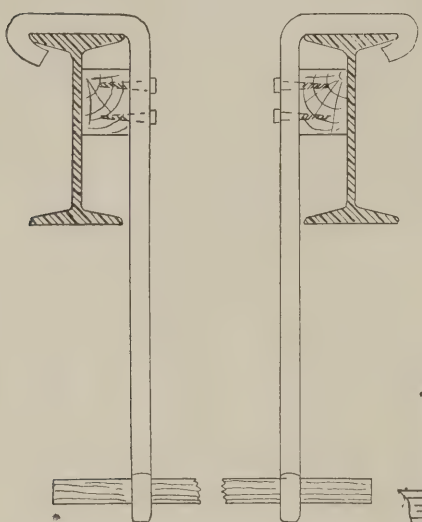


Fig. 8.—Method Adopted When a Platform Only 18 In. Wide Is Wanted.

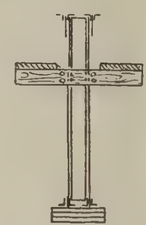
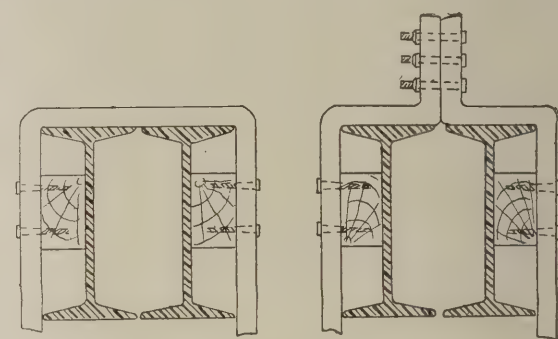


Fig. 15.—Cross Section of Fig. 14, Showing Planking Resting on the "Needles."



Figs. 12 and 13.—Manner in Which Hangers Can Be Used to Cover Double Girders, and Carry Platform on Each Side.

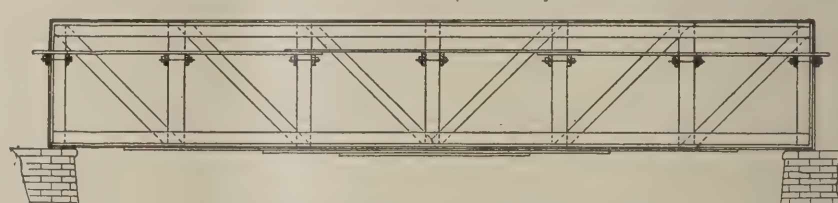


Fig. 14.—Platform for Heavy Lattice Girder Work.

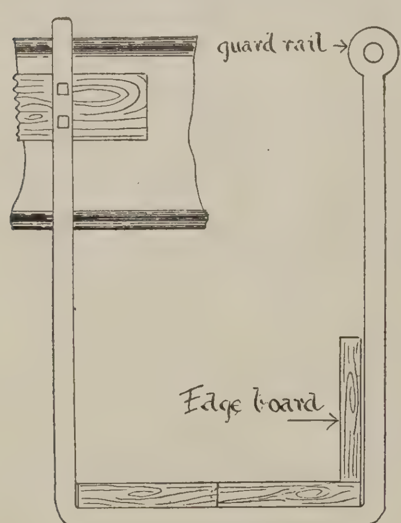


Fig. 9.—Sectional View of Platform When Arranged as Indicated in Fig. 8.

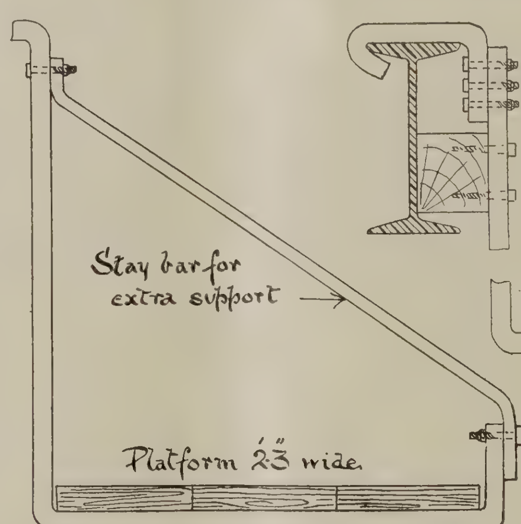


Fig. 10.—Hanger Provided with Stay-Bar to Afford Added Strength.

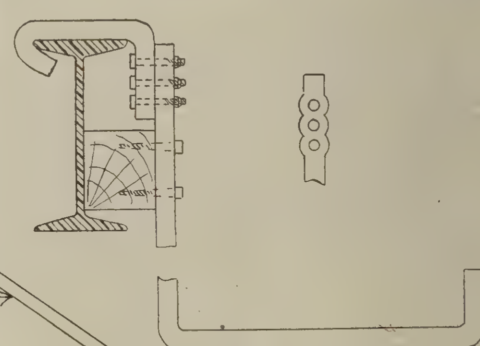


Fig. 11.—Hanger Made in Two Parts.

Portable Scaffolds in England for Steel Frame Buildings.

right angles to the run of the girder. To enable this to be done the hangers can be made to carry a pole or a length of quartering of sufficient strength, as shown in Fig. 7. Two poles hung from different girders are necessary, and on these the boards can be laid. A particular advantage is gained by this method, which is useful in many cases. It allows of a platform being laid to a width which is only limited by the effective length of the bearer poles. If a platform of only 18 in. is wanted it can be gained by arranging the hangers, as shown in Fig. 8. A section of the platform when arranged in this manner is shown in Fig. 9, which also shows how the end of the hanger can be continued must be provided, and this is given by fixing a stay bar, as shown in Fig. 10.

A disadvantage may be urged against the hanger in that it is cumbersome. It can, however, be made in two parts, as shown in Fig. 11. This also permits of differently sized clips being used to suit the flanges, the other portion of the hanger remaining of the standard size. Three bolts are wanted to make the connection, and the bars where joined should be slightly flattened out before the holes are drilled in order to give sufficient material around the bolt holes to withstand the stress that arises.

In Figs. 12 and 13 are shown the manner in which hangers can be made to cover double girders and carry a platform on each side. Fig. 13 being in two parts is, of course, the most portable. When used in this way the wooden blocks keep the whole arrangement rigid.

Fig. 14 shows the method of erecting a platform for heavy lattice girder work. It will be noticed that on the top boom of the girder flange plates have still to be put on similar to those on the lower boom. These plates could not readily be put in position if ordinary hangers were used, therefore a method of glanding timber crossheads to the struts is found most desirable. In the illustrations the crossheads, or needles, as they shown is hard against a wall or some other obstruction that will not allow an ordinary hanger to be fixed is illustrated in Fig. 17.

Fig. 18 illustrates a method of supporting a fireproof scaffold on which fires for heating rivets are to be used. The hanger carries angle irons covered with a deck of corrugated sheets.

Fig. 19 shows a safe hanger for supporting planks laid flat. By removing the plate and "bent flat" from the holes marked "A" to those marked "B" the planks can be placed at right angles to the position first indicated, as shown in Fig. 20.

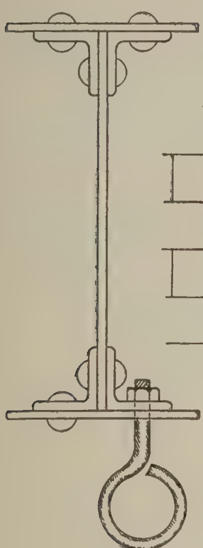


Fig. 16.—A Method Often Adopted to Carry Scaffolding.

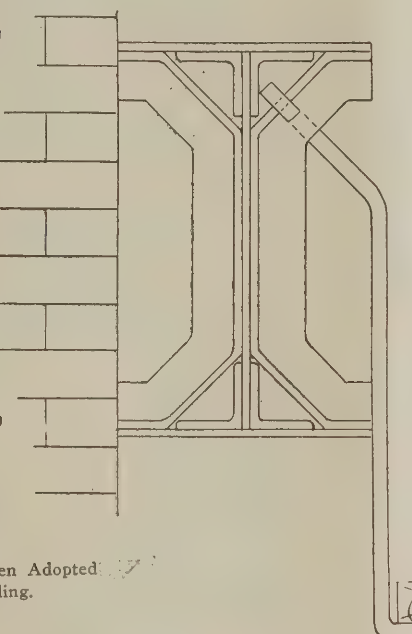


Fig. 17.—Hanger Useful Where Girder of Type Shown is Hard Against a Wall or Other Obstruction.

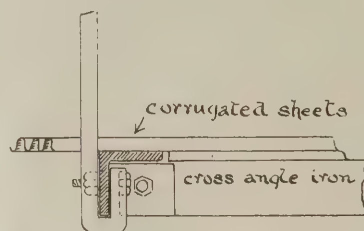


Fig. 18.—Method of Supporting a Fireproof Scaffold.

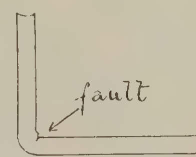


Fig. 24.—A Common Fault in Making the Hangers.

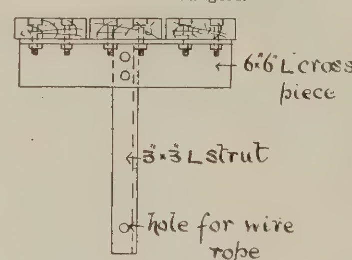


Fig. 23.—A Detail of the Lower L-Strut Shown in Fig. 21.

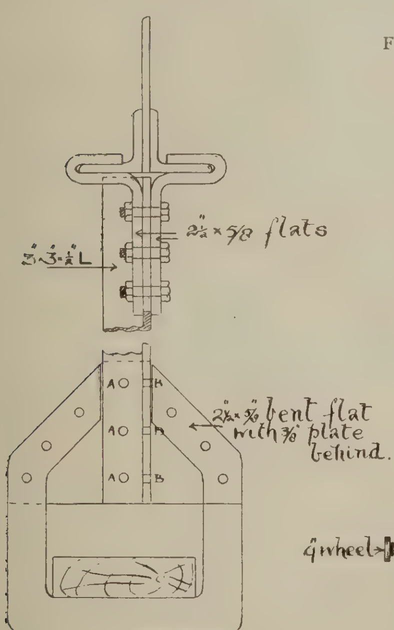


Fig. 19.—Hanger for Supporting Planks Laid Flat and Carrying Cross Planks.

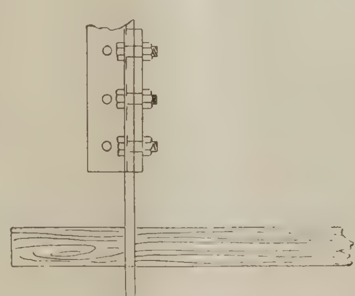


Fig. 20.—An Alternate Arrangement.

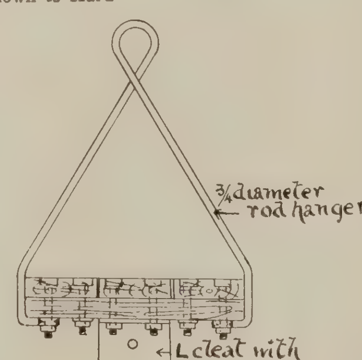


Fig. 22.—A Section of Fig. 21.

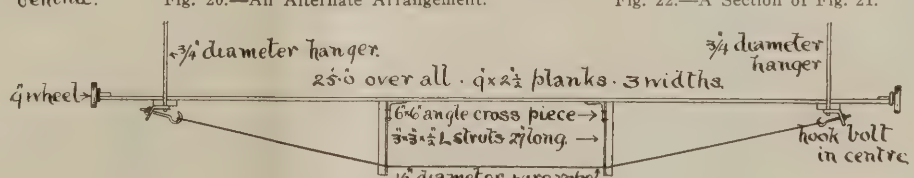


Fig. 21.—A "Trussed" Scaffold Capable of Carrying a Number of Men and Adapted for Use On Vertical Sides and Ends of Buildings.

Portable Scaffolds in England for Steel Frame Buildings.

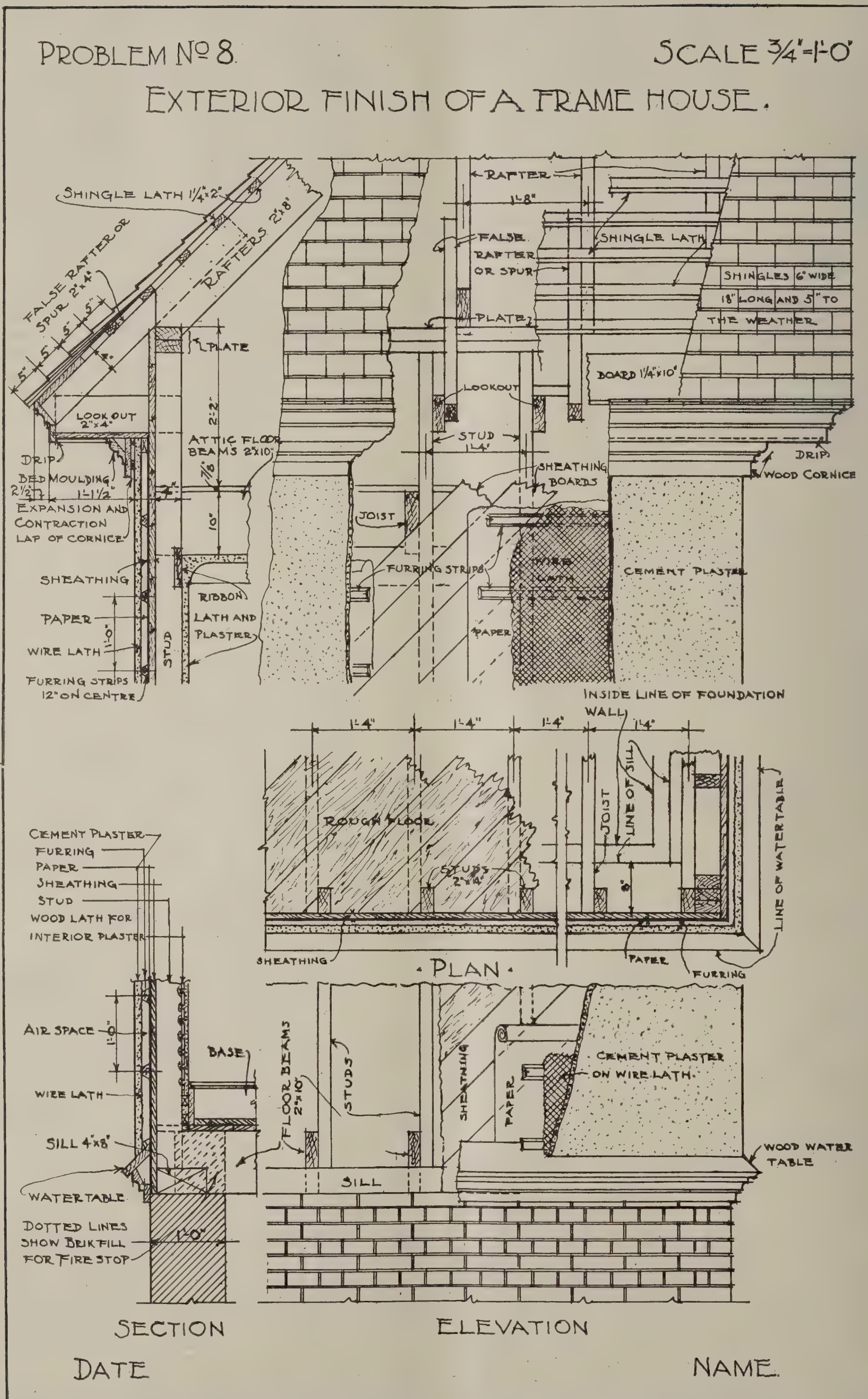
are sometimes termed, are shown fixed at the required distance from the top boom in order to allow of easy reach by the workmen. Fig. 15 is a cross section showing the planking resting on the needles.

A method often adopted to carry scaffolding is illustrated in Fig. 16. Rivets are cut out of the bottom flange at suitable distances apart, say every eight feet, and ring bolts inserted in their place. From these depend chains or cordage to carry whatever scaffolding may be required.

A hanger which is useful where a girder of the type

In Figs. 21, 22 and 23 is represented a scaffold capable of carrying a number of men and is useful for various purposes. By trussing it, as in Fig. 21, with a half inch wire rope and two hook bolts, a fairly long platform is provided. Fig. 22 represents a section of the arrangement with the hanger entire, but without the lower L-strut, a detail of which is presented in Fig. 23.

The manufacture of these hangers is easily accomplished by any ordinary smith, but care must be used to guard against the common fault shown in Fig. 24.



Lessons in Architectural Drawing for Beginners.—Scale of Sheet Three-Quarters Original Size.

LESSONS IN ARCHITECTURAL DRAWING FOR BEGINNERS

By Alfred Auslander.

THE exterior of a frame house is ordinarily finished with either clapboards, shingles or novelty siding, but owing to the fact that the cost of wood is steadily increasing, plaster is largely being used in place of the materials mentioned. Just at the present time a great deal of attention is being given to the use of plaster as a substitute for wood in the exterior treatment of frame houses, and the drawing on the opposite page shows one of the many ways in which exterior plaster may be applied to a frame house. Before proceeding, however, the student should be made acquainted with some of the terms and definitions used for this lesson, which is the eighth in the series.

The water-table is the base of the main wall set on top of the foundation wall, or a molded projection near the grade line, and consists of a board ⅞ x 6 in. set in such a way as to throw off the water from the foundation wall. A molding is generally placed under this board as indicated in the section on the opposite page. The water-table covers the joint between the top of the foundation and upper wall. If the exterior of the frame house is to be finished with clapboards or shingles the water-table should never be omitted and may be very plain, as shown in Fig. 1 of the accompanying sketches.

The dotted hatched part above the foundation wall and between the floor beams is called the "brick fill," or, as sometimes named, brick nogging. The brick fill is built after the floor beams are in place, is 8 in. thick and as high as the floor beams. It acts as a fire and mice stop and should never be omitted in good work.

If the house is to have plaster finish the water-table may be made either as shown by the drawing on the opposite page, or it may consist of a row of brick headers set on edge, as shown in Fig. 2. The plaster is then carried down to the top of the brick or in the form of a cove. The water-table is sometimes omitted altogether, in which case the plaster is applied to the foundation wall and carried below grade. Fig. 3 explains this fully.

After the frame work is all done the sheathing boards consisting of ⅞ x 8-in. hemlock are nailed to the studs. It should be nailed diagonally to stiffen the walls and should reach from top of the foundation to the top of the wall plate. The sheathing boards are then covered with heavy building paper (sometimes tar paper is used). This is to cover up the joints of the sheathing boards after shrinkage and its purpose is to exclude cold and heat, and therefore it must cover every inch of surface. To apply the plaster several methods are used. The best and perhaps cheapest method is shown by the full-page drawing. Beveled strips of wood 1 x 1½ in. are put on horizontally about 9 in. to 12 in. apart and on these wire lathing is fastened. The wire lath gives a good clinch and all corners of the building can be rounded off, if so desired. The wire lath should always be galvanized iron wire, galvanized after the wire is woven. The galvanizing gives a good protection against water and dampness.

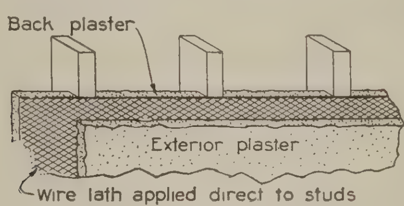


Fig. 4

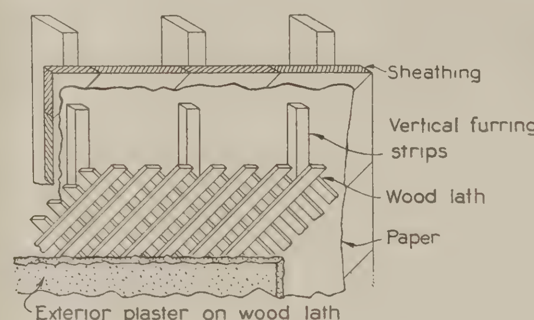


Fig. 5

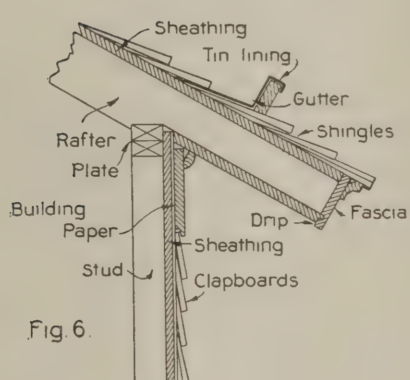


Fig. 6

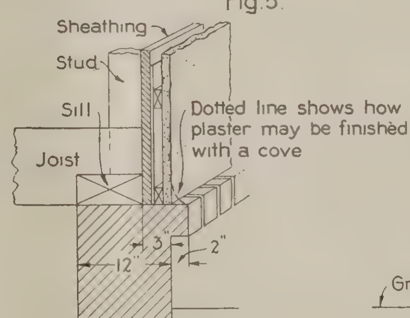


Fig. 2

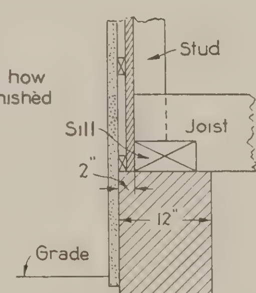


Fig. 3

Lessons in Architectural Drawing for Beginners.
Various Details of Exterior Finish.

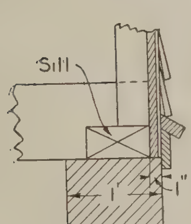


Fig. 1

A coat of cement plastering, called stucco, ½ in. thick, is now applied to the lath. This plaster should be well pressed through the openings of the lath, so as to cover the wire all around. The surface of this coat is to be roughed with a stick or trowel to receive the finished coat after the first coat has well set. It is composed of 5 parts of good Portland cement, 12 parts sand and 3 parts lime. The sand used must be absolutely free from loam, clay or other soluble material. Sometimes a small quantity of hair is added to the above composition. The second coat is composed of one part of Portland cement, three parts clean, coarse sand and one part of lime and is applied to the scratched coat. Plaster in large and extended surfaces is inclined to contract and crack; therefore, it is advisable that a space of about ½ in. to 1½ in. be left between the face of the plaster and back of the woodwork, as shown on section at cornice marked "expansion and contraction lap of cornice." Should the woodwork of the cornice shrink it will not cause any horizontal cracks on the plaster surface. This is a point which is frequently overlooked and the result is, after the woodwork has shrunk and the plaster contracted, a horizontal crack all around the building is obtained and the opportunity is given for water to get in behind the plaster face and so destroy, after a short while, the plaster from the least protected side. The air space formed by the horizontal furring lath insulates the building completely from the outside atmosphere and makes the building warmer in winter and cooler in summer. Where the cost of the building does not allow this method of construction, the wire lath may be fastened direct to the studs. In this case it will be necessary to protect the wire lath by a coat of plaster, applied from the inside as shown by Fig. 4, before applying the interior wood laths for the inside plaster. This is called back plastering and should in this case not be omitted. Another method is to use furring strip 1 x 2 in. nailed vertically on top of the building paper. Sometimes wooden laths 1/4 x 1 1/4 in. are used instead of wire or metal lath and are applied upon the furring placed outside of the sheathing and paper. They are placed diagonally in 1 1/2 in. spaces and then the lathing is repeated diagonally in the opposite direction, all being well nailed and secured. Plaster may be applied to this the same as upon wire lath. Fig. 5 fully explains the method.

There are many ways to construct a cornice for a frame house, the simplest being, as a rule, the best looking one. That shown on the full-page drawing is constructed as follows: A piece of wood 2 x 4 in. and of the necessary length is nailed to each stud. In our case the top of this piece of wood is 1 ft. 2 in. above the attic floor joists and projects 1 ft. 4 in. from the outside face of studding. This piece is called "Lookout." The rafters are cut off flush with the plate and separate pieces 2 x 4 in. are nailed to each rafter, forming the spur or false rafter. On top of the rafter at the eaves a board is laid 1 1/4 in. and 10 in. thick, also the shingle laths 1 1/4 x 2 in. are nailed about 8 in. apart. On top of these the shingles are laid, starting with a double course at the eaves as shown. Wooden shingles come usually 18 in. long and about 3/8 in. thick at the butts and about 1/16 in. thick at the point ends. They should be laid so that less than one-third of the length is exposed to the weather. The section shows that the shingles are covered or lapped 13 in. and 5 in. to the weather.

Another type of cornice for cheap work is shown in Fig. 6 of the sketches. The exterior is finished with clapboards 6 in. long, 1 1/2 in. lap and exposed 4 1/2 in. to the weather. The projecting rafters are boxed and sheathing is used instead of shingle laths.

To lay out drawing No. 8 proceed as follows: Place paper vertically and draw a rectangle measuring 10 x 14 in. for margin line. Begin with section through wall; place outside face of foundation wall 1 3/4 in. from left border line, and top of same 2 1/4 in. above lower margin line. Everything is to be drawn to a scale of 3/4 in. to the foot. Draw outside face of studs 1 in. back of face of foundation wall and draw sheathing 1 in. thick. Draw water-table with 45 deg. triangle 7 in. above brick wall. Make board 6 in. wide and place simple molding under same similar to the one shown on full-page drawing. We would suggest here that the student shall lay out a water-table in full size and study all moldings and then reduce these to 3/4 in. scale. Draw face of cement plaster 3 1/4 in. from studding; inside plaster including lath to be 1 in. thick; base 1 x 6 in. to reach to rough floor. After section of lower part of building is obtained begin with the plan. Place outside face of studding 5 1/4 in. above lower border line and 1 3/4 in. from right border line. Draw corner post and studding as figured. Sheathing furring strips and outside plaster, as well as projection of water-table, are obtained from the section. Draw section through cornice by projecting all lines as studding, sheathing, plaster, etc., from lower section and, as explained above, under cornice. Follow figures closely and draw pitch of roof with 45 deg. triangle.

Now begin with elevation of lower portion of building; first project face of plaster from plan to top of water-table, which is to be obtained from the section by a horizontal line. The profile of water-table on elevation is to be exactly as on section; lay of brick courses 2 1/2 in., each showing English and Flemish bond. (See Lesson No. 1.)

The explanation of how to lay out the water-table on elevation also applies for the cornice, by drawing horizontal lines through each point on section for the elevation and keeping the profile the same as on section. Show width of shingles on roof 6 in. Draw on a separate sheet the framing only and also one sheet showing clapboard finish. Mark each material clearly and show all other lettering, figures, etc.

Fireproof Concrete Houses

In a paper read before the American Society of Mechanical Engineers, F. B. Gilbreth, the well-known contractor, discussed the subject of fire-proof concrete houses, and from what he had to say the following extracts will doubtless prove interesting:

In a concrete structure there need be little or no combustible material. Let us take for example the dwelling house, for it is the most difficult to make both cheap and fire-proof. In a concrete residence there is little trim that cannot be made better and cheaper of Portland cement than of wood. The chair rails and picture molding can be made of concrete. The trim around the windows and doors can be molded in metal molds as cheaply as straight members. Even the wire moldings can be done away with, and the conduits buried in the concrete partitions, walls, ceilings and floors. Baseboards should be made of concrete or else omitted entirely, as they serve no useful purpose in a concrete building, except in the following wooden precedents. Windows may have cement sashes, with wired glass and self-closing shutters, or self-dropping shutters of rolled-up metal or asbestos. Metal furniture may be used. The paint and varnish used on buildings and furniture should be selected carefully, as these are great factors in determining the temperature at which a fire will start and the speed with which it will spread. There is also a great difference in the paints and varnish used for painting concrete. The flooring need not be of wood. There are many first-class non-combustible materials besides Portland cement that will fill every good requirement of wood and still be fire-proof. There are also parquetry floorings, made of slow-burning wood and much thinner than the old-fashioned hardwood floor, which make the best flooring in case wooden floors are desired. In a concrete residence there is no excuse for wooden under-flooring nor for wooden screeds.

The new building which is to occupy what was once a historic site at the northeast corner of Church and Vesey streets, New York City, will be 18 stories in hight and will cost in the neighborhood of $400,000. The plans for the office building have been filed by Goldwin, Starrett & Van Vleck, architects, of the city named. The site has long been occupied by two very old-fashioned five-story brown stone front stores and offices, but some 200 years ago the corner was occupied by what was known as Meeks Saw Mill, the property being originally owned by the old Meeks estate.

A CEMENT RESIDENCE AT NEWTON CENTER, MASS.

AMONG the many interesting examples of the application of cement for the exterior walls of a dwelling is that presented herewith, which relates to the residence of Dr. M. E. Stephenson at Newton Center, Mass. In this building the walls are of reinforced cement-concrete and are of a nature to render the building warmer in winter and cooler in summer. The frame is solid reinforced concrete, each post and girder containing from four to six rods extending the entire length. Between the posts the walls are reinforced with metal lath, the cement being applied on both sides, thus giving a solid wall 2½ in. thick, with the reinforcing metal lath extending through the center. The metal lath is attached to wooden studs placed flush with the corner posts and then lathed and plastered, so as to give a dead air space and prevent dampness on the interior of the building. The detail representing a horizontal section through the outer wall clearly indicates the method of construction.

For the 9-in. foundation walls a 1:2:4 mixture was used, while for the walls above grade a 1:3:5 mixture was used.

The roof is covered with pressed cement tile, and the general effect produced may be noted from an inspection of the photographic reproduction herewith.

The girders are 6 x 10 in.; the first and second floor joists 2 x 8 in.; studding for all bearing partitions 2 x 4 in.; for closets and cross partitions 2 x 3 in., and the rafters are 2 x 8 in. All floors are made double, the finish floors in the dining room, living room and reception hall being quartered oak.

The standing finish of the living room is red birch-finished mahogany, while the dining room is golden oak. The living room has a cement stone mantel and the dining room a built-in china closet. Leaded French glass doors lead from both dining and living rooms to the sun room, the latter being arranged with glass windows hung on cords and weights, so that they may be lowered into the basement. The screens are arranged the same way and come up in place of the windows.

The doors of the main rooms on the first floor are birch-stained mahogany, while the base, standing finish and fluted columns are of white wood, white enameled. All rooms on the lower floor except the kitchen have 8-in. ceiling molding. The standing finish of the rooms on the second floor is white wood. The floors are selected hard pine, with the exception of the bath room, which is of tile. All rooms are finished in white enamel with red birch doors except the den, which is Flemish.

The house is heated by vapor low-pressure steam, with exhaust ventilation in the den connected with the chimney. The house is also piped for vacuum cleaner in the cellar, the position of the pipe being clearly indicated on the first floor plan.

General View of Building as Reproduced from a Photograph.

A Cement Residence at Newton Center, Mass.

At the right of the hall as one enters the house through the vestibule is the reception room, beyond which rise the main stairs. At the left of the hall is the living room with its swelling bay window, which extends through the second story. Beyond the living room is the dining room, and opening out of both is the sun parlor.

Beyond the main hall and communicating directly with it through double doors is the kitchen, from which lead stairs to the upper floor as well as to the cellar. Communication with the dining room is established through a commodious pantry, out of which opens the room for the refrigerator so placed that it may be readily iced from the back porch.

On the second floor are four sleeping rooms, bath room and den. Readily accessible from the hall on this floor is the linen closet and the clothes chute, which extends to the basement practically beside the door to the laundry.

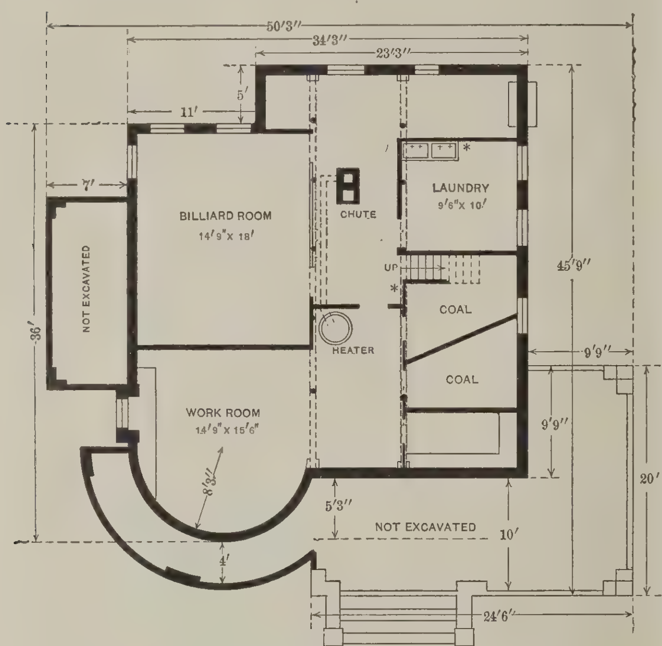
The billiard room is located in the basement, as is also a work room fitted with bench and lighted by a window directly above it.

A Large Skylight Roof

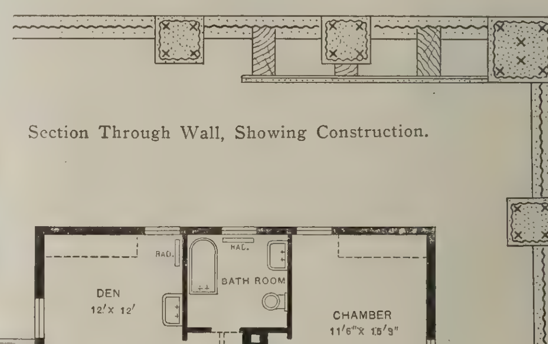
One of the most striking examples of skylight construction to be found in this section of the country is in connection with the roofs of the new Pennsylvania Railroad Station in New York City. The total skylight area consists of approximately 80,000 sq. ft., while the remaining portions of the roof, which are of many styles and forms, are covered with promenade tile and Monel metal roofing. Over the train shed there are two hipped monitor-top skylights, both exactly alike, having a total area of 26,000 sq. ft., while around the central portion of the building there are 13 hipped skylights of varying size. Over the concourse there are three large hipped skylights and 63 saw-tooth skylights glazed on each side, with curved ridges and vertical gable ends. Extending from the ends of the saw-tooth skylights are others which cover the circular or barrel-shaped roof, having an area of about 13,000 sq. ft. Around the outer portion of the concourse roof there are 23 monitor skylights—14 circular and 9 elliptical—supported by Guastavino construction.

A striking feature in connection with this work is found in the fact that no curved glass was used, despite the fact that in the saw-tooth and Guastavino lights, comprising a total of over 30,000 sq. ft., each light of glass lies in a plane different from that of the adjoining lights and all the glass being of irregular shape in surface dimensions. In connection with the skylight work use was made of flat wire glass, all of which was furnished by the Mississippi Wire Glass Company. The glass used was 3/8 of an inch thick and required about 220 tons in all. All the skylight work, which is of the new Multiple Unit System, was done by the National Ventilating Company, of New York City. The contract for the entire roofing was awarded J. C. McFarland & Co., 215 East Forty-fourth street, New York City.

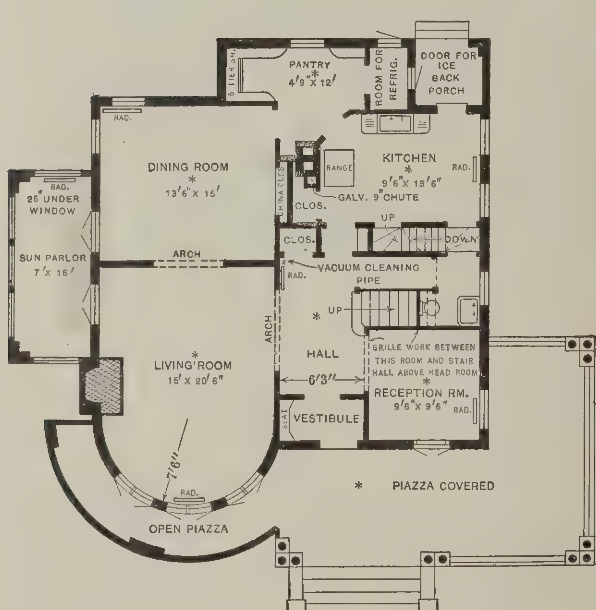
Two buildings will be torn down to make room for the new Hackling & Carding building, which will be erected for the Stevens Linen Company, of Webster, Mass. This building will be 289 x 70 ft., two stories in hight, with elevator tower at the southern end and connected to present Mill No. 2 by a runway. South of present Mill No. 2 will be erected a new spinning and weaving building, 197 x 76 ft. in plan and three stories and basement in hight. These buildings, which are being planned by Charles T. Main, mill engineer and architect, Boston, Mass., will be of standard, slow-burning mill construction, the exterior wall of gray brick to match as nearly as possible the present buildings. The plans will also include a new blacksmith shop of one story over a very high basement, a section of Mill No. 3, 46 ft. long, being torn down to make room for the shop. The west hall of the engine room will be torn out and a steam turbine room built on. The boiler house is to be altered and extended to accommodate two additional boilers and the coal pocket extended to take care of the additional requirements. The office building is to have an additional story and will be connected by a bridge to the weaving and spinning building.



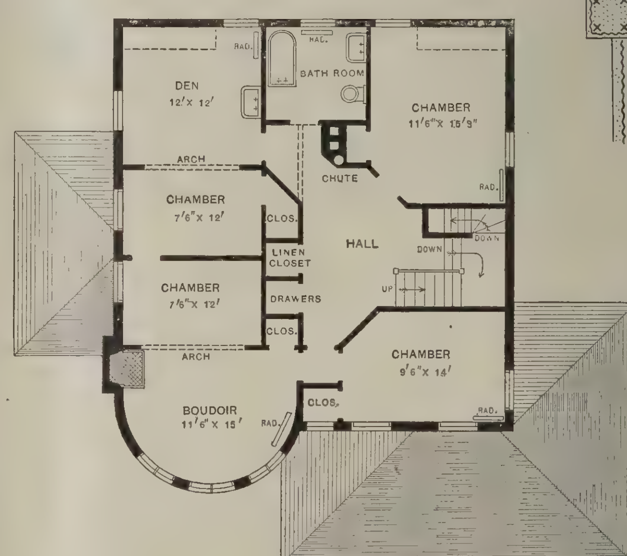
Foundation Plan.



Section Through Wall, Showing Construction.



Main Floor.



Second Floor.

A Cement Residence at Newton Center, Mass.—Floor Plans.—Scale, One-Sixteenth Inch to the Foot.

A PLANK FRAME BARN IN OHIO

We take pleasure in bringing to the attention of our readers by means of the accompanying half-tone engraving and floor plan a farm barn of plank frame construction, with basement walls constructed of concrete blocks. The picture shown herewith is a direct reproduction from a photograph taken soon after the various bents were "raised," and with the farther end of the barn partially sheathed.

The building is 42 x 100 ft. in plan, has a 16-ft. superstructure and a curb roof. The main barn floor is entered from the embankment by means of two driveways, one on either side of the building, but the floor itself is free from obstructions the entire space, 42 x 100 ft., up to the roof, 36 ft. high. The building is well arranged for the purposes for which it is intended, having 11 single horse stalls, 9 cow stalls, 7 box stalls, feed alleys and a driveway at the rear of the stalls for the entrance of manure spreaders. At the right is what is termed a large open stable, 40 x 40 ft. in area, in which the cattle are permitted to run loose.

Most of the horse stalls are 5 ft. 6 in. in width, while the cow stalls are 4 ft. wide. Two box stalls measure 8 x 10 ft. each in area, while the others measure 10 x 12 ft.

The main doors to the driveway extending across the barn are 10 ft. in width, while the entrance to the large open stable at the right is 8 ft. in width. It will be observed by comparing the floor plan with the picture representing the framing in position that a few changes were made in the construction of the basement entrances.

The barn was built for R. W. Dunlap and is located at Kingston, Ohio, a short distance south of the city of Columbus, the work being done by John L. Shawver & Bros., Bellefontaine, Ohio.

View of Framing of Barn as It Appeared Just After It Had Been "Raised."

A Plank Frame Barn in Ohio.—Contractors, John L. Shawver & Bros., Bellefontaine, Ohio.

Application of Tile to Concrete Surfaces

The following very interesting comments upon the application of tile to concrete surfaces were contributed by John Wynkoop, of the well-known architectural firm of Squires & Wynkoop, New York City, to a late issue of *The Cement Age*. What the author has to say is so pertinent to the subject that we reproduce the article herewith:

The intensely practical advantages of concrete have so impressed themselves upon the public that there is no longer any question as to its use from that point of view. The beauty and treatment of concrete surfaces, because of this utilitarian development, have not received the important study warranted by the nature of the material. A few authorities advocate leaving concrete surfaces just as they are when the rough forms are removed. However meritorious this may be, the majority of architects look upon concrete as a material which from its very nature gives a most extended opportunity in surface decoration and color. Architecture in stone is essentially dependent upon architectural lines —shade and shadow—whereas architecture in brick or concrete is dependent upon the actual treatment of their surfaces for their character and effect.

From this viewpoint, which is that of the majority of architects, any material enriching the surface of a concrete wall without interfering with its structural strength is possible and worthy of consideration. Of stone, brick, pigments and tile, the latter is, undoubtedly, best adaptable because of its beauty and extreme simplicity in application. In France, Italy and America, the application of tile to concrete surfaces has been considerably exploited, so that many actual examples exist upon which to base an opinion as to the effect produced. From these and from the general principles of design involved, it may be seen that extreme accuracy of tile setting as we know the material in general use is harmful to fine effects and not to be desired. Concrete, especially for exterior use, should be sufficiently rough and uneven to insure artistic surface modeling when seen from a considerable distance. This necessitates a free and varied treatment of any tile applied to it, both as to setting and as to coloring. The color of the concrete itself, in the main determines the color scheme of such tiles as are applied to it. Rough and deeply colored tiles are found to blend most easily with the rough surface of the concrete, although it can easily be imagined how certain bands or spots in tile could be both highly colored and finished to bring out accents sought after by the designer.

Especially in country house work the application of tile must be concentrated largely because of the costliness of entirely covering the concrete. As a matter of effect, from an artist's point of view, what a concrete surface needs is contrast with some material which is more refined and decorative than itself. Panels, band courses or scattered designs in tiles, so long as they do not become all-over patterns, seem particularly advisable in this kind of work, as much depends upon concentrating this decoration as does upon an intelligent selection of colors and an artistic placing of the individual tiles. Without doubt there can be no limit to the ways in which tile employed in this way may be treated. Practically any size and shape, any color, any surface, are being manufactured continually; and along with this, moldings and special colors and combinations may be obtained, provided the manufacturer considers the amount to be ordered as warranting him to produce special ideas in this way.

In fact, a rather new and certainly delightful avenue of design has been opened to the architect by the increasing prominence of concrete and its allied arts and materials. An original and pleasing type of building is to come from concrete, and, without question, decorative tile is to play an important part in this new type of the twentieth century.

Color Scheme in Schoolhouse Construction

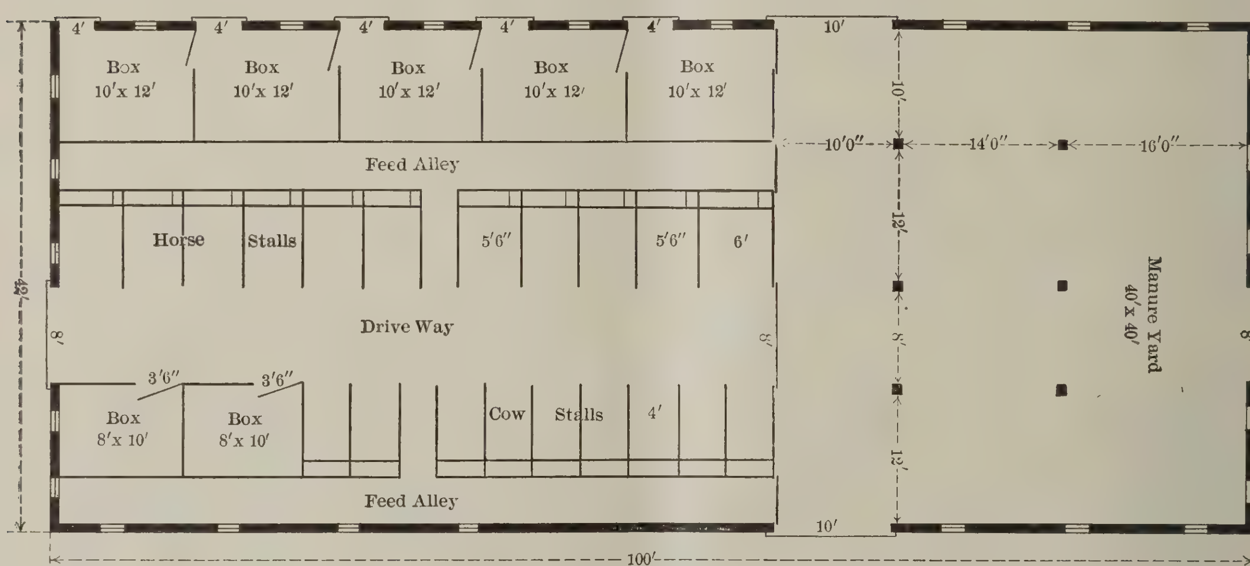
The completion of the Frederick Douglas schoolhouse in Cincinnati, Ohio, is being awaited with considerable interest by builders in that section because of the novelty in effect which is being attempted. A color scheme in a public building is said to be something of a rarity in the State of Ohio; hence the curiosity on the part of the members of the building fraternity. The school building is to be a three-story structure of stucco and brick. The stucco will be buff, the terra cotta a warm brown and the brick a mixture of red and browns set in a very thick joint in a pattern, so that the brick will have the appearance of an inlay. The tile in the tower over the archways will be in terra cotta color, and will be scattered over the walls to give weather effect. The tile showing over the towers and the middle section will be a dull, variegated green. Finally, in appropriate places over the structure will be bright spots of purple, green, brilliant red and other gay colors in Rookwood tile to relieve the general gray. The design of the structure will be in the Spanish Renaissance style of architecture—something rather new in Cincinnati, though of long standing in the West.

The Coming New York Cement Show

The management of the Cement Show, which is to be held in Madison Square Garden, New York City, in December, calls the attention of prospective exhibitors to the fact that all applications for space to be considered in the first allotment must be filed on or before noon September 1 with the Cement Products Exhibition Company, 115 Adams street, Chicago, Ill. The number of applications already received is such as to occasion the belief that at the allotment exhibitors will be limited to fewer spaces than nominated in their applications in order that the space may be so distributed as to accommodate the largest number of exhibitors. Those expecting to exhibit are therefore requested to forward their applications as promptly as possible.

The engagement is announced of John Philip Sousa and his band of 75 musicians to furnish the music for the New York Cement Show. The management feels that the engagement of this band should attract to the exhibition thousands of people from all over the United States, this being the first instance where a world-famous feature of this character has been introduced in connection with any previous trade or industrial show.

In connection with the Cement Show will be held the seventh annual exhibition of the National Association of Cement Users, whose convention will be held in Madison Square Garden Concert Hall, December 12 to 23 of the current year.



Floor Plan of Plank Frame Barn in Ohio.

CONVENTION OF SHEET METAL CONTRACTORS

IT was a highly representative body of sheet metal men which came together at Philadelphia the second week in August in connection with the sixth annual convention of the National Organization of the interests engaged in that important industry. The convention as well as the exhibition of goods of interest to sheet metal workers was held in Lu Lu Temple, where every provision had been made for the comfort of the members. The delegates began to arrive early in the week and on Monday attended the meeting of one of the Philadelphia associations and its banquet in the evening, while Tuesday was devoted to sight-seeing, and on Wednesday the regular sessions of the convention were opened. One of the important acts of the meeting was to change the name from the National Association of Master Sheet Metal Workers to the National Association of Sheet Metal Contractors. President Seabrook opened the convention, after which C. F. Geissler, president of the Philadelphia Association, introduced Mayor Reyburn, who delivered an address of welcome, after which the members rose and sang the "Star Spangled Banner."

In the report of Secretary Otto Goebel reference was made to the value of trade papers to the members, also to the increase in membership by a total of 43. The report referred to the local associations which had affiliated with the national body during the past year, and to the fact that since the membership fee to individuals was reduced there has been an appreciable increase in members. The treasurer's report showed a gratifying balance on the right side of the ledger. The president then appointed a number of committees, after which the convention adjourned until afternoon.

The President's Address

The feature of the afternoon session was the president's address in which he reviewed the work of the year, pointing out that it had been successful in every respect. Philadelphia, it was stated, still held the record for having the largest membership, and during the year the local body rented an office with the idea of placing a competent person in charge of the association work. By this arrangement it was expected that much greater benefits would result. The president also referred to the results of the efforts to obtain better prices for work, and also to the results of organization work, by which a number of local associations had become affiliated with the national body. The president discussed problems of future organization work; the question of a salaried organizer, and persons entitled to membership; supplying locals with printed by-laws, blank books, etc.; touched upon labor conditions; trade protection; the promotion of warm-air furnaces; the question of rating furnaces, and various other points of practical interest and value to the members of the organization.

Following the president's report, which was received with much favor, reports were presented by representatives of various local organizations as to what was being done to promote business. The president announced a Committee on Resolutions, after which it was moved that the constitution be amended so as to make the name of the organization the National Association of Sheet Metal Contractors.

During the evening session a number of papers were presented, among them being one by Dr. W. F. Colbert on "The Humanitarian Mission of the Sheet Metal Worker." At the close of his paper the author warned architects against awarding contracts for furnace heating work to the man who bids lower for it than other bidders.

Thursday morning was spent in executive session and the afternoon in sight-seeing, while in the evening those who were invited attended a dinner given by the Philadelphia Association.

Friday morning Secretary Goebel read the report of the Committee on By-Laws, after which Charles S. Prizer, president of the Federal Furnace League, was introduced, and read a paper on a plan for "Standardizing the Capacity, Rating and Rules for Installing Warm-Air Furnaces."

The chief features of this plan are the placing of correct, authoritative capacity ratings upon the warm-air furnaces manufactured by the members of the League, and the furnishing to architects and heating contractors of correct, definite standard rules for the installation of their furnaces. In the past it has been alleged that the capacity ratings assigned in "cubic feet" to their furnaces by many of the manufacturers showed too wide variations between minimum and maximum capacity, and were indefinite and misleading. It has also been alleged that many furnace manufacturers failed to furnish correct or definite rules for installing their furnaces. The new system of standardization in capacity ratings and rules for installation, will remove the cause of these complaints so far as the members of the Federal Furnace League are concerned.

The furnaces of the members of the League will be scientifically tested by a competent heating engineer employed for the purpose. These tests will be absolutely impartial and will all be made in a building which the League has erected for the sole and special purpose of conducting such tests. These tests will be made under uniform rules, uniform methods and uniform conditions.

The capacity ratings of the furnaces as determined by these tests will be certified by the consulting heating engineer who conducts the tests and by the secretary of the League, and will thus be the official, certified ratings of the League.

No member will be permitted to fix or assign his own ratings, but must take the ratings on his different furnaces as determined by the League tests. Every furnace rated by the League will have its official rating published in the catalogue of the member who manufactures it. This official rating will also be affixed to the front of the furnace on a plate designed for that purpose or will be permanently cast thereon.

The official ratings will be expressed in "Federal Heat Units." Architects and heating contractors will be advised that only those furnaces whose ratings are published in Federal Heat Units and whose ratings are cast or affixed to the front of the furnaces, have been officially tested and rated by the League.

Election of Officers

After the Committee on Resolutions had reported, recommending the printing in the proceedings of the reports of the president and secretary and that a vote of thanks be given to those who had favored the association, the election of officers ensued, resulting in the following choice:

President.......... R. J. Braley, Providence, R. I.
First-Vice-Pres......Frank J. Smith, Norfolk, Va.
Second Vice-Pres.... J. Bogenberger, Milwaukee, Wis.
Third Vice-Pres..... John Hussie, Omaha, Neb.
Fourth Vice-Pres.... F. J. Hoersting, Dayton, Ohio.
Secretary.......... E. L. Seabrook, Philadelphia, Pa.
Treasurer.......... W. A. Fingles, Baltimore, Md.

It was decided to hold the next convention of the association in the city of Omaha, after which the convention adjourned.

PLANS HAVE RECENTLY BEEN FILED by Hertz & Tallant, architects, New York City, for a 12-story commercial building having a frontage on Fourth avenue of 63.2 ft., and on Thirty-first street of 115 ft. It is estimated to cost $200,000.

The
Building Age
Formerly
Carpentry and Building

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SEPTEMBER, 1910

New York's Latest Music Hall and Restaurant

Work has just been commenced upon the demolition of another old landmark in New York City in order to make way for a mammoth music hall and café which will rise upon its site. We refer to the tearing down of the well-known American Horse Exchange at Broadway and Fiftieth street, extending through to Seventh avenue, and which removes the last notable landmark of the old horse and carriage trade center on Broadway above Forty-second street 20 years ago and more. Indeed it was this fact that originally gave Longacre Square its name, being so called from a famous horse mart in London. The site is that of an interesting Dutch homestead built in 1758 and stood until about 1885, when it gave way to the present American Horse Exchange. The new building will involve an outlay of something like $300,000 and has been planned on an artistic and elaborate scale by architect William Albert Swasy, of New York City. The music hall proper will cover a space 90 x 157 ft. and the stage will have a depth of 45 ft. by a width of 75 ft. The proscenium opening will be 48 ft. wide and 30 ft. high. The parquet floor will contain 1200 seats and the balcony 400, in addition to 25 boxes each containing six seats. The main entrance to the auditorium will be on Broadway, with 10 exits on the Seventh avenue front. The entire auditorium will be finished to give the effect of open air trellis construction on which vines will be interwoven. The side walls behind the trellis work will be decorated with landscape paintings, with concealed green lighting, and the general interior effect will be that the entire audience will appear to be witnessing a theatrical performance on the roof high above the city sidewalks and in the open air, protected from the sky by a huge pergola with trellised roof. All floors will be covered with red Pompeian tile and the wall space will be decorated with Pompeian pottery and statuary, with scrubs and flower boxes. It is the intention to make the structure fireproof throughout, and by reason of the three streets surrounding the property it will have more exits than any other auditorium of its size in the United States. The café and restaurant will occupy the balance of the Broadway front and the entire Fiftieth street front, the entire interior being in Flemish treatment. The Broadway corner will have a room 50 x 75 ft. in area, which will be carried up two stories and will be treated as a courtyard of an old Holland inn, with balconies overlooking the court. Opening on to this courtyard, which will be used as a café, will be the main dining room, paneled entirely in Flemish oak, with paneled ceiling and red-tiled floor. Private dining rooms with service rooms and servants' quarters will occupy the floors above. There will be an artistic roof garden on top of the building. It is the present intention to have the music hall and restaurant completed by November of the present year and preparations are already under way for an elaborate New Year's Eve celebration in the café.

Filtered Water, But Dry Closets

There seems to be something inconsistent in the action of a Board of Education in a city which orders the filtration of all drinking water used in a school building, and, at the same time, awards contracts for the installation of dry closet systems to take care of the wastes. Any city of sufficient size to indulge in a Board of Education should make provisions for a water closet system. There may be a difference of opinion as to what is the best type system, but there is little occasion for doubt that the individual closet placed in a stall made of non-absorbent material, in a room that is thoroughly ventilated, is the best equipment which can be provided. There is also now available for school use continual and periodic flushing urinals, which can also be provided for the use of the boys. It is of little importance that it may cost a great deal more to install the water-closet water-urinal system of plumbing than it would be to provide the dry-closet system. With full light directed on the dangers of the dry-closet system, it would not take the taxpayers long to decide. Plumbers in such communities owe it to the people as well as to themselves to force proper sanitary measures by crystalizing public sentiment in the press and otherwise. One cannot contemplate with any equanimity the picture of indifferently cared for dry closets or the dissemination by the winds of dried excreta.

Caisson Sinking in Record Time

The sinking of the foundations for the mammoth municipal building which is in process of construction, opposite the Manhattan entrance of the Brooklyn Bridge, has involved a number of interesting engineering problems and at the same time has afforded opportunity for the contractors to establish a new record in the sinking of caissons. In the course of the work a caisson for one of the column piers was sunk through sand to bed rock at a depth of 112 ft. 1 in. below water level, without accident or casualty of any kind. The caisson was of concrete, with a reinforced cutting edge and supporting a concrete shaft 10 ft. 9 in. in diameter, which was cast before sinking. The construction of the caisson was commenced April 15, and the bottom was passed May 16. While under the maximum pressure of 47 lb., the work was executed by 20 five-men shifts working about 40 min. each, with a very long time for decompression and an interval of 4 hours between the two shifts each man worked daily. The men were under very strict physical and medical supervision, improved sanitary and hospital appliances were on hand and a competent physician was in constant attendance, and not even a single case of the bends occurred. This is believed to be the deepest pneumatic caisson ever sunk, and is expected to be the maximum for this building, which will have 106 caissons, over half of which have been sunk. The work is being executed under the direction of the Department of Bridges, F. W. Perry, engineer in charge, and the Foundation Company of New York City has the contract for the substructure.

New Washington Irving Girls' High School

What will undoubtedly prove to be the most complete school building of its kind in this city, if not in the country, is the new structure for which complete plans have just been filed with the Bureau of Buildings for erection in Irving place, between Sixteenth and Seventeenth streets, New York City. It will be known as the Washington Irving Girls' High School, will be eight stories in hight and have a frontage of 184 ft. in Irving place, 183.4 ft. in Sixteenth street, and 166.6 ft. in Seventeenth street. The facade will be of brick and limestone, with entrance in both streets, and the main entrance in Irving place. The latter entrance will be ornamented with four large Ionic columns extending to a hight of two stories. Twelve columns of the same hight will ornament the rest of the Irving place facade at the first and second stories, while on each street facade will be sixteen Tuscan columns. There will be an open court from the second story up for purposes of light and ventilation, while the roof will contain open-air playgrounds. The structure will be fire-proof throughout and will be equipped with four elevators. According to the estimate of C. B. J. Snyder, the architect for the Board of Education, the building itself will cost $600,000, but the furniture and fixtures will bring the estimated outlay to something like $1,132,000. There will be 82 class rooms, giving accommodations for 3,000 pupils.

In the basement will be a gymnasium, heating and ventilating plants, baths, locker gallery, etc., while on the first floor will be the assembly hall, the offices for the day and night school, principals' and general offices, the library, bindery, typewriting room, supply room, salesroom and retiring room, and on the second floor an assembly hall gallery, language class rooms, English class rooms, commercial class rooms and typewriting rooms. On the upper floors will be sewing, dressmaking and millinery rooms, costume design room, mathematics class room, housekeeping and demostration room, domestic science rooms, laundry, domestic service rooms, pupils' dining room and service kitchen, music room, lecture room, laboratories, teachers' dining room, physical laboratories, general drawing rooms, chemical laboratory, photography room and dark room, history class room, with the top floor occupied by class rooms, gymnasiums, baths and lockers.

Wages of Workmen in Chicago Building Industry

Some interesting statistics have just been compiled by E. M. Craig, secretary of the Building Contractors' Council, showing the rates of wages paid workmen in the various branches of the building trades in Chicago, as contrasted with those paid in the same lines in 1902. From the table here given, it will be seen that the painters received the highest advance and the bricklayers and stone masons the lowest:

	Per Hour 1902	Per Hour 1910	Per Cent. Increase
Bricklayers and stonemasons	$0.60	$0.67½	12.5
Structural ironworkers	.50	.65	30.0
Ornamental ironworkers	.50	.60	20.0
Plasterers, tilesetters, plumbers, steamfitters	.56¼	.68¾	22.2
Gasfitters	.50	.68¾	37.5
Carpenters	.50	.60	20.0
Painters	.40	.60	50.0
Stonecutters	.45	.62½	37.0
Electricians, lathers	.50	.68¾	37.5
Sheet metal workers	.42½	.60	41.2
Marble setters	.50	.62½	25.0
Cement finishers	.40	.57½	37.5

According to the authority above quoted, bricklayers in Kansas City secured an increase of 37.1 per cent. since 1902, and in Providence, R. I., 35.4 per cent. Chicago led 24 other cities in the advance in wages for building workmen, the average for all trades being much higher than in any other city.

A REINFORCED CONCRETE FACTORY BUILDING, 440 x 230 ft. in plan and eight stories in hight, has just been designed by William Higginson, architect, for the Bush Terminal Company. The contract for the execution of the work has been awarded to the Turner Construction Company, New York City. This concern also has the general contract for a reinforced concrete factory building to be erected in Buffalo, N. Y., for the Alling & Cory Company, Rochester. The building will be L-shape, 153 ft. 5 in. by 65 ft. in plan, with a wing 117 ft. 10 in. by 53 ft. 5 in. Both the buildings are six stories and basement in hight and are figured for 300 lb. floor loads. Another contract is that for a reinforced concrete reservoir 68 x 40 ft. in area, which is designed to carry a three-story building to be constructed later.

A CONCRETE BLOCK CHURCH, 30 ft. wide, 40 ft. high and 100 ft. long, has recently been completed in Cleveland, Ohio. The walls are of hollow interlocking blocks, with an exterior facing of white silica sand and Blanc cement. Medusa compound was used for waterproofing. The interior facing is the same toned to old gold with a waterproofing paint made by the Billings-Chapin Company, Cleveland, Ohio.

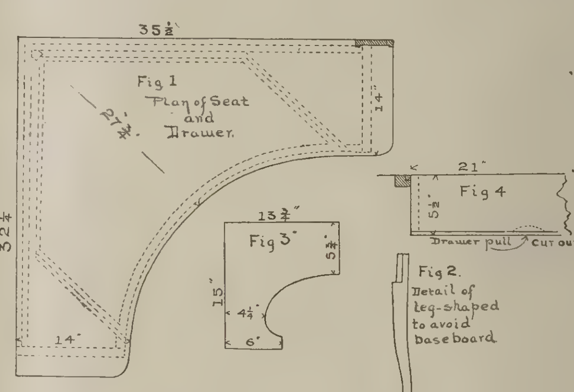
WHAT WILL BE ONE OF THE TALLEST THEATRE BUILDINGS in New York City is the eight-story structure for which plans have just been completed by Architect William H. McElfatrick. The proposed building will cover a plot fronting 200 ft. on 123d street and 100 ft. on Seventh avenue, and according to the architect's estimate will cost in the neighborhood of $650,000. The theatre section will be arranged with a seating capacity of 2300 and will have three tiers of boxes and two balconies.

CORRESPONDENCE

A Corner or Window Seat

From Paul D. Otter, Chicago, Ill.—I wish to tell the readers of *The Building Age* the satisfaction which a certain corner seat affords. It is one of those many wants expressed by the feminine members of the household, and to be expressed is soon to be in evidence, for what man of tools does not like to show his skill in work about the home, especially when it adds to the furnishing and general comfort of the household. In a small home, drawer space is frequently a matter unfortunately not considered in the original plan, so that it is essential that every acquired piece be of such a character that a drawer may enter into the design where ordinarily unused space prevails, in which case a double purpose is gained. A third purpose which entered largely into the building of this seat in the corner was to take away the too square effect of the room. It has every appearance of being fixed, or as constituting an integral part of the interior fitting, but it is so made that by any whim the entire piece may be placed in another corner having the same pattern of baseboard.

General View of the Completed Seat.



Various Details of Construction.

A Corner or Window Seat.—Contributed by Paul D. Otter.

The plan Fig. 1 shows the shape of the top, which in this instance was slightly longer on one side than on the other. The outer dotted lines show a sliding cleat and the shape of the under drawer, which will be found in its five-sided shape to be ample for table-cloths and other table linen. As it is desirable to have free dusting room, the rear corner is supported by a light leg, the detail of which is shown in Fig. 2. This is screwed on diagonally at the top, where the two side rails come to a corner, as indicated by the outer dotted lines of the plan of the seat in Fig. 1. The shape of the leg, as shown, was so made that it would come in front of the projecting baseboard and bottom quarter round mold. The two side rails were simply in the nature of battens, consisting of ⅞ x 2½ in. material set on edge and screwed to the top.

The front of the drawer was a segment of a 42 in. circle set ¾ of an inch under the edge of the seat. It was made of a 2 in. plank, having thickness at each end glued on to produce this shape. Then cut out on a band saw, after which a thickness of 1⅛ in. was scribed by a gauge to mark the sawing of the black line in the same maner.

The plan shows the two side blocks added to the thickness of the two supporting floor brackets Fig. 3, which will be required to fill up and conform to the curvature of the drawer front, as it appears when closed, a square relish being made to permit of the slide strip on the top edge of the drawer passing through, as indicated in Fig. 4.

A 2-in. box edge cushion conforming in shape to the top of the seat was made of tapestry goods to harmonize with rugs upon the floor and burlap covering of the wall.

Hanging Pivoted Windows

From J. C., New York City.—Will some of the practical readers of the Correspondence Department kindly tell me the best way to hang pivoted windows swinging in a horizontal or vertical plane, and the best or a different way to arrange the stop heads?

Taking Hewn Timber Out of Wind

From A. D. H., Prattsville, N. Y.—I notice in the July issue of *The Building Age* that "J. W. B.," Dushore, Pa., wishes to know how hewn timber may be taken out of wind. As I have had considerable experience in working hewn timber, I will give the method I have always used, which I learned from my father, who was an old-time carpenter.

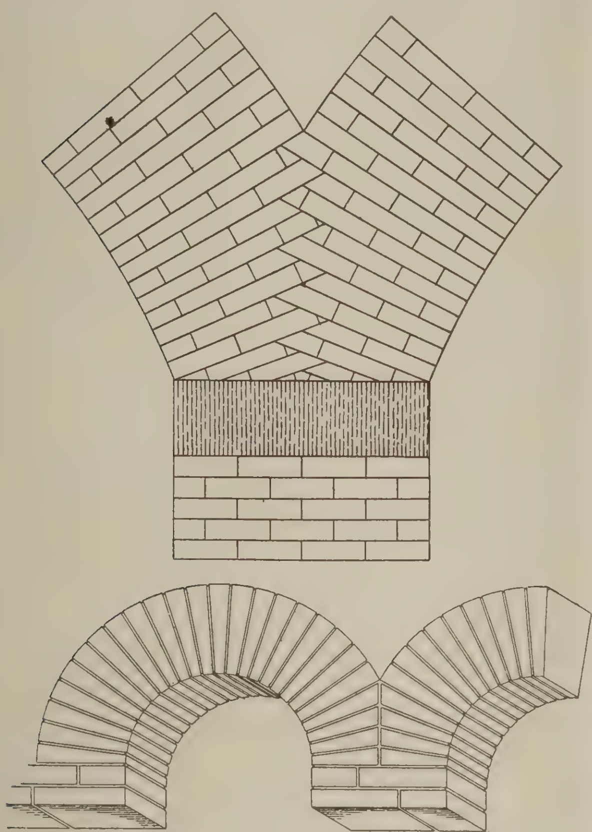
With the timber on blocks as for ordinary hewing, begin by hewing a place across the top near each end with an adz, making the hewn place the width of the adz blade, and having it a little lower in the center of the stick than at the edges. Now take two squares and hang them across the hewn places, with both the tongues on one side. By looking across the blades lengthwise of the timber you can tell where to hew on the spots so the blades will be out of wind when squinting across them.

After you have gotten the blades out of wind in this way hew a spot down the side of the timber where the tongues of the squares hang so it will be square with the hewn spots or places on top.

Now, to lay out the timber without counter-hewing, measure in 2 in. from the corners of the hewn spots and strike lines. These are called the work lines, and one may lay out all the framing by placing the inside of the blade of the square on the line so that you can mark clear across the stick, paying no attention to the relation of the square to the edge of the timber.

If it is desired to counter-hew the timber then strike lines from the corners of the squared spots or places and hew by them, hewing half way down from one side, then turning the timber over and finishing from the other side. This must be done by a good hewer or the result will not be much better than the rough hewn timber.

I desire to say that in my opinion the Correspondence Department of the paper may be made a great help to the readers if all of us would take an interest by answering the questions which are presented from month to month and not be afraid of showing ignorance, but ask for help from our brothers in the trade.



Intersection of Arches.

No one man knows it all, although, perhaps, some may think they do, and if every practical reader would take it upon himself to express his views on one or more of the questions asked each month the result would be a fund of information which would be exceedingly valuable to every one of us, whether young or old. As the editor has often stated, this department is intended as a medium for the interchange of ideas between those practically engaged in the building industry, and I am quite sure if every reader would take that as an invitation to contribute his mite in the way of comment, or a description of his method of doing the work to which an inquiry may relate, he will be doing his fellow craftsmen a great favor, besides aiding materially in rendering the Correspondence Department the most valuable section of the paper.

Note.—We heartily endorse what our correspondent has to say in the closing paragraph of his communication, and we trust that the readers will adopt his suggestions by sending us a letter for publication as often as their time and inclination will permit. It is obvious that the more expressions of opinion we can publish concerning the various phases of building construction which are covered by the inquiries from month to month the greater will be the value of the paper to all concerned.

Intersection of Arches

From Mason, New York.—Would any of the readers of *The Building Age* state whether the intersections of the hemispherical or semi-circular arches shown in the accompanying sketches are correct. Bricklayers differ greatly as to how brick should join at the intersection.

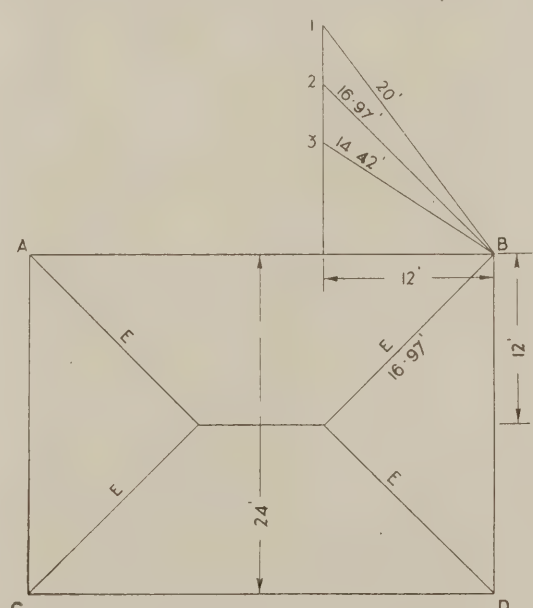
Why does not the level maker who criticises the adjusting of levels in the July number give us his way of doing it? If he has a better way, why not trot it out for the benefit of the many readers of the Correspondence columns? We are all open to conviction, and if one reader has a better way of doing certain work than the method advocated by someone else, he should be charitable enough to send it to the editor for early publication.

Pulp Plaster vs. Lime Plaster

From W. J. K., Providence, R. I.—Will some of the readers who have used "pulp plaster" in their work let me know, through the correspondence columns, what advantages, if any, it has over common lime and hair plaster?

A Question in Rafters

From L. E. R., Auckland, New Zealand.—I noticed in your March issue under the title "A Question in Rafters," a communication from a correspondent signing himself "Parallelogram," and also a correction of the same article on page 163 of the April issue by the same correspondent. His letter was in reply to a question asked by a correspondent some time before reading "If the length of a common rafter in a roof of 45-deg. pitch represents the run of hip rafter, why will not the length of a common rafter in a roof of one-third pitch represent the run of the hip rafter?" is rather misleading to our younger readers. By referring to the accompanying diagram, I think it will be clearly demonstrated that the length of the rafter is never the same



A Question in Rafters.—Diagram Accompanying Letter of "L. E. R."

as the run of hip rafter in a square house with the exception of a 45-deg. or one-half pitch roof. Referring to the diagram, A B C D represents the plan of a hip roof and E is the run of the hips 16.97 ft. The lines 1 B, 2 B, 3 B represent the lengths of a two-third, one-half and one-third pitch rafter respectively, for the same roof. It is therefore quite clear that the length of rafter does not equal the run of hip in all pitches. Different pitches may alter the true length of the hip, but never the run or seat, which remains the same.

I hope this will enable "W. H. P.," who asked the original question, to see why the one-half pitch and no other pitch is the same as the run of hip.

From Charitable Justice, Valparaiso, Ind.—My attention was recently called to the answer in the July issue of *The Building Age* of J. Bremner to the question asked some time ago by "W. H. P.," in regard to the ratio of the length of the common rafter to the run of the hip rafter. The explanation of J. Bremner is mathematically correct, but might it not be made more direct by saying "When the right quadrilateral, of which the common rafter is the diagonal, is equal to the right quadrilateral (that is, the quadrilaterals have equal boundary lines), of which the run of the hip is the diagonal; the length of the common rafter is the same as the run of the hip, but if the right quadrilaterals are not equal, the common rafter and the hip run are unequal"? The above is put in the form of a question out of respect and not because of ignorance.

I give the accompanying diagrams Figs. 1 to 5 in illustration of the statement in regard to the right quadrilaterals.

If a one-third pitch roof is placed upon the diagram Fig. 2, it is quite evident that the length of the common rafter for run of 12 ft. is equal to the run of the hip, but the length of the common rafter for run of 8 ft. is not equal to the run of the hip. It is likewise evident that if a one-third pitch roof is placed upon the diagram Fig. 3, the common rafter run 12 ft. is not equal to the run of the hip. If a one-half pitch roof is placed upon the diagram Fig. 3, the common rafter run 12 ft. is equal to the run of the hip, but if one-half pitch roof is placed on diagram Fig. 2, the common rafter run 12 ft. is longer than the run of the hip. We have here considered all the possible conditions and have all possible results; that is, the common rafter equal to, less than and greater than the hip run. Therefore, there can be no fixed ratio between the length of the common rafter and run of the hip, but the ratio changes with each change of condition. The length of the common rafter is conditioned by the length of the run and the hight of the rise; the hip run is conditioned by the length of two runs, the one of which is equal to the run used in getting the length of the common rafter, while the second run may or may not be equal to the rise and conditions or determine the ratio of the common rafter to the hip run. That is, in getting the common rafter and the hip run two lines are respectively equal each to each if the roof is rectangular. The other two may or may not be.

In making general proof by applying jolly old Euclid with his "Q. E. D." I should apply the Theorem: if two triangles have the two sides and the enclosed angle of the one equal respectively to the two sides and enclosed angle of the other, the triangles are equal; that is, they coincide and all of the lines and all of the angles are equal. Or, I should apply the Theorem: the square described on the hypotenuse of a right triangle is equivalent to the sum of the squares of the other two sides and the axioms—if equals be multiplied by equals their products are equal—if equals be added to equals their sums are equal; and the principle, if like roots are extracted from equal numbers, the roots are equal.

I think a proof made thusly, especially with the last Theorem, would be more conclusive and better understood by a beginner than a proof made by one or more of the Theorems of similar triangles or other corollaries. The getting of the common rafter is but a problem in plane geometry; that of the hip or of the valley rafters, a problem in solid geometry. The length of the hip or valley rafters is the diagonal of a right parallelepiped, the lateral edges of which are equal respectively to the common rafters involved and the rise of the roof if the latter is rectangular.

In the way of illustration I present the diagram Fig. 5. The solution of most of the problems in solid geometry which the mechanic has to make is by the application of the Theorems of plane geometry; that is, a problem in solid becomes two or more in plane, the one being a sequence of the other and using as a known part the conclusion or answer to the preceding.

In getting the numerical length of the hip two problems in plane geometry are involved, but, nevertheless, the problem is one in solid geometry. The problem is solved by twice applying by computation the second Theorem given in this article; in other words, the problem is reduced to two problems in square root, which can be combined and the root extracted either by computation or by twice applying the square. The man who arrives at the correct result by intelligently applying the square may have as much brain—and more skill in some directions—as the man who applies the Theorem by computation.

From the lines involved in the computation, one who is even quite well versed in book geometry might hastily conclude that in a one-half pitch roof with equal rafter runs the common rafter does not equal the run of the hip, or he may conclude that in any pitch with equal rafter runs the common rafter does equal the run of the hip. It all depends upon the viewpoint from which the subject is approached and how hasty is the conclusion. Hence I fail to see even if either of "J. B.'s" possible meanings are put upon "W. H. P.'s" question, how he shows ignorance by making the inquiry. The most that we should infer is that he arrived at a hasty conclusion—a conclusion without due consideration.

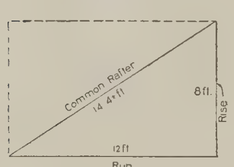


Fig. 1.

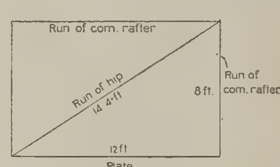


Fig. 2.

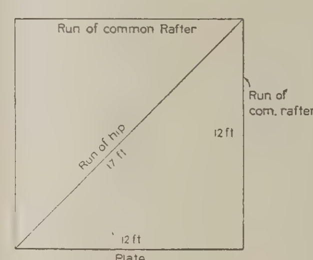


Fig. 3.

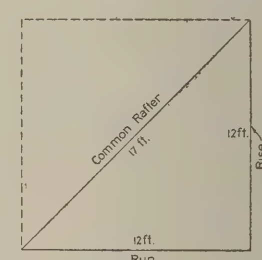


Fig. 4.

A Question in Rafters.—Various Diagrams Accompanying Letter of "Charitable Justice."

I, however, agree with the correspondent in that the expression a one-fourth, one-third and a one-half pitch roof is confusing and misleading; such a nomenclature is not strictly in accord with mathematics as usually applied, although I judge the best architects use the nomenclature and they are no doubt classed with the best mathematicians.

In mathematics the tangent is the expression of the ratio of the sine to the cosine; that is, the ratio of the altitude to the base, which conditions the sine angle.

$$\text{Tan A} = \frac{a}{b}$$

As the angle sine A increases from 0° to 90°, a increases from 0 to 1 and b decreases from 1 to 0.

I cannot, however, agree with the correspondent that a roof with a 15-in. rise to a 12-in. run should be called a "two-pitch roof." According to my understanding that would not be so nearly correct as the old nomenclature and much more confusing. What would he call a one-fourth roof; or a roof of equal rafter runs, in which the rise is equal to the width of the building.

The old nomenclature is at least systematic. To my mind the nomenclature which would give the pitch, as the undivided ratio of the rise to the run, would be in accord with mathematical usage, systematic and more intelligible than either the nomenclature of the architect or the one proposed by the correspondent in question.

A roof, the run of which is 12 ft. and the rise of which is 8 ft., would then be called an 8/12 or ⅔ pitch roof; a roof with the same run and a rise of 7 ft. would then be called a 7/12 pitch roof; with the same run and a rise of 12 ft., the roof would then be called a 12/12 or 1/1 pitch roof; with the same run and a rise of 15 ft., the roof would then be called a 15/12 or 5/4 pitch roof, etc. Such a nomenclature would express a correct ratio of rise to run; that is, the figures used on the square in spacing the rafter and in marking the cuts. The nomenclature would save many mistakes in computing the length of the rafter and in computing the angle of the elevation of the roof.

I can no more agree with "J. B." in his statement that "W. H. P." shows ignorance by asking the question and then not coming forward with an answer than I can agree with him in his new nomenclature for roof pitches, or that "W. H. P." shows ignorance by the possible constructions of his question as to meaning.

The question may have been asked to induce thought, or provoke discussion, and not because of ignorance or a desire to make display of his stock in store of knowledge. But if "W. H. P." did ask the question for information I fail to see how that shows ignorance. I do not doubt but that many of the men who fought the battles of the Revolutionary War did not know that

$$h = \sqrt{b^2 + a^2},$$

nor that the hip rafter $= \sqrt{rcr^2 + rcr^2 + R^2}$.

Perhaps many of them did not know that there was such a science as geometry and the numerical application, trigonometry. Yet that they were not ignorant is shown by the fact that they performed feats of engineering and trained guns in such a way that the British regulars who were trained in those branches of mathematics had to yield to the "backwoodsmen." When the war was over, the men who perhaps knew more about a "pitch battle" than they did about the pitch or framing of a roof, framed a constitution which stood nearly 100 years with only 12 amendments and is yet standing with but few additions.

If "W. H. P." is ignorant, why rail at him? Perhaps he did not have as good an opportunity to obtain an education as "J. B.," or perhaps he has not so much native ability. In either case he should be induced to ask more questions, not censured. Instead of advising a man to study Euclid, would not the better way be to assist him to study Euclid and to see that the youths of Portland, at least when they take their places as artisans, need not be told to study Euclid?

With the future artisan the gaining of a livelihood and the putting away of a competency is paramount. He enters school, and, owing to the unsatisfactory course of study which he must pursue in combination in some instances with the inefficiency of teachers, he becomes disgusted; in fact, sees no need of an education, and I guess there is no need of the kind at which he has an opportunity, so he leaves school in, say, Grade 4, which would not be so bad if he left school with a correct attitude toward books—the need of "book education" and had correct mental habits; that is, knew how to study.

Why not make effort to have the courses of study revised so that they give practical knowledge and the fullest mental development, so that the public money be spent in, say, the first nine years of school; the burden of the support of the remaining three years being superimposed by direct tax upon the people whose assessable value of property is more than some determined amount, say $2,000? But one may say, "A few would have to pay for the education of many." I say "no," and if they did I fail to see why that is not more fair than for the many to pay for the education of the few at the expense of their own education. But you say "the schools are maintained by the public fund, the State fund, which comes from the sale of public land." That is just what I wish you to say. Who is the State? Are not the farmer and the artisan the largest part of the State? Why should courses of study be so made and the schools so manipulated that the education of the major part of the State should stop eight years before that of the minor portion? The larger part of the State is the farmer and the artisan. They are the brains as well as the brawn and the bone of the nation and the correct ratio of the public funds educationally is theirs.

It is possible that "J. B." may have been one of the "select two or three" who have acquired a knowledge of Euclid at the public expense; "W. H. P." may not have been so fortunate. The child can be taught a fair working knowledge of geometry several years before he reaches the high school and formal Euclid with his "Q. E. D.," provided, of course, that the course of study and the superintendent permit, and provided also that the child has a "teacher."

That the future artisan may have his correct ratio of public fund, so that the artificer or the mechanical artist may be superimposed by his being properly instructed in Euclid plus some other very important subjects, the school system must be revolutionized and reorganized. First, the course of study must be thoroughly revised, made practical, enriched, so that the mental discipline and the knowledge gained can be utilized and applied in life's problems; second, the teachers employed must have some practical knowledge as well as book knowledge of the subjects taught, and appreciate the relations between them and life's problems. The teachers employed must also have due respect for all necessary vocations and perfect sympathy and respect for humanity and must be teachers, not school keepers. The teachers must be employed because of efficiency and barred for no other reason than that of incapability, as must also the superintendent.

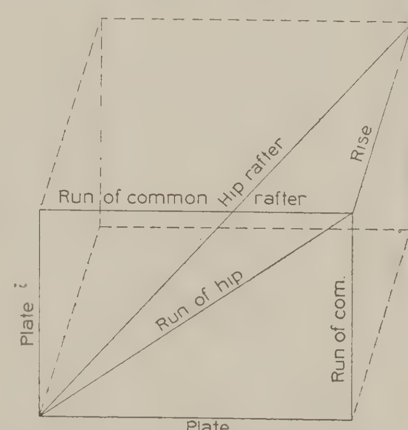


Fig. 5.—Diagram Showing the Length of Hip to be the Diagonal of a Right Parallelopiped.

A Question in Rafters.

Many reforms could be suggested, but I refrain. Trade schools and farmers' institutes and courses in manual training are not the remedy, the remedy lies back of these. I have suggested that the young artisan should not be barred from a knowledge of Euclid and from the divine right of man—full growth—but how about the old artisan? Is there a school with a "genuine teacher"—not school keep or professor—who can put in the basis for as well as the knowledge of Euclid without outraging the laws of manhood; a school where the old artisan can spend a few pleasant hours each week and not be ridiculed because of his ignorance—

of Euclid; a school where he can really meet Euclid and learn what a pleasant and useful companion he is? If there is no such school in Portland, it seems to me "J. B." has a work before him.

In regard to "J. B.'s" two-pitch roof, I will say that my good sense tells me that "J. B." either thoughtlessly said a two-pitch roof, or did say or meant to say a 15/12 or 5/4 pitch roof. The first would be a case of hasty conclusion; the second, an error by the typo; the third, a case of carelessness. "J. B." shows both by the figure he gives in illustration and by his explanation that he has a good knowledge of mathematics; also good sense, either of which would prevent him from thoughtfully saying that a roof with a 15-in. rise to a 12-in run should be called a two-pitch roof. Neither does he show ignorance in saying that he would apply the Theorem of "similar triangles" to make proof of his statement in regard to the conditions necessary to make the common rafter and the hip run equal each to each. He simply shows a hasty selection without application. Had he stopped to make proof, to write the Theorem, or even to think of the proof, he would have selected either a Theorem of equal triangles or the Pythagorean Theorem.

I took issue partly from my love for a friendly joust and partly to convince "J. B." how easily he might mistake the mental status of "W. H. P.," who may be able to throw him in a mathematical wrestle. I took issue to show that a man is a man whether he understand Euclid or not, and to show to the artisan the real cause of the lack of mathematical knowledge, if such is the case, so that he may apply the remedy.

I have tried to be just in my comments, and if I have indulged in seeming sarcasms they are of the friendly kind and are meant for good and not to wound or harm.

The proposed changes in school conditions can be brought about, perhaps not suddenly nor all at one time, but one by one the reforms can be made, some by petition to the local authorities, some by petition to the General Assembly and others by being made issues at elections. One of the sacred rights of the American is the right of petition. Another, the right to vote as he may choose. The last two reforms mentioned in regard to the teaching force are the first that should be made and are the easiest to make; the others should follow as rapidly as possible. The question resolves itself into this: "Does the artisan want to apply rule and Theorem more intelligently?" Results will tell.

Figuring Cost of Window Sash

From J. K., Brownwood, Texas.—I am desirous of ascertaining how to figure the cost of sash that are not listed in sash books. It seems to me that the way to figure them would be to figure the frame by having a rate per inch, which includes the lumber and labor of making the sash, then add the cost of glass, plus the labor of setting it.

I have not been able to figure a rate satisfactory to myself, consequently I wish to place the matter before the readers of the correspondence columns so that they may express their views and show how they would proceed.

Some Questions in Cabinet Work

From J. L. B., Queen Charlotte, B. C.—I am much interested in the articles now running through the columns of the paper under the title "Jobbing Carpenter and Some of His Work," and I wish to take advantage of the standing offer of the author to discuss any phase of work. I am desirous of obtaining pointers on the making of show-cases, the method of working and fitting corners and connections, and I would therefore be glad to have Mr. Crussell give the best way, together with sketches.

Will he also give the rule for making saw kerfs to bend boards which are to be used where the surfaces swell in and out?

Calculating Safe Loads on Wooden Beam or Girders

From J. Bremner, Portland, Ore.—In his "Lessons in Architectural Drawing" in the May issue of the paper, Alfred Auslander gives a statical formula for calculating the safe load on wooden beams of girders which I notice is at most extreme variance from one given for exactly the same in the mechanical carpentry section of "People's Standard Work on Stairbuilding and Hand Railing." The following are the two formulæ:

$$S = \frac{8\,b\,d^2\,Z}{5\,L^2} \text{ Auslander's.}$$

$$S = \frac{b\,d^2\,C}{6\,L} \text{ People's.}$$

In both formulæ "S" equals the safe load, but in Mr. Auslander's the load is equally distributed over the girder, while in People's it is collected on the center, and he says: "It is a well-known fact that if the weight be uniformly distributed the load may be doubled on the beam." Consequently to equate the above two formulæ, that of People's must be multiplied by 2 and then "S" in both should be equal or pretty nearly equal to each other.

In both formulæ "L" equals the length in feet of the girder between the supports.

b = the breadth or thickness in inches and

d = the depth in inches of the girder.

Z is a constant said to allow a deflection of not more than 1/40 of an inch per foot span and to be equal to 103 lb. for yellow pine.

"C" is a constant found by experimental tests on a unit of material by taking a bar 1 in. square and 12 in. long between supports and loading the bar at the center until it breaks, and is found equal to 850 lb. for yellow pine. This test is all in terms of inches and 12 in. being a foot gives the breaking load inversely as the length between supports in *feet*. Then for safety the factor of 1/6 is introduced; that is, the formula at the breaking poin tis divided by 6 to give S, the safe load.

Either the length, thickness or depth of the girder can of course be found to conform to any particular formula from the formula when the other terms are given.

Now to compare the result of the one formula with that of the other, take the example given by Mr. Auslander; namely, a yellow pine girder 6 x 8 in. and 8 ft. between supports. Substituting these quantities in the formulæ and adjusting for a uniform distribution of load in People's the same as Auslander's, as before mentioned, we get the two statements as follows:

$$S = \frac{8 \times 6 \times 8 \times 8 \times 8 \times 103}{5 \times 8 \times 8} = 7910 \text{ Auslander's.}$$

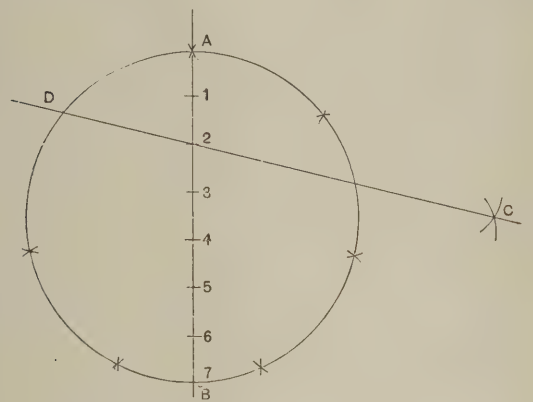
$$S = \frac{2 \times 6 \times 8 \times 8 \times 850}{6 \times 8} = 13{,}600 \text{ People's}$$

Here the safe load which the beam will carry according to one formula is about 8000 lb., and according to the other about 14,000 lb. or 75 per cent. more by the one calculation than the other. No rule can be given nor formula be depended on for exact estimates of this nature. All the particular conditions have to be known as far as possible; the different natures or qualities of the same named material and different parts of the same piece of material, etc. Simply everything is different and practical good judgment gained from continued experience is the most successful method of determining dimensions of this nature and, in fact, is the method used in 99 cases out of 100 without making or depending on any formulated calculations.

Of course it is proper for beginners to have education sufficient to be able to make such calculations.

Dividing Circumference of a Circle

From Jack Plane, Portland, Ore.—Here is a method of dividing the circumference of a circle into any number of equal parts that I submit in the hope that it may be as useful to others as it has been to me. It is simple, easily remembered, and is applicable to a great many geometrical problems that arise in a mechanic's work. In order to draw a star with a given number of points, or to lay out a polygonal shaped plan with a certain number of sides, it is necessary, according to the various text books on the subject, to follow a particular formula adapted to the case in hand and to no other. Thus the manner of locating the points of a five-pointed star will be of no assistance in drawing a similar figure with any other number of points. It will be seen on examination this difficulty is obviated in the diagram shown herewith. It will be found serviceable in many other ways.



Dividing Circumference of a Circle.

Suppose it is desired to divide the circumference of the circle shown into seven equal parts, or to locate upon its perimeter seven points equi-distant from each other: draw the diameter A-B and divide it into seven equal parts. From A and B, respectively, with a radius equal to the diameter, strike the arcs intersecting at C. From C draw a line through 2 and intersect the circumference at D. Then the arc A-D will be one-seventh of the circumference of the circle. By setting off that distance on the dividers and carefully stepping around the circle, the remaining five points will be located. Any other number of points may be found in the same manner, the line C-D always being drawn through the second division of the diameter.

Finding Weight of Plate Glass Windows

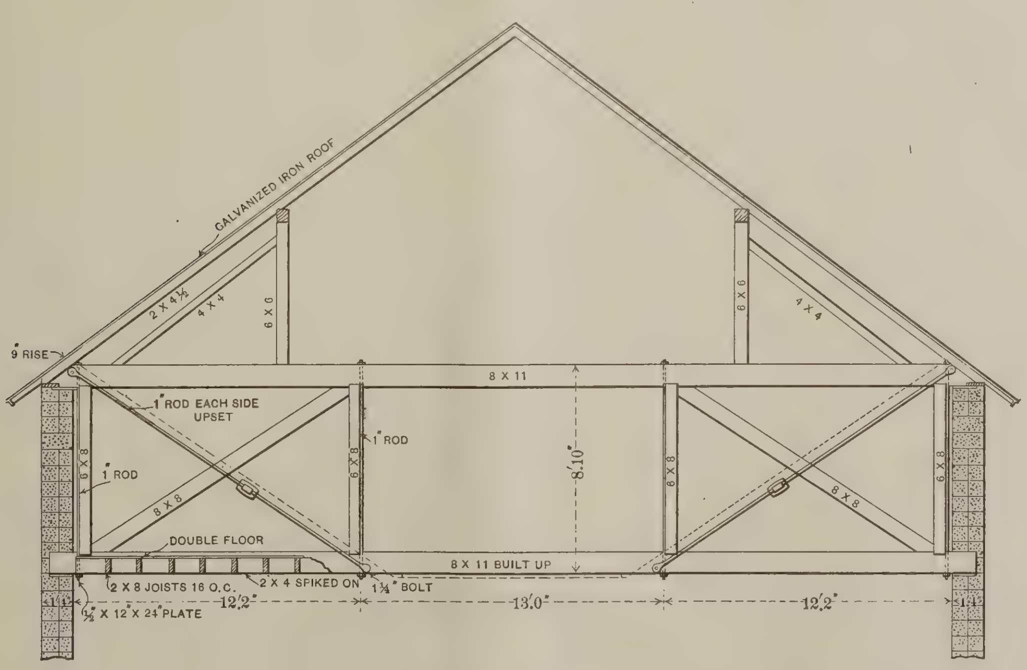
From W. J. H., Phelps, N. Y.—I come to the Correspondence Department to ask a few questions. Can any of the brothers give me a rule to ascertain the weight of plate glass windows without weighing the sash? I get the weight by first reducing the surface of the plate glass to square feet, then multiply the square feet by 3½ and add the weight of the sash (open) which gives the weight pretty close.

I would also like to know if there is a rule for finding the length of the pocket in window frames made for plate glass.

Truss For Concrete Block Barn

From S. M. F., Fulton, Ind.—I am sending a pencil drawing of a truss which was used in the construction of a livery barn built of cement blocks. The barn is 40 x 50 ft. in size, and the trusses are spaced 12 ft. on centers. The lower story is 12 ft. in the clear, and the upper story is as indicated by the drawing.

I wish to ask, through the columns of *The Building Age,* if the truss is sufficiently strong to carry the load. The second story is to be used as a mow for hay in bulk. If the truss is not strong enough for the purpose I would like to have the practical readers offer suggestions as to how it can be rendered perfectly safe. My own idea of strengthening the truss, if too weak, is to put on another set of rods, as indicated by the dotted lines, but I do not know what size rods to use. The reason I left the center panel in the truss "open" was to have



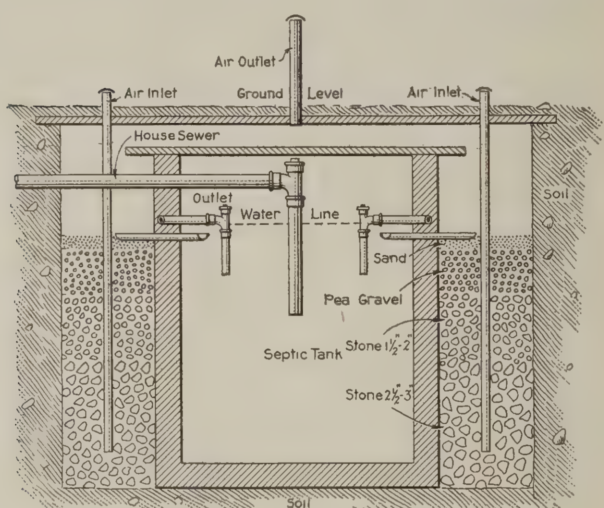
Truss for Concrete Block Barn.—Submitted by "S. M. F.," Fulton, Ind.

an open passage through the mow. I wish also to state that the timber used was oak.

Any other information which the practical readers may see fit to furnish in the way of comment regarding this truss will be thankfully received by one who has been a reader of the paper for a number of years and considers it O. K.

Construction of a Septic Tank

From W. J. T., Cameron, Mo.—I have been a reader of *The Building Age* for several years and consider it a very valuable paper in the hands of a carpenter. I would like to ask my brother craftsmen, through the correspondence columns, how to make a septic tank suitable for two dwellings. I live in a town of 4,000



Construction of a Septic Tank. Fig. 1.—Section Through Tank and Nitrifying Bed.

people. We have no natural outlet for sewer, and it is quite a question to drain a closet. Will a septic tank purify soap suds from the laundry tubs?

When I receive my copy of the paper the first thing I read are the letters in the correspondence columns.

Note.—With no desire to anticipate the answers, which we trust our practical readers will furnish in reply to the above inquiry, we would say to our correspondent that in back volumes of the paper we have at intervals presented short articles describing septic tank construction, the more recent appearing in the issues for January, July and September, 1909. If our correspondent has access to the volume of the paper for last year he may obtain some suggestions regarding septic tank construction, which in conjunction with what we hope our practical readers will furnish, will place him in a position to build a tank which will meet his requirements.

The following, contributed by a correspondent of the *Metal Worker* to a recent issue of that journal, may also be suggestive:

The combined septic tank and filter shown in Figs. 1 and 2 of the accompanying illustrations, is said to have furnished good results and requires little or no attention when bacterial action is established. This generally begins in about one month in the septic tank, and in five or six weeks in the filter, but varies according to the sewage treated and to climatic conditions. It has the advantage that it may be readily adapted to heavy or light soils.

Where the soil is porous no outlet need be provided, as the effluent will soak away as from a leaching cesspool, but with the difference that it will not seriously pollute the soil or any underground stream of water into which it may find access. Where the soil is heavy, tiles may be laid at the bottom of the filter to collect the effluent and conduct it away to some convenient outlet.

This is really only a modified sewage purification works, as the same processes are gone through. As illustrated the septic tank is circular, but if a large flow of sewage is to be handled it would be better to make it oblong so that the contents would not be passed out in too short a time. A tank to contain 18 to 24 hours' flow is considered about right, as longer septic action is not desirable. In this circular tank the inlet pipe was carried to the center and well down below the water line to guard against sewage being carried through until in temperature between outside air and filter bed was counted upon to maintain this air movement and this outlet might well be carried to some convenient high point to assist in promoting thorough ventilation.

A separate cover was placed over the septic tank; but this could be omitted, as a tenacious scum soon forms where exposed to the air, and is sufficient to exclude light and air from the contents. The upper bed of filter was made of coarse sand, the next of small gravel and the lower beds of stone broken into rough cubes from 1½ to 3 in. in size.

The sand promotes better distribution and also strains the effluent and retains much of the insoluble matter, but care must be taken not to use it of too fine grain or it will hold so much water that air cannot circulate through it.

The depth of the septic tank from the water level to the bottom was 5 ft., and the filtering material 4 ft. 6 in. The sand bed was 6 in. deep, gravel 1 ft., small stone 1 ft. 6 in., large stone 1 ft. 6 in., and as the soil was porous no outlet was provided.

The only attention such a plant requires is a very infrequent removal of sludge from the bottom of the septic tank and raking up of the sand bed. Then, if complete purification is not effected, at least a very great amount has, and the effluent is very unlikely to be in the least offensive, though it may be turbid at times when the flow is unusually large.

Strange Work for the Carpenter

From A. B., New Orleans, La.—Will some of the readers kindly explain in the Correspondence columns

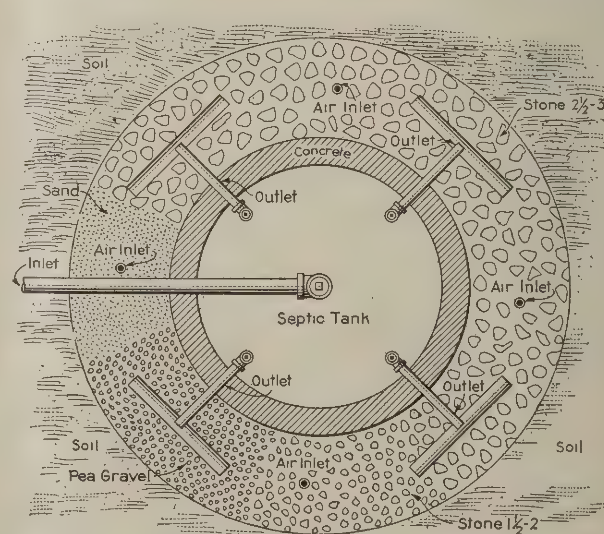


Fig. 2.—Plan of Septic Tank and Nitrifying Bed.

how to lay out a baseball ground, a tennis court, golf links and a croquet ground, it being work the carpenter is sometimes called upon to do in this section of the country?

OPEN FIREPLACES AND HOUSE CHIMNEYS

BY LAWRENCE S. KEIR.

FIREPLACE and furnace chimneys should never have flues smaller than 8 x 12 in., and stove chimneys never less than 8 x 8 in. There are plenty of cases where smaller chimneys give good results, but it is due more to good luck than good planning, and it is always best to be sure of the results.

It is decidedly cheaper to build a proper sized chimney at the start than to build one too small and then take it down and build a larger one in place of it. Even if a smaller flue does draw properly it is more easily stopped up with soot or a fallen brick. In constructing a chimney start right and have a solid foundation. A cracked chimney is dangerous. Point up the work as you go along and see that the joints are well filled. Do not permit the fact that the flue is lined to be an excuse for careless work. Chimneys with no lining should be pointed inside as well as outside.

It is never advisable to plaster chimneys inside. It is difficult to make a good job of it, and when the plaster falls off—which it will do in time—it pulls part of the mortar from between the bricks with it.

Chimneys should be kept as nearly straight as possible and should never be narrowed to pass around beams.

All chimneys should extend at least 2 ft. above the highest part of the roof, and every chimney in the house should be the same hight. A high chimney spoils the draft of a shorter one by drawing its supply of air down the short chimney, then through the house and up the tall chimney. This would, of course, not happen where the two rooms containing chimneys were shut off from each other. At *a* and *b* of Fig. 8 are shown in section two good methods of finishing the top of a chimney. Sloping the top serves three purposes. It causes the rain to run away from the flue and also the passing wind to rise instead of striking down into the chimney, and it also helps to protect the mortar joints from rain and frost. At *c* is represented an evil often noticed in connection with chimney construction. In other words, the chimney is splitting. Wide corbeling at the top tends to pull the chimney apart.

Chimneys are often topped with a stone cap, and this construction is to be recommended. The cap keeps out rain and snow, and in many instances prevents wind eddies produced by large buildings or trees nearby from blowing down the chimney. It is to be noted that chimney caps should be kept at least 7 in. above the top of the chimney. Chimney copings and caps are often made of cement, using a mixture of about 1 to 4. Caps should be not less than 3 in. thick and slightly sloping on the top. In the case of large caps it is often well to mold them on the scaffold or even in place, and thus save hoisting them with the attending danger of breaking.

Keep the cement stone damp and protected from the sun while seasoning.

The best grade of tin with the heaviest coating, or, better still, sheet copper should be used for flashing. Let the flashing project 3 in. over the shingles. Have each piece well lapped over the one beneath and solder at the corners. Bed each piece well in the mortar joint, allowing them to extend about 1½ in. into the masonry, and to prevent from pulling out crimp the edge slightly, as shown at *d* in Fig. 8.

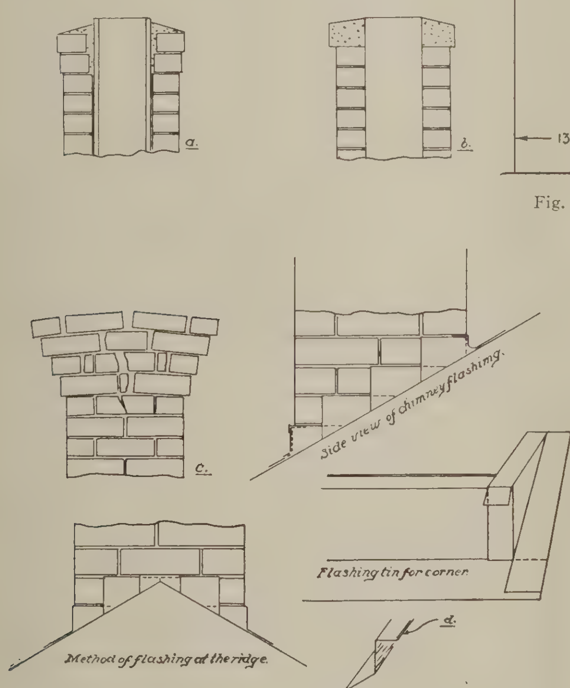


Fig. 8.—Some Details of Chimney Tops and Flashing.

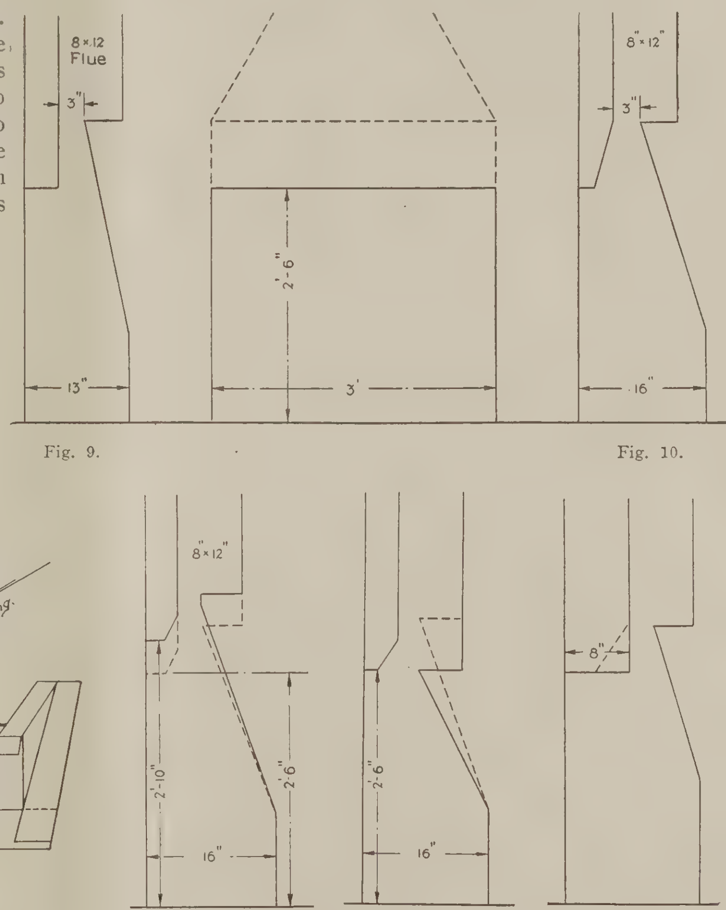


Fig. 9. Fig. 10.

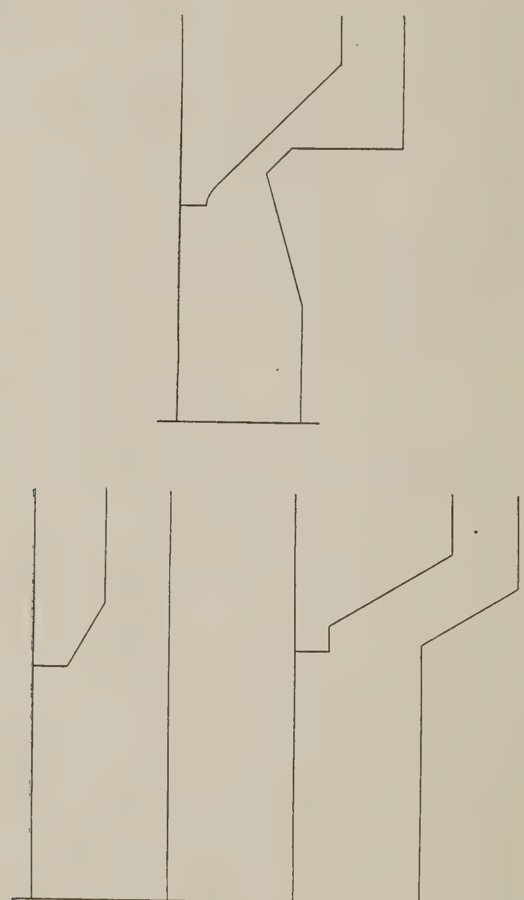
Fig. 11. Fig. 12. Fig. 13.

Figs. 9 to 13.—Various Forms of Fireplaces Tested for Draft.

Open Fireplaces and House Chimneys.

Chimneys built up on the outside of a house should be two bricks thick in order to prevent rapid chilling of the smoke, thus causing poor draft and a settling of soot which will in a short time choke the chimney flues. Long, narrow flues are to be avoided. Keep the flue as nearly square as possible. Smoke ascends spirally so it will be seen; the nearer square we make the flue the less dead air space will be formed. The ideal flue would, of course, be round. It is an excellent idea to furnish each flue with an iron cleanout door, which may be had of nearly any firm dealing in fireplace fixtures and supplies. In building fancy chimneys avoid, as far as possible, designs which depend much on the binding of the mortar to hold them in place.

The diagrams (Figs. 9 to 16 inclusive) relate to a few of a number of fireplaces which were built with the



Figs. 14, 15, 16.—Outline Designs of Various Forms of Fireplaces Which Were Tested.

Open Fireplaces and House Chimneys.

sole purpose of testing the designs and are here presented so that the reader may see for himself and draw his own conclusions. Fig. 9 represents a fireplace that worked fairly well at times, but at other times the smoke puffed out into the room. Lowering the arch 4 in. made very little improvement, as the fireplace is altogether too shallow.

Fig. 10 worked perfectly; the back of the arch was slanted and the fireplace made 3 in. deeper.

Fig. 11 represents a case where the fireplace smoked a little at times, but worked with entire satisfaction after it had been remodeled, as indicated by the dotted lines. The opening was too high.

In Fig. 12 is shown the outlines of a fireplace that acts badly because the wind break was too low. When the changes indicated by the dotted lines had been made it gave no more trouble.

Fig. 13 represents a design often met with, and one that usually smokes because the arch is too broad and flat; the corner or back of the arch should be cut away, as shown by the dotted lines.

Designs like the one indicated in Fig. 14 are not to be relied upon. Sometimes they work satisfactorily, but at other times, owing probably to the smoke chamber being too small, they smoke and cause trouble. It is safer to avoid them when possible.

If straight back fireplaces have plenty of depth and the arch is low, as indicated in Fig. 15, they usually draw well, but there is much loss of heat, and when the fire is not going the ashes are often blown into the room.

In Fig. 16 is represented a fireplace that will smoke every time. Nearly every rule of good designing has been violated, and the easiest remedy is to tear it down and build it over again.

Each of these fireplaces was tested with the wind in nearly every direction, and on rainy as well as clear days. In all cases it was found best not to have the fire too far forward. An addition of 4 ft. extra hight to the chimney nearly always gave a noticeable increase in draft, but never stopped a poorly designed fireplace from smoking. In all cases the fireplaces were built with openings 3 ft. wide and 8 x 12 in. flues. It was found even in the best fireplaces that a strong draft from one side of the room to the other and directly across the front of the fireplace would spoil the fireplace draft, although in the best designs it did not cause them to smoke. Shutting all doors and windows and stopping up all cracks around them also spoiled the draft, and in some cases caused the fireplace to smoke a little.

Sometimes the poor draft is caused by windows being open both upstairs and downstairs, and the doors between being open also.

Hardwood Flooring

An inquiry has been received by Consul Horace Lee Washington, of Liverpool, from American manufacturers of hardwood flooring in oak and beech as to the sales prospects for this material in England, to which he responds:

In this section hardwood is used only to a limited extent for floors. The condition existing here is quite the reverse from that throughout the continent of Europe, where even the most modest apartment houses are equipped with hardwood floors. Here the great majority of the residences are carpeted, and it is principally in modern office buildings, which are of recent date in Liverpool, that hardwood flooring is used. The hardwood flooring used is principally of oak and maple. Very little beech is used. The usual sizes are as follows: Mostly 1 in. thick, some 1¼ in.; widths, 3, 3½, 4 and 4½ in., chiefly 3½ and 4 in.; lengths, practically all 3 ft. and up. Two-foot lengths have been called for, but do not represent more than 5 per cent. of the trade. Prices, £30 to £40 ($145.99 to $194.66) per standard, Liverpool.

In parquet flooring the sizes are: Thickness, 1 to 1½ in.; width, 2 to 3 inches; length, 9 to 12 in. It appears that while ordinary flooring is tongued and grooved with matched ends, parquet flooring is grooved on the sides for mortar, or tongued and grooved, and end grooved on both ends (but not tongued on the ends). Parquet flooring is steel polished, not sanded on the face. The price paid in carload lots is about 5s. ($1.21) per cubic foot. It is shipped in bundles or sacks and in uniform lengths only.

Only ordinary flooring is bored for secret nailing. All flooring is hollow backed.

The hardwood flooring used in this market is imported prepared, chiefly from Ohio and West Virginia.

WHAT BUILDERS ARE DOING

THERE was an appreciable shrinkage in new construction work projected throughout the country in July as compared with the same month a year ago, due no doubt to the growing tendency to conservatism manifested in many branches of industry at this season of the year. In general, the striking feature of the situation in June was the number of smaller cities which showed increases in the amount of capital invested, while the larger cities showed the important decreases. Last month the decreases were more general and embraced very many of the smaller places as well as the larger ones, thus showing that the tendency to restrict new work is being felt throughout the length and breadth of the land.

Some of the larger cities in which building operations showed a heavy decrease in July were New York, Chicago, Philadelphia, Cleveland, Pittsburg, Omaha, Rochester, Mobile and New Orleans, while some of the more important cities showing increases were Atlanta, St. Paul, Seattle and Los Angeles. It must be borne in mind, however, when considering the situation in the building industry that operations in the past have been conducted upon a tremendous scale, and it is not therefore surprising that in conjunction with other branches of industry new construction work should show a slackening of activity.

Baltimore, Md.

There is not much difference in the amount of new construction work that is being projected as compared with this season last year, the figures for July showing 304 permits to have been issued for improvements costing $753,404, while in July last year there were 282 permits issued for new work costing $792,120.

The regular quarterly meeting of the Board of Governors of the Inter-State Builders and Traders' Association was held at 11 o'clock, July 23, at the headquarters of the Builders' Exchange of the City of Baltimore, there being present a committee from the Builders' Exchange of Norfolk, Va., and also a committee from the Builders' Exchange of Washington, D. C.

Following the meeting luncheon was served, and then the visitors and their friends were taken on special cars to the grounds of the Maryland Athletic Club, where a game of baseball was played between a team made up from the Norfolk Builders' Exchange delegation and one composed of members of the Baltimore Builders' Exchange, the former team being the challengers. The contest resulted in a victory for the Baltimore team by a score of 3 to 2.

After the game the visitors were the guests of the Baltimoreans at dinner at Electric Park, where a special menu had been arranged. They spent the evening at the resort, and on the following day many of the visitors departed for trips to various cities before returning home.

Boston, Mass.

A feature of the local building situation is the large number of 3-tenement dwellings which are under construction, this class of building constituting a goodly percentage of the permits issued since the first of the year. In this city the Building Department does not give out the estimated cost of the building improvements for which permits are issued from month to month, but at the end of the fiscal year presents figures showing the actual cost of the buildings projected.

In July there were 131 permits granted for new construction work, as against 158 in June, 159 in May, 194 in April, 191 in March, 86 in February, and 43 in January, the grand total for the seven months being the largest in that period for many years. Of this total 674 permits were for frame buildings and 288 for brick structures.

Buffalo, N. Y.

The monthly report of the Bureau of Building shows a total of 279 building permits issued for July, the estimated value for which was $893,000, a falling off of $195,000 from the total for the month of June and $500,000 as compared with the month of July, 1909. Building operations in Buffalo for the first six months of 1910 aggregated $5,599,000, as against $5,839,000 for the first half of 1909.

Work was started during the month of August on a number of buildings of importance, and plans are in progress for many others. Some of the more important of these are: A receiving and distributing warehouse, 100 x 600 feet, ten stories and basement, steel and brick construction, with railroad facilities for the Larkin Company, soap manufacturers, to cost $750,000; store and office building, Washington and Swan Streets, for Mitchell H. Mark, $100,000; a business block for the Diebolt Estate, Court and Franklin Streets; mill and office building for the United States Rubber Reclaiming Works, $40,000; a four-story and basement factory, brick and steel, for the Niagara Machine & Tool Works, $85,000; a four-story and basement concrete factory building for the Federal Motor Company, $90,000; additional factory building for the Linde Air Products Company, $30,000; warehouse and administration building for the Keystone Manufacturing Company, Chandler Street, $25,000; foundry for the Jewell Steel & Malleable Company, $20,000; a factory for the Cooper Paper Box Company, $35,000; a six-story concrete addition to the Niagara Street factory of the J. W. Burt Company, manufacturers of paper boxes, $50,000, and a manufacturing plant for the Electrolytic Products Company on Elmwood Avenue. In addition to these mercantile and manufacturing buildings, work is in progress on an apartment building for Washington B. French, on Delaware Avenue, to cost $90,000; a church edifice for the Richmond Avenue Church of Christ, to cost $35,000; one for the Woodside Methodist Episcopal Church, $25,000; a church for the German Evangelical Lutheran Society, $36,000; a Sunday school building for Plymouth Methodist Episcopal Church, $25,000, and a theater for the Plaza Theater Company on William Street, $50,000. The city of Buffalo has the following municipal work under way: Two school buildings, to cost $150,000 and $80,000; two fire engine houses and one hook and ladder house; also a tuberculosis hospital at Perrysburg, N. Y., comprising three buildings, to cost $125,000.

Chicago, Ill.

Building operations in Chicago during July showed a slight reaction from the high record of last year, and the total for the seven months of this year also shows a falling off compared with last year. In July, 1910, there were 825 permits, covering 25,250 feet frontage, costing $5,253,200. Last year the figures were 957 buildings, 26,978 feet, cost, $6,782,050.

The total cost for the seven months of this year, as shown in permits, was $50,771,800, against $52,242,980 in 1909. One reason for the decrease in the figures is that there are not so many large-steel buildings under way this year as there were a year ago.

Financial conditions this summer have made it more difficult to borrow money for large buildings, and the general policy of caution in financial operations has also had the effect of discouraging investors in these large undertakings.

Another factor in the situation is that the building code in Chicago is being revised on a basis that will permit higher buildings. Until the new code is actually adopted architects do not know just what changes may be made in sanitary matters and other details.

The building of apartment houses and smaller undertakings has been going on at an active rate, and there is also a large amount of new industrial construction under way in which reinforced concrete and steel figure largely. Building loans are easily obtained for smaller undertakings like apartment houses. There has been an enormous increase in the use of birch mahogany for the interior finish of high-class apartment buildings. A few years ago quarter-sawed oak was used almost exclusively, but the mills have been so successful in imitating mahogany finish with birch stock that oak is now "out of fashion."

Cleveland, Ohio

The local situation in building lines continues very satisfactory. A good amount of new work, mostly in the line of medium-priced residences, is coming out. Not much large construction has developed during the month, but considerable work of that character which came out earlier in the season is getting under way, and will keep contractors busy late in the season. During July the city Building Inspector's office issued permits for 690 buildings to cost $1,094,638. This is a falling off of nearly $300,000 as compared with the previous month. Permits for the year until August 1 amount to $7,516,495, or $432,000 less than the corresponding period in 1909.

The city of Cleveland expects to start work this fall on the foundations for the new municipal building, for which plans were prepared some time ago, as a part of the group plan of public buildings. The new Federal Building and county court house, which are included in the plan, are nearing completion. The former will be occupied November 1 and the latter a little later.

James Young, a prominent member of the Carpenter Contractors' Association and of the Builders' Exchange of Cleveland, was accorded a very pleasant surprise at his home on the evening of July 23, when a delegation of carpenter contractors called upon him in a body to extend their congratulation upon his recently becoming a Benedict. The visitors were well supplied with refreshments, and a very pleasant evening was enjoyed, with Mr. and Mrs. Young as hosts.

Columbia, S. C.

The first meeting of the Master Builders' Association of South Carolina since its organization was held in Columbia, July 22, President J. J. Keller, of Rock Hill, occupying the chair. The principal business considered was that of improving the builders' lien law, and a committee on legislation was instructed to take active measures to secure an amendment to this law at the next session of the General Assembly. The by-laws of the association were adopted and a number of committees appointed as follows:

Executive Committee.—President Keller, Rock Hill; W. M. Otis, vice-president, Columbia; E. R. Heyward, Jr., Columbia, and T. B. Haynesworth, Florence.

Membership Committee.—M. L. McCullough, W. M. Perry and U. R. Brooks, Jr.

Finance Committee.—J. J. Cain, W. M. Otis, E. R. Heyward, Jr.

Auditing Committee.—W. P. Tennent, T. B. Haynesworth and C. L. Johnson, all of Florence.

Legislative Committee.—J. F. Gallivan, Greenville, chairman; T. B. Atkinson, Florence; J. J. Cain, W. M. Perry and W. B. Guimarin, of Columbia.

Following the business sessions there was a delightful luncheon at Ridgewood Club, tendered by the local members of the association.

Dayton, Ohio

The leading builders of the city of Dayton held a meeting on the evening of July 19 for the purpose of organizing a new Builders' Exchange. The meeting was held in the banquet hall of the new Y. M. C. A. Building, and a membership of seventy-one of the leading contractors and builders of the city was announced. Cleveland was represented at the meeting by George B. McMillan, Harry Gillett and Secretary E. A. Roberts, of the Builders' Exchange of that city, who assisted in the launching of the new organization.

Denver, Col.

There has been something of a slowing down of operations in the building line during the last month and the totals are not quite up to the figures for the same month a year ago, although the figures for the first seven months this year rank ahead of the same period in 1909. According to the Bureau of Building Inspection there were 206 permits issued in July for new work costing $1,765,635, which amount is $475,035 less than the figures published for July last year, when 280 permits were issued. Of the permits issued last month 93 were for brick residences costing $276,050. There were thirteen for business buildings costing $179,500, and one for the custom house and postoffice costing $1,212,390.

The average cost of buildings so far this year is somewhat greater than during the same period a year ago, as permits for the first seven months of 1909 exceeded those for the present year by 372. The total value of the building for which permits were issued this year is $8,150,985, as against $7,630,478 for the same period last year.

Duluth, Minn.

During July the Building Inspector's office issued 134 permits for building improvements estimated to cost $266,955, while in July a year ago 131 permits were issued for improvements estimated to cost $182,965.

The total cost of building done in Duluth thus far this year exceeds that of the same period a year ago by $338,065. The total estimated cost for work done the first seven months of 1910 is $2,017,544, as against $1,679,479 for the same period last year.

Kansas City, Mo.

The estimated cost of the buildings for which permits were issued in Kansas City in July was more than double that of the corresponding month last year, the showing being regarded by local builders and contractors as both unusual and most encouraging. The increase grows out of the unusual activity in the construction of buildings intended for business and factory purposes. Last month there were 303 permits issued for brick, frame and miscellaneous structures having a frontage of 4,896 feet, and estimated to cost $1,584,465, while in July last year the estimated cost of the projected improvements was $734,715.

Of the new work projected, forty permits were for brick buildings estimated to cost $1,184,000, having a street frontage of 2,165 feet.

Los Angeles, Cal.

Though building operations in this city are holding up well as compared with other Pacific Coast cities and as compared with the same season in recent years, there is, nevertheless, a lack of the snap and vigor which property-owners and builders have been expecting ever since the first of the year. The record for new work undertaken in July showed a continuance of the falling off noted for several months past. During July a total of 832 permits for buildings were issued, with an aggregate estimated value of $1,319,268. This was somewhat less than for the earlier months of the year and considerably less than had been hoped for, but it was a gain of 205 in the number of permits and of nearly $300,000 in the total value as compared with the same month last year. Of the permits issued in July a considerable percentage was for alterations and repairs. Permits were issued for only twenty-four new business buildings, the estimated cost of these being $302,295. Permits were issued for 282 one-story frame residences, to cost $408,136; for 40 one and one-half-story frame residences, to cost $103,681; for 53 two-story frame residences, to cost $281,801, and for three three-story frame residences to cost $51,400.

Among the buildings for which plans are being drawn, or for which bids will be asked for in the near future, are: The five-story Crighton Smith Building at Eighth Street and Grand Avenue, to contain 125 rooms and to cost $110,000, J. T. Zeller, architect; the three-story Lillie T. Webb apartment house, to be erected on Scarff Street, near Twenty-fourth, at a cost of $30,000, and the seven-story fireproof Rampart Apartments, to be built at Sixth and Rampart Streets, at a cost of $175,000, Paul C. Pape, architect.

Newark, N. J.

The report of the Building Department for July showed a heavy falling off in the amount of vested capital involved in the building improvements for which permits were issued as compared with the same month last year. This perhaps is not altogether strange, in view of the fact that business in many lines is showing unmistakable signs of curtailment, and with so many important problems in the near future which will have to be settled, all more or less affecting business interests, contractors and builders are beginning to manifest increasing conservatism in their operations. Last month there were 241 permits issued for building improvements to cost $729,202, while in July last year 220 permits were issued for improvements involving an estimated outlay of $990,990.

The fourteenth annual outing of the Master Carpenters' Association occurred on August 11, when the members of the association and their friends proceeded by steamer to Point View Island, College Point, L. I., where games for prizes were held, also a special clambake.

New Haven, Conn.

The lull in general business conditions throughout New England is reflected in the report of Building Inspector Austin for the month of July, which shows a decrease in the cost of building operations amounting to $319,053, as compared with July last year. According to the report in question there were 98 permits issued for building improvements to cost $218,257, while in July last year there were 112 permits issued for building improvements estimated to cost $537,310.

For the first seven months of the current year 641 permits were issued for building improvements to cost $2,668,785, while in the first seven months last year there were 647 permits issued for new building alterations, repairs, etc., to cost $2,133,426.

New York City

Mid-summer dullness has prevailed in the building industry as well as in other lines of trade, and July has shown the greatest falling off in building operations of any month of the current year when contrasted with the corresponding period of 1909. The shrinkage in operations has been due almost wholly to the greatly reduced tenement house construction, particularly in the Washington Heights section of the city.

According to the figures of the Building Department seventy-two permits were issued in the Borough of Manhattan for new buildings to cost $5,801,975, while in July last year permits were taken out for 113 new buildings to cost $17,778,390—a decrease of forty-one buildings and a reduction in estimated outlay of capital amounting to $11,976,415. Of this reduction tenement house construction accounted for a loss of forty buildings and a difference of $10,808,000 in capital engaged for this class of work.

In the Borough of the Bronx there was also a falling off both in the number of permits issued and in the estimated cost of building improvements, the figures being for July this year 117, involving an estimated outlay of $2,391,250, as against 231 permits in July last year for improvements costing $3,700,875.

In Brooklyn more new buildings were projected in July than in the same month a year ago, but the estimated cost was less. The permits issued were 367, and the estimated cost $3,181,595, as against 345 permits for buildings costing $4,734,914 in July a year ago.

Taking the figures for all three boroughs, and including the cost of new work as well as alterations and repairs, the totals stand $12,915,000 and $24,625,000, respectively.

In the Borough of Queens there were 350 permits issued in July for new work estimated to cost $1,351,500, while in the corresponding period of last year 510 permits were issued for new work to cost $2,509,000.

Norfolk, Va.

The members of the Norfolk Builders' Exchange are preparing a royal welcome for the members of the Baltimore Builders' Exchange, who on the Saturday prior to Labor Day have been invited to partake of the hospitality of the Norfolk Exchange. At the same time an invitation has been extended to the members of the Builders' Exchange at Richmond to be the guests of their sister city. Ever since the Norfolk builders visited Baltimore recently and were defeated at baseball by the Baltimore team there has been a disposition among the Virginia builders to not only wipe out their defeat at baseball but to return in full measure the generous hospitality they were shown when in the Monumental City.

At a recent meeting of the Norfolk Builders' Exchange various committees were appointed to map out a programme of entertainment, which will probably include sightseeing in automobiles and a baseball game, the latter, of course, being the main feature or excuse for the gathering. In the evening there will be a banquet at a hotel or an outing at one of Norfolk's resorts. A call has been made upon the merchants of the city to decorate in honor of the occasion, the committee in charge having decided to use the blue and orange of Virginia and the black and gold of Maryland interwined as a basis for the decorative features.

Oklahoma City, Okla.

During the past month more than 100 new dwelling houses have been commenced in the city, while among the work projected are several garages, which, while not of unusual size, will add considerably to the business of the city. According to Building Commissioner Bennett there were 175 permits issued in July for improvements estimated to cost $370,000, which, while showing a heavy falling off as compared with June, when the total was $962,000, yet is an increase as compared with July last year, when the amount involved was $289,315.

The figures for the last month establish a record for July, and while they show a heavy decrease over June, due in some measure to the exceedingly torrid weather which has prevailed, the principal cause of the shrinkage was the absence of new large constructions, such as the Levy and Terminal Buildings, for which permits were issued in June.

Omaha, Neb.

In this section of the country the crop outlook has much to do in determining the volume of business in progress, and the building industry is no exception. The very high temperatures which were experienced in the corn belt during July caused a natural slackening of business generally, and in the building industry this is reflected by the 134 permits issued for new construction work estimated to cost $463,975, as against the 163 permits issued for building improvements in July last year estimated to cost $815,280.

For the seven months ending August 1 there were issued 1,057 permits for building improvements aggregating an estimated outlay of $3,617,218, as against an estimated cost of $4,358,640 in the first seven months of last year. The total for last year was augmented by the permit for the new court house, estimated to cost one million dollars, and last year's total was the highest that the city has recorded in that month for many years.

Philadelphia, Pa.

While the volume and value of building operations at the beginning of June showed an increase over the six months' period when compared to last year, the falling off in work undertaken during July has resulted in a smaller total for the first seven months, as compared to a like period in 1909. The decrease, however, is not great, and it is believed that in view of the volume of prospective work that the lost ground can be recovered. The total estimated cost of work undertaken up to the end of July last year was $25,792,345, while that for the same period this year was $25,735,695.

From statistics compiled by the Bureau of Building Inspection it is to be noted that during July 768 permits for 1,378 operations, at an estimated cost of $3,462,665, were isued, a decrease of 215 operations, and a decline of $225,000 in the estimated cost over that of the previous month. On the whole, however, the month averages fairly well with the amount of work done during July for some years back. Work of a miscellaneous character fell off about 50 per cent as compared with June, while that covering manufacturing building was practically double. A considerable volume of small garage work was undertaken, seventeen permits being issued for work estimated to cost $29,390. One school, to cost $160,000, and one church, at an estimated expenditure of $225,000, were included in the month's permits.

Notwithstanding the fact that dwelling houses, for which permits were taken during July, showed a decrease of nearly a hundred as compared with June, and a decline of $379,590 in cost, an increase in value of about $100,000 over July, 1909, is shown, while for the seven months' period, that of the current year shows an increase over that of last year, the comparative figures being 6,492 operations at a cost of $14,888,470, against 6,441 operations at an aproximate expenditure of $14,625,915.

Estimates have been invited by John Stafford from subcontractors for the erection of an eleven-story bachelor apartment house, to cost from $250,000 to $300,000, to be erected at 1216 and 1218 Walnut Street. The proposed building will be of brick, limestone and terra cotta, 47 x 107 feet, and contain 130 rooms and 99 bath rooms.

Bids have recently been taken for a new hotel to cost approximately $500,000, to be erected in Atlantic City. It will be 72 x 128 feet on the ground plan, fourteen stories high, of brick and steel construction. Hewitt & Paist are the architects.

Preparations are in progress for a large dwelling operation covering nearly 200 houses, to be erected by the Lehigh Construction Company. One hundred and thirty-six houses, each 14 x 28 feet, are to be built on Taney and Cambridge Streets and Indiana Avenue. Fifty-two houses, 16 x 32 feet, will, it is proposed, be built on Bailey Street above Somerset Street.

Improvements to industrial plants are claiming a good share of builders' attention. These include a $150,000 addition to the Roxford Knitting Mills; a one-story addition to the Freihofer Baking Company's plant, to cost $15,000; a six-story building, to cost $60,000, for the Electric Service Supplies Company; a carpenter and paint shop at Ninth and Brown Streets for the Philadelphia & Reading Railroad; a three-story factory building for Sibson & Stern, at Stenton Avenue and Wyoming Street, and a new plant to be built at Frankford Avenue and Old Front Street, for the Keystone Finishing and the Edgewater Paint Works.

Dwelling operations of note during the closing week of the month included fifty-five houses in the 40th Ward, to cost $118,400; ninety-four in the 34th Ward, sixteen at Forty-ninth and Chancellor Streets, thirty-two in Germantown, to cost $153,600, and five two-family flat houses in the 34th Ward. The majority of these are to be of the usual two-story type.

Pittsburg, Pa.

Last month witnessed the filing of more permits for building operations than was the case in July last year, although the aggregate amount of vested capital involved was considerably less. Superintendent S. A. Dies shows in his record compiled for July that 340 permits were issued for new construction work in the city involving an estimated outlay of $958,593, while in July last year 337 permits were issued for building improvements to cost $1,506,923.

There is in the aggregate quite a volume of new work in the way of dwelling construction in the suburban sections of the city, and this is tending to keep building mechanics fairly well employed, with encouraging prospects for the rest of the season.

Portland, Ore.

A feature of the past month has been a perceptible increase in the number of apartment houses which have been commenced, these being for the most part of a high-grade character. There has been considerable activity in all lines of the building industry, and while it is generally noticed that June usually witnesses the maximum of operations, this year it seems probable that there will be a large amount of new construction work for the fall and winter months.

The figures compiled in the office of Building Inspector Plummer show that last month there were 523 permits issued calling for an estimated outlay of $908,080, as against 559 permits for building improvements costing $1,687,725 in June this year, and 406 permits for building costing $911,570 in July a year ago. There are now two permits under consideration which will probably be issued in August, one covering the Ben Selling Building, to cost $400,000, and the other the new O. R. & N. freight sheds, to cost $150,000.

For the seven months of the current year 3,712 permits were issued for building operations involving an estimated outlay of $9,517,772, whereas in the corresponding period of last year 2,643 permits were taken out for new work, alterations and repairs to cost $7,217,005.

San Diego, Cal.

The members of the San Diego Builders' Exchange held their first annual basket picnic on July 20 at Del Mar. A special train carried the members and their friends to the picnic grounds, where the day was spent in athletic sports of various kinds in connection with which prizes were offered. There were egg and potato races and nail-driving contests for the women, fat men's races, old men's races, three-legged races, running and jumping contests and sports of other kinds. A three-piece lancewood rod was given to the person weighing in the largest fish before 12:30 P. M., and there was also a special prize for the smallest fish.

San Francisco, Cal.

During a great part of the month of July building operations in this city were at a standstill by reason of a strike of Union hodcarriers, who demanded a reduction of one-half hour in the day. Heretofore the hodcarriers had been working eight and one-half hours where workmen in other branches of the building trades had worked only eight hours. Contractors, however, held that in all cases where hodcarriers worked in connection with bricklayers or plasterers it was absolutely necessary that the former begin work a few minutes earlier than the latter, and that the demand of the men was simply a demand for extra time pay for the half hour. The men went out, and practically all the brick buildings under construction in the city were tied up. The contractors were pretty well united in their stand, and the material men gave their assistance. The city administration, however, was strongly labor union in sentiment, the president of the Building Trades Council being the Mayor of the city, and was able to embarrass the contractors and material men materially. Action was taken to have all temporary sidewalks, scaffolding, etc., removed from the sidewalks and streets in front of incompleted buildings on which work had been suspended, to remove all spur tracks connecting the railroads with material yards, the owners of which refused to use these tracks to deliver building materials, and in other ways the city administration brought pressure to bear.

On the other hand, public opinion was very strong against the unions as the aggressors, this being considered an inopportune time for a struggle. As a result, a compromise, which was practically a retraction on the part of the hodcarriers, was agreed on. The eight-hour day was conceded to the men in cases where they were not working in connection with bricklayers or plasterers, but in all cases where working in connection with bricklayers or plasters the day was fixed at eight hours and twenty-five minutes—a shortening of the day by only five minutes. The daily wage remains as heretofore—$4 for hodcarriers working with bricklayers and $5 for hodcarriers working with plasterers. With the settling of the strike, work has been generally resumed, and builders are hopeful that the new work which has been held up will now be started. The greater part of the building planned for the summer was to have been in the way of brick structures, and there is still time to get these under way before fall.

The total value of the building permits issued in San Francisco during the month just closed was $1,452,741, as compared with $2,216,631 for the month preceding, and with $2,154,999 for the month of July, 1909. That the material falling off for last month is due to the strike is shown by the fact that the decrease was almost altogether in brick buildings.

The building material market here is generally stronger than it was a few weeks ago. Lumber receipts at this port have fallen off greatly. The falling off for the month of July as a whole was probably in excess of 15,000,000, as compared with the month preceding. The shipments of lumber from San Francisco Bay points to the interior have increased, and the stock on hand here is accordingly much lighter than it was. Prices are firmer, though prices as a whole show but little change. The brick market is firmer than for many months. The surplus which has been on hand for more than a year past has apparently been used up, and there has been an advance of 25 cents per thousand in the price of common building brick. This is the first advance in brick that has been noted in a year. Other lines are generally firmer, but without an advance in prices.

The San Francisco Board of Supervisors has amended the building law of the city by passing a resolution authorizing the use of other material than asbestos for the roofing of certain classes of buildings within the fire limits.

The San Francisco Architectural Club has taken a five-year lease on the fourth floor of the Rochat-Cordes Building at Post and Gardner Streets. A. C. Headman, of Righetti & Headman, is president of the club and Charles Derleth, Jr., dean of the college of civil engineering at the University of California, has charge of the club's class in structural engineering.

Among the more important buildings, either now under way in this city or announced for early construction, are the following: The F. A. Meyer apartment house on Eddy Street near Larkin, to be four stories high and 52½ x 120 feet in dimensions, the Mess-Nicholson Company, architects; the six-story Margaret Lees apartments at the corner of California and Stockton Streets, to cost $50,000, Henry P. Smith architect; the five-story Melletz & Bannan apartment house at the corner of Ellis and Leavenworth Streets, to cost $70,000; the six-story J. J. Moore Building on Post Street near Taylor, to cost $32,000, Hladik & Thayer architects; the new Premium Theater Building on Fillmore Street near Geary, to cost $40,000; the five-story A. Isenberg Building on Taylor Street near Sutter, Charles J. Rosseau architect; a five-story apartment house to be erected by Judge F. A. Dorn at the corner of Van Ness and Pacific Avenues, at a cost of $80,000, M. J. Lyon architect; a three-story brick and steel business building to be erected by William Goeggle on Van Ness Avenue and Fulton Street, at a cost of $25,000, Hermann Barth architect, and the four-story L. L. Borden Building to be erected at the corner of Clay and Front Streets, at a cost of $40,000, H. Geilfuss & Son architects.

Seattle, Wash.

The building season is now in full swing and new projects are coming forward in gratifying numbers. The report of Superintendent Francis W. Grant, of the Department of Buildings, for July shows that permits were issued for 1,005 building improvements calling for an estimated outlay of $1,655,495, while in the same month last year 1,078 permits were issued for building improvements costing $1,275,415. An interesting feature of the report, as now issued by the department, is the street frontage of the buildings for which permits are issued, together with the number of sleeping rooms contained in the dwellings and apartment houses projected.

During July there were four permits issued for flats and apartment houses calling for an outlay of $46,800, and 245 permits were issued for frame residences costing $352,785. For frame business structures there were 170 permits issued calling for an outlay of $366,290. Concrete construction is gradually forcing its way to popular favor, and last month permits were issued for three reinforced concrete structures to cost $220,000. There were also five permits for brick buildings to cost $460,500.

For the first seven months of the current year 7,620 permits were issued for new buildings, alterations, repairs, etc., estimated to cost $9,996,490, while in the corresponding period of last year 8,976 permits were issued by the department calling for an estimated outlay of $12,379,948.

St. Louis, Mo.

An important feature of last month's building record is found in the number of business structures projected as well as in the large number of flats and dwellings for which permits were filed. The new buildings projected in July number 602, costing $1,861,513, as against $1,415,618 for new buildings in the month of June. The total for July, however, was $1,976,350, as against $1,884,013 in June, and $2,066,059 in July last year. The figures for last month include no large buildings, but because of the good showing on small structures indicates a healthy condition. There were eighty new brick flats projected, most of them double; 100 brick dwellings, ninety-one frame dwellings and three tenement houses, the latter averaging $35,000 each. Six warehouses, ten factories and shops and eleven stores were also planned.

St. Paul, Minn.

Building operations continue upon a most gratifying scale of activity in this city, and the month of July witnessed improvements projected involving a capital expenditure considerably in excess of that for the same month last year, and ranking third in the months of the current year. According to Building Inspector Cunningham there were 389 permits issued last month for building improvements calling for an outlay of $1,116,861, while in the same month a year ago 479 permits were issued for improvements costing $770,498.

For the seven months of the current year there were 2,248 permits issued, and the amount involved was $6,242,367. In the corresponding period of last year 2,529 permits were taken out for new buildings, alterations, repairs, etc., to cost $6,375,195.

The Builders' Exchange has just issued its seventh annual Builders' Reference and Guide Book for the city of St. Paul consisting of a volume of 238 pages bound in covers of leatherette with gilt side and back titles. The matter consists of a list of officers, committees and members of the Builders' Exchange of St. Paul, with their telephone calls and addresses, together with classified lists of the members. Mention is made of special brands of building materials and where to buy them; manufacturers of materials represented by members of the Exchange, an enumeration of the benefits to be derived from membership in the Exchange, a list of architects of Northwestern, Western and Northern Pacific Coast States, together with lien laws of those States. A considerable number of ruled pages are inserted toward the end of the book for convenience in making memoranda. The matter has been arranged with a great deal of care, and much credit is due the officials of the Exchange, especially Secretary A. V. Williams, for the shape in which the book is sent out.

A PRIVATE GARAGE OF SHINGLED EXTERIOR

A NECESSARY adjunct of every suburban dwelling whose owner is the possessor of a runabout or touring car is a garage of sufficient size to conveniently house the vehicle and provide space for work bench or repair room, as the case may be. A neat design of building of this character is illustrated upon this page, the picture being a direct reproduction of a photograph of the garage of Lewis R. Wallis at Winchester, Mass. The building is of frame construction, with shingled exterior, lattice work windows and having doors of triangular panels, the upper portions being lighted by means of windows glazed with triangular panes. The entrance at the right is closed by a large sliding door. The upper part of the building is lighted by dormers front and rear, and in addition to the small door at the front giving access to the building there is a rear entrance, both of which are reached from the steps at the left which lead down from the walk extending to the owner's residence.

The design is of a nature well calculated for execution in almost any suburban district and is especially adapted to situations where the requirements for space are not large.

A Private Garage of Shingled Exterior.

The architect of the garage was Edwin K. Blaikie, 46 Cornhill street, Boston, Mass.

What is No. 2 Sheathing

If a man should ask you what is No. 2 sheathing you would probably not consider it a very difficult question for a lumberman to answer. Yet it is not as simple as it looks, says a writer in the *Mill Work Magazine.* At least, we have found some instances of confusion over it which reminds us of a story about No. 2 flooring. Once upon a time there was a man wanted to build some houses and he ordered his lumber and specified No. 2 flooring. Naturally, the lumberman sent him what was at that time called No. 2 common flooring, and in some territories is sold yet as No. 2 common. The man made a complaint when he came to use the stuff, and when the lumberman went to investigate he found that it was No. 2 common alright, but what the fellow wanted was B. In other words, the fellow wanted not the very highest grade, but the second best, so he called it No. 2.

Now, then, with this in mind you will probably be in shape to understand the confusion about sheathing. Take a territory where No. 2 boards are used for sheathing and it comes to be known as sheathing. We might say as No. 1 sheathing, or, rather, as the standard for sheathing. Then along comes a man and calls for No. 2 sheathing, and some lumberman sends him No. 3 boards. Probably the man doesn't know any better, but here is where the complication comes. Others figuring on the same job will figure No. 2 sheathing as being No. 2 common boards and naturally ask a higher price than the man figuring No. 3 boards as being No. 2 sheathing. This may sound like a strange thing to be happening in the lumber world, but that it has been happening and that recently we have had evidence of it raises the question of what is No. 2 sheathing. Also, it is a reminder of the complications and confusion that can arise in figuring on lumber bills when we depart from standard grading specifications of the manufacturers. The fact of the matter is, that we should neither say No. 1 common nor No. 2 sheathing, but should use the terms A, B, C and D just as the manufacturers do in grading. Then there would never be any room left for misunderstanding the grade of lumber being figured on.

Curious Baths in Penang

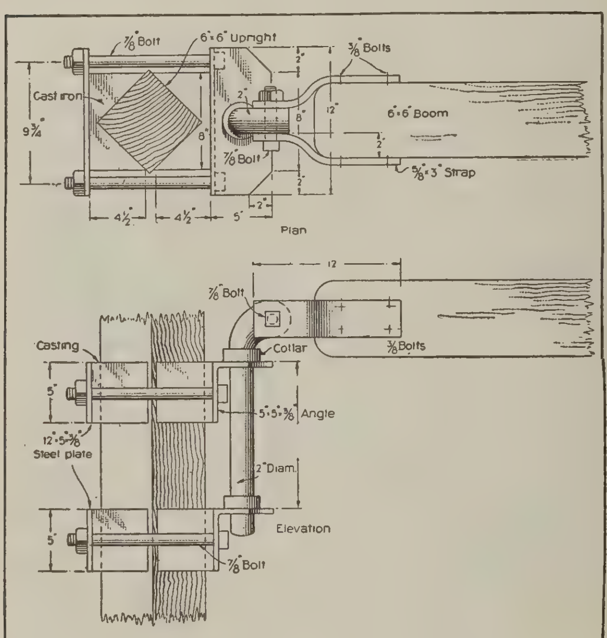
One of the many things that strike the tourist as curious at Penang is the type of baths with which the hotels are provided. Penang is in the Straits Settlements, a British crown colony in the Malay peninsula, deriving its name from the Straits of Malacca, which forms the great trade route between India and China.

From each of the first-class rooms opens a dark, cement-paved, damp-smelling little room which serves as the bath. In it is an immense jar of porous brown earthenware, about five feet high, nearly three feet in diameter in the middle, and but one and a half feet in diameter at the top. It stands huge and graceful of outline, but dark and uninviting, and is full to the brim with water, not, however, to get into. Near it is a supply of soft soap and a long-handled quart dipper.

The proper procedure is to soap the body well, then throw several dippers of water over it, repeating the process until satisfied.

A Novel Boom-Seat for Hoisting Derrick

In the execution of building contracts novel expedients are often devised with a view to facilitating the performance of some detail of the work, or some peculiar form of construction is adopted in connection with the apparatus which is likely to command the immediate attention of the contractor or builder who may see it. In connection with the recent erection of a reinforced concrete building a rather novel fastening of the boom to the upright of a derrick was adopted by the concern executing the contract for the work. The boom seat was attached to a construction elevator tower, the elevator being used for hoisting concrete and the derrick for raising reinforcing steel and forms to the various floors of the building. The seat consisted of two pairs of castings 8 in wide by 5 in. deep by 4½ in. thick cast to fit a 6 x 6-in. timber diagonally. Each pair of these castings was tightly clamped to an upright of the elevator tower by two ⅞ x 11-in. bolts, a 12 x 5 x ⅜-in. steel plate and a 5 x 5 x ⅜-in. angle 12 in. long. The two pairs of castings were spaced so that there was a distance of 12 in. from top to top of the outward flanges of the angles. In the horizontal flanges were holes through which passed a 2-in. steel pin, held in place by



A Novel Boom-Seat for a Hoisting Derrick.

a collar resting on each angle. The head of the pin was bent slightly out from the upright, upset and drilled for a ⅞-in. bolt. This bolt held a ⅝ x 3-in. strap to either side of the head of the 2-in. pin, and the 6 x 6-in. boom was tightly bolted to these straps by four ⅜-in. bolts.

The derrick boom seat here illustrated and described was designed and used by the Aberthaw Construction Company, Boston, Mass., in connection with the erection of the building in question.

American Society of Engineer Draftsmen

A few weeks ago the first steps were taken to form a permanent organization to be known as the American Society of Engineer Draftsmen, embracing every branch of the profession, including architectural, mechanical, electrical, civil, sanitary, automobile and aeronautical draftsmen.

The first meeting of the society was held on July 27 and the officers chosen were: President, E. F. Chandler; vice-president, William B. Harsel; secretary-treasurer, Henry L. Sloan, with headquarters at 116 Nassau street, New York City.

Draftsmen have long felt the need of an organization both from an engineering and a fraternal standpoint, which would be the means to establish a higher professional standing and place them on a recognized plane in the field of engineering. A decided feature of the society is the opportunity offered juniors, affording means by which they may become familiar with the demands of practice, in the drafting room, while students or employees in other branches of industrial work. Another feature is an employment bureau co-operating with employers.

The qualifications for membership are such that a standard will be established as in other branches of engineering, and it will be the aim of the society to maintain this standard and to secure recognition from every concern employing draftsmen.

Bonding New Concrete to Old

In discussing the question of bonding new concrete to old Albert Mayer, of the Vulcanite Portland Cement Company, presents the following suggestions:

Clean off with clear water and stiff broom the surface of the old concrete. Mix one part commercial muriatic acid or hydrochloric acid and four parts water, or use bonsit or ransomite, mixed according to directions with hot water, make several applications one after another with a brush containing little or no metal. This will not injure the concrete, as the acid does not sink to a sufficient depth before it is neutralized.

This will have the effect of removing the cement from the top surface of each grain of sand or piece of stone and the other aggregates that may have been used, exposing the clean surface of these aggregates in exactly the same condition as they were before being mixed.

After applying the acid wash the surface with clear water, scrubbing with a stiff broom or brush, removing all the dead particles. While the surface is still wet (and it should be thoroughly wet) apply the new concrete. Protect this new concrete by keeping it damp for at least a week. Do not let it dry out at any time during the first week.

It will be found that the new concrete will bond to the old as strongly as if both had been mixed at the same time.

Zinc as a Substitute for Mortar in Masonry Joints

It is stated that zinc instead of mortar was used for joining the stones of two elliptical arches of an eighty-two-foot span that supports a newly completed armored concrete bridge near Lyons, France.

Previous experiment having proved that the molten zinc—at 800 degrees Fahrenheit—caused no fractures in dry stones, the zinc was melted and poured between the stones, forming metallic joints an eighth of an inch thick. The substitution for mortar increased the cost about $2.40 for each square foot of the bridge's horizontal surface.

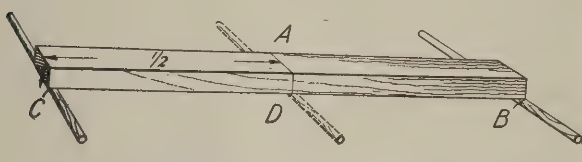
Tests with cubical stones, 2½ in. on a side, showed that zinc joints do not weaken stones having a strength of about 14,000 lbs. per square inch, but are 10 or 15 per cent. weaker than stones having a strength between 14,000 and 18,500 lbs. A less compressible metal is needed for very hard stones.

Cement joints, when as thin as one-twenty-fifth of an inch or less, stood the tests equally well, but disintegration gradually reduces the original strength of joints of mortar.

CARRYING LENGTHS OF TIMBER

BY JAMES F. HOBART, M. E.

HARDLY a day passes in active building operations but what there can be seen or heard a group of men discussing the location of a lever or carry-stick under one end of a length of timber whereby with two men at the carry-stick and one man at the end of the timber the weight thereof shall be evenly borne by each of the three men. The distance from the end of the timber that the stick shall be placed varies between one-third and one-sixth of the length of the timber, and to settle this discussion the following illustrations and description have been prepared:



Carrying Lengths of Timber.—Fig. 1.—The Carry-Stick Problem.

First, what happens when a timber 30 ft. long is supported upon a carry-stick placed one-sixth of the length, or five feet from one end of the timber? The end nearest to the carry-stick will be known as the "heavy end." Reference to Fig. 1 will reveal several things which must be understood before the problem can be properly studied. "A" represents a timber supported upon two carry-sticks at B and C, and it goes without saying that one-half the weight of the timber will be upon each carry-stick; but let one of the carry-sticks be shifted to D and the entire weight of the timber A is carried by the one stick at D.

Fig. 2.—The Carry-Stick at One-Third the Length.

By varying the position of the carry-stick between C and D (one-half the length of the timber), it is evident that any portion of the weight of the timber between one-half and the whole may be brought upon the carry-stick C. There are two things to be studied in this sketch. The first is, that the weight upon either carry-stick B or C is that of one-half the timber between them. The other thing is, that when there is an overhang of timber beyond any carry-stick the weight of the overhang tends to lessen the weight at the other carry-stick of the half length of material between the carry-sticks. This is the case with carry-stick D and B. One-half the length of timber between those carry-sticks is carried by each, but the overhang at C is just sufficient to balance all the weight at B.

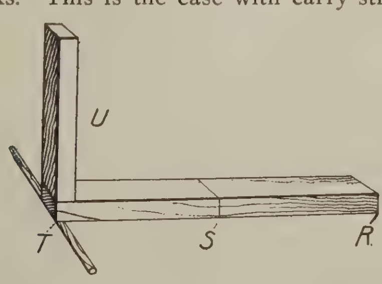


Fig. 3.—Proof (?) of One-Third Position.

This balancing business is where all those who have attempted to figure the carry-stick business have "fallen down." It is customary for them, each and all, to say that the overhang balances an equal length of timber on the other side of the carry-stick. And it is the experimenting of balancing on one point at the middle of a stick which has given this idea, which is true when the timber is evenly balanced in the middle, but at no other time.

If this "balancing" were true, then the stick could be carried equally by three men if loaded, as shown in Fig. 2, where the carry-stick P is placed one-third of the distance Q-N from Q, and if the "balancing" theory were true, P-Q would exactly balance P-O, leaving N-O to be carried by the third man, who is at the end of the timber. But it won't work. Where the timber is cut off at O and connected again by means of a hinge, the part Q-O would not be in balance, for it has to carry a certain amount of N-O, consequently the third man does not get his share of the load.

It is pretty hard to convince some men that this manner of placing the carrier is not the proper one, for

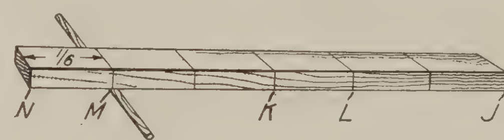


Fig. 4.—Carry-Stick at One-Sixth the Length.

they will cut the stick at P (Fig. 2), and arrange the two pieces as shown in Fig. 3. And now the problem does test out if placed upon the scales, for the carrier obviously must carry one-half T-R, which is equal to T-S, and then the dead weight of U is added and the carrier actually has two-thirds the weight of the stick, and the other, or end man, has his one-third.

When the timber is actually placed on the scales, according to Fig. 2, it is found that the carrier men are overloaded, while the end man has little to do except follow along and look happy. A strong argument for the use of the one-third position shown by Fig. 2 is the same old balancing fallacy. Its advocates argue that, as stated, the third P-Q balances P-O, leaving N-O, for the third man to carry. They do not consider that the carrier has to carry all of P-Q, one-half on P-N, and that the overhang of P-Q is all the time bearing down on P and lifting a part of the load off of N,

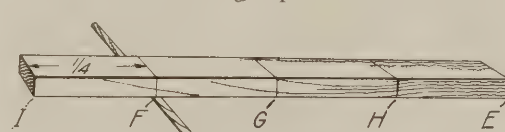


Fig. 5.—Carry-Stick at One-Fourth the Length.

but such is the case, as the lucky man who happens to be at N can testify.

Fig. 4 shows the carrier placed one-sixth the distance from the two-men end of the stick. It appears as though the carrier would have to carry M-L, which is one-half M-J, in addition to M-N, but this would make the stick carry three and one-half sixths of the timber, while the single man must carry two and a half sixths of the timber. But we cannot make two and one-half equal to half of the three and one-half, try as we will; therefore the one-sixth plan is a failure as well as the others.

Fig. 5 shows the carry-stick placed at one-fourth the length of the timber, in accordance with the location of the carrier by the advocate of that distance. And figure this plan in every way we can think of, and it is very doubtful that he hits upon the proper explanation for the correctness of this location of the carry-stick. In accordance with the statement of the claim that the handspike men are to carry the piece I-F and its balancing section F-G, together with one-half the remaining timber, G-E, which is G-H, making the carrier men carry three-fourths of the timber, as the advocate states.

But something else actually happens. Instead of carrying one-half of the length G-E, the two men actually carry one-half of E-F, together with all of I-F. Therefore the two men have two and one-half fourths of the stick, or five-eighths of it, while the single man carries the remaining three-eighths, making the two loads three to five, which is closer than we have before arrived at, the proper figures which are two to six. The difference between three-eighths and two-sixths is only one twenty-fourth of the entire weight of the timber, and the load of the single man is that much too light, while the two men are still carrying one twenty-fourth too much load.

Now let us see what effect the overhang I-F has upon the matter. There is one-fourth of the timber, and if we imagine it as all bunched in one spot it will be at one-half its length, or one-eighth of the timber length from F. To find the leverage exerted by this overhang we will multiply its weight, which is one-fourth (of the timber) by its distance from the carrier. Now the product of one-fourth and one-eighth is one-thirty-second, and that is the leverage exerted by the weight of I-F if it were at a distance (leverage) of one foot from the carry-stick. But the action is at the far end of the timber, e, three-fourths the length of the timber away, and to find the actual lifting effect of our 1-32 foot pounds, or "foot-timber," we must divide the "foot-timber" by the length of the long arm of the lever, which in this case is three-fourths, and one-thirty-second divided by three-fourths is exactly one-twenty-fourth, which is the exact amount of overload for the single man; and the overhang, at one-fourth, amounts to exactly one twenty-fourth of the weight of the timber!

To make doubly sure that the one-fourth position was the correct one, the following experiment was tried. A piece of timber, clear and straight-grained and free from hard spots was selected and cut to 30 in. in length. It was weighed and found to tip the beam at a trifle more than 30 pounds. It was dressed down to the same width and thickness at both ends, and its weight brought down to exactly 30 pounds by careful jointing, taking great care to keep the sides parallel.

The "one-man end" of the timber was suspended by a bit of twine, which was tied with the knot underneath the timber, then the end of the twine was brought up over the end of the timber and made fast to a nail in the ceiling. A lead pencil was laid on the scale, the weights adjusted to 20 pounds, and the model timber rolled along on the pencil until the scale balanced. Then the distance from the pencil to the end of the timber was measured and was found to be exactly 7½ inches, thus proving that the "over-hang" leverage calculations were correct, and that one-fourth the distance from the end is the correct place to put a carrier when the timber is to be carried equally by three men.

Constructing and Waterproofing a Reinforced Concrete Water Tank

A most interesting piece of reinforced concrete work in the shape of a cylindrical structure 75 ft. in diameter, with the walls 30 ft. high and covered with a reinforced concrete roof, has just been completed by the city of New Ulm, Mich. It is a storage reservoir for water, having a capacity of 1,000,000 gal. According to City Engineer H. F. Bloomquist, the ground on which the reservoir is built consists of hard clay well drained by natural drainage, and upon this clay was spread a layer of stone with an average thickness of 12 in., the voids of which were filled with a wet, fine grained concrete poured in. This formed the foundation for the floor, which is 10 in. thick, and reinforced near the surface with expanded metal No. 16 gauge thickness and 3-in. mesh. The floor is bound to the walls by means of 1-in. round steel rods 8 ft. long bent so as to extend 4 ft. into the floor and 4 ft. up into the walls. These were placed 12 in. apart throughout the circumference.

The walls are 20 in. thick at the bottom and taper to 15 in. at the top, with the batter on the outside. They are reinforced with 123 1⅛-in. and 40 1-in. round steel rods rolled to the required radius and placed horizontally, and by 20 upright supports made of steel angles with lacing bars, which served as supports for the horizontal rods during the time of construction, as well as vertical reinforcement in the walls. The horizontal reinforcement is sufficient to take all the stress without assuming tension in the concrete, or counting on the support of the earth embankment on the outside.

The roof consists of a conical concrete slab 3 in. thick and reinforced with No. 12 gauge, 3-in. mesh expanded metal, and is supported by eight trusses radiating to the wall from the center pillar. The trusses are bound together with steel I-beams as purlins 5 ft. apart. The steel trusses are 6 ft. high from c. to c. of chords at the ends which rest on the center pillar, and taper down to 3 ft. at the ends resting on the walls.

Since it was of the utmost importance that the walls and the floor should be water-tight, special care was taken during the construction to grade the aggregate for the concrete. It has been found by experiments that the densest concrete can be made when rounded pebbles varying in size from about ¼ in. to about 2½ in. are used instead of broken stone on account of the ease with which such pebbles will move about in a quaking mixture while it is being worked in place, and adjust their positions so as to form the least amount of voids. For this reason pebbles were screened from a gravel bank and used instead of crushed stone for the walls and upper part of the floor, and the sand used was a mixture of very coarse and ordinary fine sand. To reduce the permeability of the concrete to a minimum, 20 lb. of hydrated lime was used to every barrel of cement, and after the forms were removed the walls were brushed and cleaned with steel brushes, and two coats of cement plastering were applied on the inside. The mortar for the plastering consisted of one part cement, two parts of sand, hydrated lime to the extent of 10 per cent. and Medusa waterproofing compound to the extent of 3 per cent. of the cement used.

The proportion used for the concrete in the walls and the upper 4 in. of the floor was 1:2:4, and this proportion of concrete together with the plastering has apparently made the walls watertight, as no leakage has been noticed up to this time except that a small leak in the bottom shortly after the reservoir was filled, which was due to an imperfect bond at one point between old and new concrete. This, however, did not cause serious trouble.

The forms for the walls were made in sections about 12 ft. long by 2½ ft. high, and the inside and outside parts were bound together by means of ½-in. rods extending through the walls, which were removed after the concrete had acquired its initial set. The holes formed by the rods were afterwards filled with a strong cement mortar. Only one round of forms was used, as the contractor found that he could work most economically filling the forms in one day and removing them the next, and set them up for the pouring of concrete again on the third day. When it was necessary to build scaffolding two days were taken to remove and set up the form and build scaffolds.

The bond between old and new concrete was made by brushing the old concrete thoroughly clean and pouring on a neat cement grout just before pouring on the new concrete.

SUGGESTIONS FOR BUILDING A MODERN DWELLING

By WILLIAM ARTHUR.

LET us make a calculation of the weight of any frame house without going into niceties. Suppose we take a house 26 x 32 ft., with two stories, basement and attic.

The walls that carry the floor joists are the ones that carry most of the load. In this assumed house the joists are 26 ft. long. There are 832 sq. ft. of floor space on each floor, allowing clear over the walls. For dwellings the weight permitted per square foot by various cities runs from 40 to 70 lb., so that it is easily seen that niceties are out of the question when experts differ so much. Suppose we allow 70 lb., and this to include the weight of the floor itself. The average office floor load in 210 office buildings in Boston was found to be only 17 lb. of movable furniture, etc., and the heaviest load was 34 lb. A Chicago wholesale warehouse load was only 50 lb., so that 70 is more than enough for our purpose.

	Load in lbs.
First floor	58,240
Second floor	58,240
Attic (Allow)	22,000
Roof, 1080 sq. ft. at 10 lb.	12,800
Brick wall, 64 ft. by 9 ft. by 9 in. at 80 lb.	46,080
Outside walls, 64 by 20 ft. at 20 lb.	25,600
Inside partitions, say, a total of 250 ft. by 10, and attic, 50 by 8 ft. at 20 lb.	58,000
Total	280,960

There is thus a total weight of practically 140 tons, But the whole of this weight does not come upon the side walls. In nearly all houses there is a central girder through the basement, supported by posts resting on a masonry foundation. If the joists are in one length, as they should be in such a house as we are considering, this central girder could be cut out entirely, and even with the weight of the partitions, the house would still stand, although the floors would sag considerably with ordinary joists. The extent of this sag would show the weight the central girder supported. For our purpose we shall assume that a weight of 20 tons is carried for the three floors and partitions, but none for the roof or outside walls.

This leaves us with 120 tons, or 60 tons on each side of the house, on a distance of 32 ft.

But the footing course, as we have seen, is made at least 17 or 18 in. wide for a 9-in. wall—and if a thicker wall is used, increasing the weight, there is an extra 4 in. of footing extension which more than takes care of the difference. On a length of 32 ft. there are, therefore, 48 sq. ft. of bearing surface, which even at 1½ tons each will hold up 72 tons.

As a matter of fact, a floor load of 70 lb. is not required. A load of 50 lbs. should be ample, including the floor itself.

The end walls do not carry any floor load to speak of. Wind pressure is not allowed in the roof weight—New York building laws disregard it below 100 ft. of hight. Only about half the area of the attic is estimated, for there is scarcely ever any load put up there.

Posts

The girder should have two or three posts under it. We allowed 20 tons, or a weight of about 7 tons on each post base. If the masonry is made 30 in. square it would hold 9 tons on a 1½ load to the square foot. If only two posts are used the size must be changed to correspond.

I have seen houses spoiled and partitions cracked because of insufficient bases below the girder. A very few extra brick or a little more concrete would guard against all danger. Why save $2.50 and spoil a house?

On a bad soil the danger is from unequal settlement. The ideal foundation should have equal bearing at all parts. Then if the building sinks it will be equal.

Brick Weight

If the walls are of masonry the extra weight must be allowed. The basement and the first story would likely be 13 in., and the upper story 9.

	Load in lbs.
First floor	58,240
Second floor	58,240
Attic	22,000
Roof	12,800
Walls, 64 x 20 to top of second floor by 120 lb.	153,600
Walls of top story, 64 x 10 x 80 lb.	51,200
Partitions	58,000
Total	414,080

The difference between brick and window or door openings—disregarded in the case of a frame house—amounts to about 6 tons on the two sides. From a total of 207 tons we have thus 20 tons for girder and 6 for openings to deduct, leaving a total net weight of 181 tons on a foundation 64 ft. long, taking in both sides. The width of the lowest course must be at least 21 in., or a total area of 112 sq. ft. The bearing is practically 1 6/10 tons to the square foot. In 1907 when building flats for myself under these exact conditions I allowed a base 25 in. wide. The extra 4 in. width does not cost much.

Testing

If there is any doubt about the bearing power of a soil it should be decided by loading a square foot with metal or some heavy substance. A timber 12 x 12 may be set upright and a small platform built on top of it to carry the load. If the timber is too small, a board the exact size can be nailed on the end that goes in the ground. After bracing to an upright position the load can be applied and the levels taken.

Porch Piers

These should never be less than 12 x 12, and 17 x 17 is a much better size. They must also go below frost line. A pier 9 x 9 carries all the weight that comes on a porch, but it looks ridiculously cheap in the front of a house, and usually goes to pieces in a few years.

Chimneys

The foundations for chimneys should be large enough to stand a load of at least 2 tons to the square foot. A single course of brick weighs about 40 lb. to the square foot. By finding the number of square feet in the single courses of the walls and the partitions, and adding a fair allowance for the tile lining the weight can be easily obtained. The plaster is often cracked and the wall paper spoiled at the junction of partitions and chimney. A wider foundation would often be of advantage.

Wood Foundation

We often see houses set on posts. The under side of the girder should be at least 24 in. above the ground.

For this style of foundation a sill 6 x 8 in. is about right, but a 6 x 6 is often put in. If a 6 x 8 is used it should be set the deep way. Posts 6 x 6 or 6 x 8 are large enough. They should be set about 6 ft. apart. A plank base 2 ft. square is large enough on good ground. One layer should be laid on the ground and a cross plank put on top.

Brace all posts, cover with rough boards, then at least one ply of building paper and finish with the outside layer of upright finish boards. If the air is kept out this makes a warm enough foundation in any climate, but in the coldest it is advisable to use more than one ply of paper.

Concrete Floors

A concrete floor should be laid over the entire basement, and this must include the bottom of the cold-air duct. The sides of the duct are usually bricked up. Whatever system is used, it is imperative that the complete underground duct be surrounded with good masonry. This is not only to keep damp from arising, but to keep away rats. In many houses the duct is made a rat playground.

In a damp climate, and especially in low-lying grounds, a concrete floor should be considered indispensable. Concrete and a cement top makes a better floor than brick unless they are grouted with cement and sand between the joints. When merely laid on the sand a brick floor may be dry enough in a dry climate, but the joints are always open and the moisture rises from below, however much the brick themselves may absorb.

Cold-Air Duct

The floor over the cold-air duct should be laid on expanded metal. Boards are first laid down and the metal put on top; then the concrete is slightly tamped until the metal is incorporated in the mass. After the concrete is thoroughly hardened the boards are taken out. This kind of a floor is used on all the heaviest warehouses.

The ordinary method is to use boards only, and the floor layer will do this if no agreement to the contrary exists. The boards are left in permanently, and if they are wide they swell under the wet concrete and crack the floor. If boards are used they should not be more than 4 in. wide, and a space of ¼ in. should be left between them for swelling.

Floors

Portland cement is the best material for making basement floors, outside of some expensive mixtures. The ingredients are Portland cement, sand and crushed stone, broken brick, slag, hard sifted cinders, or any such material. Crushed stone is best, but good slag makes a fine floor.

The proportions are often 1 cement, 3 sand and 6 of stone. A better mixture is 1:2:5.

Several years ago I compiled a building code, and I was reminded of it on turning to the Underwriters' Model Code to see what was said about cellar floors. They "shall be concreted not less than 4 in. thick." It is a good law, a highly desirable law, but it slightly strains the quality of mercy.

In a large semi-business building I have put down a floor with a total thickness of 2½ in. The floor in a dwelling house does not have the rough usage that such a floor has. If a floor is to be pounded with a sledge, that is another question; but even wood may be split in a reasonable way. A "pounding" block 2 ft. by 2 ft. by 8 in. would be useful.

A 3-in. floor is passable—a 4-in. should undoubtedly be put down if there is money enough on hand to make everything what it should be in a model house. The mixture is spread evenly and tamped down ready to receive the top dressing.

An amateur can lay his own floor much easier than he can make "craftsman" furniture. The whole area of the basement is too large to attack at one time, but a 2 x 4 can be staked down temporarily about 4 ft. apart, and of such a hight above the surface as the finished floor is to be in thickness. The concrete is then filled in to within ½ in. of the top of the guide timber. The top dressing may be put on at once, and the mass allowed to dry. By taking a straight-edge and drawing it along on top on the two guides the pure cement and sand can easily be scraped down to the level ready for careful troweling. An expert uses a plasterer's trowel, but an ordinary one is better for the amateur.

Each alternate space is treated in this way and allowed to harden. The 2 x 4's are then lifted and thrown away, and the vacant strips are merely filled in and the smoothing done as before.

By this method there will be a few parallel joints clear from one end of the room to the other, the same as are seen crossways in a sidewalk to keep the frost from leaving the slabs. In a basement it is not necessary to have even long parallel joints, as the frost does not reach there; but this method is to save the amateur from attempting to do too much at one time and leaving the floor out of level. When the top dressing is mixed it must be applied at once, and not left to harden for an hour.

When outside work is done in this way a little sand is put in between the blocks to keep them from joining in one slab underground, where the surface cutter does not reach; at other times a thickness of tar paper is used; but in a basement floor it does not matter if the whole floor joins in one slab, for that is how the tradesman lays it.

The base might be laid without the top, and the finish ½ or ¾ in. coat applied over the entire area, without a joint, as soon as the other is hard enough to walk on. The danger is that one not accustomed to leveling a large area would get an uneven floor. If this method is used the base must be well wetted before the top is applied. If the top is not properly put on it will scale off.

Cinders

Before the concrete is put down a base of 2 or 3 in. of sifted cinders is sometimes laid on the ground, well watered, and tamped to a uniform surface. And occasionally porous drain tiles are laid along each side of the house to take away any under flow of water; but this is seldom done in prairie countries or on high ground.

In damp soils one layer of concrete is often put down, then one of asphalt, another of concrete, and finally the top dressing. But if the soil is so bad as to require that, why not sell the lot to some unsuspecting neighbor and move to a healthier location?

The dressing is made in the proportion of one Portland cement to two or three of sand. It should never be made less than ½ in. in thickness. Some architects specify an inch, but that is not necessary for ordinary dwellings.

Cellar

If a cellar only is dug, and the walls set on top of the bank, going 3 or 4 ft. below in frosty countries, the floor may be laid as in a full basement, and the sloping walls lined with one course of brick laid on flat, with a Portland cement mortar. There would be no economy in lining the slope with two courses of brick, but it would pay better to carry the outside walls down and be done with it.

Indeed, if the matter is considered, that is the best way. First of all, we should rise at least 2 ft. above the ground with the brickwork; and, in northern countries, we should go down at least 3 ft. 6 in., thus making a wall of 5 ft. 6 in. Why not go a foot more and have a fine basement with only the cost of the extra excavation, and about $20 for brick? If we set the wall up 30 in.—and that is not too high—and have to go 4 ft. down, as in some localities, there is less excavation and sufficient headroom. Why, then, is this not done? Because the building laws are not enforced, and brick may be set practically on top of the ground.

In some hard soils a ¾ in. coat of Portland cement-mortar is plastered on the slope and floor. It lasts for several years, but in time it cracks and peels off.

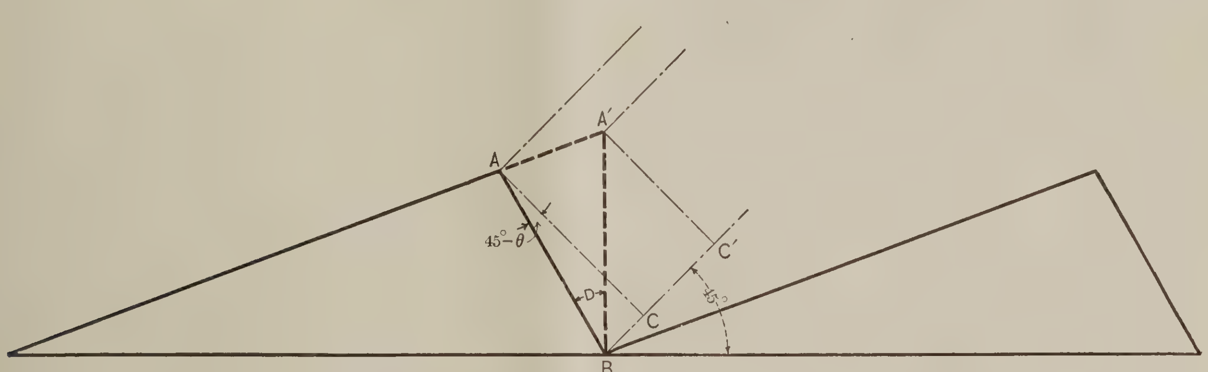
(To be continued.)

VERTICAL VERSUS INCLINED SAWTOOTH SASH

THE intention of this article is to set forth the advantages and disadvantages of both the vertical and inclined saw-tooth sash. There has been much discussion among designers of industrial plants of the relative merits and demerits of both of these types, and it must be remembered that each individual case in which saw-tooth construction is required should be analyzed and the proper style selected best fitted to fill the requirements.

As the principle of the so-called saw-tooth form of skylight is a diffusion of a strong northern light into the work room without admitting any direct sunlight, either the vertical or inclined sash will be effective to accomplish the end in view provided only that there is a sufficient area of glass. Regarding the effective lighting area, it has not been clearly demonstrated that with equal glass area the vertical sash will not provide as good lighting facilities as a sash inclined only to such an extent that no direct sunlight will be admitted.

About the maximum angle of inclination allowable in the United States without the entrance of any direct sunlight is about 15 deg., being less in the South and greater in the North. Granting that there may be a slightly greater lighting effect using the inclined sash, let us endeavor to determine to what extent the glass area should be increased in order to have the same lighting effect with vertical sash. Taking the direct northern skylight at 45 deg., let it be considered that the "effective lighting area" of a sash is its length times its normal projection on these rays. Referring to the accompanying diagram, the effective lighting area of sash A B, inclined with the vertical at an angle D would be $AC = AB \cos(45^\circ - D)$.



Vertical Versus Inclined Sawtooth Sash.—Diagram Showing Angles of Inclination.

On the above hypothesis, should the sash be vertical, that is D = O, the projection on the normal of the north light rays, A′ C′ should equal A C in order to have equal intensities of light. But

$$A'C' = A'B \cos 45^\circ; \text{ and as}$$
$$AC = A'C',$$
$$A'B \cos 45^\circ = AB \cos(45^\circ - D),$$
$$\text{or } A'B = AB \frac{\cos(45^\circ - D),}{\cos 45^\circ}$$

Where $D = 15^\circ$ this ratio is as 1 : 1.23 — that is vertical sash should have about 23 per cent. greater glass area than sash inclined at 15° to secure the same intensity of light. In actual practice, however, it has been found that it is not necessary to increase the glass area to this extent to receive satisfactory lighting.

F. W. Dean, of Boston, who has designed a number of mills with vertical sawtooth sash, uses the simple expedient of figuring an inclined sash the proper size and proper angle to secure the desired amount of skylight without any direct sunlight and then projecting the roof until it meets the vertical, the increased hight of the sawtooth face being entirely devoted to glass, and in every instance this method has given satisfactory results in regard to light.

It is generally admitted that as regards construction the vertical sawtooth is much easier to erect and adapts itself particularly well to steel construction, as instead of resting the whole sawtooth on carrying girders the vertical face can be made in the form of a light truss to take the place of the girder. Furthermore, with the vertical type, ordinary pivoted sash may be used, so that in hot weather the entire front of the sawtooth face can be opened for ventilation. The increased heating effect of the additional roof area exposed normally to the sun's rays would be more than offset by the increased ventilation thus secured. Furthermore, where condensation drip is apt to cause trouble, the vertical sash will be the better form to use.

Concerning cost, Mr. Dean has found that contractors when requested to submit comparative bids on the two types of construction for the same job made practically no difference in price, but on rush work the completion of a job would be promised in a shorter space of time with the vertical style than with the inclined owing to the fact that in most cases special sash for the inclined face would have to be purchased or installed by the manufacturer or by a subcontractor.

The amount of direct skylight transmitted into a mill by the vertical rays which would strike the inclined sash would be practically nil, owing to the acute angle of glass which would cause much of the light to be totally reflected and would allow very little to enter into the mill. Moreover, there is some question about the desirability of having narrow bands of the more intense light under each sawtooth due to the vertical rays, if they were transmitted.

A VERY INTERESTING EXAMPLE of the use of tapestry brick in dwelling construction is found in the two-story and attic residence which is under way in Andrews avenue, a short distance from the University campus, for Professor Collins P. Bliss, head of the engineering department of New York University, New York, N. Y. The dwelling occupies a plot 50 x 80 ft. and was designed by architects Squires & Wynkoop, 44 Cortlandt street, New York City. One of the striking features of the interior arrangement is a playroom which is two stories in hight, this being on the second floor and extending to the attic. The builders are Bliss & Griffith, who were also the contractors for the hollow-tile dwellings mentioned in a recent issue of this journal as being erected in connection with the Kellogg-Green Company operation at Orange, N. J.

New Publications.

Standard Handbook of Estimating Data. Size, 3½ x 5¾ in. 80 pages. Bound in board covers. Published by the Builders' Auxiliary Company. Price, $1.00.

This little work is designed especially for the use of architects, contractors, estimators, carpenters, masons, plumbers, painters, electricians, tinsmiths, draftsmen, etc., the information being compiled from a large number of actual contracts of varying sizes under varying conditions. The manner in which the information is arranged is, so far as the authors are aware, entirely different from anything previously published, and the figures presented are those for average work by average workmen.

In regard to the data on labor, the fact has been carefully kept in mind that what a workman actually does day after day is quite different from what he can do if pushed for a limited time under the most favorable conditions. All the figures given are made up from an average taken of work accomplished, including instances when conditions were unfavorable, favorable and just average.

No prices of work or material are given, as such could only be applicable for a limited time and over a limited area, but the data are so arranged that with a knowledge of local conditions the cost of any piece of work can be easily computed.

The little work in question has been brought out to meet the numerous requests received by the authors since publishing the Builders' Auxiliary reviewed in these columns a month or two since, to publish the data in that work regarding labor and material in the form of a small book of a size convenient to carry in the pocket, and therefore be of ready reference.

Concrete Floor Construction for Dairy Barns

One of the papers presented before the Chicago meeting of the Northwestern Cement Products Association was that of J. V. Godfrey, in which he considered the details of construction for a concrete cattle barn. What he had to say covered many interesting points, and we present herewith copious extracts for those of our readers having to do with concrete construction:

The use of concrete for cattle barns presents a vast field for operation and thought. To the dairyman it is one of great importance. The cost, sanitation and durability are all brought vividly to his mind. In our locality we have three classes of material for construction—lumber, brick and concrete. Of course the first question asked by the prospective builder is: How does cost compare with lumber and brick? The first cost of lumber construction generally has the concrete enthusiast beaten, but when annual repairs are added the owner soon finds that his first cost is but a small part of the actual cost. As to brick, with kiln run costing $8 per M at the kiln, bricklayers at 60 cents per hour, and tenders at 25 cents per hour, it is soon apparent that the cost of concrete is lower, at 45 cents per square foot for a 14-in. hollow wall against 30 cents per square foot for block construction, and 25 cents per square foot for solid wall construction.

Farmers in our section of the country have not been convinced of the good common sense of using concrete for walls and roof. Four years ago a contractor who talked concrete construction for the farmer was "crazy and needed watching." But to-day the farmer is figuring. Thus far I have convinced a few farmers that to use concrete for walls part way and for floors throughout is the correct thing, and it is of concrete floors in dairy barns that I wish to speak.

The job that I consider did me the most good and also served the cause of concrete, was equipped with the James sanitary stall, and the concrete work had to conform with its measurements. The building is 38 ft. by 140 ft. and has stalls for 56 head, besides ample room for calf pens and bull pens. This barn is at Watts Siding, Clay County, Minn., and is owned by E. C. Schroeder, whose chief object in life is to raise the most and best potatoes to the acre of any man in the world. As a means to that end he started in the dairy business to have more fertilizer for his farm. He believes with James J. Hill that every "critter" will put back onto the farm 75 cents in manure for every dollar that she costs. These few remarks may seem to be a digression, but if we can convince the farmer of these facts it will mean more concrete work for those who are engaged in it.

Concrete work in this barn is all 6 in. in thickness excepting the driveway, which is 8 in. in thickness. Personally, I believe that 4-in. work for feed alleys and standing platforms and 6 in. for the driveway is heavy enough, but the careful man always likes to be sure that the work is substantial. Our material is bank gravel and was mixed 1:6 in a continuous mixer for the concrete back, while the top coat was of clean, sharp sand mixed 1:2 and 1 in. in thickness. The feed alleys and standing platforms were all troweled smooth, while the driveway was rough troweled.

The contractor cannot be too careful with a driveway of this kind. It is always apt to be wet and slippery at best, therefore the greatest care should be exercised to get a very rough finish to keep the cattle from slipping. Also, I always advise and insist when I can, that the standing platform be covered with a wooden platform, as concrete is too cold for the udder of the milch cow.

The gutters are a very important detail. The gutters in this job are 11 in. deep and 18 in. wide. While that may seem large, I find that they are not too large when the manure spreader comes around night and morning. Of course 11 in. deep is considerable of a drop behind the cows, but with these patent stalls the cow can never get back far enough to step off, as the stall is adjustable to the length of the cow. The feed mangers and the gutters are connected to the sewer or cesspool, and as there is plenty of water under pressure here they are thoroughly flushed three times a day. All the grades on this job slope to the sewer, feed alleys, standing platforms, driveway, and everything being cleaned thoroughly at every flushing. This feature alone is worth enough to make every farmer stop and figure, if he can afford concrete floors in his barn.

Finally, the durability is beyond question. There are no floor joist or planking to rot away nor any place for dirt to accumulate, thus ensuring clean milk for the babies. The floor becomes harder each year and can be used by future generations.

The addition which is soon to be made to the Hotel Woodstock in West Forty-third street near Sixth avenue, New York City, will be a 12-story extension 39 x 110½ ft. running from the rear of the present building to West Forty-fourth street. The façade of the extension will be of limestone for the first two stories and brick with terra cotta trimmings above. The basement will contain the kitchen and accessories; the first floor will have a large palm room, a ladies' dining room and a ladies' parlor, while the stories above will be devoted to small suites of rooms and bedrooms. The cost is estimated at $250,000 and the architects are Mulliken & Moeller, Forty-first street and Park avenue, New York City.

German architects are making more and more use of glass bricks, in cases where walls instead of windows are essential, while at the same time light must be provided.

A REINFORCED CONCRETE FACTORY BUILDING

A VERY interesting example of reinforced concrete factory construction is found in the new warehouse which has just been completed for the Gordon-Van Tine Company, Davenport, Iowa, and which replaces one of the largest warehouses of the concern destroyed by fire in November last. The several views which are presented herewith represent

A Reinforced Concrete Factory Building. Fig. 1.—The Site February 7.

various stages of the work and clearly indicate the celerity with which it was executed. The building is four stories and basement in hight, with concrete foundations and exterior walls of brick, while the entire interior structure of the building is reinforced concrete. In the erection of the building the Kahn system of reinforcing was used in connection with the reinforced concrete work, use being made of high grades of steel rolled from billet stock and a mixture of concrete composed of one part cement, two parts sand and four parts of clean crushed limestone. The exterior walls of the building are constructed solid of vitrified paving brick, the walls being exceptionally heavy and designed to carry the floor loads from the outside panels of the building without concrete columns.

Fig. 2.—Appearance of the Work April 18.

The floors from the first to the third story inclusive are designed to carry a live load of 225 lb. per square foot, while the fourth floor is designed to carry 175 lb. The floors of the building throughout are finished with a ¾-in. top dressing of cement-mortar mixed in the proportions of one of cement to two of sand. The building is divided into two sections by a brick fire wall, the openings in which are fitted with the Underwriters Standard tin-clad fire doors. A 9-ft. loading platform extends the entire length of the building on the north and half way down the east and west sides. This is of reinforced concrete protected along the outer edge with steel curb angles.

The building is equipped throughout with automatic sprinkler system and with the Underwriters Standard automatic metal windows glazed with ¼-in. ribbed wire glass. The sprinkler system is complete in every detail and subject to the strict inspection and approval of the chief inspector of the Stock Insurance Company. The elevators, of which there is one in each end of the building, are fitted with automatic safety gates in addition to the Underwriters Standard automatic rolling shutters.

In the construction of the building nothing has been neglected in making it thoroughly practical in every way for the purpose for which it is to be used, and an idea of its fireproof qualities may be gained from the statement of the contractors that it has received one of

Fig. 3.—The Building on May 3.

the lowest rates ever issued by the Board of Underwriters on any building in the State of Iowa.

In addition to the main building there is a lumber shed extending on the north side of the two switch tracks which enter the building. This shed is constructed of the same vitrified paving brick used in the main building. Intermediate covered platforms extend the entire length of the plant between tracks and connect with the molding shed at the extreme east of the property.

Referring to the accompanying illustrations, Fig. 1 represents a view of the site as it appeared on February 7 of the present year, while Fig. 2 shows the progress of the work as it appeared on April 18. In the view Fig. 3, the condition of the building is represented as it appeared on May 3, and Fig. 4 shows the building and surroundings on June 20 of this year. Everything

Fig. 4.—The Warehouse on June 20.

was in shape by July 15 for the prompt shipment of mill work of description of which the Gordon-Van Tine Company are extensive manufacturers.

The contractor executing the work was C. L. Gray Construction Company, St. Louis, Mo., and New York City.

Cleaning Window Blinds

A good method for cleaning window blinds is thus described in a recent issue of *The Painters' Magazine:* If the blinds are finished in the natural with varnish, remove them from their hinges and take them to the yard, dust well and use a mixture of two parts strong household vinegar and one part sweet oil or raw linseed oil which stir or shake well while in use. Apply with a brush to the slats and all other parts, rubbing the brush vigorously over all and dry with a cloth. Rinse well with water and permit to dry. To remove the dust it is well to have a pair of bellows to get into the corners.

If the blinds are painted, make a cleansing solution of one pound brown soap, one ounce of pulverized borax, dissolved in one gallon hot water, but do not let it boil. Use a piece of flannel for the framework, but a good brush for the slat work, and rinse off quickly when the paint is clean.

If you wish, however, to remove the paint or varnish from blinds for the purpose of refinishing same, put them in a shallow trough, one at a time, which has been filled with a solution of 8 lb. of concentrated potash lye in 32 gal. of water. The paint or varnish will soon soften, and can be removed with a stiff brush. Now the blind must be washed in clear water with a whisk broom, so that the water gets into every corner. When the blinds are dry they should be given a wash with vinegar to neutralize the alkali, and when dry it will be found that the fiber has been raised some and sandpapering is necessary.

Paint and varnish removers, as they are now on the market in liquid form, are more effective and less troublesome, but of course very expensive for cleaning paint or varnish from blinds.

The Bath Room and Clay Products

In considering the field of clay products, with a view to further extension here and there where the best opportunities present themselves, we are impressed with the idea that the bath room presents an excellent lot of opportunities for those making the line of products used or that may be used in this work, says a recent issue of the *Clay Worker*. This includes not only the bath tub and sanitary ware, but also tiling for walls and for the floors. The ideal bath room is one which may be made up almost exclusively of clay products, with the bare exception of the piping and metal work. It has been thoroughly demonstrated that, from a sanitary standpoint, nothing equals the enameled clay ware, and gradually a discriminating public is taking notice of this fact and is showing a favorable disposition to use it almost exclusively. Now, aside from the technical matters involved, one important point the trade should take into consideration is this: We are coming to the day when practically everything in the form of a home built in or near cities is to have a bath room, and the more pretentious home, instead of having just one commodious one, is moving toward the idea of one to almost every sleeping room. Moreover, it will extend further and builders of modest homes in the country will include a bath room as a part of their house. Some of the cities have already taken quite a strong stand in this matter, and are insisting that when new homes are built that they are properly equipped with bath rooms.

By and by we may see the day when there will be included in almost every city ordinance a requirement for bath rooms. With things tending this way one hardly needs a pencil and pad of paper to figure out what it means in the way of increased requirements for bath room material. Moreover, it would be almost impossible to figure it out specifically, but we can easily picture the needs multiplied almost a hundred times. and, therefore, this branch of the trade should present openings for further developments that will not only keep the present industries manufacturing such products hustling, but will make room for a number of new ones without in any way endangering the market.

DAVID RANKEN, JR., founder of the school of mechanical trades that bears his name in St. Louis, Mo., died at Atlantic City, N. J., on August 18, at the age of 74. He was a native of Boyston County, Londonderry, Ireland, and went to St. Louis in 1862.

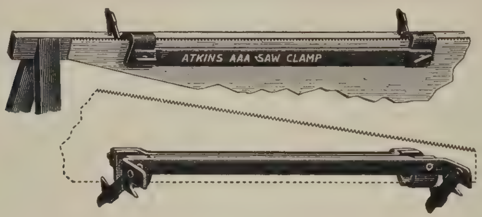
RALPH SCOTT, who was for many years one of the business representatives of *The Building Age*, died in New York City recently from a complication of diseases. Mr. Scott had passed the three score and ten mark, but retained not only his faculties, but a great deal of vigor, and at the time of his death was engaged in a number of enterprises. He had a wide circle of acquaintances, particularly in the South, and took great interest in the advances made in Southern industries in recent years. He was an Englishman by birth, and a year ago spent some time at his old home.

CONTENTS

NOVELTIES.

Atkins Hand Saw Clamp

E. C. Atkins & Co., Indianapolis, Ind., have recently brought to the attention of the trade a new Hand Saw Clamp, which is made entirely of steel and is referred to as practically unbreakable. It can be used for either jointing or setting, and being seated close to its work does not quiver; neither does it require wooden props. It may be attached to any square edge for immediate use, and is easily detached. It is referred to by the manufacturers as their "AAA" Saw Clamp, and as it weighs only a little more than a pound, it can be conveniently carried in the carpenter's kit. The advantages possessed by this Saw Clamp will be readily apparent to all users of saw clamps who have heretofore been obliged to carry with them a large, heavy contrivance. By referring to Fig. 1 it will be seen



Novelties—Fig. 1.—Atkins Hand Saw Clamp

that the saw is placed in clamps at the tooth edge for jointing and filing, and that all parts, as well as the teeth, are easily accessible. For setting purposes the vise is reversed, the blade being then clamped at the back.

The Disston Hand Saw

As demonstrating the merits of the saws produced by Henry Disston & Sons, Philadelphia, Pa., it is related that a short time ago a man called at the works carrying a Disston hand saw and complained that it would not cut and seemed to feel aggrieved that the concern should send out such a saw as the one he possessed. This struck the manufacturers as being somewhat curious in the light of its 70 years of saw making, but upon examining the saw in question the cause of the difficulty was readily apparent. The Disston representative casually asked the visitor if he though the saw would cut iron, and received an emphatic negative in reply. The visitor was therefore asked to wait a few moments and the saw was taken out into the shop, where it was specially filed to cut iron. The visitor was then taken to the machine shop, where a piece of iron bar about 2 in. in diameter was placed in a vise and the saw was put to work. In a short time the bar was nearly sawed in two and the teeth were said to be still in fair condition. The visitor expressed great surprise and would not have credited its work, he said, had he not seen it with his own eyes. After an explanation of the trouble—simply a matter of the condition of the teeth in the saw—he asked if the saw could be put in proper condition for sawing wood and he was told that it could, after which he remarked that he would never complain again about a Disston saw. The point is made by the manufacturers that the majority of users do not know or else give little thought to the fact that to obtain the best results in any particular class of work the saw must be specially toothed and filed for the sawing to be done. Years of experimentation have determined just what shape and bevel should be given to the teeth, as well as the amount of "set" best suited for this or that class of sawing, and that the tooth best adapted for sawing soft woods is not at all suitable for cutting hard woods. Of course the work could be done after a fashion, but the result would not be comparable to that obtained by the use of a saw properly filed and set for its particular purpose.

In line with this it may be noted that even a saw blade made for cutting soft metals is not at all adapted for sawing the harder metals, nor will a saw made for sawing wood stand the work of cutting a combination of wood and metal without injury to the points of the teeth, thereby spoiling it for further use in making a clean cut in wood. A saw that is "fitted-up" for sawing wood has the teeth filed with a bevel back and front, given a proper set, enabling it to do fast cutting. A hand saw for sawing metal has no set on the teeth, but is ground for clearance and filed straight across the front of the tooth, while to a limited extent it would cut wood, but not in a manner that a mechanic desires. In other words, it is not adapted for wood cutting and its temper also is different from that of a wood-cutting saw.

Sasgen Improved Setter Derrick

The new setter derrick, which has been brought out by Sasgen Brothers, 2053 to 2057 Racine avenue, Chicago, Ill., and with New York office at 103 Park avenue, embodies a number of interesting improvements over the old style derricks which cannot fail to interest building contractors generally. The top frame of the setter derrick is made of malleable iron and has an extension by means of which the operator is enabled to hoist the load without scraping the derrick. The top frame is equipped with two sheaves, and thus does away with a block on top. The frame is supported by a ⅝-in. truss rod, is provided with lugs for guy lines in front and back, and also clamps for fastening the extension pole. The bottom and side pieces of the derrick are connected with two malleable castings, which are fastened by means of bolts the same as the top frame. This, it is pointed out, makes a very strong connection, and also renders the derrick easy to be taken apart for shipment or removal should this be necessary. The setter derrick has a 2 by 2½ ton capacity. In case special speed is desired the makers extend and square the drum shaft, so that the handles can be used on it, thus applying power direct to the load. By using a single block the hoisting capacity can be regulated to single, double, or triple according to the work being done, thus enabling loads to be lifted ranging from 500 lb. to 1000 lb. The increasing demand for the derricks, made by Sasgen Brothers, has rendered it necessary for them to secure additional facilities and purchase therefore has been made of the two-story and basement building at 2053 to 2057 Racine avenue, having a frontage of 55 ft. and a depth of 125 ft. This new building, with their increased equipment, has enlarged their capacity several times what it was before and places the firm in a position to promptly meet the requirements of its customers.

Swartwout Rotary Ball-Bearing Ventilator

As a result of the thorough investigation on the part of the medical profession and architects and the widespread publicity given to the matter of ventilation by manufacturers, there is no longer need of stating reasons for providing pure air for operatives in various lines of mechanical work. The question now is how to get it at reasonable, or, in most cases, least cost. In many factories the ventilation is inadequate, usually because the apparatus considered is costly and involves perpetual expense for operation. Admitting that expensive apparatus is desirable for some types of buildings, yet such prohibitively costly investment and continual expense is often unnecessary, for it has been shown that an outlet in the room is all that is necessary to permit the escape of heated air.

But the ventilator must fulfil certain requirements, and most successful appliances can be brought out only after experience. Following various "Swartwout" designs already well known, the new Rotary Ball-Bearing Ventilator, shown in Fig. 2 and made by the Ohio Blower Company, Cleveland, Ohio, embodies features that make it most ef-

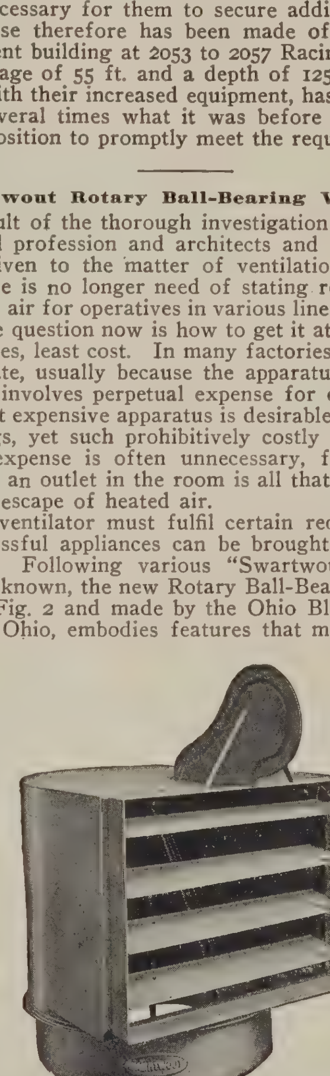


Fig. 2—Swartwout Rotary Ball Bearing Ventilator.

fective at no expense other than first cost. Unlike the circular rim-bound type of ventilator, which requires the air to make two right angle changes in direction, the air escapes from the "Swartwout" with a single turn and through openings that are abundantly large. As compared again with the circular rim-bound type, the "Swartwout" swings with every change in direction of the wind, so that when air moves across the top of the ventilator the entire area of opening is effective in allowing the escape of air induced to flow upward; whereas with the circular type a much smaller portion delivers air. The main part of the ventilator is suspended on a tripod construction which revolves on ball bearings. The four dampers, or louvres, are so constructed that they close by gravity, and when closed the entire ventilator is storm-proof and dust-proof. The louvres are opened by pulling a chain from within, all four operating simultaneously by being hinged to the same rod. By replacing the metal top of the ventilator by glass, rendered water-proof at the joints by cement, this ventilator acts as a combined ventilator and skylight. The closing of the dampers in no way shuts out the light, for they are at one side of the glass top. To overcome difficulties encountered in the use of ordinary forms of charcoal iron, galvanized steel and similar materials, the new "Swartwout" is made of "Toncan" metal, which is a rust-resisting product particularly adapted for exposed sheet metal work; tests have proven this to be far more durable than the materials commonly used for ventilators.

Metal Ceilings and Side Walls

William Foster & Sons, Springfield, Ill., have issued from the press an attractive catalogue of 88 pages, relating to artistic interior decorations in the way of metal ceilings, side walls, etc. A large number of new and special designs are included in the assortment, and the entire makeup of the catalogue is such as to render the work valuable for reference by the architect, the builder and the sheet metal worker. In connection with the many designs illustrated are given the plate number, the dimensions in inches and the cost per square foot. The designs embrace ceiling plates, cornices, frieze and borders, molds, fillers, side walls, centers and ceiling designs, each of the latter being of a size to fill a page, or in other words, measuring 10 in. in length by 6½ in. in hight. The company has a modern and up-to-date plant, operated under an aggressive policy of advance, and has exceptional facilities for shipping. These advantages, it is pointed out, together with years of practical experience in the sheet metal business, place the company in a position to promptly and satisfactorily meet the wants of an exacting trade.

Sheet Metal Shop Specialties

David Lupton's Sons Company, Allegheny avenue and Tulip street, Philadelphia, Pa., is distributing among its friends in the trade a 52-page catalogue, 6 x 9 in. in size, calling attention to the Lupton specialties for shops and industrial buildings. These include steel sash for side walls, steel skylight and hollow metal windows. The sash is made of rolled steel sections, with a special type of joint to lock the parts securely together. The units in which this sash is built are made in a number of sizes, all of which are interchangeable. The steel skylight is built up of 3/16-in. bars of a peculiar cross-section covered by a cap of cold-rolled copper or Monel metal. The metal fireproof windows of this company are constructed in accordance with the requirements of the National Board of Fire Underwriters. Other specialties illustrated and described include the Pond continuous sash and the Pond operating device for pivoted sash.

Catalogue of Builders' Hardware

We have just received from the National Manufacturing Company, Sterling, Ill., a copy of a very attractive 72-page catalogue showing leading lines of builders' hardware turned out by this concern. With a view to giving its customers as faithful a reproduction of its goods as possible, and in order to assist them in making their purchases the company has made use of half-tone engravings throughout the catalogue, thus showing the original appearance of the goods as nearly as possible. Full explanatory notes accompany the illustrations, so that the merits of the goods may be readily comprehended. The typographical features are such that the catalogue constitutes an excellent example of the printers' art and the entire makeup is attractive. Prominent among the goods illustrated and described may be mentioned door hangers of various styles, latches, pulls, hinges of different kinds, foot scrapers, screen and storm sash hangers, cellar window sets, cupboard turns, sash locks and lifts, ornamental butts and hinges, coat and hat hooks, ceiling hooks, harness hooks, chimney tops and caps, fuel chutes, etc. We understand that a copy of this catalogue will be sent to any architect or building contractor upon request.

Bradford Pressed Brick

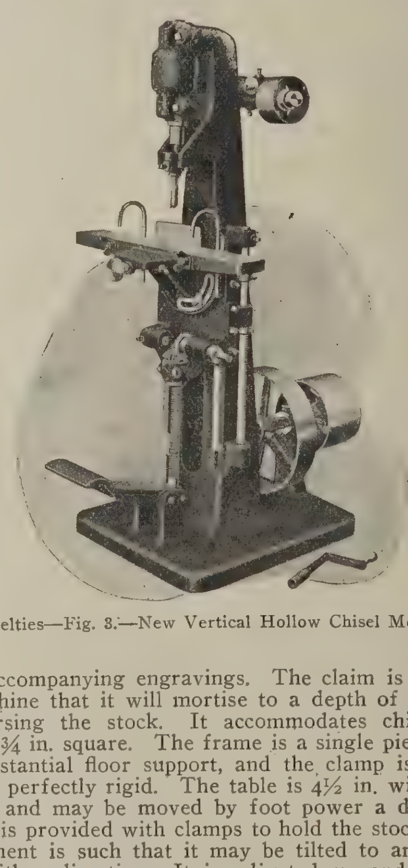
We have received from the Bradford Pressed Brick Company, Bradford, Pa., copies of attractively printed catalogues setting forth the merits of the leading product of this concern. One of the catalogues above referred to is entitled "Brick Mantels" and carries illustrations of a number of designs in connection with which are given important dimensions of value to the architect, the builder and the house owner. Another important feature is the prices of standard and molded bricks to lay up the mantels shown, including hearths, fire backs, etc. Another catalogue illustrated a great variety of molded and ornamental bricks, which are specially adapted for use in brick mantel construction. For 16 years the company has been manufacturing face brick and many beautiful residences, churches and mercantile buildings the country over are striking testimonials. A new plant is just being completed with a capacity of approximately 70,000 brick a day, which gives the company an aggregate daily output of 100,000 building brick. The company manufactures nothing but "Reds," by both the dry-pressed and stiff-mud method. Its kilns are arranged so as to burn either coal or natural gas for fuel, but at the present time both plants, which are located at Lewis Run, Pa., are being fired with natural gas. Use is made of gas engines for power and the plants are equipped with a 50, a 60, an 80 and a 200-hp. Otto gas engine. The proprietor and president of the company is William Hanley, who in addition to being a brick manufacturer is one of the leading contractors of Northwestern Pennsylvania.

Hand Screws and Clamps

Hammacher, Schlemmer & Co., Fourth avenue and Thirteenth street, New York City, has just issued from the press an attractive little catalogue of 30 pages bound in paper covers and relating to Hand Screws and Clamps of all kinds. It is known as Catalogue No. 400, and is intended especially for the attention of carpenters and cabinet makers, cement and concrete workers, machinists, metal workers, etc. Within its covers special reference is made to the Colt's line of Quick Action Clamps, the Jorgensen Hand Screws and also to the Automatic Mitre Clamps. In connection with the illustrations, which are numerous, brief descriptive particulars are presented, together with tables showing sizes, numbers, prices, etc. The entire make-up is neat and attractive, and it is sent out in a shape to excellently serve the purpose for which it is intended. The company is agents for the celebrated Francis line of modern glue room equipment, such as veneer presses, glue heaters, boilers and spreaders, all designed for the rapid and efficient handling of glued-up stock. Those who are interested in this little work can secure a copy of the catalogue by addressing the company.

New Vertical Hollow Chisel Mortiser

A machine which will be found of special interest to woodworkers generally is the Vertical Hollow Chisel Mortiser, which we illustrate in general view in Fig. 3



Novelties—Fig. 3.—New Vertical Hollow Chisel Mortiser

of the accompanying engravings. The claim is made for this machine that it will mortise to a depth of 3 or 6 in. by reversing the stock. It accommodates chisels from ¼ in. to ¾ in. square. The frame is a single piece casting with substantial floor support, and the clamp is made so that it is perfectly rigid. The table is 4½ in. wide and 30 in. long, and may be moved by foot power a distance of 6 in. It is provided with clamps to hold the stock, and the arrangement is such that it may be tilted to an angle of 40° in either direction. It is adjusted up and down by crank and bevel gears, and is jibbed to the column of the machine. It is provided with a stock rod to regulate the depth of the mortise. The chisel mandrel is made of crucible steel and runs in self-oiling bearings lined with babbit metal. The mortiser is made by the J. A. Fay & Egan Co., 221 to 241 W. Front street, Cincinnati, Ohio.

(Trade Notes on second page following.)

TRADE NOTES.

THE FOLDING SCAFFOLD BRACKET, which the Mani Manufacturing Company, Box 112, Peoria, Ill., is introducing to the attention of carpenters and builders embodies a number of interesting features. It can readily be set up for use and as readily taken down and folded, so as to occupy comparatively small space, thus facilitating the transportation of it from one job to another or for storing it when not in use. In order to place it in position, it is simply necessary to bore an inch-hole in the lining or when putting on the lining or sheathing cut in a notch where it is desired to place the bracket, then insert the hook in the hole or notch, lower the diagonal members so as to raise the horizontal member. After this has been done the engaging block, which is arranged between the outer ends of the diagonal members, is made to engage the depending projection of the plate on the outer end of the horizontal member. The various parts are of iron, the hook, which is the main feature of the device, being of Norway iron. The wood is Norway pine. In most cases the horizontal member is made 2 ft. 8 in. long, but when so required the company makes them 3 ft. 7 in. The bracket is meeting with great favor among contractors and builders, those who have practically demonstrated its merits speaking in high terms of the satisfaction which it has given.

THE CAMPFIELD RAGGLE BLOCK COMPANY, Richmond, Ind., represented by the De Fraim Sand Company of Philadelphia, made an exhibit at the recent convention of the Sheet Metal Contractors' Association, consisting of a 2-course and 3-course raggle block, for use in connection with roofing work. The company's representatives present were A. Milligan and J. Reese Bailey.

THE SIDNEY TOOL COMPANY, Sidney, Ohio, refers to its "Famous" Universal Woodworker as in effect 14 machines in one, for the reason that by means of it and its attachments the operator can do 14 different kinds of work. In another part of this issue the company points out that an added feature is the friction reversible shaper spindle, which carpenter-contractors cannot fail to appreciate. Still another feature is the arrangement by which the operator may disengage any of the different attachments, or run them all at one time without changing any of the belts. Full details of the machine are set forth in a catalogue which the company has issued, and a copy of which any carpenter or builder can secure for the asking.

WILLSHIRE CLAMP COMPANY, Willshire, Ohio, is making what is designated as the "Ever-Ready" door clamp, for the use of carpenters and builders. The device is of such a nature as to hold doors and windows firmly on edge while being planed or while locks are being fitted. The claim is made that the construction is such that the weight of the door or sash serves to throw the clamping jaws toward each other, so as to hold the door firmly on edge, every downward pressure on the door causing the clamp to grip it more tightly. A simple thumb screw provides for adjusting the clamping jaws to take the different widths of doors, the clamping faces being padded to prevent injury to the work. The device is small and can easily be carried about in the ordinary tool kit of the carpenter and is ever ready for use.

HUTHER BROS. SAW MANUFACTURING COMPANY, 2500 University avenue, Rochester, N. Y., calls attention to Huther Bros. patent groover or dado head, which, it is pointed out, can be used on any circular saw mandrel for cutting any width groove from ⅛ to 2 in. or over. The construction is such that the device will cut a perfect groove either with or across the grain and leave the edges smooth. The company makes a specialty of concave ground smooth cutting circular mitre saws for either rip or cross cut; also grooving saws for all kinds of special work, band saws, scraper blades, etc. In regard to the patent groover or dado head, the company states that it will ship the device to any responsible firm on ten days' approval, and, if not satisfactory, the recipient is at liberty to return it at the company's expense.

THE DAVID LUPTON & SONS CO., Philadelphia, Pa., displayed at the recent meeting of Sheet Metal Contractors' Association in that city a working model of the Pond continuous sash and operating device, rolled steel metal sash, corrugated conductor pipe and fittings, copper spouting, stamped metal fittings, etc.

GORDON-VANTINE COMPANY, Davenport, Iowa, are co-operating with builders by furnishing them cuts of attractive advertisements for use in their local papers. These advertisements are prepared especially for the purpose and the building contractor or carpenter can secure copies of them free, simply paying for the postage and handling. The company's name does not appear in the advertisements, but it secures benefit from them by the increased business that comes to it from the contractors and carpenters making use of the advertising cuts. This is one of the many ways which the company is taking to show its plans of co-operating with the carpentry trade.

THE KEASBEY & MATTISON COMPANY, Ambler, Pa., made an elaborate display of asbestos roofing products, recently, at the Philadelphia convention of Sheet Metal Contractors' Association. The roof of its booth was covered with asbestos shingles, while samples of asbestos Century shingles, asbestos building lumber and asbestos cornice sheathing in a number of forms were shown.

T. H. BROOKS & CO., 3104 Lakeside avenue, Cleveland, Ohio, have sent out a pamphlet which covers a line of structural shapes, roof trusses, cast iron columns, vault lights, coal hole covers, sidewalk plates and store fronts. All of these lines are illustrated, and in addition there are views of a number of buildings for which this company furnished the structural work.

"ROOF THOUGHTS" is the title of an interesting booklet which is being distributed by the Genuine Bangor Slate Company, Easton, Pa., the matter within its covers relating to the advantages of roofs covered with slate. Numerous suggestive illustrations are presented, and the scheme of the general make-up of the booklet is decidedly out of the ordinary. Many reasons are given why slate roofs are better than others, some of which are that they will not rust, warp, crack, decay, chip, tear, burn or shrink. They require no paint to preserve them and are not affected by acids, gases or other substances. Another point is that a slate roof is not easily damaged and that the slate are not likely to be blown off by the wind. The company announces a series of pamphlets on slate roofing which it has issued, any of which will be sent on application.

A FEATURE of the August number of "Graphite," issued by the Joseph Dixon Crucible Company, Jersey City, N. J., is found in a number of illustrations of partially completed buildings, the steel work of which was treated to several coats of Dixon's Silica-Graphite paint. Another feature is what some might term a "living obituary," with portrait of Arthur C. Bowles, the present manager of the San Francisco branch of the company. Mr. Bowles entered the employ of the company in 1902, when he was attached to the San Francisco office, traveling in Southern California, Arizona, New Mexico, and a portion of Texas. His territory later embraced in addition the Republic of Mexico, the entire State of Texas, Arizona and the Hawaiian Islands. His records were such that it finally led to his appointment as manager of the San Francisco office.

AT THE RECENT PHILADELPHIA CONVENTION of the Sheet Metal Contractors' Association the Tubular Heating and Ventilating Company, Philadelphia, Pa., exhibited the Forbes warm-air furnace, which consists of a round firepot and combustion chamber, with an extended surface manifold in the rear, through which the products of combustion pass on one side of the casting and the air passes on the other. The whole construction is placed in an oval galvanized casing that does not stand as high as a short workman. It is provided with water heaters for combination heating. A booklet given as a remembrance contained reproduced photographs of plants in cellars of owners, with letters giving useful information of their behavior. These books also gave instructions for designing furnace work and contained tables that are almost daily used by the furnaceman.

MILWAUKEE CORRUGATING COMPANY, Milwaukee, Wis., was notified a short time ago of a decision made in its favor by the examiners-in-chief of the United States Patent Office in the matter of an improvement in mechanism for forming sheet metal elbows. This was an appeal from the decision of the examiner of interferences awarding priority of invention in the matter of the interference between the application of Friederich Brune, filed January 31, 1906, and the application of Adolph Dieckmann, filed January 18, 1906.

THE AUGUST "BULLETIN" of the Universal Portland Cement Company, Chicago, Ill., and Pittsburg, Pa., contains some very interesting information regarding the use of cement in connection with construction work of various kinds, ranging all the way from a concrete coal washery to the grandstand of the baseball grounds in Chicago. A feature of this issue of the "Bulletin" is the design awarded third prize in the Pittsburg Architectural Club competition for plans of a concrete house and garage. The "Bulletin" is illustrated by means of numerous half-tone engravings, representing work in connection with which Universal Portland cement was used. The "Bulletin" is published each month and is distributed free of charge among those who desire copies.

The Building Age

NEW YORK, OCTOBER, 1910.

A Twelve-Sided Farm Barn of Reinforced Concrete Construction

AS the adaptability of concrete for constructive purposes becomes more widely recognized, its use in connection with farm buildings shows a steadily growing popularity not only by reason of its fire-resisting qualities, but also for its economy and durability. One of the striking examples of its utility along the lines indicated is the twelve-sided reinforced concrete barn, which we illustrate upon this and the pages that follow and which was planned and erected by Menno S. Yoder on his farm half a mile west of Shipshewana, in La Grange County, Ind. The several half-tones show the general appearance of the completed structure with its bridged approach to the driveway, the location of the barn in its relation to the other farm buildings and the interior arrangement of the basement, where are located the cow and horse stalls. One of the half-tones also represents an interior view of the barn during an early stage of its construction. The basement plan clearly indicates the position of the various stalls, feeding alleys, hay and straw chutes, etc.

The building is twelve-sided, each side being 16 ft. in length, making it 192 ft. around the outside of the barn walls, while the diameter of the barn is 60 ft. The walls are of cement-concrete 30 ft. high above the ground floor and are reinforced with 118 rods of heavy wire fencing all made of No. 9 wires and placed in the middle of the wall.

At the sides of the doors and windows and above them the walls are further reinforced with old iron. The bridge beams imbedded in the walls at the sides of and above the doors have heavy wire wrapped around them for the purpose of more securely holding the cement in place.

The foundation is 3 ft. 6 in. wide at the bottom and tapers to the grade line, where the main wall begins 12 in. thick. The concrete for the foundation was mixed one part cement to six parts gravel and stones were tamped in. What is called gravel in Northern Indiana is sand and coarse gravel mixed. Above ground no stones were tamped in the walls and the concrete was mixed 1 to 5. The walls of the barn are 12 in. thick one-third of the way up, then 10 in. thick, while the upper third is 8 in. thick.

The bridge forming part of the driveway to the second floor of the barn is 18 ft. long and 16 ft. wide, with a rise of 10 in. It is made of steel and cement concrete.

The ground floor of the barn is cemented and has a driveway through the center, with a row of stalls and mangers on each side so arranged that the stock stand

General View of Barn with Bridged Approach to Central Driveway of Main Floor.

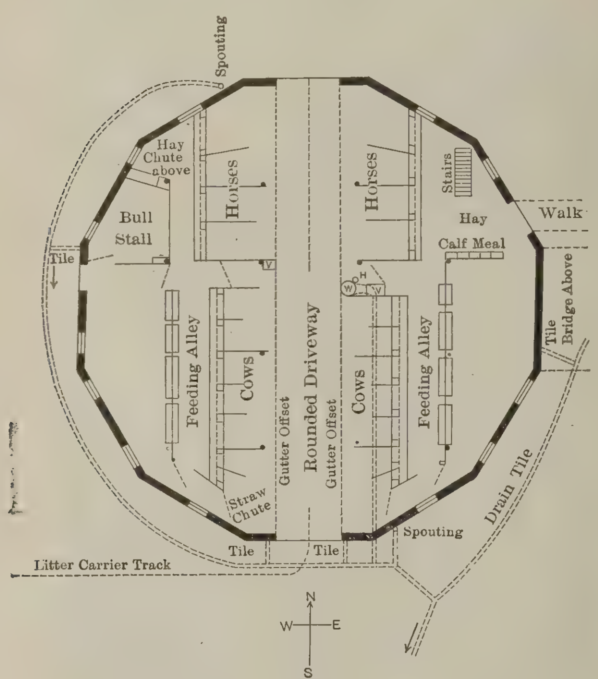
A Twelve-Sided Farm Barn of Reinforced Concrete Construction.—Designed and Built by M. S. Yoder, Shipshewana, Ind.

with their hind feet lined up to shallow gutters on each side of the driveway.

Nearly all woodwork about the stalls and mangers is low down, so that it will not obstruct the light or a view over the entire basement. The doors at each end of the barn are 8 x 8 ft., each door being made in two sections so that anything from a three-horse manure spreader to a top buggy can readily pass through it. The barn doors are hung on rollers and the square tubular track is fastened on the wall by bolts passing through it. There is a hydrant on the ground floor for watering stock.

There are 31 windows of the same size in the barn, there being four lights to each sash. The lower windows are protected inside and outside by heavy wire screens, the screen frames being held in place by wood screws tightened up against the cement. The window sash fits in the cement and is held there by common window bolts which fasten into small oak blocks in the cement.

The timbers of the second floor are supported by 16 tubular iron columns 6 in. in diameter and filled with



A Twelve-Sided Farm Barn of Reinforced Concrete Construction.—Fig. 2.—Plan of Basement, Showing Arrangement of Stalls, Feedways, Etc.

cement. This floor is nearly 9 ft. above the ground floor and is double boarded with inch boards having tar paper between. Above this floor is a frame of timbers across the barn, making one open passage or threshing floor 12 ft. wide and 12 ft. high, with another on the right side of it 10 ft. wide and 7 ft. high, both together giving a floor space 22 x 60 ft. in area. This is covered above with a rough floor with the exception of a space next to the big barn doors, which is left open to draw up hay. The granary bins at the left side of the threshing floor have spouts running down so as to permit of loading grain on a wagon in the stable driveway below.

The barn is 53 ft. high from the ground floor to the opening in the roof, over which the ventilating cupola is built. Iron rims of old binder wheels were put in for ventilator outlets and the upper end of the long rafters are bolted to these rims.

The lower king rafters are 20 ft. long and the upper 18 rafters are 2 x 8-in. timber spliced at the hip by pieces 8 and 10 ft. long. The pitch of the roof below the hip is 15 ft. rise to 12 ft. run and above the hip 5 ft. rise to 12 ft. run. The plate that holds the lower end of the rafters is built up of five thicknesses of 2 x 12-in. hardwood lumber, well interlocked at the corners by extra interlocking plank 6 ft. long put in the plate across the corners. It is all well spiked and bolted, so as to effectually withstand the outward thrust of the self-supporting roof. Short 2 x 4 pieces are securely

Fig. 3.—Photographic View, Showing Relative Location of Farm Buildings.

spiked on the outside of the plate and extend down over the outside of the wall about 6 in., bolts passing through these and the wall. The cornice supports are fastened to these 2 x 4s.

A ⅝-in. wire cable is embedded in the wall 4 in. from the top and the bolts last mentioned pass through the wall directly under this cable. A round hay track 30 ft. in diameter is placed just under the roof and is so arranged that the hoisting outfit will carry hay from the mow to the wagon as readily as from the wagon to the mow. A gasoline engine and power hoist are used to operate the hay carrier, although it can be operated with horses if desired. The engine is in the little shed roof building shown in the picture on the third page of this article, just at the left of the bridge to the second floor driveway.

The barn here shown has as much floor space as a square barn 40 x 72 ft. in plan, while it required 32 ft. less outside wall to enclose it. It also has less roofing in about the same proportion.

When building the barn wall "forms" were used ex-

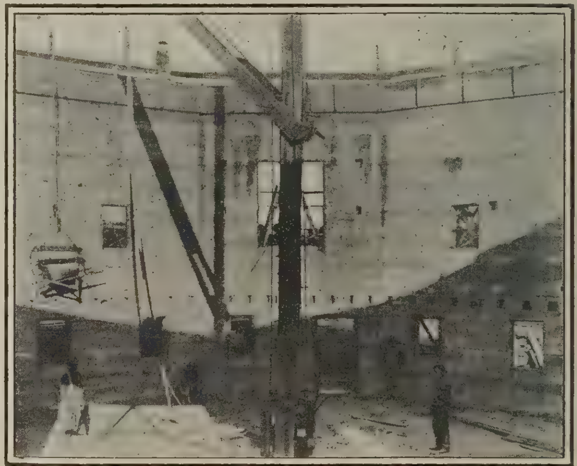


Fig. 4.—Interior View of Barn During Construction of the Walls.

tending all around the barn made of three 2 x 10-in. hemlock planks fastened together with 2 x 4-in. cleats placed 4 ft. apart. These forms were held in place by removable bolts 20 in. long.

The heavy work of mixing and lifting concrete, elevating lumber and lifting the "forms" was accomplished through the medium of a gasoline engine. Every time the "forms" were raised the outside of the barn wall was painted with a mixture of pure cement and water. A double drum hoist was used in connection with the engine and a cable on one drum pulled the gravel truck up above the mixer, while a rope on the other drum operated on the crane to do the hoisting. The center pole of this home-made crane was 64 ft. high.

As will be seen from an inspection of the floor plan, there are two long feeding alleys, one on each side of the double central stable, while outside of the feeding alleys the irregular shaped space is utilized for box stalls and calf pen, but all is so constructed that any kind of stock may be fed in them. A little carrier is used for supplying bedding to the stalls for the cattle. There are 60 ft. of track in the stable and 70 ft. of track over the barn yard outside. The mangers or feed racks, as they might properly be termed, are 18 in. above the cement floor for the horses and 12 in. for the cattle. There are cross bars lengthwise of the mangers through which the stock gets its hay, the lower space being open 12 in., and the others above are 8 in. for the horses and 7 in. for the cattle. The side of the manger toward the stock is a 2 x 8-in. plank fastened in a sloping position, with the small feed box on top of it, and the side of the manger away from the stock slopes out and is high enough to hold the hay. The

A Twelve-Sided Farm Barn of Reinforced Concrete Construction.—Fig. 5.—View of Barn, Showing Driveway Entrances at the Two Floor Levels. Also View of Engine House.

horses have an extra cross bar of gas pipe higher up to keep them back where they stand while eating. The advantages of these mangers is said to lie in the fact that stock can lie down where they stand while eating without stepping back and horses can be fed in the cow stalls when necessary, which would not be the case if stanchions were used.

Lids that slide horizontally on rollers are fitted under the floor at the opening of the hay chutes to close them in cold weather. They can be operated from any point along the chute to the roof by double cords running on pulleys. There are six 8-in. inlet ventilators through the walls of the stable, each ventilator being made of two elbows and a joint of pipe placed upright in the wall. There is one outlet ventilator 27 x 27 in. made of matched 6-in. flooring and leading from a point 10 in. from the ground floor to the peak of the roof.

The stairway and hay chute openings are kept closed in cold weather, as there is perfect control of the ventilation by opening or closing more or less of the inlet ventilators. The cold impure air is carried out through the outlet ventilator, which is open all the time and draws up the air somewhat after the manner of a tall chimney. The horses and cattle keep the stable warm, this being possible because they are housed together in one tight but well lighted and well ventilated basement.

The barn, according to Mr. Yoder's statement, cost about $1,800 besides the labor and what building material was cut on the farm. Most of the gravel was hauled in the winter from the banks of a dredge ditch about 5 miles distant. About 150 loads were used in building the barn. The point is made that water does not freeze in the basement of the barn and experience has shown that with less than half as much stock in

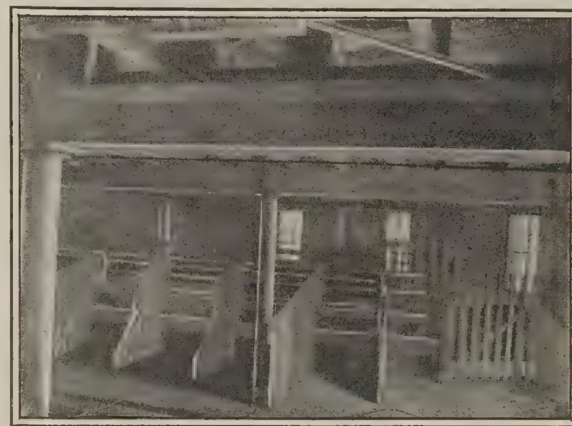


Fig. 6.—View of Stalls in Basement of Building.

the barn as could well be stabled the temperature in cold weather has been from 19 to 27 deg. warmer than it was outside.

Preventing "Dusting" of Concrete Floors

Improperly laid concrete floors which have been allowed to become prematurely dry, says Albert Moyer in discussing the subject, are porous and weak, causing easy abrasion under foot traffic, or what is commonly known as "dusting." This can be remedied as follows:

Wash the floor thoroughly with clear water, scrubbing with a stiff broom or scrubbing brush removing all dirt; allow the surface to dry. Mix 1 part water-glass (sodium silicate) of 40 deg. Baume, with 3 to 4 parts of water, total 4 to 5 parts, depending upon the porosity of the concrete. The denser the concrete, the weaker the solution required.

Apply with a brush one coat evenly over the entire surface. This will penetrate into the pores of the concrete. Allow the concrete surface to dry, after 24 hours apply another coat the same as before. Again

Fig. 7.—Looking Along Driveway in Basement, with Cow Stalls in Foreground and Horse Stalls Beyond.

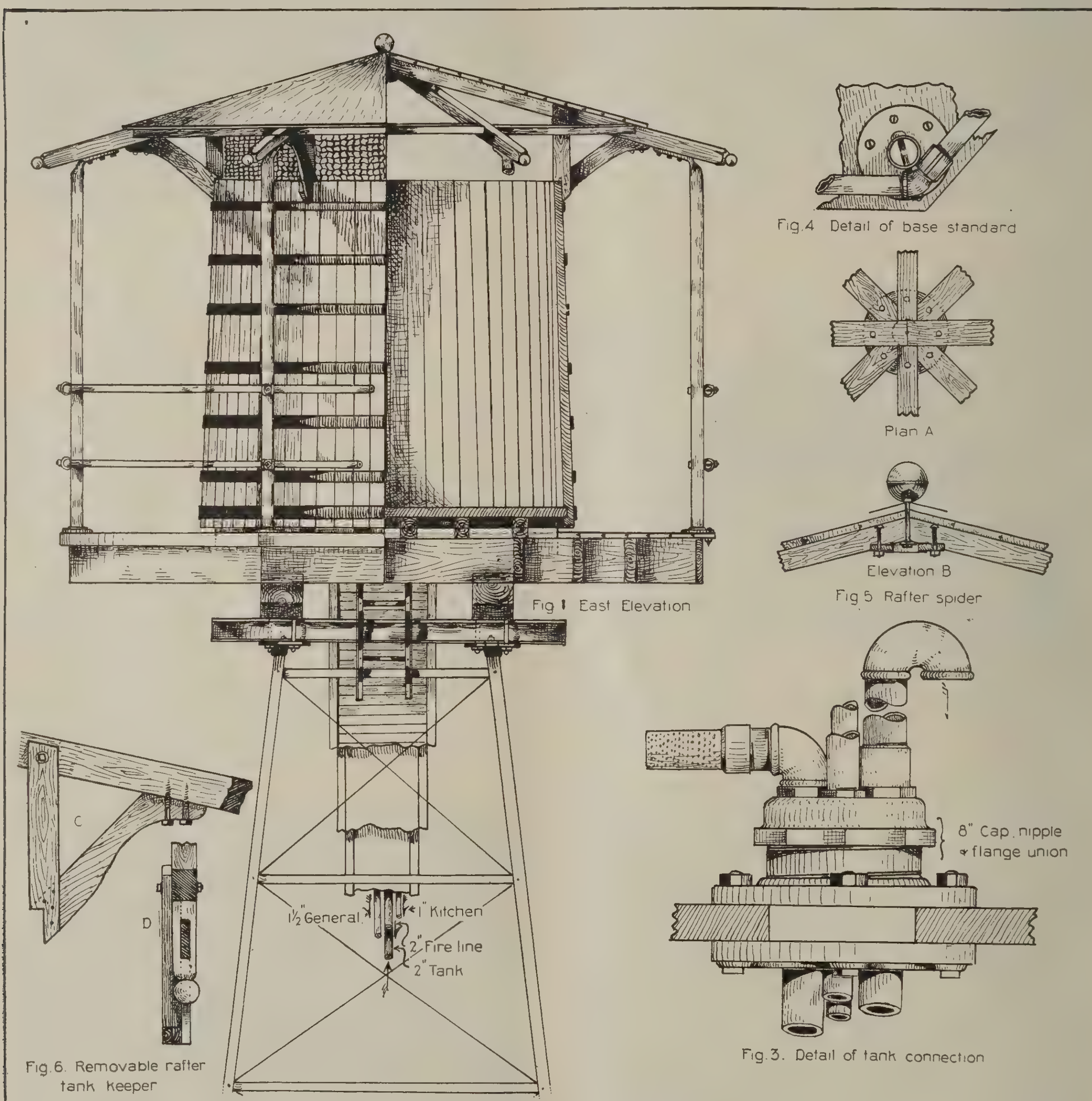
allow the surface to dry and apply another coat. If after 24 hours the third coat is not flush with the surface in any part of the floor, apply another coat. That which remains on the surface can be readily washed off, thus evening up the floor. That which has penetrated into the pores has come in contact with the alkalies and salts in the concrete and formed into an insoluble, very hard mineral glue.

DETAILS OF A WATER STORAGE TANK

By W. B. Gray.

An institution with 75 years' experience in paying for and using domestic water storage facilities was prevailed upon by a tinner to allow him to erect an elevated tank of sheet metal. Shortly after its erection a similar tank was blown from its structure during a wind squall, while it was without sufficient contents to withstand the strain. Thereafter, the owners were continually on the anxious seat from fear theirs would be blown down by high wind when it was door. No method of repairing could give it a respectable lease of life.

On inquiry it was learned from some of the older people on the place that a wood tank had, under cover, done service on the premises for 40 years. It was pointed out to them that many railroad companies still adhere to wood tank storage; that the life of a light metal tank is short; that the present tank was hand made, on the ground, and, therefore, ungalvanized



Elevation and Various Constructive Details of a Water Storage Tank.

without sufficient water to hold it in place. After five years the tank developed numerous leaks.

The writer was called to see what could be done. The tank was a paper-weight galvanized sheet affair, badly pitted in the bottom and seam-strained at several levels from sheet-ice expansion. It was without anchorage save the lock-nutting of the 2-in. discharge pipe, the delivery to tank being up and over outside. It had a close iron cover with a swinging trap. The dunnage was barely sufficient to support the tank bottom and the ladder, attached to the tank itself, was so close as to give no toe-hold in climbing up to the trap over the seams and rivets; that it was without platform and railing; that a wood tank would last long and could be easily erected, piece by piece, and that a 2-in. well-made cypress tank could be placed upon the present tower in a way that would shelter it sufficiently and make it accessible from any quarter, by means of a common ladder on the balcony. It was pointed out further that any hoop could be tightened, driven down or renewed; any stave calked or renewed; a new bottom board renewed; a new line of pipe placed, removed or repaired without the aid of a derrick or guy poles and without disturbing the balcony, railing, standards or canopy; that the wood tank would not suffer from frost as the iron one did and that when thus properly erected, would serve at least 25 years and perhaps longer.

A new tank was favored and the plumber looked the premises over to see what timber was at hand that could be utilized—after which, he designed, to approximate scale, the structure shown by the accompanying illustrations.

The tower was the only redeeming feature of the original work, being a four-post, 3-in. galvanized angle iron type with good foundation and good eye-beams bolted to the shoes at the top. The bracing was not in good condition on account of plain bolts having been used and allowed to go unprotected. A general elevation with the tank and sub-structure broken to show construction is represented by Fig. 1. It was proposed to add to the tower, additional lacing of 1¼-in. galvanized angle iron. A triple frostproof box with mineral wool in the two outer compartments and plenty of room in the interior for all lines that might be needed was in place. It had been erected by some one who knew enough to make it positively serve the purpose even if at the expense of more material than necessary, and had been placed after trouble with the discharge pipe during the first winter of the tank's service.

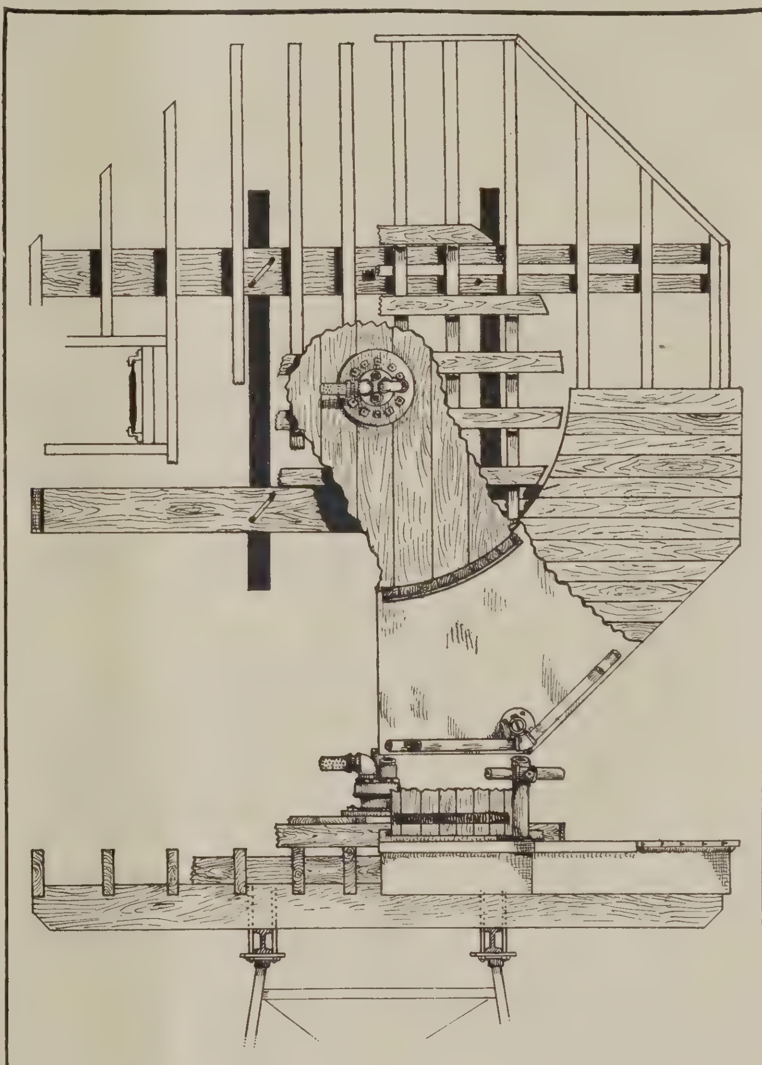
The entire sub-structure of the old tank was counted as naught, the new work to begin with two 8 x 10-in. x 14-ft. timbers gained down ½ in. over the eye-beams and stirruped to them with ⅞-in. rod stirrups passed down through auger holes straddling the eye-beams, and through a straight bar of 2½ x 1-in. iron in a way to prevent slipping or rocking of the beams. Over these timbers was placed a grillage of 2 x 12-in. joists notched down over the timbers 2½ in. and gained into them ½ in., the grillage being cut to form an octagon platform. Between the grillage, blocks of 2 x 8-in. joists were filled in over the timbers to act as bridging. Across the grillage and somewhat less in length than the inside diameter of the tank at the bottom was placed a dunnage of 4 x 6 timbers, upon which the tank bottom was assembled in due time.

A ⅞-in. common tongue and grooved yellow pine floor was layed over the grillage balcony space to form a walkway around the tank, the floor projecting 2 in. over the skirting, which was 1½ x 12-in. plank. The walk-way floor was covered with galvanized iron bent down 2 in. at the outer edge and turned up midway between the ends of the dunnage and the inner edge of the staves.

A metal ferrule extended from the top edge of the floor sheet under the tank to below the bottom of the platform floor. In this way any leakage that may drop outside the ferrule line finds its way off the platform at the outer edge and what falls inside the ferrule falls to the ground, as the grillage and dunnage is open under the tank, except where the frost-proof box is extended up to the tank bottom. The box is covered over with metal so as to convey leakage from over it. In general, all this is indicated by Fig. 1, and the "quarter-section" plan view, with side elevation, Fig. 2.

The canopy is held up by eight 2-in. pipe standards, flattened 12 in. at the top and bent to the angle of the cover. These are lag-screwed to the under side of the rafters and attached to the platform by means of 2 x 6 in. floor flanges, the holes coming over the floor inside the skirting being filled with wood screws and those over the floor outside the skirting between it and the water shed of the galvanized sheet being bolted.

The railing is formed by two lines of 1-in. pipe attached to the 2-in. standards as shown. The work is all threaded right-handed except at the finish, where two male and female 45-deg. malleable bends were used and a right and left coupling used to join the two ends. The 2-in. standard and flange with 1-in. 45-deg. bend attached by ½-in. bolt and the right and left connections are shown in detail sketch Fig. 4. The pocket over the 45's, next to the standard, was filled with asphalt putty.



Details of a Water Storage Tank. Fig. 2.—Plan and Elevation of Platform.

The canopy frame consists of eight 3 x 4-in. rafters joined as shown in plan detail Fig. 5. In lieu of a spider casting a 4 x 12-in. undrilled pipe flange was bored to suit and bolted, housed in, to the rafters underneath at the apex, as shown in detail plan and elevation A and B, Fig. 5. The apex of the canopy is surmounted by a 6-in. copper ball, a galvanized bolt having been placed through the entering half and soldered inside before the ball was put together. This, with a deck flange slipped over the bolt and soldered to the ball in the neck, makes an excellent finish to the crown of tin roof, the opening in the pipe-flange spider affording an easy means of screwing up a nut and washer at the bottom to hold this improvised finial in place.

Other than the tongued and grooved sheeting to support the tin, no other framing was placed in the canopy except a skirting strip shown in Fig. 1. To act somewhat as stiffeners and to keep wind pressure of any velocity from tipping the tank, should it be empty and detached from the pipe, a rafter-keeper brace made as shown in detail elevations C and D, Fig. 6, was placed at each rafter, the upright being bolted through the rafter and the brace arm lagged to its under face. The brace and upright are well nailed together at the tank, but not fastened to it.

Only one line discharged from the old tank. It was thought best to provide for other lines in case a better and more extended distribution of the supply should be desired. The delivery to the tank was brought up through the frostproof box and the present discharge already in place extended into the tank and provided with a strainer as shown in detail in Fig. 3. Other lines were also placed, anticipating a change in the supply, so that supplies for different purposes would be automatically controlled by their intakes stopping in the tank at altitudes corresponding to their importance.

Where a number of pipes lead from a tank, nothing short of a gang plate of some type is satisfactory to the man doing the work. In this case an 8-in. cap was bored for the necessary pipes, which with a nipple and flange union made an admirable substitute for the usual plate. A hole was cut through the tank bottom in the center and the bolt-housing half of the flange union placed below. Blocking between the dunnage was fixed below this so the bolts could not drop too far. The lines were brought up to one level, all with long threads of the proper length and lock-nuts run down tight to a level and the cap, nipple, upper half of the flange union and gasket dropped over the ends and lock-nutted down firmly with packing between the upper lock-nuts and top of the cap, thus insuring no out leakage when the pipes enter.

The bolt holes of the gasket were cut as tight as possible and the whole arrangement screwed down in asphalt, and bolt ends, nuts, gasket, cap, lock-nuts, nipples and flange thickly covered with it, hot. By taking off the nuts and loosening the upper lock-nuts, the cap and flange can be lifted off and any line changed, renewed, added or repaired without trouble and without opening the frostproof box anywhere between ground and tank bottom. The delivery to the tank was extended up to above water level and fitted with an open pattern return bend.

The water level in the tank is indicated in the kitchen by a column of mercury operating over a scale by means of water pressure from the main supply acting upon the surface of the mercury in the cup into which the glass tube dips. The scale on the board was penciled in by actual test.

Leaves, birds and insects are kept out of the tank by a crown of wire mesh stapled to the sheeting and tacked lightly to the top of the staves, a hinged section being provided so that it can be let down when necessary to enter the tank.

The angle iron ladder of the original tower is the means of reaching the tank platform, through a trap door in the balcony floor. The door is hinged on the tank side and fitted with cords and pulleys, so that it can be pulled up from the ground before starting up a ladder and pulled down again with a second cord after descending.

Some Curious Buildings in England

According to a late issue of the London *Daily News*, the village of Brightling, about 9 miles inland from Hastings, possessess probably the most novel collection of strange buildings to be found among the British Isles.

About half a century ago a certain Squire Fuller, the chief resident, who was possessed of great riches, spent money lavishly in the erection of numerous quaint buildings, with the idea of rendering his memory imperishable in the little vallage. Squire Fuller's eccentricity earned him the sobriquet of "Mad Jack."

Perhaps the most remarkable of the buildings is the Sugar Loaf House, in which the "Mad Squire" was anxious to immune a man for seven years, during which time the victim was neither to shave, wash nor hold any communication with the outside world. His food was to be passed in through a window. There were several candidates for the experiment, but the authorities intervened and forbade the execution of the wild scheme.

The observatory contains in the dome a camera obscura, which the Squire placed there so that his tenants could keep observation on their cattle without going into the fields.

Cleopatra's Needle, built of local sand stone, stands at an altitude of 600 feet above the sea, and its base is covered with innumerable visitors' names.

"Solomon's Temple," built in the style of an Eastern mosque, with massive marble pillars, was used by "Mad Jack" as a card room.

The Squire's tomb, built to resemble the Pyramids, has a beautifully decorated interior and bears carved quotations from the Squire's favorite authors. The Squire's coffin was placed on a stone trestle above ground and the door of the tomb locked with a key which was afterward destroyed.

Beacon Tower was originally intended to guide ships into Pevensey Bay, but the Squire planted trees all round and thus rendered it useless to mariners.

Bedding Plates and Posts on Concrete

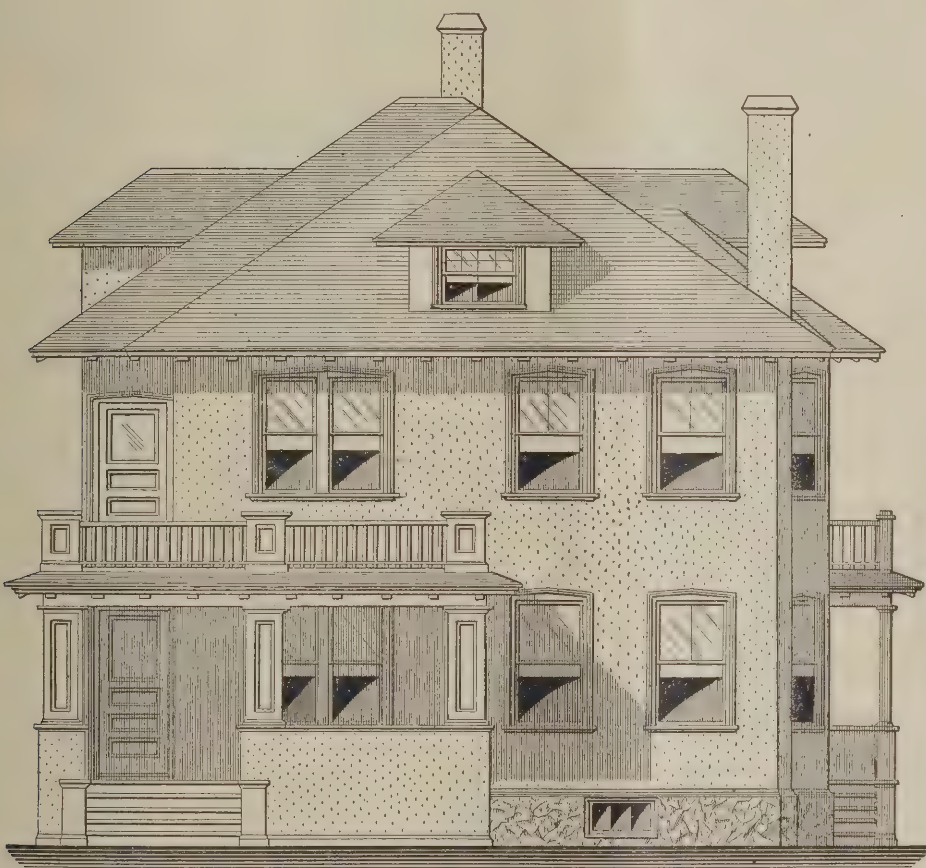
By J. Crow Taylor.

Concrete is the greatest material going for foundations under frame buildings, both for the side walls and for footings under posts, and there are several forms of construction and different methods of bedding the plates and posts on the concrete. Some make a monolithic wall to the top of the ground for the main building and then use hollow concrete blocks above so as to reduce the chances for moisture to work up by capillary action and cause decay in the plate and joists. Where this is done the common practice is to put a plate of 2 x 8 directly on top of the concrete blocks. A better plan is to cover the bottom side of the plate with some form of waterproof building paper. One good way is to take a tar or asphalt paper, then use a tar paint and paint the plate thoroughly with it on the bottom side, after which attach the paper to the plate with tacks; put another coat of paint on top of the paper, then turn it right side up to the wall.

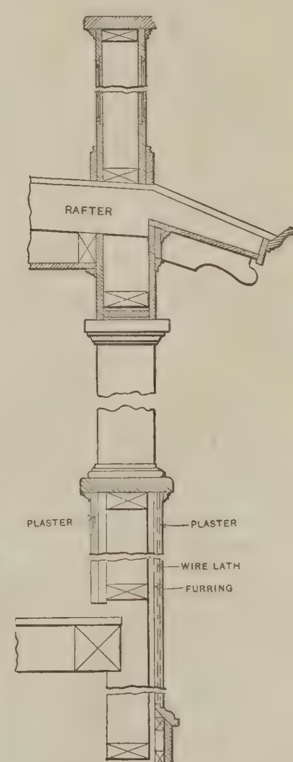
One can take ordinary rolls of roofing paper, and with an old hand saw with coarse teeth, using coal oil quite liberally, saw the roll off in sections that will give the width wanted for the plate. If it is an 8-in. plate cut off 8-in. sections of the roll before undoing it, or if 10-in. then 10-in. sections, and so on. It will be found much more convenient than trying to unroll it and trim it with a knife to width. Then, under the footing of posts carry out the same idea. Put a coat of tar or asphalt paint and then put a sheet of tar paper either two-ply or three-ply, depending on one's preference, and another coat of tar paint. This kind of bedding will insure it against the chance of moisture coming up into the posts and plates and causing decay, and while it is a little tedious and takes more time, it is worth the additional cost.

A TWO-FAMILY HOUSE PLASTERED OUTSIDE WITH CEMENT-MORTAR

AT the present day the two-family type of dwelling is a noticeable feature of many important building operations in connection with the development of the suburban sections of our larger cities. The type has been growing in popularity for many years and the modern construction is well adapted to meet the requirements of those in moderate circumstances. It enables the owner to occupy one portion of the dwelling while renting out the other half and receiving a return upon his investment which gives him comfortable housing accommodations practically rent free. The design which we illustrate herewith is interesting not only from the standpoint of the builder and prospective home-seeker, but also by reason of the fact that it was planned by a woman, not altogether unknown to the readers of this journal by reason of the recognition which her designs received in connection with several of the house competitions conducted under the auspices of *Carpentry and Building*.



Front Elevation.—Scale, ⅛ In. to the Foot.



Section Through Front Porch and Balcony.—Scale, ½ In. to the Foot.

A Two-Family House Plastered Outside with Cement-Mortar.—Designed by L. E. Kingston, Worcester, Mass.

The house is of plastered exterior, natural color, with a green slate roof; trimmings of cream white and the blinds of sage green. According to the author's specifications the foundation walls are to be of quarried stone, laid up dry and all joints well flushed up both sides with cement-mortar, after which the inside is to be whitewashed with two good coats. All footing stone are to be at least 6 in. thick and as large as may be necessary to support the weight placed upon them. The underpinning wall where exposed above grade is to be of quarried granite laid as broken ashlar with vertical and horizontal joints, the work to be laid in cement-mortar and pointed with Portland cement.

The first floor joist are to be 2 x 9 in.; the second floor joist 2 x 8 in. and the third floor joist 2 x 7 in., placed 16 in. on centers. The collar beams are to be 1 x 8 in. and the rafters 2 x 7 in. placed 20 in. on centers. The outside wall studs are to be 2 x 4 in. and the inside wall studs 2 x 4 and 2 x 3 in. placed 16 in. on centers. The sills are to be 4 x 8 in. and the girders in the basement 8 x 9 in. supported on 3½ in. iron posts. The outside frame of the house is to be covered with matched hemlock boards, which in turn is covered with red sheathing paper. The outside wall surface of the dwelling is to be furred with ½ x 2 in. furring strips placed not more than 12 in. on centers. On this in turn is to be placed galvanized herringbone wire lath fastened with galvanized nails. The whole surface, including chimneys where exposed, is then to be plastered with cement-mortar, the last coat to be left rough cast.

The roof is to be framed and constructed as shown, and covered with matched spruce boards, on which is to be laid 10 x 14 in. green slate, secured with large-headed galvanized iron nails.

The cellar is to have a floor consisting of 2 in. of cement-concrete with a top layer of Portland cement ¾ of an inch thick, the floor to pitch to a catch basin. The partitions in the cellar are to be of 2 x 3 in. studs, the laundry partitions being boarded both sides with matched spruce boards and the ceilings boarded on the joist. The other partitions are to be boarded one side to within 1 ft. 6 in. of the ceiling, and the remainder covered with coarse wire netting.

The porch floors are to be pine laid open ¼ in., while the ceiling is to be of matched pine sheathing. The porches are to be supported on 2½ in. iron posts. The balcony rail is to be formed with posts and balusters and the balcony to pitch 2 in. and to be covered with Paroid paper. The steps are to be of wood with plastered buttresses.

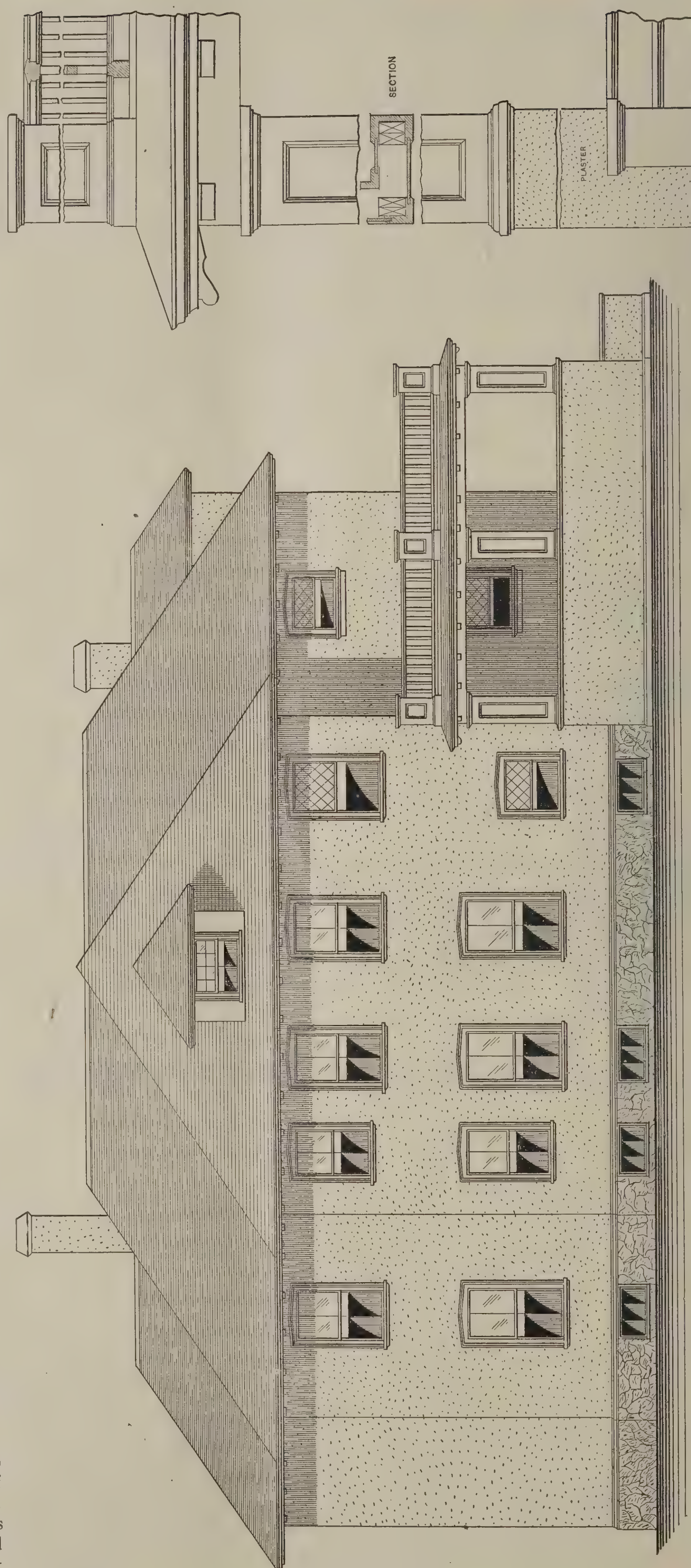
The window frames are to be of pine and the sash are to be glazed with first quality double-thick glass hung with weights and Samson spot cord.

The floors, except in the bed rooms, are to be ⅞ x 3 in. matched birch, selecting light for one and dark for another room. The front halls are to be laid in alternate light and dark strips. The bed room floors are to be No. 1 matched ⅞ in. spruce. The living rooms, dens, dining rooms and halls are to be finished in even-colored birch with doors to match. The finish around the sides and tops of doors and windows are to be as shown in the details, and the windows are to have stool and apron finish. The base is to be 9 in. high with a molding on top. The dens are to have a plate rail about 6 ft. from the floor. The remaining rooms are to be finished in even-colored hard pine with doors to match, with stock pattern finish, etc.

The china closets are to have a case of four drawers with four shelves over, enclosed with one door, fitted with double-thick glass. Pantries are to have countershelf enclosed with sheathing doors and one case of three drawers. Above the countershelf are to be five 12 in. shelves, part closed in with sheathing and drawers. Under the sink is to be a case of three drawers and the remainder closed in with sheathing and provided with a door.

The kitchens, bath rooms, pantries, entries and rear staircase halls are to be wainscoted 3 ft. 6 in. high, with beaded sheathing and have a cap molding. The storerooms, opening from the entries, are to be fitted with coal and wood bins 4 ft. high and have two shelves over them. The galvanized iron sliding ash sifter is to be connected with an 8 in. pipe extending to the ash pit in the basement.

The front stairs are to be an open flight built of birch, to have 2 in. stringers; 1⅛ in. treads and 1 in. risers grooved together. The newel post



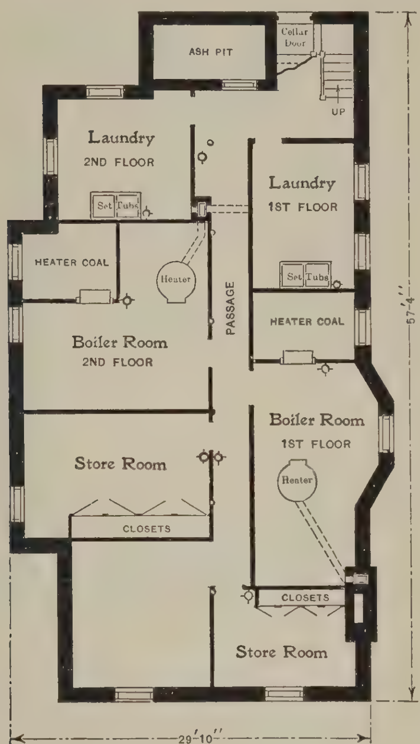
A Two-Family House Plastered Outside with Cement-Mortar.—Side (Left) Elevation.—Scale One-Eighth Inch to the Foot.—Details of Front Balcony.—Scale, One-Half Inch to the Foot.

is to be 6¾ in. square and paneled, while the angle posts are to be 4¾ in. square and have 2¾ in. rail with 1¾ in. balusters.

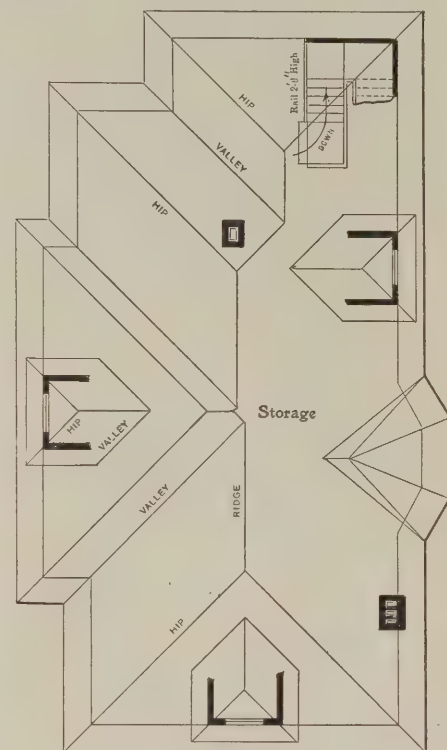
Each fireplace in the living room is to have a wooden mantel.

The front door is to be operated by an electric for each family and properly wired, with all necessary batteries to operate them.

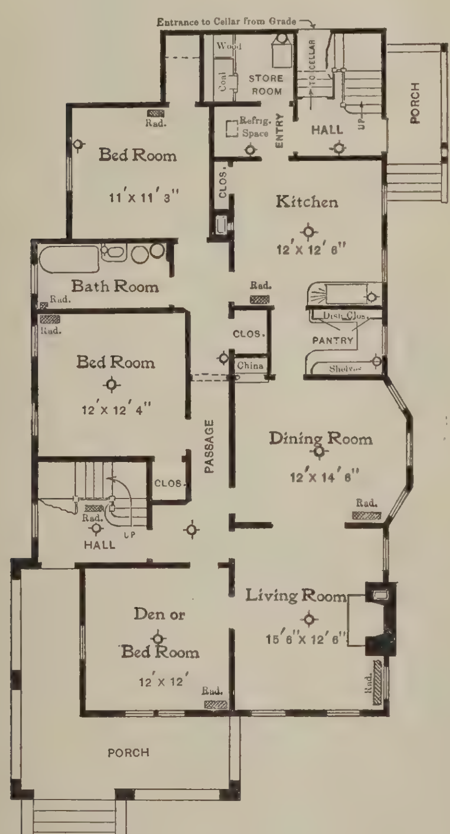
The house is to be heated with two "Volunteer" steam heaters with 18-in. fire pots and heating capacity of 300 ft. A one-pipe system is to be used with "National" two-section radiators, the latter to be 38 in.



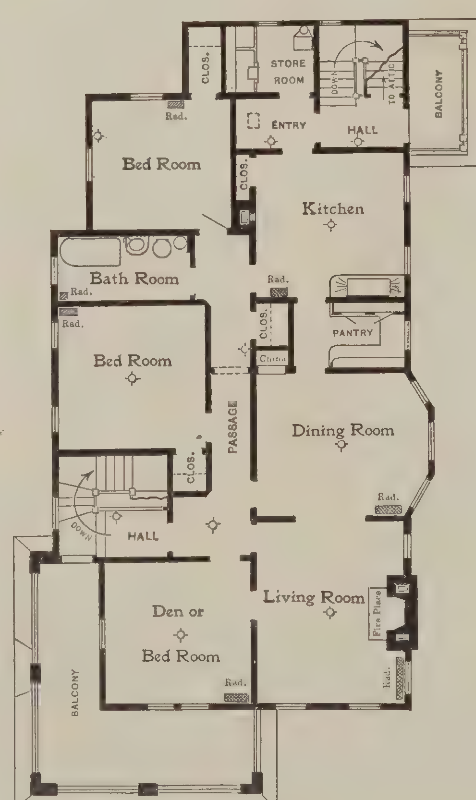
Foundation.



Attic and Roof.



First Floor.

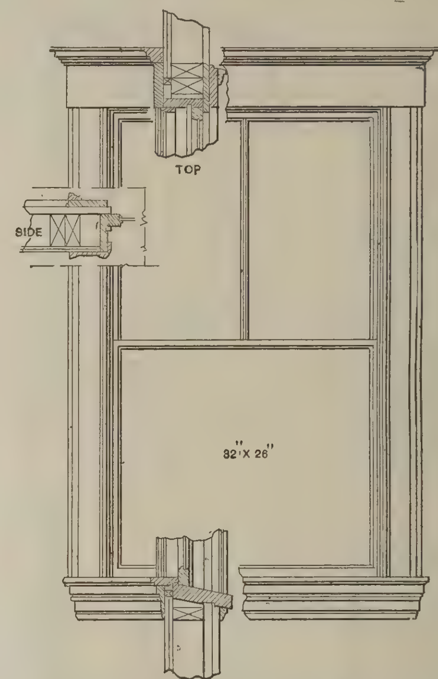


Second Floor.

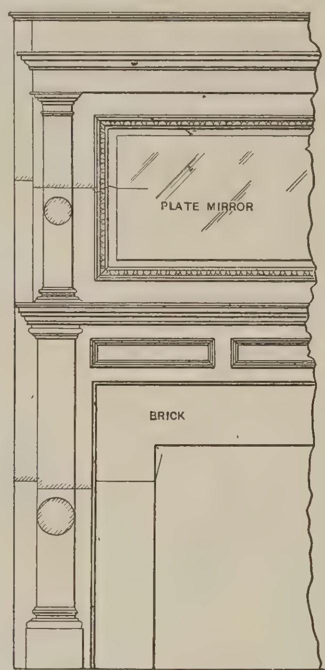
A Two-Family House Plastered Outside with Cement-Mortar.—Floor Plans.—Scale, One-Sixteenth Inch to the Foot.

opener from the passageway of each floor. There is to be a speaking tube from the passageway of each floor to the front door, with porcelain mouthpieces. There is to be an electric bell for front and rear doors high, except in the living rooms, where they are to be 23 in. high. The building is to be piped for gas, the owner to select lighting fixtures.

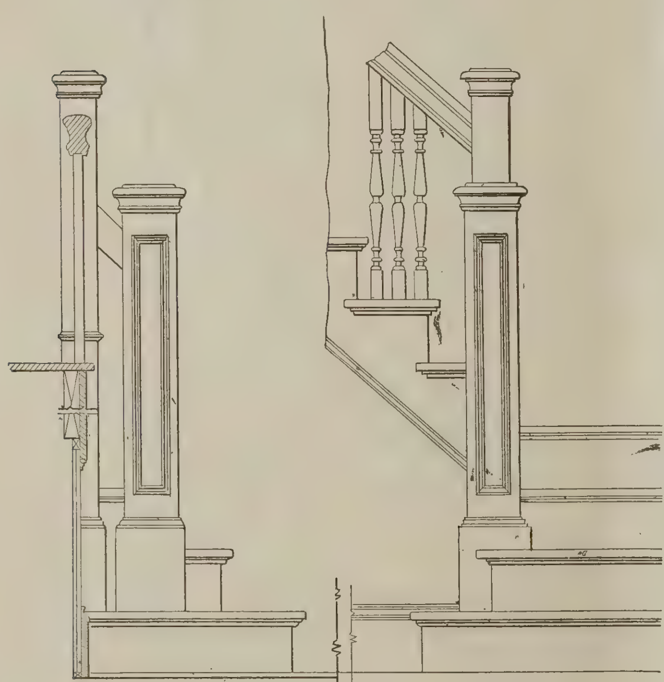
Each laundry is to have a set of two-part Alberene soapstone set tubs supported on iron legs. The sinks are to be Alberene soapstone, with backs 14 in. high and drip shelf at each end. A 30-gallon pressure hot water boiler is to be placed in each bath room, with all necessary brass pipes to supply boiler and running from boilers to fixtures and stoves. Each bath room is to have a syphon jet closet, bowl made of vitreous ware, with red birch seat and cover, copper lined tank and fixtures. Wash bowls are to be one-piece enameled iron 20 x 24 in. with nickel-plated waste trap, supplies and low pattern faucets. Each bath room is to have a 5 ft. enameled iron tub with rubber stopper and chain, the ceilings to have a coat of oil and a coat of varnish. The birch floors in the living rooms, dens and dining rooms are to have a coat of shellac and two coats of Johnson's wax, well polished. The front hall, passageway or corridor, kitchen, pantry, bath room, entry and closet floors in each tenement are to have a coat of oil



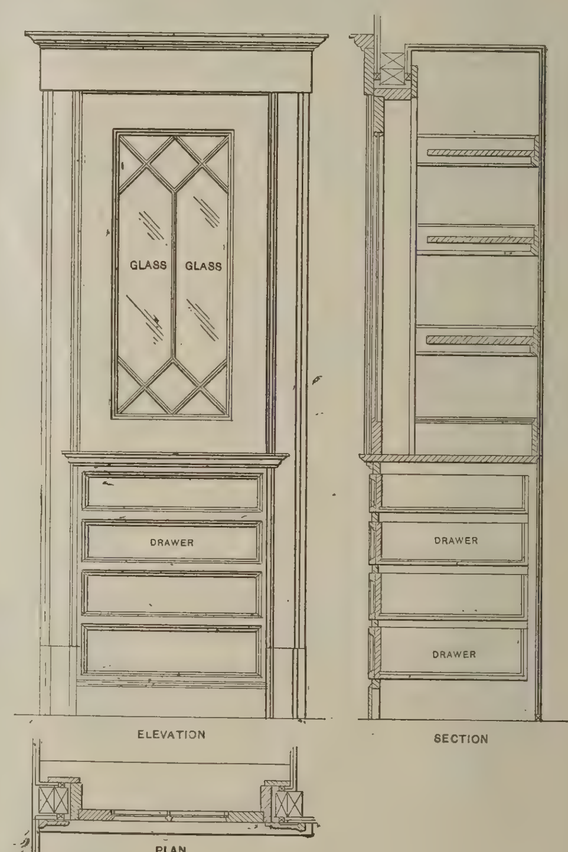
Details of Window Construction.—Scale, ½ In. to the Foot.



Detail of Mantel.—Scale, ½ In. to the Foot.



Details of Main Stairs.—Scale, ½ In. to the Foot.



Details of China Closet.—Scale, ½ In. to the Foot.

A Two-Family House Plastered Outside with Cement-Mortar.

with double bath cocks and nickel-plated supply pipes.

All wood, galvanized iron, tin or other work on the outside, including blinds, are to have two coats of pure lead and oil paint. Outside birch doors are to have a coat of oil and three coats of exterior varnish, while the outside pine doors are to have three coats of paint. The birch floors are to have three coats of paint, and and two coats of Berry Bros. liquid granite. The spruce floors in the bed rooms are to have two coats of paint.

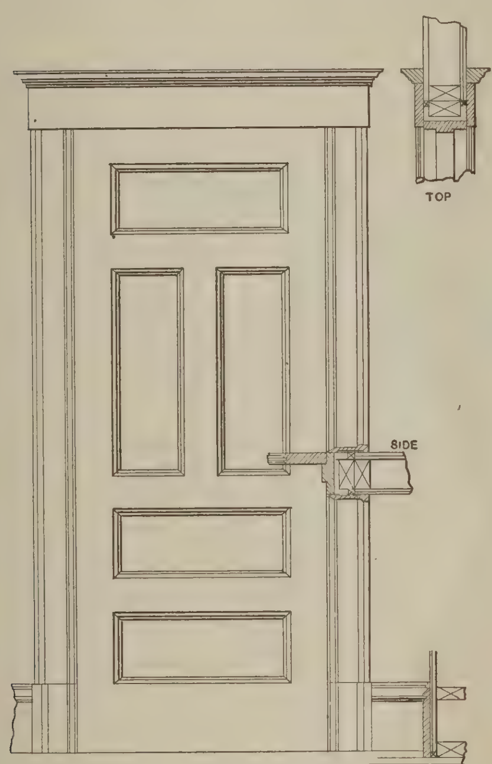
The birch finish in the front halls, dens and living and dining rooms are to have a coat of stain and two coats of Berry Bros. varnish, followed by a coat of Flatine. The hard pine finish in the bed rooms is to have a coat of stain and two coats of Berry Bros. varnish, left with a lustre. The remaining finish work is to have a coat of oil and two coats of varnish.

The walls of the kitchens, pantries, entries and bath rooms are to have a coat of sizing and two coats of oil paint. All cellar doors and sash, stairs, the inside of laundry partitions, as well as ceilings, are to have two coats of paint. The same treatment to be given the attic sash and stairs.

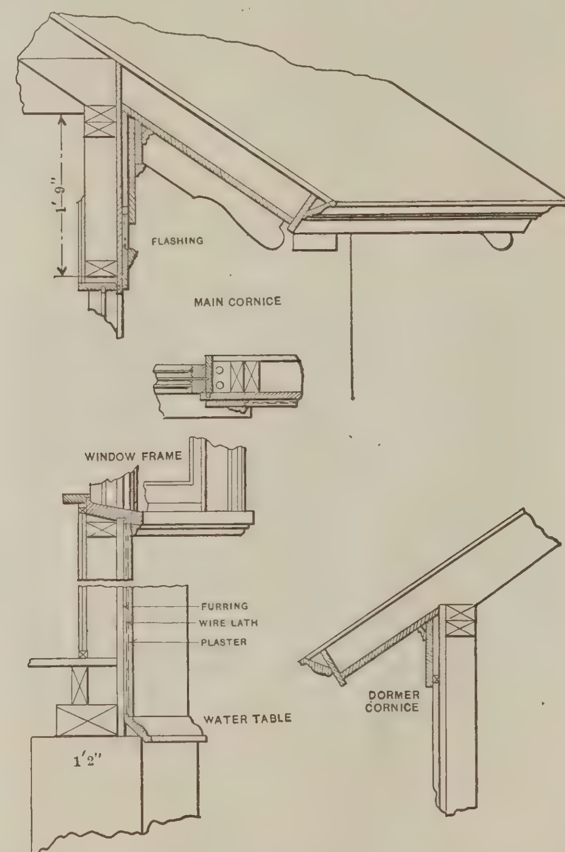
The author of the design is Laura E. Kingston, 518 Main Street, Worcester, Mass.

Some Curious City Houses

An architect in commenting recently upon old and new residences in the Metropolis of the East referred to the talk frequently heard at the present time about the unsatisfactory methods of speculative builders, and pointed out an old-fashioned brown stone residence on Fifth Avenue as a striking example of how badly they



Elevation of Door, Showing Trim.—Scale, ½ In. to the Foot.



Details of Water Table, Window Frame, Main and Dormer Cornices.—Scale, ½ In. to the Foot.

A Two-Family House Plastered Outside with Cement-Mortar.

used to do it in the good old days. Referring to a group of several houses, which from general appearances would indicate the most substantial workmanship and the greatest comfort possible in the methods of builders at the middle of the nineteenth century, he said that as a matter of fact they were mere shells and always were. More than 40 years ago he said a firm of speculative builders hurriedly put them up; the materials were carelessly thrown together and the general result flimsy. There were architectural defects which would not be tolerated to-day, even in a house planned merely by builders without the aid of architects' experience. There was no butler's pantry in those houses, and there were no back stairs. Just fancy, he said, houses on Fifth avenue having such pretensions being put up that way in these days!

Another old house on the Avenue and which exteriorly presented a rather comfortable appearance is as much of a snare and a delusion as the other houses, in that there is no possible means of heating it. It is so constructed that no apparatus can be put into it that will not cost more than the thing is worth—a fault of its original construction—and ever since it was first put up there has been a constant moving in and out of tenants who thought they could put up with it but discovered afterward how impossible it was.

Glass Bricks Equal Stone

It is generally considered that glass is the most fragile of all the building materials. As a matter of fact, it is one of the most substantial. It is no common thing to encounter a house built in the Colonial times or earlier still supplied with many of the panes of glass which were originally put in place upon the completion of the building. We must realize the substantial qualities of glass when we contemplate the extremes of temperature and the many shocks that these panes must have withstood in their career.

Glass put to the crushing test is harder than granite. It has a resistance of 1800 tons per square foot, while that of granite is 750 tons, limestone 625 tons, brickwork 60 tons and concrete 97 tons. In view of these figures it is surprising that glass has not before entered into serious competition with the other building materials. Glass bricks are being introduced for a number of purposes, and they are recommended for their strength and hardness of surface, which is a guarantee against chipping and cracking and entirely sanitary under all conditions. The glass brick consists of a shell with two flat surfaces which form the exposed portions when in place, and after being laid wet cement is poured into the open ends so the bricks are bound together in a solid mass upon the hardening of the concrete.

"FORM" WORK FOR REINFORCED CONCRETE CONSTRUCTION

BY M. M. SLOAN.

THE usual method of constructing the forms for reinforced concrete floors has been described at length in the previous articles. All form work, however, is not constructed in this way. For in certain portions of the country and on certain work the forms for the floors have been built up in panels or units. Each panel is formed with sides and top, so that the top will mold the soffit of the floor slab and the sides will form the molds for the beams and girders.

This system of form construction is only economical where the entire building is built with panels of uniform size. A typical construction of the unit system of forms for concrete floors is shown in Fig. 15. In this instance the panels were of such a size that they could not conveniently be handled for the construction in one piece, so they were made up in three sections and arranged so that by taking out the small section in the center the other sections could be conveniently removed. In Fig. 15 the bottom board of the girder form is constructed with two ledges on either side as at A, which stiffens the board and extends the girder to the required depth below the edges of the units forming the panel molds.

The key panel at B is constructed with splay ends, so that when it is wedged in place it will complete the centering in the panel unit, and also so that it can readily be removed when the concrete has set sufficiently. All of the panels are securely braced as shown at D and the continuation of the form construction with an adjacent panel in place forming sides of the girder as shown at C.

The unit forms are supported in the usual manner on 3 x 4-in. studs, with cross pieces over the top and well secured laterally by 1 x 8-in. ledger strips.

As many buildings have been erected throughout the country with reinforced concrete walls, it is interesting to consider the usual method of making the forms for such walls. With simple buildings of one story in hight, the general practice seems to be to construct the forms for an entire story, bracing them so as to resist the hydrostatic pressure of the wet concrete, which is considerable when the forms are filled to their entire hight at one time.

While this method of form construction works very well for small buildings, it can not be used successfully in large buildings; and it is, therefore, the general practice in the construction of large buildings to build the concrete wall in sections, 4, 5 and 6 ft. in hight at a time. There are many ways of proceeding with the work, but the method shown in Fig. 16 has worked out very successfully.

Side forms are built up of good, clean material, well battened together as shown at B, and these are made about 12 in. or 18 in. higher than the section which it is proposed to form. In order to hold these sections in place, light channel iron buck stays or braces are made, and these are used about 4 ft. 6 in. apart. The plank for the centering should be constructed of 1½-in. dressed material. The channel iron braces are made sufficiently long to extend down upon the portion of the wall that had been previously finished and are held in place by through bolts as shown in the illustration. These through bolts pass through pipe sleeves which are left in the concrete, and the pipes through which the bolts pass are made the exact thickness of the wall and are so arranged as to bear on the face of the wooden forms, thus holding them and the channel beams the correct distance apart. At the lower end of the channels wood blocks were inserted between them and the finished concrete.

These wood blocks are the same thickness as the boards of the form construction. The top bolt and pipe sleeve holding the channels in place are shown at C and D in the illustration.

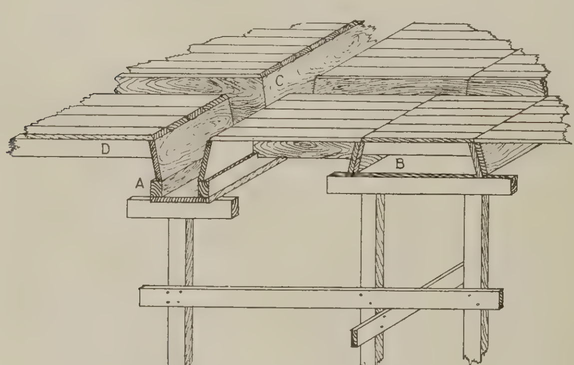


Fig. 15.—Construction of the "Unit" System of Forms for Concrete Floors.

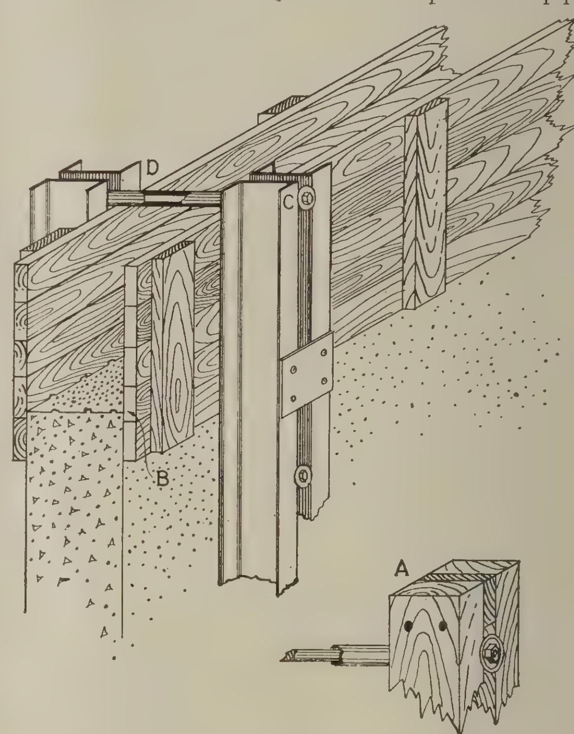


Fig. 16.—Showing How Walls of Large Buildings Are Constructed.

"Form" Work for Reinforced Concrete Construction.

By the use of the channels the forms were constructed plumb and readily held in place, and, being of steel, they were not likely to damage. These braces could of course have been of wood, as shown at "A." The objectionable feature exists in the fact that the pipe sleeves used for separators and to form the holes through the concrete work are left in the wall. The pipes then have to be cemented up and are quite likely to rust and run on the cement work. This is not generally an objection, because the buildings may be painted with a cement paint to give them a better finish.

Where buildings are constructed with reinforced concrete walls it is customary to top them out with a reinforced concrete cornice. The "form" work for such a cornice is always costly to construct, as it requires a great amount of material to brace the boards as illustrated in Fig. 17. In general such cornices are constructed upon the outrigger beams, well braced to studding and supports as shown in figure at C.

The outside form boards are strong material and the moldings are generally worked up in the mill and placed as indicated. The outside form boards must be well braced, and where the cornice extends above the roof it is back-braced as shown at A. The back form must be raised above the top of the slab forms, so as to allow the concrete to run under as indicated at D.

The capabilities of form construction for reinforced concrete work are illustrated in Fig. 18, which shows the construction of a very steep roof, including a dormer window likewise built of reinforced concrete.

The method of back-bracing the outside of a lintel of the dormer is well illustrated in this picture and is shown over the top of the dormer window. It shows the arrangement of the continuous lintel along the brick wall, with a slightly projecting edge for the finish.

Where roofs are of such a steep slope as shown in the cut, it is necessary to either use a very dry mixture in placing the concrete or else it is required to build a double form; that is, to build a bottom and top form to mold the work in the same manner that a concrete wall

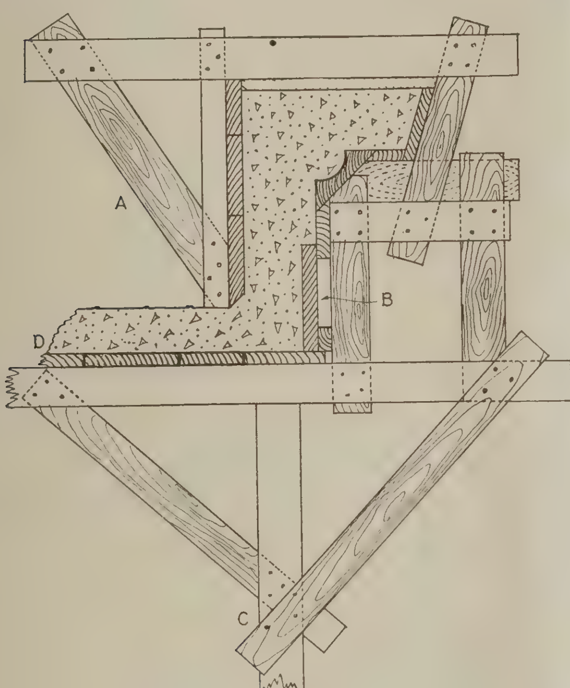


Fig. 17.—"Form" for Concrete Cornice.

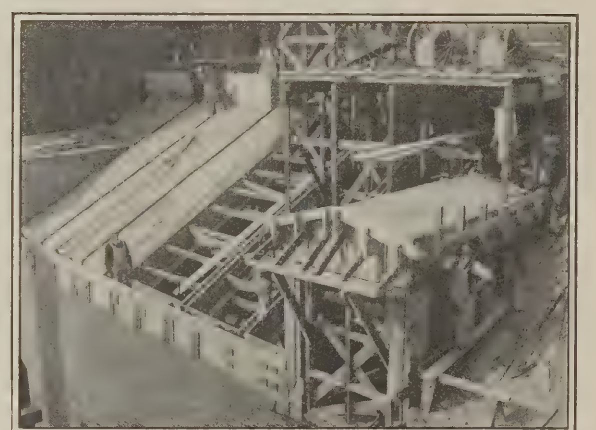


Fig. 18.—Construction of a Very Steep Roof of Reinforced Concrete.

"Form" Work for Reinforced Concrete Construction.

is built. This, however, makes the cost of form work for steep roofs excessive.

Most of the serious accidents which have occurred have been due to mistakes in the removal of the supports of the forms before the concrete has properly set. The carpenter contractor, especially the one in charge of the work, should reassure himself regarding the condition of the concrete before attempting the removal of the supports under any of the forms carrying a concrete floor system.

It is the usual practice in pouring the concrete into the forms to first pour the concrete in the column forms, to allow the concrete to settle.

The next day the concrete in the beams and girders and for the floor slab is then placed. By this method the concrete in the columns is usually one day older than the concrete in the rest of the construction and consequently, as the column forms are the first things to be erected in the construction of an upper floor, they can conveniently be removed from the floor below, in advance of the balance of the floor construction.

It is not unsafe under good conditions to remove the forms from the columns one week after the concrete has been poured. After the column forms have been removed and placed upon an upper floor, and usually there is some cutting to length and other fitting required, then the sides of the beams and girder forms and the slab panels are removed.

It is not, however, well to leave the beams and girders, where the concrete is only a week old, without some support, and it is the customary practice to leave some of the studding in place. Generally it is sufficient if one or two studs are placed under the beams and girders and one of them under the center of the floor panel.

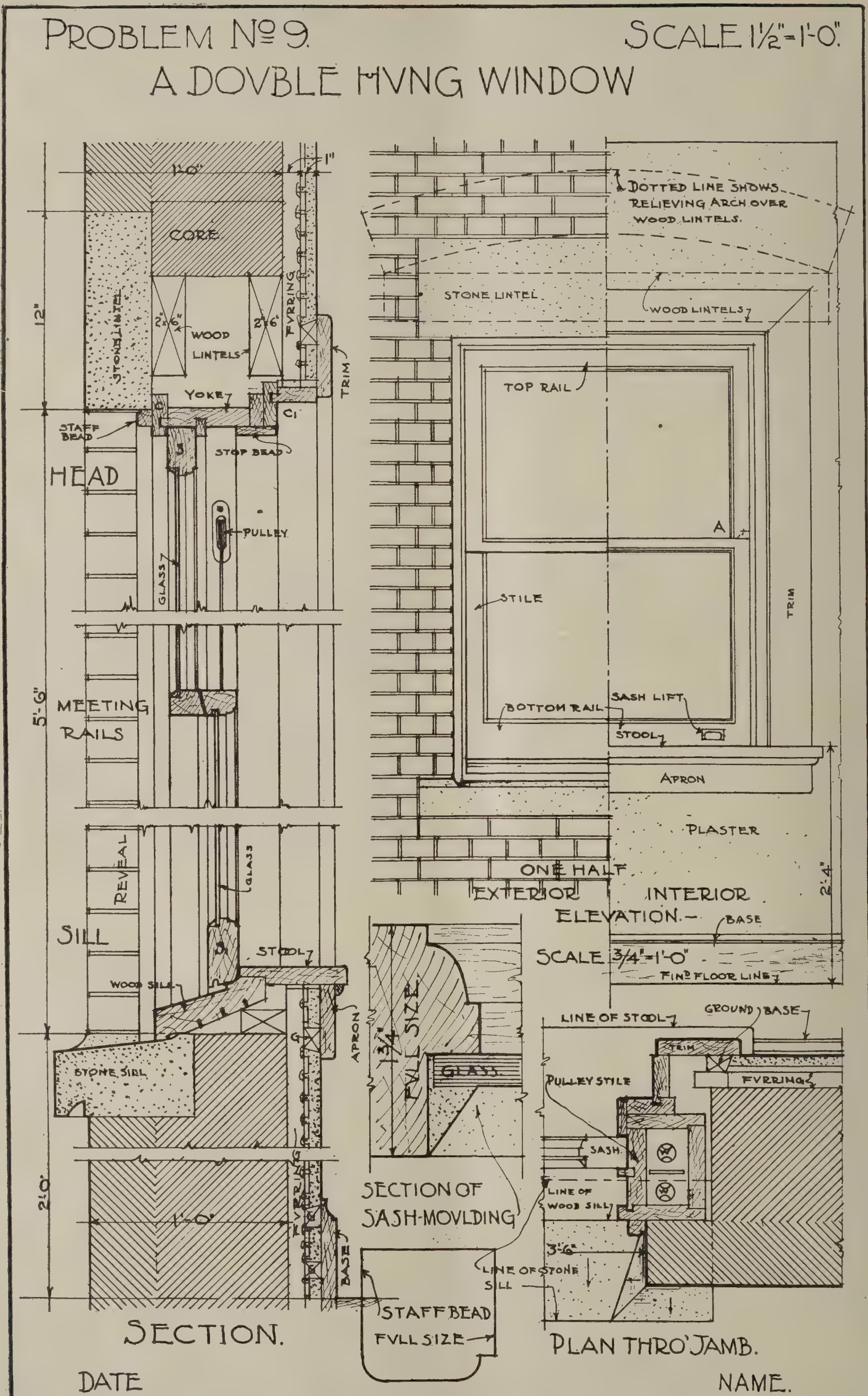
Cost of the Great Pyramid

A painstaking compiler has written a paper which gives the estimated cost of reproducing the Great Pyramid of Cheops. The author assumes that the material should be equally as good as that of the original, and that all the chambers and passages should be reproduced, says the *Stone Trades Journal*. The length of the sides of the pyramid are at present 746 ft., the hight 454 ft., and the area of the base 12¾ acres. To build it there would be required 3,313,000 cu. yd. of coarse limestone as backing stone, 140,000,000 cu. yd. of fine limestone as facing stone, 2000 cu. yd. of granite as facing stone, and 2000 cu. yd. of polished facing granite. The total cost of the above would be at least £7,200,000, and the labor required would be 24,000,000 days' work, which is equivalent to the work of 40,000 men for a period of two years.

Assuming that the labor required to reproduce Egypt's wonderful pyramid would cost no more than an average of 6s. per day for each workman, this item would reach a total for the two years of £7,200,000, which would make the total for material and labor £14,400,000. To this figure must be added at least £600,000 for transportation and smaller items, and, practically, wherever built, the cost of a suitable foundation would also have to be considered. The Pyramid of Cheops stands on a foundation of solid rock 120 ft. deep, and if a foundation this depth were built, an additional 2,600,000 cu. yd. of material would have to be used, bringing the total cost of the reproduction up to about £20,000,000.

The Pyramid of Cheops consumed the labor of 100,000 men for 30 years, which is about 900,000,000 days' work.

A cypress tree near Oaxaca, Mexico, is said to measure 104 ft. around the trunk at a hight of 130 ft. from the ground, and that 27 people holding hands can just reach around it. The tree has stood for many centuries and part of its trunk has commenced to decay from old age. Some one of a statistical term of mind has estimated that the tree with its branches weighs something like 1300 tons.



Lessons in Architectural Drawing for Beginners.—Scale of Sheet, Three-Quarters Original Size.

LESSONS IN ARCHITECTURAL DRAWING FOR BEGINNERS

By Alfred Auslander.

IN this our ninth lesson we will take up the construction of a double-hung window. Before proceeding further with the details of window construction, however, it will be well to consider briefly the various terms used in connection with a window; they are as follows:

Jamb.—The sides of an opening which connect the two sides of the wall is the jamb. The section of the full-page drawing shows the jamb in elevation.

Reveal.—The two vertical sides of an opening from the front wall to the door or window frame most commonly at right angles to the upright surface is the "Reveal." The section on the opposite page shows the brick courses of the reveal, a part of it being covered by the staff bead.

The reveals of windows in common brick buildings (especially where the walls are 12 in. thick) are generally 4 in. wide, beginning from the face of the wall to the sash frame. In thicker walls or in large stone buildings the reveals ought to be of greater width than 4 in., according to the size and dimensions of the opening.

Sash.—The removable frames marked "S" which receive the glass are called sash. A double-hung window has always two sashes, an upper sash towards the outside and a lower sash towards the inside. The piece of the frame forming the top is called top rail, as shown in the elevation. The piece forming the bottom of the lower sash is called the bottom rail. The pieces forming the sides are the stiles. The two horizontal rails meeting at the center of the window are the meeting rails. The stiles and rails are generally made of the same width excepting the bottom rail, which is wider to allow room for the sash lift. The meeting rails are of less width than the stiles and other rails. Therefore the weakest portion of a double-hung sash is at the meeting rails. To overcome this weak portion, especially for large windows, it is necessary to extend the rail as shown at A on the elevation. Of course this does not permit opening the window its full hight.

The frame which receives the sashes consists of, first, the pulley stiles, yoke and sill and the parting strip; then the outside casing, the staff bead and the stop bead and inside casing. The two sides which receive the pulleys as shown on the plan through jamb and section through head are the pulley stiles. The same piece which forms the top at the head of the window is called the yoke. They are generally made 1⅛ in. thick. The outside piece marked C on the section, to which the staff bead is nailed, is the outside casing. The piece of wood ½ in. to ⅝ in. thick between the sashes is the parting strip.

The stop bead, ½ in. thick and 1½ to 2½ in. wide, is nailed on the inside at the head of the window and the two sides. Sometimes it is continued over the top of the stool. These beads are generally fastened with round-headed screws. In cheap work wire nails are used for fastening the stop beads. Roller shades can be set on the stop beads if they are 1¾ in. wide or more.

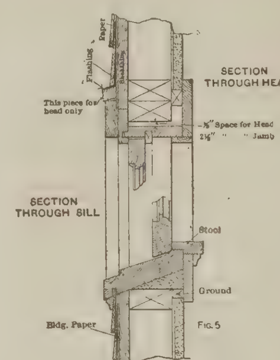
The width of the "mason's opening" is 3 ft. 6 in. and the hight is 5 ft. 6 in. A stone lintel 4 x 12 in. is placed over the opening, which is 4 in. wider on each side than the opening itself. The inside has two wood lintels 2 x 6 in., over which a relieving arch is sprung.

Double-hung window frames are practically the same for brick openings or such in frame houses.

The student should compare the section of the full-page drawing with the section of the window for frame houses, which is shown in Fig. 5. The jamb of this window is exactly the same as the section through the head, with the exception that the space between the back of the yoke and the studding is 2½ in., which gives room for the weights. The top piece for the outside trim (architrave) is omitted at the jambs.

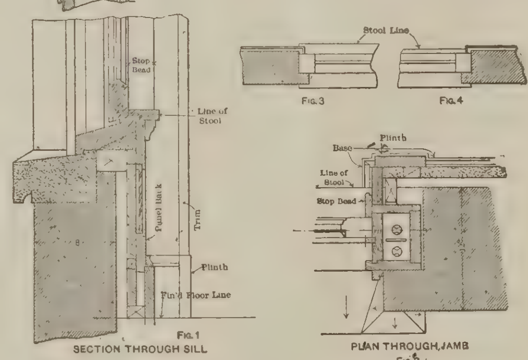
Double-hung windows in brick walls are indicated in ¼-in. scale drawings, as shown in Fig. 3, if there is no panel back, or as in Fig. 4 if there is a panel back. Fig. 1 shows a section through the sill of a window in a 12-in. wall, but the brick work is only 8 in. thick below the window sill. This forms a recess in the wall and is very often done, especially in thick walls, in order to give room for steam radiators, seats, etc. Fig. 2 shows the section through the jamb for the same window, showing the 12-in. wall in full, but the method of finishing the inside is a little different from the one shown in the full-page drawing. The student should also note where the grounds are to be set; these serve for nailing the woodwork to the wall and are set before the plastering is done. The weights are generally made of cast iron; for large windows, and windows with small space for the box, the weights are of lead.

No attempt has been made to show any moldings on the trim and only a plain ⅞ x 4½-in. piece is shown. The student may, however, measure any trim and use this for the detail drawing.



To lay out drawing No. 9 proceed as follows:

Draw a rectangle measuring 10 x 14 in. Draw outside line of wall for section 1½ in. (actual size) from left, and 3¾ in. from bottom margin



Lessons in Architectural Drawing for Beginners.—Various Details of Construction.

line for top of sill. Use a scale 1½ in. to the foot for plan and section and ¾ in. to the foot for the elevation. Draw top of stool 4 in. above top of stone sill. The bottom line of stone lintel is 4 in. (actual size) below upper margin line and the bottom line of wood lintels 2 in. above bottom of stone lintel. Draw plan through jamb as follows:

Measure 1½ in. from bottom margin line for outside line of wall and 2¾ in. from right-hand margin line for brick opening, the section through the wood frame sash, etc., to be exactly the same as the section through the head, excepting that a back piece ⅞ in. thick should be placed 2½ in. back of pulley stile and making a break of 4 in. in the brickwork. The inside finish is to be either as shown on the full-page drawing or as shown by Fig. 2 of the sketches.

It is well to draw a line, say, 2 ft. below stone sill, which will represent the floor line, and in laying out the elevation this line will be a datum line from which all measurements are to be taken for hights, and only in this way will the student see that the stone sill is to be drawn lower than the stool, etc. The full-page drawing shows all figures in their respective scale, so that the student may scale off all the points from this drawing. The wood sill may be carried out to the outside line of the staff bead. Put all measurements as marked and also indicate the various materials clearly.

Concrete in Palestine

The following interesting particulars relative to the use of concrete in Palestine and its application in a somewhat unusual way in connection with a German sanatorium in Jerusalem are taken from a report made by Deputy Consul John D. Whiting:

Concrete, introduced into Palestine about 20 years ago, was first used only for making floor tiles. The materials used were sand and shells from Jaffa and cement from Germany. At first these tiles were made in wooden molds and pressed by wooden mauls, and without patterns, in either black or white. Some years ago a leading German merchant imported a European machine, and produces in his factory in Jaffa different sizes, colors and designs of tiles, also concrete sewer and water pipes and railings, cornices, steps and building blocks.

In Jerusalem the opportunity for selling floor tiles, pipes, steps and perhaps cornices is quite large, especially the first mentioned. Little, if any, opening can be expected for using concrete building blocks, as stone is plentiful, and labor for quarrying and dressing it is cheap, while cement and sand are extremely high, since it costs $4 a ton to bring them from Jaffa by rail, although the distance is only about 53 miles.

In Jaffa the conditions are reversed. Little stone is found in the vicinity, and much of modern Jaffa has been built from sandstone brought from the ruins of Cæsarea and other old towns. This source of supply is now exhausted, and as stone quarries are scarce and the material inferior, concrete building blocks are growing in use. An inexhaustible supply of sand and shells is right at hand.

These blocks are now used in building corners of houses and for sides, sills and arches of windows and doors, the spaces between being filled with sandstone, sometimes plastered over. The houses are sometimes finished off with a concrete cornice; often an entire balcony is thus made, the top, brackets, slabs and railing being molded separately and cemented into the building. Concrete steps are also quite often used, and generally the floors are paved with concrete tiles.

Reinforced concrete has just appeared, calling forth much interest and curiosity from natives, especially masons. When the German Emperor and Empress visited Jerusalem in 1898 a carriage road from the northern suburbs up and along the ridge of Mount Scopus to the summit of the Mount of Olives was built for them by the Turkish Government. From the top of Mount Scopus there is an extensive view. Jerusalem lies near by, below to the west, and to the east the Dead Sea appears only a few miles off, while it is over 20 miles, and beyond it and the Jordan valley extends the range of Moab.

It was this sight that impressed the Empress, and on her return to Germany a large sum was collected for building a sanatorium at this place. The cost is about $386,000, and it will be known as the Kaiserin Augusta Victoria Stiftung. It will be open to the German public. In this building concrete has been used in a different manner from that in general use.

The sanatorium proper is two stories high, with a basement under a part, and is built around a large open court. The living rooms, etc., form two sides and the north end, while the south end is occupied by the church and the lofty bell tower. The apses are toward the south, it being the first Lutheran church in which the apses do not face the east.

The facings are large blocks of gray limestone trimmed with white limestone, and the building terminates in a steep roof covered with black tiles.

Owing to the high price of sand here, mortar is generally made of lime mixed with black soil, but in constructing this building stone crushed fine mixed with lime has been used. The bell tower, 197 ft. high, is finished inside with concrete steps, from the second story up, made in Jaffa of sand and shells with an iron I-beam embedded in each step. The steps are about 42 in. long, with about 10 in. built into the wall, and, on the under side, are slanting, the top one lapping slightly over the one below. The part built into the wall is square. The staircase, not otherwise supported, goes around the four inside walls and at the corners square reinforced landings are made, supported on the side where one flight ends by an I-beam built into the wall, and on the other, where the next flight begins, by another I-beam imbedded in concrete, making it about 14 in. square on the outside. These steps cost only about one-half what stone ones would.

The floors throughout the building are hollow tiles and concrete. Where the span is considerable two I-beams, about 16 in. apart, are used, filled in with reinforced concrete. These double I-beams are placed about 13 ft. apart. Boards close together are then put in place, either hung to the I-beams or supported by posts from below, on which are laid the hollow bricks, each 12½ x 12 x 6.3 in. A space of 1 3/5 in. is left between the bricks each way, and iron rods 0.6 to 0.7 in. in diameter are laid in between the bricks running the shortest way. The rods lie flat near the bottom of the space, and pieces of stiff paper are used to cover both open ends of all the bricks to prevent them being filled with the concrete, which is poured in until it covers them 1 3/5 in., making the total thickness of the floor 8 in. The concrete is made of cement and sand only. In this way the floor is formed of concrete T-beams running in both directions, one reinforced and one not, with a brick to fill up each of the empty squares left. In only one case, a floor 86 sq. ft. was made without the I-beams being used. It was made as above, the only difference being that the iron rods in the concrete were placed, running in both directions. In another place where the floor needed strength, and where a flat ceiling was required, a reinforced concrete beam about 29 in. wide by 16 in. thick was so laid that it projected above instead of below the floor, not being in the way, as the space above was in the attic.

This being the first instance in which floors of this style were built here, men were brought from Germany to oversee the construction.

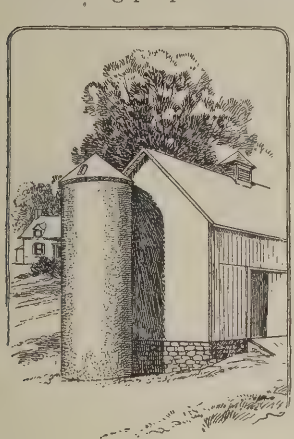
The old style roofing in a building in this country was an arched dome. The roofs were then either paved with slabs of stone and pointed in between, or covered with a hard plaster. More than 25 years ago French tiles for roofs were introduced, and with them the ceilings made of iron I-beams placed about 40 in. apart and filled in between with narrow arches built of light firestone, roughly shaped. The old method is still sometimes used, but generally for only the lower stories.

Reinforced Concrete for Coast Defenses

Recent tests of the resisting power of reinforced concrete as a defense against high-powered projectiles have recently been made at Sandy Hook with somewhat astonishing results. A concrete wall 20 ft. thick, heavily reinforced with steel beams, was pierced by a 12-in. projectile fired at high velocity. The blow delivered, it is stated, was sufficient to penetrate 22 in. of armor plate, and the reinforced concrete withstood the attacks so well that this material will probably be used in the construction of the new coast-defense fortifications in the Philippine Islands.

CONCRETE IN CONNECTION WITH FARM WORK

THE rapid depletion of timber supplies of the country and the necessity of substituting other materials for wooden construction are causing interest to be more and more closely centered in cement concrete for building purposes. The adaptability of the material is well known through the practical examples of its use to be found everywhere, but it is only within a comparatively recent period that it has been used to any great extent for farm buildings and other purposes in connection therewith. As bearing upon this phase of the subject the comments contained in the valuable little volume issued by the Lawrence Portland Cement Company will be read with interest by those likely to be called upon to execute work of the nature indicated. We present the subjoined excerpts from the source in question:



The uses of cement in combination with gravel and sand are so numerous and the facility with which cement can be obtained and the large number of sand and gravel banks which occur, make its use particularly economical and advantageous. Almost every part of every construction on the farm can be and has been made of concrete either in mass or reinforced. Foundations are usually constructed by mixing cement, sand and gravel in the following proportions and depositing the mass after thoroughly mixing with the proper proportion of water, between wooden forms carefully laid out and staked to prevent their bulging during the process of depositing of concrete.

MATERIALS FOR ONE CUBIC YARD OF CONCRETE.

*PROPORTIONS.	Bbls. Cement in 1 Cubic Yard.	Bbls. Sand in 1 Cubic Yard.	Bbls. Gravel or Broken Stone in 1 Cubic Yard.
1:2:4	1.57	3.14	6.28
1;2½:5	1.29	3.23	6.45
1;3;6	1.10	3.30	6.60
1:4:8	0.85	3.40	6.80

For ordinary foundation work, mixtures in the proportions of 1:2½:5 or 1:3:6 are amply rich, but for pavements, floors and building superstructures, mixtures in the proportion of 1:2:4 should be employed. Only very small quantities of gravel stones larger in diameter than 2½ to 3 in. should ever be employed even for mass concrete work and they should be mixed with smaller sizes down to pieces of the size of peas. For superstructural work in which steel is to be incorporated in the form of reinforcement, no pebbles larger than ¾ in. should be used.

For the mixing of concrete materials by hand it is usually easiest to make "batches" which will contain only two or three bags of cement. Concrete is easiest mixed on a special platform, one of the cheapest of which can be made by nailing together ⅞ in. x 10 ft. boards of any desired width with 2 x 4 cleats placed about 2 ft. apart. For a two-bag batch the mixing platform should be 9 x 10 ft., while for a four-bag batch it should be 10 x 12 ft. The aggregates are most easily measured by means of boxes built without tops or bottom and provided with four handles at the several corners, made by simply extending two sides and cutting them so that the hand can be easily placed beneath the extension of the sides and the mixing platform. For a 1:2:4 mix in which two bags of cement are to be employed, the sand box should be 2 ft. x 2 ft. x 11½ in. inside measurement, while the gravel or stone box should be 2 ft. x 4 ft. x 11½ in.

For a 1:3:6 mix the sand box should be 2 ft. x 3 ft. x 11½ in. and the stone gravel box 3 ft. x 4 ft. x 11½ in. For other combinations the necessary size of box is obvious from these measurements. The amount of water to be used varies slightly with the kind of cement and the qualities of sand and gravel. It may be roughly assumed that 10 gals. of water are necessary for a two-bag batch mixed in proportions 1:2:4, while 13½ gal. will be necessary for a batch of similar size mixed 1:3:6.

Methods of Mixing by Hand

The methods of mixing concrete by hand, as to order of procedure, are almost as numerous as are the individuals who do the work; but the following method has been found easy and effective: Place the sand box on the mixing board and fill it with sand from wheelbarrows or by other convenient methods. When the box is filled level full lift it off and spread the sand on the board in a layer about 4 in. thick. Empty the required number of bags of cement over the sand as evenly as possible; mix the sand and cement by turning it over with shovels into a new pile of the same general shape and thickness as the old one, giving the shovel a smart twist before the material leaves it, so as to mix the sand and cement thoroughly. Two or three operations of this nature may be required, the material being shoveled from one side of the board to the other with each turn. After a sufficient number of operations and spreadings of this nature have been carried out it should produce a perfect mixture. Place the gravel or stone box on top of the pile of sand and cement, and fill it from wheelbarrows or other receptacles as before. Remove the box and pour over the top of the gravel and stone about three-fourths of the required amount of water, dashing it over the top of the pile as evenly as possible. Do not lose any of the water by letting it run off the edges of the board. Again turn the whole material over in the same manner as with the sand and cement, adding water little by little to the dry spots as the mixing continues. Repeat this operation until the whole mass is uniform in color and moisture.

A concrete which quakes like jelly when being handled and is just too stiff to flow is right for most purposes, like foundations, sidewalks, etc. For building work, ornamental and other complicated pieces, a very wet concrete is usually employed, while occasionally a relatively dry mixture, which must afterward be sprinkled several times a day for several weeks is preferable.

Placing the Concrete

The concrete is then ready to be placed. It can be conveyed to the desired point of deposit most easily by wheelbarrows unless it is found necessary to place the mixing board more than 100 ft. from this point, in which case an ordinary one-horse dump cart will be found convenient. If wheelbarrows are employed, runways of 2-in. plank about 12 in. wide should be laid down and carefully maintained so that wheelbarrows do not run off the edges and upset so as to lose their contents. The runway should be laid out in the form of a circuit, so that men do not meet each other on the return and thus interfere with one another.

Foundations for barns, silos, green houses, cellars, ice houses, chicken houses, etc., are easily constructed

* In all of our proportions formulæ the first figure represents the quantity of cement; second figure, quantity of sand, and third figure, quantity of broken stone or gravel, all measurements to be by volume.

and where the earth will stand without special bracing, the concrete may be deposited in open trenches at a very small cost.

An ordinary carpenter can build the necessary forms for water tanks, cisterns, watering troughs, partitions in root cellars and other similar structures, and concrete mixed as above described can be readily deposited in them. Mass concrete can also be used for culverts under roadways for carrying the water from small streams.

It is also an easy matter to make open boxes either straight or tapered in which concrete can be deposited together with the necessary wire for reinforcing the same, so as to form fence posts, clothes posts, blocks of artificial stone for horse blocks, for window sills, steps, hog troughs, retaining walls, curbs, steps, etc. Tests of fence posts made in this way, designed to extend 4 feet above the ground, showed that it would require a pull of about 500 lb. applied at the top of the post to break it if it is made 6 x 6 in. at the bottom and 6 x 3 in. at the top, and if four ordinary twisted fence wires were placed near the corners in the wet concrete. By pushing loops of wire into the wet concrete at proper intervals along the post, very convenient fastenings are provided for the attachment of the common wire fencing. More elaborate structures like chicken houses, piggeries, ice houses, mushroom cellars, green houses, silos, duck houses, manure sheds, and even the most elaborate farm buildings like stables, can be built of reinforced concrete in as elaborate detail as is desired. Such complicated things as chimneys have been built of reinforced concrete on the farm, while at the other extreme the simple laying of sidewalks and floors in stables and cow barns, feeding floors, etc., can be easily constructed in concrete.

Laying Sidewalks and Floors

To do the latter work, the ground should be excavated at least 12 in. below grade and refilled with porous material like coal cinders or gravel, to a depth of 8 in. This material should be thoroughly compacted after careful wetting, so that the final thickness is about 7 in. This excavation and refill should be so arranged that water which may collect in it will be drained naturally away from the structure. This drainage can be effected by actual drain tile, either of terra cotta or cement pipe, or by the use of a blind drain made of broken brick or large gravel. Upon this subbase is to be deposited a mass of concrete which when finally compacted will have a thickness of 4 in.

This concrete should be mixed in the proportions of 1:2½:5 and before it is set a top coat of cement mortar mixed in proportions of 1 cement to 2 coarse sand should be spread upon this concrete base and thoroughly worked into contact with it by much troweling. This wearing surface should have a thickness of at least 1 in. and its top surface be carefully leveled and smoothed and finally marked in blocks either 4 ft. square or of smaller size as is deemed necessary for the particular object in view.

For sidewalks or cellar floors blocks not more than about 4 ft. square are wisest, while in stables and at other similar points, where much traffic is to be encountered, squares as small as 6 x 6 in. are best. The larger blocks should be cut clear through the 4-in. concrete base, and surfaces which are marked in small blocks should be similarly cut through at about the same intervals.

Concrete is indispensable in dairy farming since Boards of Health in cities throughout the United States and Europe are demanding high sanitary conditions in dairies which can be secured most economically only where concrete is used for the construction of cow stables, feeding floors, etc. Dairy farmers also find other economies obtainable with the use of concrete; aside from the advantages secured with regard to sanitation when proper gutters and drains are provided, the stables can be completely flushed out with water and a disinfectant if necessary, although the very nature of the concrete materials makes them practically germ proof when made in a dense, workmanlike manner.

Similarly poultry houses and yards can be maintained in a high sanitary condition where concrete is employed, and the latter developments along this line even provide cement hens' nests and runways. The feeding and scratching floors can advantageously be constructed with concrete covered with 6 in. or more of clean gravel, sand-crushed shells, etc., which can be replaced from time to time as deemed necessary.

Garbage receptacles, either in the form of permanent boxes or in the shape of light cans are being manufactured of concrete which are fire and vermin proof, and when properly waterproofed are not subject to attack by rust or other disintegrating influences.

Non-destructible and explosion-proof gasoline, wood alcohol and kerosene tanks can be constructed with great advantage.

Ornamental Possibilities

The ornamental possibilities of concrete are very great, especially when reinforced. Molded fountains of cement concrete can be erected of the most complicated and beautiful sort. The basin can be made of any shape and lined with a mixture of 1 cement to 2 sand applied as described above for top surfacing of sidewalks and floors, but this surface, however, should not be cut into blocks as there described. The mass concrete of the basin should have provided in it some reinforcement to prevent cracks due to freezing and thawing, from winter to summer. This reinforcement, however, need not be very great in quantity, but should be well distributed throughout the whole body.

Settees or benches of reinforced concrete can be readily constructed as complicated and artistic as desired, while some crude products, which would be equally as serviceable, can be made of mass concrete at much less expense.

Besides the posts for fences, the running members can be made of concrete, molded separately and placed in position in the forms before the concrete for the posts is deposited in the final positions they are to occupy. If deemed preferable even these posts can be molded on the side in special forms, with recesses formed in the concrete work by placing blocks at the necessary points on the sides of the forms. These recesses will serve to receive the ends of the running members of the fence and it is necessary only to tamp a post in position, set in place the strings between it and the next one, propping them so that the next post can be put in place, and then tamping it firmly on the ground. It is often preferable under those circumstances to place a small amount of concrete in the post hole instead of refilling it solely with earth. A fence made of this description is absolutely indestructible, needs no painting, will not be affected by attacks of burrowing insects, and stock and small animals will not gnaw it or otherwise destroy it.

Cement bath tubs have been manufactured and placed in houses and are cheap and effective.

Concrete Construction in Japan

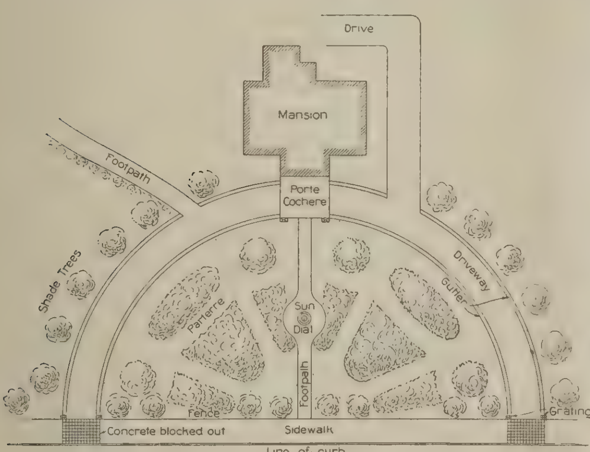
According to a recent report of Consul-General Thomas Sammons at Yokohama, there has as yet been little construction of reinforced concrete buildings in that city and Tokio. Concrete blocks have been used for a number of buildings and the Japanese have become very much interested in reinforced concrete construction. The form of construction popularly used is a wooden frame faced with flat tiles and cement or plaster or sheathed with brick.

CONSTRUCTION OF CONCRETE WALKS AND DRIVES

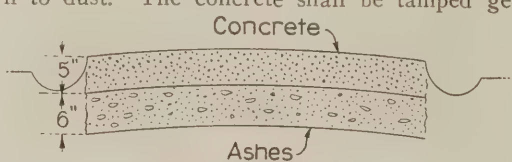
BY WILLIAM MACDONALD.

THERE is one thing that the architect and the contractor usually give very little attention to, and that is the grading of the grounds around the house,

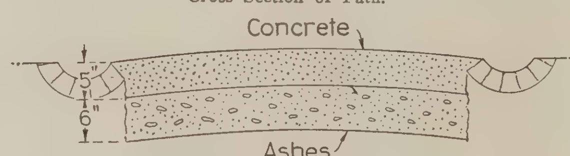
especially when it is a suburban residence, where everything must conform to municipal requirements and the entrances and walks must be carefully planned with relation to the street and also with relation to adjoining houses. In large mansions, where the grounds are extensive, a landscape gardener is employed. Nevertheless a certain amount of engineering skill, also of the artistic taste of the landscape artist, as well as the designing ability of the architect, must be combined in the successful builder and contractor. He must be able to lay out roadways and driveways with the proper grades and curves; these



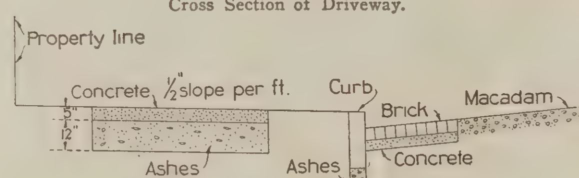
Plan View Showing Layout of Driveways, Walks, Etc., for a Suburban Residence.



Cross Section of Path.



Cross Section of Driveway.



Cross Section of Sidewalk.

Construction of Concrete Walks and Drives in Connection with a Suburban Residence.

must conform and be symmetrical with the clumps of shrubbery and flower parterres and the whole must be in unison with the mansion and other buildings.

It reminds one of Macaulay's famous definition of an educated man, viz.: "One who knows something about everything and everything about something."

The first thing to consider in walks and drives is the grade, so that they shall be as nearly as possible uniform; also that where the ground is so flat that there is no natural grade that an artificial summit or summits be introduced, giving at least a minimum fall of at least ½ per cent. In constructing sidewalks in the street where the walk is put in the center of the sidewalk space and the remainder is left for park purposes the walk is laid with a cross grade of ½ in. per foot. Where the whole space is covered with concrete or flagging ⅓ in. per foot is sufficient. In driveways the walk should be built as an arc, giving the same fall both ways. Theoretically the correct cross section for a road is a parabola, but this is too much refinement for a simple driveway. Provision is made at each side for a gutter paved with cobble stone. The water is preferably caught in a small silt basin and if the street has a combined sanitary and storm water sewer, it is taken to it, otherwise it must be carried under walk and discharged into gutter.

The next important thing after the grades have been fixed is the construction of the walks themselves. In the Borough of Richmond, New York City, Theodor S. Oxholm, who has had a great many years' experience in this class of work, has just compiled specifications embodying some very improved methods, both in work and practice, which will be found interesting in this connection.

The space over which the sidewalk is to be laid shall be excavated to a depth of 17 in. below the finished grade and parallel thereto. On the surface of the sub-grade thus prepared shall be placed 12 in. of clean steam cinders, which shall be rolled or tamped until the surface is firm and unyielding. On this bed, after wetting, shall be laid a bed of concrete 5 in. thick.

The concrete shall be made of one part of the best quality of Portland cement, one and one-half parts of clean, sharp sand and three and one-half parts of broken stone. The sand shall be carefully screened and be free from loam or other foreign material.

The stone used shall be broken syenite, granite or limestone varying in size, none of which shall be more than one inch in any direction, and shall be graded down to dust. The concrete shall be tamped gently until enough mortar has been drawn to the surface to permit troweling to smooth, true finish. In troweling to a finish enough neat cement shall be added to allow of troweling easily, and in this cement lamp black shall be mixed to make the color uniform.

The pavement shall be laid in blocks not less than 4 ft. square nor more than 6 ft. 5 in., separated by ¼-in. shims, which shall be removed when the concrete shall have sufficiently set.

The old way of constructing walks was to make 4 in. of concrete and then 1 in. finish of a richer material, but the danger was that the two parts were liable not to unite and then the inch finish would be apt to come off. This new way gives a richer mixture throughout and does away with all danger of not uniting, besides being cheaper.

Private driveways are paved with cement walk 6 in. thick and blocked out as shown in drawing.

Concrete shall be mixed in batches—not more than one barrel of cement with the requisite proportion of other materials on suitable tight platforms, not less than 12 ft. by 12 ft. in size.

The cement and sand shall be thoroughly mixed dry, after which the broken stone, after first being wetted, shall be added. The whole mass shall then be turned and worked by skilled laborers, until a resultant is obtained, with the stone uniformly covered with mortar.

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OCTOBER, 1910

For Increased Service

We take this opportunity to announce that *The Building Age* has secured the services of Frank Meyers, who will represent its business department in New York State and in the New England States. Mr. Meyers is well qualified to care for the interests of the advertiser in this journal, as he is no stranger in the advertising field. His entire career has been devoted to this line of work. For eight years he was connected with a large publishing house, with which he received a thorough grounding in the various departments, and is prepared to give the advertisers in this journal the benefits of his experience in these lines. For the past year he has been connected with the business department of *Iron Age-Hardware,* one of the David Williams Co. publications, from which he comes to this journal.

Apprenticeship Laws Need Modernizing

The laws governing apprenticeship now on the statute books of most of the States are obsolete in many particulars, and in some instances have stood in the way of a satisfactory solution of a question which is of growing importance. Apprenticeship in former days was an institution very different from that of the present. Then a boy was bound out to his employer for a long term, usually during his minority. The master combined the powers of the parent and the employer. The boy's monetary recompense was little, if anything. He learned his trade thoroughly and this was considered his reward, but in return he had been a source of some profit to his master. To-day the limited apprenticeship is all that survives. The boy contracts to serve two or three or four years, always for a wage, which increases with his experience, these details being stipulated in the indenture papers. Naturally, laws designed for the old system apply but poorly to the new. To illustrate the inconsistency, in some States there is doubt as to whether the employer has the right to hold back a portion of the apprentice's wages in lieu of the cash bond which guarantees the fulfillment of the term of service. This is almost a vital matter. Many employers hold, basing their opinion upon experience, that a better average of apprentices is recruited from the class of boys that cannot get the $50 or more for deposit as a bond. They have usually been compelled to shift for themselves to a greater or less extent. They are dependent for a living upon their own efforts. The stimulus to their apprenticeship is ambition rather than parental influence. When they graduate as journeymen they are more apt to continue in the routine of the shop, being content to advance gradually. But they cannot procure the required bond money, and the employer must have some guarantee that they will continue to the end of the agreed term for the sake of the boys, and for his own because it is during the latter portion of the period that the service of the apprentice is valuable. Therefore the plan has been adopted of deducting a certain part of the wages until the fund has been established, reverting to the boy when he has passed to the journeyman class. If this cannot be done legally, then he would be able to break his agreement and recover the funds in his employer's hands. Probably it is legal in most States, but all doubts should be removed by statute. Other obscurities should be cleared away. Legislative study of the questions involved would result in a code of laws which would take care of the necessities of the situation as it now exists. Probably this will not be attempted until some powerful organization shall take the initiative in the form of a request. Should one State create practical, liberal laws others would follow, until the statutes would be essentially uniform, serving the mutual welfare of the employer and his apprentices.

Approval of Fireproof Construction

Confidence has been inspired when the sheet metal contractor has invited purchase of fireproof constructions for building equipment bearing the label showing that the construction has been approved by the fire insurance underwriters as the result of tests in a laboratory maintained for the purpose in Chicago. Every commendable interest is served when buildings are so constructed as to resist fire to the greatest possible extent, and while many constructions clearly demonstrate to the average man that they possess such advantages, there are others on which only an expert can give assurance of positive merit. Unfortunately, however, those who have sought the approval of this insurance organization have suffered a delay in securing a consideration that, in their opinion, is wholly unnecessary in view of the charges required for the service and the simplicity of the construction to be reviewed, and its similarity with those which have already been approved. Some are inclined to the opinion that the delay is not wholly in the interest of safety against fire, but sometimes in the interest of constructions already approved. It would be most unfortunate if confidence in this examining body should be lost, and in view of the reports that come from various sections of the country of the delay that is experienced at the hands of this organization, it is possible that its usefulness would already be impaired were it not for the fact that it is backed by so powerful an organization as the Underwriters. They can refuse to accept insurance on a building which is equipped with unquestionable fireproof and fire-retarding devices, if these have not secured, through the faults of the Underwriters themselves, the approval of the laboratory which they maintain, and for the delays attending which they are responsible.

Kitchenette Apartments

What are designated as "kitchenette apartments," consisting of suites of two rooms, one of which, as the name indicates, is a kitchen on a decidedly small scale, are growing in popularity in New York City. Generally speaking the kitchenette is equipped with a sink with running water, an ice box, a one or two-hole gas cooking appliance, a small dish closet and a dumbwaiter or some other means of receiving supplies. In short the up-to-date kitchenette may be said to consist of a miniature kitchen minus laundry tubs, gas range and perhaps an outside window. It occupies a comparatively little space, is easily looked after and yet is equipped so that the tenant may prepare a simple hot meal for one or two persons without the necessity of resorting to that Mecca of the furnished-roomer—the delicatessen store.

The demand for this type of kitchenette has grown to such an extent that many builders in putting up apartment houses now provide from 6 to 8 kitchenette two-room apartments, and even some former furnished room houses have lately been altered so as to provide the same convenince.

Some Features of the New York Cement Show

Among the interesting features of the Cement Show, which will be held in Madison Square Garden, New York City, from December 14 to 20, will be a model of the concrete sanitary cottage awarded the first gold medal in the competition for inexpensive workingmen's homes held in connection with the late National Congress on the Prevention of Tuberculosis. The house was designed by architect Milton Dana Morrill, of Washington, D. C., and created much public interest at the time. It is a five-room, two-story cottage constructed of reinforced concrete throughout, and a number of buildings of this type are being erected at Virginia Highlands near Washington. One of these houses was illustrated and described in these columns a few months ago.

Another interesting feature will be a display of what is known as the Edison "poured" cement house, concerning which the trade press has had so much to say during the past year or more. The plan, it will be recalled, upon which Mr. Edison has been working is briefly the completion of a set of steel molds which can be used repeatedly in "pouring" concrete houses. The molds are capable of variation of arrangement, thus making possible different styles of houses and avoiding the monotonous sameness which often characterizes rows of houses to be seen in sections largely populated by workingmen. The "poured" house is intended for one family and to be built on plots measuring about 40 by 60 ft., the house having a plan of approximately 25 by 30 ft. It is expected that the cement public will be attracted in large number to the New York Cement Show in order to view Mr. Edison's molds for his cement houses, as the claim is made that a house can be completed in 14 days after pouring the concrete, and that with six sets of molds 144 houses can be completed in a year, the forms being used indefinitely, thus reducing the cost to a minimum.

Wages of Building Mechanics in Atlanta, Ga.

The secretary of the Builders Exchange at Atlanta, Ga., has recently compiled some interesting statistics covering wages of mechanics in various branches of the building industry and showing changes which have occurred in the rate this year as compared with 1908. We present the following figures from the compilation in question:

	1908 Per hour	1910 Per hour
Masons and bricklayers	45c.	50c.
Plasterers	40c.	45c.
Carpenters	$2.50 to $3.50 per day	32c.
Lathers	29 7/9c.	30c.
Plumbers	40c.	50c.
Painters	$2.50 to $2.75 per day	30c.
Roofers	$1.75 per day	30c.
Hoisting engineers	29 7/9c.	35c.
Tile setters	29 7/8c.	37½ to 43½c.
Electricians	$3.00 per day	35c.
Structural iron setters	44 4/9c.	50c.
Ornamental iron setters	44 4/9c.	50c.

An examination of the above figures will show that masons and bricklayers are being paid 5 cents an hour more than they were in 1908, as are also structural and ornamental iron setters. The wages of plasterers show an advance of 5 cents, while the wages of plumbers have advanced 10 cents.

A METHOD OF WRAPPING CEMENT SACKS to prevent loss during shipment to the mill consists in stacking the bags in piles of 50, placing one long rope lengthwise on top and a shorter rope near each end transversely beneath the pile. The sacks are folded on the long rope, which is brought underneath them, passed around the bundle at the center and tied. The short ropes are also passed around the bundle and then tied at the top.

F. W. DEAN, mill engineer and architect, of Boston, Mass., has completed plans and specifications for a new storehouse for the E. H. Clapp Rubber Company, of Boston, Mass. The building is approximately 100 ft. x 116 ft., two stories, of slow-burning mill construction. An unusual feature is the second floor, designed to carry a load of 500 lbs. to the square foot. The columns are wood, suporting steel beams running parallel with one side of the building. Wooden beams running across the building are hung by brackets from the steel girders. In the second floor every other column is omitted. The first floor is concrete and the second floor of wood, with finished floor of maple. The exterior walls are carried above the roof line and the roof line is pitched for inside drainage.

CORRESPONDENCE

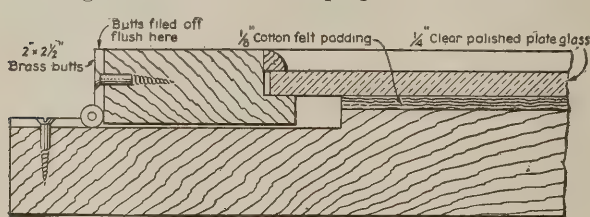
A Convenient Blueprint Frame

From W. F. Gernandt, Fairbury, Neb.—I am sending drawings for a blue print frame which has given great satisfaction in use and which has many good points of merit over the old style blue printing frames which are used for sunlight exposure. Our firm has used many different frames since it commenced the practice of architecture, but we find this one of extreme value for rapid work and the drawings of the frame are forwarded for publication, as they may prove of interest to many readers of the paper. We make use of three different sizes of frame, but the drawings sent herewith relate to the smallest size.

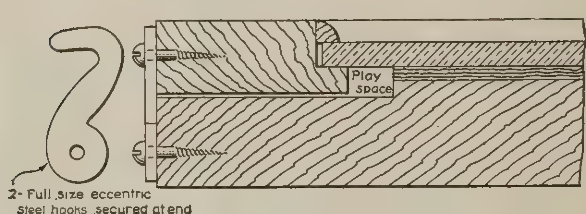
The drawings are sufficiently clear to render the construction readily understood.

Calculating Safe Loads on Wooden Beams or Girders.

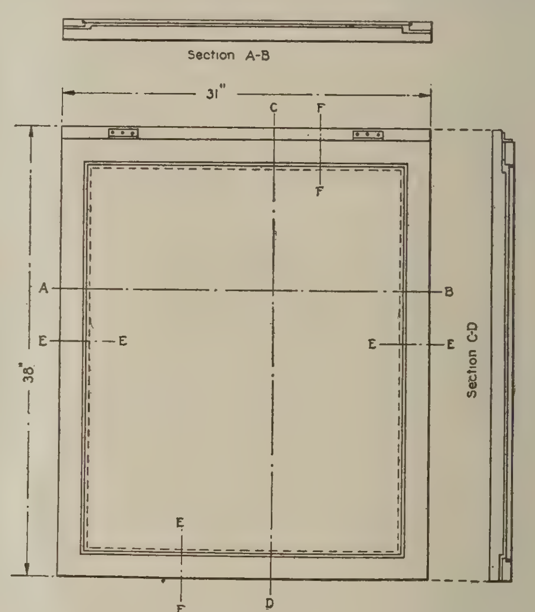
From F. L. T., Corpus Christi, Tex.—In the last number J. Bremner compared two formulae for the strength of beams. The results obtained do not agree and I infer from his remarks that he relies more on good judgment than on calculations or published tables of strength to determine the proper size of beams to



Section Through F-F of the Plan.—Scale, 6 In. to the Foot.



Section Through E-E of the Plan.—Scale, 6 In. to the Foot.



Plan and Sections of Blue Printing Frame.—Scale, ¾ In. to the Foot.

Convenient Blue Print Frame.—Contributed by W. F. Gernandt.

support a given load. The two formulae and the authorities quoted are

$$S = \frac{b\,d^2\,C}{6\,L} \quad \text{(Peoples)}$$

$$S = \frac{8\,b\,d^3\,Z}{5\,L^2} \quad \text{(Auslander)}$$

Where S equals the safe concentrated load at the center in Peoples' formula, and uniformly distributed load in Auslander's.

b = breadth in inches of rectangular beam.

d = depth in inches of beam.

L = length of beam.

C is a constant found by experiment, depending upon the material of the girder and the manner of loading.

Z is a factor said to allow a deflection of 1/40 of an inch per foot span.

Right here Mr. Bremner overlooks an important distinction between the formulæ. Peoples' formula does not take the deflection into account. It is what is usually termed a formula for strength, while Auslander's formula is based on stiffness. Mr. Bremner will doubtless agree with me that a beam may be amply strong yet deflect enough to be unsightly or crack a plastered ceiling.

The general formula for the strength of beams is $M = R\,I \div e$ where

M = greatest bending monent on beam in inch-pounds.

R = fiber stress in extreme fiber from the neutral axis, and varies with the materials used.

I = moment of inertia of cross section of beam where greatest bending moment occurs.

e = distance in inches of extreme fiber from the neutral axis.

The bending moment can be readily calculated by means of the formulæ given in Kidder's Pocketbook, which every progressive architect, contractor and carpenter should own.

"R" is given in pounds per square inch and varies with the material and sometimes with the authorities quoted.

"I" is likewise best calculated from formulæ.

Now for the case cited by Mr. Bremner, a rectangular beam carrying a uniformly distributed load:

$$M = \frac{12\,W\,L}{8} \text{ inch pounds where}$$

W = total load on beam (in this case including weight of beam) in pounds.

L = span in feet.

Multiplying by 12 reduces the moment to inch pounds.

$I = b\,d^3 \div 12$, where

b = breadth of beam in inches.

d = depth of beam in inches.

e = d/2.

I/e is called the section modulus and for a rectangular beam is $b\,d^2 \div 6$. The factor 6 is therefore an essential part of the formulæ, and not, as Mr. Bremner states, a factor of safety.

Gathering our terms together, we have for the conditions named:

$$\frac{12\,W\,L}{8} = R\,\frac{b\,d^2}{6}$$

$$\text{or } W = C \times \frac{b\,d^2}{6\,L}$$

The factor of safety is introduced by the relation between C and R, which can be made such as to cause W to equal S, the safe load in pounds.

As Mr. Bremner states, these formulæ are not mathematically accurate, except in theory. Practically much depends on the selection of the "constants," but the differences in published results of experimental determinations of their values need not shake our confidence in the accuracy of the formulæ.

The writer has in mind a small brick building where a brick wall was carried across a large opening on a wooden girder made by spiking together 2 in. plank. The deflection was great enough to start the plank apart. The builder evidently depended on "practical good (?) judgment . . . without making or depending on any formulated calculations."

Taking Hewn Timber Out of Wind

From C. J. M., St. Johns, Newfoundland.—In the August number of the paper there appeared an inquiry from "J. W. B." for the best method of taking hewn timber out of wind. In answer I submit the accompanying sketches, Figs. 1 to 4, which I trust will serve the purpose of the correspondent. Referring to Fig. 1 of the sketches, A A represent two blocks of timber upon which the stick B, which is to be taken out of wind, is laid. The blocks may be placed level and out of wind with each other, although this is not absolutely necessary so long as they are sufficiently so to keep the timber in a convenient position for the work that is to be done upon it.

Having placed the timber on the blocks the wind should be equally divided between the ends. This may be easily done by holding a plumb bob by the side of the timber in the center as indicated at *a d* of Fig. 1 and nipping it up with wedges as shown at *g* to make it bear steady on the blocks. When this is done take the plumb to the end of the timber, and having chalked the line to which it is attached, hold it as shown at *c d* of Fig. 1. When the plumb hangs steady, nip the line at *c* and *d* and move it slightly up and down, which will leave a mark upon the end of the timber. The same thing may be done at the other end of the timber as shown at *e f*, which will indicate the amount of timber to be taken off in order to straighten this side. With a chalk line strike a straight line from *c* to *e*, when all the timber outside of *c d e f* must be hewn off, but provision against under chopping must be made by holding the plumb along every 2 to 3 ft. as the work proceeds.

I would here remark that to guard against the plumb being lost among the chips a red rag should be fastened to the other end of the line.

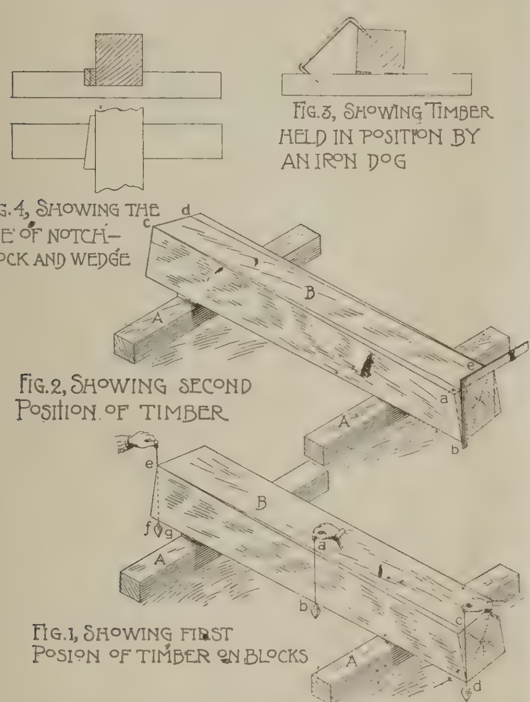
When this side of the timber is hewn down straight and plumb it should be turned over on the blocks in the position indicated in Fig. 2. Now as there is a side from which to square, the plumb bob may be dispensed with and a steel square used in its place. Nip the timber up steady on the blocks as before; square down the end as shown at *a b* of Fig. 2; strike two lines parallel to each other from *a* to *c* and from *e* to *d* and hew the two sides down square with the top, after which the timber should be turned down over again and the under side squared with either of these.

If the timber is not of sufficient weight to hold its position on the blocks while being chopped, it should be held in place with iron dogs, one of which is indicated in Fig. 3, or with a notched block and wedge as shown in Fig. 4, taking care always to drive the wedge in the opposite direction to that in which the axe is used in chopping.

From M. R., Sturgeon Bay, Wis.—A method which is found very convenient for taking timber out of wind is illustrated in the sketch, Fig. 5, which I send herewith. The upper stick of timber shows two steel squares resting upon it, there being one at either end with the timber "spotted" so that in sighting over the tops of the squares both blades coincide. As will be noticed the timber has been drawn out of square, the dotted lines showing the largest size that could be framed from this stock. In framing such a stick the dotted lines as shown would be used for "working lines" instead of using corner edges as is customary with straight timbers.

The lower stick shows a piece that has been taken out of wind with the witness marks near either end the same as a great many timber framers make use of in connection with their work.

These marks are used to locate the points from which working lines are to be taken.



Figs. 1 to 4.—Showing Method of "C. J. M."

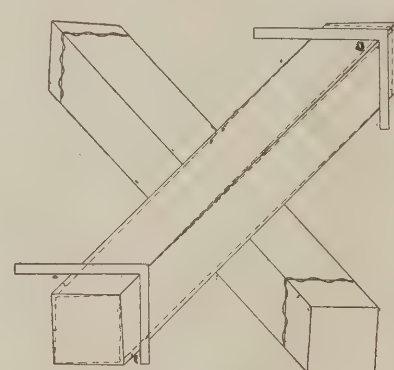


Fig. 5.—Method Suggested by "M. R."

Taking Hewn Timber out of Wind.

Paint for Copper and Galvanized Iron Work.

From D. C. Cartwright & Co., Sharon, Pa.—Will some of the many readers of the Correspondence columns tell us what is the best material to use in painting copper and galvanized iron work? Our tinners have allowed the copper to stand with its natural color and it does not look just right on a finished job.

Some say it won't dry, while others say it will run off and give the appearance of paint thrown upon it. We have a job with ridge cresting and ornaments of galvanized iron and valleys, gutters and down spouts of copper. We want to make a first-class job of this and therefore come to the readers of the paper for information.

This is the first time in 40 years we have run up against copper in this section of the country and we are somewhat perplexed as to just what is best to be done under the circumstances.

"James Bremner" Replies to "Hee H. See"

From James Bremner, Portland, Ore.—In his communication "Hee H. See," Sacramento, Cal., says: "Some time ago we built a brick warehouse," and from the "we" it is reasonable to infer that "Hee H. See" is a member of a building firm. Further he says: "I am opposed to criticism as a general thing, having neither the time nor inclination for it." Being too busy he evidently did not have the time to read more than the assertion at the beginning of my letter on rafters, and which he quotes as follows: "Most certainly the hip run can be made equal to the length of the common rafter of *any pitch whatever;*" the italics having been introduced by him to emphasize the error of my assertion. The inference therefore is that if he had read all of my letter he could have given but a very careless inspection of my diagram which accompanied it, otherwise if he had studied it and understood its import he would have been forced to see that the above assertion was strictly correct, and believed it to be so as much as he says he believes that twice 2 are 4. All right, Mr. Hee H. See; your letter may do good by directing the attention of some of the correspondents to the subject.

From replies and articles which I have noticed I am convinced there are numerous correspondents of this paper well able to discriminate correctly between points and render a correct opinion on this same question if they should care to interest themselves about it. I hold to all the statements which I wrote as being strictly correct, and if decided fairly and squarely against me I will admit that I know nothing about roof framing. My letter appeared with the diagram on page 309 of the issue for July, 1910, so that any one having the paper can see it. I will, however, here make a few quotations from it.

"Most certainly the hip run can be made equal to the length of the common rafter of any pitch whatever, and the length of the common rafter of a 45-degree pitch can be made unequal to the run of the hip. The one question involves the other. To prevent misunderstanding I will explain:

"Suppose the roof had a square or rectangular deck above with four equal hips running down from the four corners. Set the common rafters, say on the east and west sides, at one-third pitch; that is, an 8-inch pitch, or any other pitch whatever, and make the run of the common rafters on the north and south sides equal to the hight of roof, which as every carpenter knows will give a 45-degree pitch to that side. Then it will be found that the hip run is not equal to the length of the common rafter on the 45-degree face of roof, while the same hip run is equal to the length of the common rafter on the other face, or the east and west sides, which is pitched at a one-third; or any other pitch, for that matter."

Further on I repeated: "The length of the common rafter of any pitch whatever is the length of the hip run if the face of the roof on the other side of the hip has a 45-degree pitch; that is, a 12-inch pitch."

The above statements are clear and explicit without any prevarication, and I know they are as correct as 2 times 2 are 4. There is no use making any reference to the tower because its hight, or what is frequently called the rise, being 5 ft. 4 in., does not conform to my statement, which requires the hight to equal the run of one side. If the hight of the tower was 4 ft. and of uniform pitch all around, the hip run length would equal the common rafter length of any of the sides. If then we were to alter the pitch of two opposite sides—say east and west—to any pitch whatever, leaving the other two sides untouched—that is, at the 12 in. pitch, which is a 45-degree pitch—then the hip run length would equal the common rafter length of the side which was altered.

There is no use in disputing or contradicting this, because neither geometry nor mathematics lie. Of course, it is known that the pitch can be altered by converting the square into a rectangle without changing the hight, but by merely widening or narrowing one direction of the base more than the other. Give a study to the parallelograms *h e b i* for an 8 in. pitch and *k e b l* for a 15-in. pitch presented in the diagram accompanying my letter in the July number, where the square *a b c d* is for a uniform 12 in. pitch all round. Then it will be seen that the length of the hip run *i b* equals the length of the common rafter *h e* and so on. Although I gave 14 ft. as the length of the run and hight of the square-based roof, any other number of feet could be substituted and all the other dimensions would come out in correct proportion to accord with the change.

It seems to me that "Hee H. See" ridicules my statement that the pitch of a roof is the ratio of its hight to its run. That is what it is, though, all the same, and well do all the authorities on the subject to which he refers know it, but for various judicious reasons they hold to the old well-known customary method of the span. It might offend old prejudices and might interfere with the sale of their books, so the old more-confusing method is still maintained.

When we say an 8 in. pitch we mean 8 to 12; what is that but two-thirds? Is not 8 two-thirds of 12. It is, however, called by the old system a one-third pitch.

What is a 6 in. pitch but 6 to 12 equals ½. By the old system, however, it is called ¼ pitch.

A 3 in. pitch, 3 to 12 or $3/12 = 1/4$ pitch; but it is called by the old system ⅛ pitch. If that is not sufficiently confusing and absurd, I do not know what is.

Referring, however, to my recommendation he says: "This system of roof framing has certainly got me guessing." Lay down two lines at right angles on a floor large enough and take off from them full size the hight and run, then the line connecting the points, which is called the hypotenuse, is the length of the rafter. It will enclose the roof triangle of pitch and give the necessary roof pitch, cuts or bevels. Let x represent the hight in inches as by the proper method or system of expression; then 12 in. is the run, and the diagonal of this smaller-sized similar triangle being in inches, multiply it by 12, (as there are 12 in. to the foot) and the result is the length of the required rafter the same as on the floor drawing.

This is all in accord with the best well known systems of roof framing, and there is no reference to the span distance at all, which, as I have said, is only confusing and altogether humbugging. The hight and run can easily and quickly be taken from the steel square to get either at once or by multiplication the length. The cuts are also obtained by the same means.

I would here mention, however, that the inches and fractions of an inch as marked, on the graduated edge of the square, are all that are ever needed. The tabulated figures filling up the body of a square are of no more use to a carpenter than the hieroglyphics on an Egyptian monolith or the Hindoo inscription on a cocoanut or talipot palm leaf. There is no need of regarding the steel square as a sort of god or fetich because it is ornamented with these body figures. I once said to a carpenter who was squaring narrow boarding with the steel square that I thought it would be handier to use a small try square. "Oh!" he said, "I would find myself lost without the steel square."

Bevel of Siding at Intersection of Shingle Roof

From James Bremner, Portland, Ore.—In the August issue "G. W. W.," Des Moines, Iowa, asks how to fit the ends of siding to the face of shingles on a roof. As the lines of junction are all straight and not tapered a straight edge of suitable width will answer very well, but the two straight edges must be perfectly parallel to each other just the same as those of a rule, level or the leg of a square.

First place the piece of siding on the wall in its correct horizontal position just as it should be when fixed, bringing or sliding the end corner of its lower edge close to the shingle at the point *a* of Fig. 1. The siding may be fixed by tacking to the studs or otherwise, but it must not be allowed to shift. Now place the straight edge on the shingle as shown and along its upper edge draw on the siding the line *e c*, which being parallel with the lower edge in contact with the shingle face must give the cut to fit that face. Mark off from *c* to *d* the distance *a b* where the jag at the foot of the other shingle above begins, placing a distinguishing dot or mark at *d*. Take down the piece of siding; draw the square off the short line at *d* to fit the foot of the upper shingle and also the line to *h*. This last line, which fits on to the upper shingle, being parallel to *c d* and only the thickness of the shingle from it, can easily be drawn with a straight edge placed correctly by the eye. This gives the layout for the entire cut.

It is not necessary to have the point *a* touch the shingle. The siding can be slid horizontally to the right any distance to suit the width of the straight edge for the purpose of bringing the cut as near to the end of the siding as possible. The point *a* on the shingle can be known by first placing the siding as shown on the sketch. The above gives the bevel, and if it is the same all the way up the roof, fix a bevel-set to it or cut a board to its shape for a pattern or template. A short piece of siding can always be used to determine the distance *a b*, which, of course, will vary according to circumstances. By this arrangement one may cut and fit the siding very quickly. Always begin by first fitting and nailing on a piece of siding next to the shingles before proceeding with the remainder of that line or row. A hand axe or chisel as well as a saw may sometimes be desirable in cutting off the fitting ends.

In using compasses instead of a straight edge place the point of one leg at *a* and the other at *c*. Then steadily maintaining the same parallelism move the two points—the longer along the shingle to *b* and the other to *d*, tracing the lines *c d*. The point will then rise at *b*, the thickness of the shingle, producing the same corresponding equal rise for the other point at *d*. In the same way the trace is continued for the remainder. When the left point gets to *f* the right-hand point will leave the siding board on the full line at *h*.

If it be difficult to perform this operation with facility, owing to the occasional sticking of the compass points, the angle points only may be indented as indicated by the four dots on the piece of siding and the saw cuts be then made from point to point. In the case here indicated the compass has to be opened from *a* to *g*. The important thing to attend to is first to have the siding piece in its right horizontal position, parallel with the other siding boards, and secondly to maintain throughout the operation the imaginary line connecting the two points of the compasses in the same parallel direction; that is, the direction representing the straight line of movement which the board would have to describe in slipping from its temporary into its permanent position.

This can be very well illustrated in coping a molding for an internal angle as shown in Fig. 2, where the dotted lines represent the line that would connect one point of the compasses with the other at different stages of the operation. Suppose now, when the left point was at *x* on the molding, a jolt or shake of the hand or arm was to change from the correct direct on *x y* to *x z* represented by the full line, then the cut on the profile of the molding which should be at *y* would be at a point away from *y*, which may be represented by *z*. This would spoil the cope and a very slight incline will spoil it for fitting.

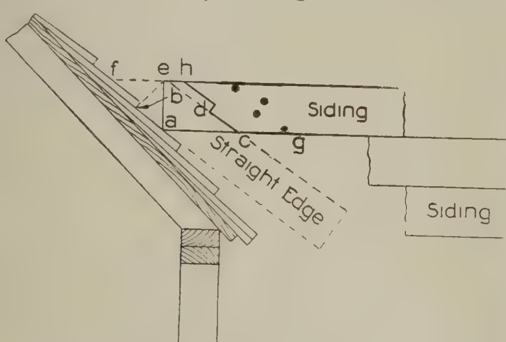


Fig. 1.—Method Suggested by James Bremner.

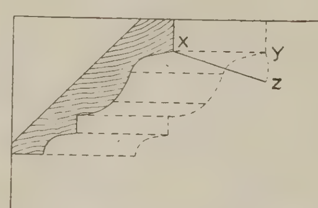


Fig. 2.—Coping a Molding for an Internal Angle.

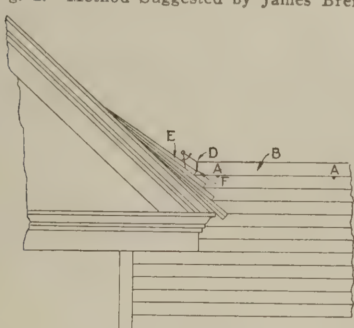


Fig. 3.—Method Recommended by "H. W."

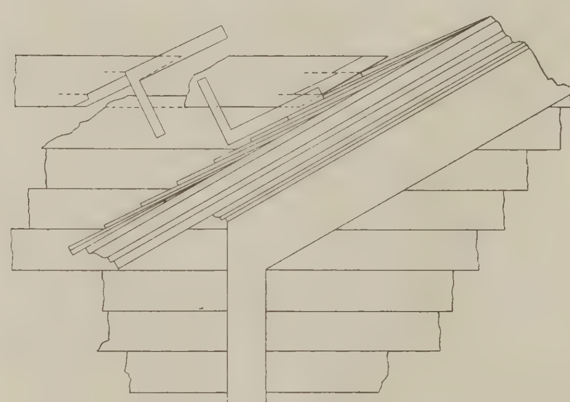


Fig. 4.—Plan Described by "M. R."

Bevel of Siding at Intersection of Shingle Roof.—Methods Suggested by Various Correspondents.

From H. W., Flushing, N. Y.—Replying to the problem of "G. W. W.," Des Moines, Iowa, I would say that if he will try the following I think he will have no trouble in fitting his siding at the first cut. Referring to the accompanying sketch, Fig. 3, first place two small nails at A A on the line for the bottom of the piece of siding marked B. Place the piece of siding on the gauge nails with the butt end against the shingles E, next set the dividers at the proper width to reach from the end of the siding at D to the shingles as shown. Scribe down from D to F, making sure to keep the dividers on a level with the siding. The result should be the desired cut.

From M. R., Sturgeon Bay, Wis.—In the August issue of the paper "G. W. W.," Des Moines, Iowa, wants to know how to compass the siding of a building to fit the shingles where the roof intersects and get it right the first time so as to save time as well as material. Referring to the sketch which I send, Fig. 4, it will be seen that the siding to be used are first cut to approximately the rake of the roof and placed at the exact hight they are to occupy. They should be slid along close up to the shingles as indicated in the sketch. Then short horizontal lines should be drawn from the upper corners of the shingle butts as represented by the dotted lines on the drawing.

Now a pair of dividers or a narrow straight edge may be used with which to scribe just as has been shown with the small-sized square. The small section in the upper left-hand part of the drawing represents the same piece of siding slid over and a steel square placed in position for marking the part which is to fit against the shingle butt the same as represented near the lower edge of the same board.

In practice it is best to scribe the siding as close to the end as possible, leaving just enough of the wood to nicely hold the saw. The siding must be placed at the exact level it is to occupy and the lines at the tops of the shingle butts carried over level, then the short saw tooth parts may be squared out by guess.

Carrying Lengths of Timber.

From D. J. M., Calgary, Alta, Can.—In the September issue of the paper I find a long article by James F. Hobart on what he calls the "Carry-Stick Problem," and in connection therewith he describes a rather tedious experiment.

This problem is readily solved by the use of the *principle of moments* and may for this case be stated as follows:

The reactions of a weight or system of weights are inversely proportional to their distance from their center of gravity. From this it follows that if one of the reactions as in the case referred to is double that of the other, its distance from the center of gravity—the middle of the stick—can only be half of the other. One man being at the end of the stick the two would be at the *quarter* point of the stick on the other side of its center or half the distance away.

If instead of a stick of uniform weight throughout, the men were carrying, say, a round, tapering log they could get its center of gravity by balancing it over something at hand, and then the distance each way would be half or double inversely from where either had decided to carry. If the log tapered considerably, the two men might carry at the large end, in which case its center of gravity should be at the third point, and if they wished the two could carry at the center and the other man at the large end. In this case they would be as before, inversely distant from its center of gravity.

If four men were carrying the same stick, two could take the large end and the others should go to the third point, which would put them equal distances from its center of gravity and divide the weight equally.

From H. F. B., Alliance, Ohio.—I have read *The Building Age* for some time past and am free to say that I like it very much. In looking over the September number I notice on page 403 the article by Mr. Hobart on "Carrying Lengths of Timber," and am constrained to ask a question concerning the problem involved.

The placing of the carrying stick is correct for three men, but suppose the same timber to be carried by five men, four at the carrying stick and one at the rear end. Where would the carry stick be placed so that the man at the rear end would have exactly one-fifth of the timber to carry? Of course, scales tell the tale if we have time to fool with them, but what I want is a correct way of figuring it out.

Some Questions in Barrel Measure

From P. D. M., New Liberia, La.—I would be very glad if some of the readers could tell me through the Correspondence columns how many barrels there are in a cubic yard, and if there is any law governing the number of cubic inches in a barrel. In measuring sand we say it takes four barrels to lay a thousand bricks. What does this infer—four cement barrels or four lime barrels? Or, in other words, is there a standard barrel for measuring sand-lime, cement, etc.? How many cubic inches does it contain, or does the standard say there are a certain number of barrels to the cubic yard; if so, how many?

Constructing an Underground Cold Storage Pit

From E. H., Springfield, Ill.—Will some of the readers who have had experience tell me how to construct a cold storage pit below the basement floor of a residence for the purpose of keeping eatables cool, instead of making use of an ice box, as ice is not readily obtainable here in the country?

What size and what depth would be advisable in making the pit? I would like to make the walls and floor of concrete, but do not know how to waterproof them. Should the pit be ventilated at the top?

I want the pit to be conneced with the pantry on the first floor by means of a dumbwaiter. Will some reader also give an illustration, with description, of a home-made dumbwaiter?

Backing Hip Rafters

From G. C., Malden, Mass.—I have a simple method of backing hip rafters of irregular shape which may be of use to some of the brother chips. Cut out two rafters on the band saw, lay one on top of the other and slide the top one past the other the necessary distance that is required at any point, and mark one by the other and you will have a perfect backing for the bottom rafter. This will apply to any shape of rafter. Simply slide it as if it was setting on the plate.

Formula Wanted for Figuring Strength of Wooden Beams and Posts

From M. K., Brooklyn, N. Y.—Will some kind reader of the paper give me through the Correspondence columns a formula for figuring wood girders and posts, such as are used in loft buildings when the load is evenly distributed? For example, I have a building 65 ft. wide by 90 ft. deep with two rows of girders running parallel with the side walls, and 6 square wood posts under the girders spaced evenly. I intend to use yellow pine posts and girders. How can I determine the exact size of posts and girders? The building, which is to be used for light manufacturing purposes, is to be 5 stories in hight, each story being 10 ft. high in the clear.

BARRELS AND KEGS IN BUILDING CONSTRUCTION

BY OWEN B. MAGINNIS.

AMIDST the many useful accessories which pertain to practical building there are few which can excel the common cement or lime barrel. In fact, these are regarded with such favor that some are always retained on the premises where building is in progress, and not sold to second-hand dealers who drive from job to job collecting them. Among the various good uses to which this indispensable auxiliary can be devoted, apart from its carrying capacity, mention may be made of its usefulness for storing water in bulk, the water being supplied through the medium of a hose connecting with the cellar supply hydrant. By this means buckets can be tipped into the barrels and water more rapidly obtained than by waiting for the slow running hose pipe to fulfill the process of wetting.

Again, the barrel acts as a standard of measurement in mixing materials as in the specified case of concrete and mortar, where the requirements may read "one barrel of cement, two of sand and five of broken stone, etc."

Next, barrels are useful to the mortar mixer; for not only do they aid him in fulfilling the foregoing duties, but also when filled with sand they act as a rest or support for hods while the latter are being filled, as shown in Fig. 1, preparatory to being taken on to the building. Being provided with a hook the hod hangs on the rim of the barrel, all as indicated in Fig. 1 of the illustrations, thus making it easy to release from its rest by the workman.

An execellent guard rail in front of or around excavations in or adjoining streets can be very simply erected by placing barrels weighted with stones, old bricks or any other old materials, and spaced at a distance apart within the lengths of planks which may be placed across the tops. This can also be done if a cheap form of scaffold for any purpose whatever must be extemporized as indicated in Fig. 2. Here is seen a scaffold consisting of two tiers of barrels, but they may if properly braced on or to any part of a building be carried up additional tiers according to circumstances.

Again, by using four or more barrels as the corners of a square or oblong form they will be found of service for scaffolding interiorly in rooms for the purpose of lathing, plastering, painting, etc. It is common practice to use barrels as a stationary base for the poles of Putlog scaffolds by filling them with sand well rammed in. This is good on concrete sidewalks, frozen ground or on rock, also as a guard for coal holes by simply inserting the barrel into the opening of the coal chute as indicated in Fig. 3.

Barrels by the ingenuity of mechanics can be made to serve other purposes. For example, observe the mortar box in Fig. 4, formed by simply sawing off the bottom section above the first line of hoops. When cut into two equal halves horizontally the barrel can be made to act as a saw horse. By setting two about 10 ft. apart with 2 x 12-in. planks or boards resting on top an excellent extemporized handy bench or benches can be made. In fact, their uses and utilities are so numerous that it would be inexpedient to refer to them all at this time, but as a fair example we illustrate a very comfortable chair, Fig. 5, made out of an ordinary flour barrel by sawing across the barrel at the second hoop, and about half way through, then sloping the sides about 60 deg. as shown in the sketch. After this the seat can be put together of ⅞-in. stuff battoned and hinged to form a receptacle underneath for the storage of tools, overalls or anything that it may be desired to place therein. Mechanics of average skill can make this chair with the aid of a few sharp tools.

Nail, bolt and rivet kegs also have their uses in connection with building construction, these uses being many and various, ranging all the way from the construction of settees and benches for use at the noon hour to scaffolds for use in executing parts of the work in connection with the building. Iron workers, house-

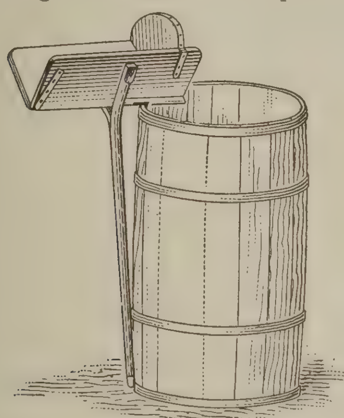


Fig. 1.—Barrel Used to Support Mortar Hod.

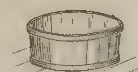


Fig. 4.—A Mortar Box.

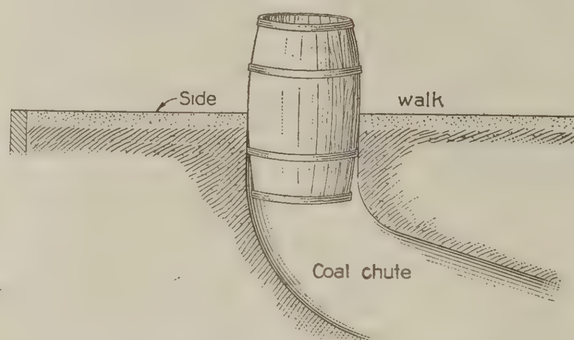


Fig. 3.—Barrel Used as a Guard for Coal Chute.

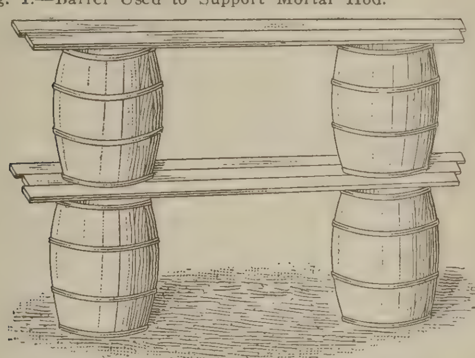


Fig. 2.—Barrels Used as Cheap Form of Scaffolding.

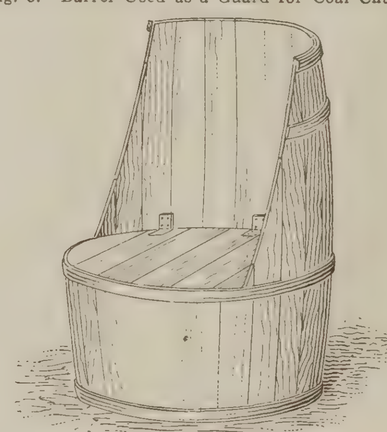


Fig. 5.—Chair Made From a Barrel.

Use of Barrels and Keys in Building Construction.

smiths and bridgemen use them extensively in riveting operations for the purpose of catching the red-hot rivets or bolts when thrown by the smiths at the forges placed on the beams to the riveters at work close by. In this case the inside or bottom of the keg is lined with asbestos, tin or wire mesh to prevent the wood from getting on fire. These mechanics are very adept at catching and throwing either across, up or down, as the case may be, thus saving much time. Pedestrians passing along some of the streets in which the elevated railroad is operated have doubtless noticed while repairs were in progress, necessitating the replacing of old iron plates with new ones, the dexterity with which red-hot bolts were thrown from the forge at the street level and caught by the workman on the elevated structure.

Finally, it is to be said that any ingenious or inventive man can find many uses for these simple and well-known appurtenances.

WHAT BUILDERS ARE DOING

AS the season advances building activity is maintained upon a fairly satisfactory basis, the volume of operations comparing favorably with this period last year. The reports from leading cities of the country are, however, somewhat irregular, many showing a heavy falling off in the amount of vested capital involved, while others show a notable percentage increase, although the amount of capital to be expended is comparatively small. Perhaps the most striking feature of the August report of building operations was the filing of the permit in Duluth for the 48 buildings to be erected by the United States Steel Corporation, involving an outlay of $10,000,000. While the returns for something like 60 cities of the country for August indicate a slight percentage gain as contrasted with August a year ago, the result would be a decrease if we eliminate the $10,000,000 permit referred to. Among the more important centers showing a decreased expenditure for new construction work in August are New York City, Philadelphia, St. Louis, San Francisco, Milwaukee, Cincinnati, Omaha and Kansas City, while among the increases are Chicago, Portland, Ore., Baltimore, Pittsburg, Seattle, Cleveland and Richmond, Va. Taking the country over there would seem to be enough work in prospect to keep mechanics fairly well employed throughout the year.

Here and there friction has developed in the labor world, the most notable being in New York City, where the Mason Builders' Association has declared a general lockout of bricklayers, to take effect Sept. 27. Some 5000 bricklayers will be directly affected by the lockout, and about 25,000 men in other trades may be thrown out of work by it.

Buffalo, N. Y.

Statistics for the month of August show 349 building permits to have been issued, with a total estimated value of $1,069,364, a gain of 34 per cent as compared with August, 1909, and a gain of 19 per cent as compared with the month of July of the current year.

For the nine months, Jan. 1 to Sept. 1, 1910, the total estimated value of buildings for which permits were issued was $6,668,364, as compared with $6,584,000 for the corresponding period of 1909.

A large proportion of the permits issued for the month of August were for dwellings, although a number of business buildings—a hospital, one school and several factories—were included.

Work now under construction, or for which plans are now in preparation, include a $100,000 dwelling on Delaware avenue for Stephen H. Clement, president of the Marine National Bank; a Linwood avenue apartment house for Sidney H. Woodruff, to cost $50,000; a contagious disease hospital for Monsignor Nelson H. Baker's Reformatory School for Boys, to cost $30,000. An addition to Columbus Hospital, Niagara street; a club house for the Columbia Turn Verein; club house for the Buffalo Automobile Club; Sunday school building for Plymouth M. E. Church, to cost $30,000; power plant for the Erie County Penitentiary, to cost $70,000; new power house for the Lafayette Hotel extension; 4-story warehouse for the American Household Storage Company, Niagara street; 6-story warehouse for F. G. Hornung & Sons, Michigan street; 1-story steel and glass warehouse, 75 x 350 ft., for the Buffalo Tool & Supply Company; a factory building for the Cooper Paper Box Company, to cost $35,000, and an administration building and an annex for the Pierce-Arrow Motor Car Company, to cost $60,000.

Chicago, Ill.

The financial situation during the past summer has interfered to a considerable extent with building operations in Chicago and other Western cities. There has been no lack of funds for erecting apartment buildings and other structures of moderate size, but it has been practically impossible to negotiate loans for large office buildings and mercantile structures which in other years have swelled the total of construction under way. The record for eight months this year falls a little short of the same period last year, but in view of the fact that the operations this year have been confined to smaller buildings the record for investments of this class is really very satisfactory. Several large office and mercantile buildings were planned and were to have been erected this year, but in every case the promoters found they could not negotiate the loans that have been obtained without any trouble in other years, and their plans have necessarily been postponed. Building permits for the eight months aggregate $57,857,200, against $61,685,080 for the same period of 1909, a falling off of $3,827,880. Permits were issued in Chicago during the month of August for 901 buildings, with 26,647 ft. of frontage, costing $6,743,200, against 894 buildings, fronting 22,084 ft. and costing $4,801,650, for the month of August, 1909, an increase of seven buildings, 4563 ft. of frontage and $1,941,550.

Cincinnati, Ohio.

August did not show up so well as July in the value of building improvements. A total of $827,060 was registered for July permits, with only $694,550 for August. All the contractors are busy, however, and the falling off is attributed to the large number of people who were away on their summer vacations. In August, 1909, 849 permits were issued to cover building costs amounting to $1,150,234, while during the corresponding month of this year 929 permits were taken out with only a total for building estimates as stated above. In a measure this can be accounted for by reason of the fact that a large number of permits were issued for private garages whose cost did not run up very high. Judging from the records the elevator companies must have done a very good business lately.

Good carpenters have been in demand, but now that the work on the Ohio Valley Exposition temporary buildings is finished this class of labor may not be so hard to procure.

Among new buildings now under construction is a large 4-story brick and steel addition to the plant of the Foy Paint & Glass Company; a 3-story factory of the same class of construction, 50 x 125 ft., for the Couch Bros. Manufacturing Company; a 1-story brick pattern storehouse, 35 x 55 ft., for the E. H. Bardes Range & Foundry Company; a manufacturing building for the Hisey-Wolf Machine Company, and what is intended to be one of the most modern plants in the country is now nearing completion for the Cincinnati Bickford Tool Company at Oakley suburb.

Architects and builders generally consider the outlook as being good for an active fall season.

Cleveland, Ohio

Building operations in this city are holding up well. While no large new projects have come out during the past month a fair amount of small work in the line of 2-story store buildings and residences is coming out, and this with what is already under way indicates that contractors and builders will be quite busy until late in the season. The issuance of a permit for the 12-story City Investment Building, to cost $400,000, which is now well under way, helped swell the August permits, which exceeded those of the corresponding month of last year both in number and amount.

During August there were 768 permits issued by the city Building Inspector's office for buildings to cost $1,506,682, as compared with 552 permits issued during the corresponding month a year ago for buildings to cost $1,092,130. Permits issued during the first eight months this year aggregate $9,023,177, as compared with permits for structures to cost $9,042,507 issued during the corresponding period of 1909.

Detroit, Mich.

Building is pushing far ahead of August last year, the increase mounting up to fully 50 per cent. Last month there were 601 permits issued for buildings to cost $2,499,880, while in August of last year there were 342 permits granted calling for an outlay of $1,651,760.

The Builders and Traders' Exchange of the city of Detroit has been publishing, for the benefit of its members, a *Bulletin News,* designed to present to their attention such information and data as would likely prove of interest and value. In the issue for September is described the "Boat Ride and Dinner" at Bois Blanc Island on Aug. 2, and the good time that was enjoyed by every one present. The article on "How the Carpenter-Contractor May Achieve Success," which appeared in *The Building Age* a short time ago, is reprinted for the benefit of the members, and there are several pages devoted to interesting items in connection with Builders' Exchanges in other cities. A number of gossipy items relative to members of the Detroit Exchange constitute a very interesting feature. The idea of the publication is a highly creditable one, and is well calculated to accomplish a great deal of practical good.

Los Angeles, Cal.

The amount of new work undertaken in this city during the month just closed was not up to the expectations of builders, though it is still held that work has been delayed rather than abandoned on the new structures which were in contemplation in the spring and summer. Satisfactory progress has been made on most of the buildings started earlier, and enough work is in sight to keep most of the builders busy until late in the fall. The building record for August shows a total valuation of permits amounting to $1,227,400, as compared with $1,319,268, and with $1,555,199 during the month of August last year. As has been the case in the previous months of the year there is no falling off in the frame construction, while in brick and concrete construction there has been a practical suspension of building operations. During August permits were issued for only seventeen buildings of slow-burning construction. Three of these were for Class A buildings to cost a total of $195,000, and 14 were for Class C buildings to cost a total of $102,763. Beside this there were permits for alterations to 50 brick buildings to be made at a cost of $98,581. The frame construction for the month amounted to nearly $1,100,000, or more than three-quarters of the total.

There has been no change in the building materials' market or in the labor market since last month, except that the labor troubles in the iron and allied trades are gradually dying out, and has ceased to have much effect on building.

Among the more important buildings about to be erected in this city are: An 8-story reinforced concrete hotel building, to be erected for J. C. H. Ivins at the corner of Grand avenue and Second street, at a cost of $275,000, for which plans are now being drawn by A. L. Haley; the 5-story and basement Class B building, to be erected for Meyer Bros. and Hugo Hoffman on Broadway, between Seventh and Eighth streets, for which the steel contract has just been let; the S. M. Bernard Estate 2-story brick wholesale building, to be erected at Central avenue near Second street, at a cost of $50,000, for which the general contract has just been let to Alpeter, Hall & Alpeter; and the 2-story brick veneered residence of W. H. Workman, Jr., at 327 Boyle avenue, for which the contract has just been awarded to B. D. Kronnick for $40,000, Robert D. Farquhar architect.

Louisville, Ky.

The report of building operations in Louisville for the fiscal year ending Aug. 31 shows the city to be in the midst of one of the greatest building booms in its history; in fact, with one exception the fiscal year just closed was the greatest building year since the office of Building Inspector was established. While the spring of the year was rather backward, mid-summer found builders overwhelmed, and at the present time work in all departments is being pushed as rapidly as possible so as to fully enclose all important structures before winter sets in. Notwithstanding the fact that a larger amount of building has been in progress than in any previous year, labor conditions may be said to have been ideal, the only trouble noticeable being the lack of supply of first-class mechanics. There is a scarcity here as well as in other important building centers at the present time. All of the large work that has been contemplated has been let principally to local contractors, and no large undertakings of importance are on foot just now; in fact, it is doubtful whether any will be attempted before the opening of the new year.

During the fiscal year ending Aug. 31 there were issued from the office of Robert J. Tilford, Building Inspector, 2448 building permits calling for an estimated outlay of $3,096,792, this being exclusive of the plumbing and electric wiring, which would carry the estimated cost considerably in excess of the $4,000,000 mark.

Of the permits issued 577 were for frame dwellings estimated to cost $835,305, and 58 for brick dwellings costing $256,475. There were also 9 permits for brick churches to cost $322,300. Apartment houses are being erected to some extent, there having been 20 permits for brick flats and apartments to cost $211,200 and 12 permits for frame flats and apartments to cost $60,700. Other prominent permits include 13 for brick factories to cost $209,400, and 7 permits for brick warehouses to cost $73,290.

Milwaukee, Wis.

There has been a continuation of the lull in building operations previously noted, and the figures for August, as well as for the first eight months of the year, are behind those of the corresponding periods a year ago. According to the figures compiled in the office of the Bureau of Building Inspection, 383 permits were issued calling for an estimated outlay of $957,173, against 370 permits for improvements involving an estimated outlay of $1,277,752 in August of last year.

For the first eight months of the current year there were 2849 permits issued by the bureau calling for an aggregated expenditure of $6,868,103, while in the corresponding 8 months of last year 2997 permits were granted involving an outlay of $8,119,751.

New York City

The local building situation has shown slightly more activity as compared with a year ago, although the figures are not particularly significant of anything like a boom in construction work. In the Borough of Manhattan, for example, the estimated cost of the 57 new buildings projected was $7,084,435, while the 72 new buildings planned in July were estimated to cost $5,801,975. In August last year, however, only 38 buildings were planned to cost $5,623,332. The increase of last month's figures over those of the corresponding period a year ago is due largely to the more extensive character of the apartment houses which are being built, the number projected being the same in the two months in question.

There were 12 apartment houses planned in August, many of them being of the 12-story variety and involving an expenditure of $2,910,000, while in August last year there were 12 apartment houses planned to cost $1,060,000. Some of the other prominent buildings projected last month were the Packard Commercial School on Lexington avenue, costing $250,000; an 8-story stone and concrete factory building for the Trinity Corporation, costing $150,000; the Washington Irving Girls' High School, costing $600,000, and a 19-story store and office building for the East River Savings Institution, Broadway and Reade street, costing $650,000.

In the Bronx there was a falling off in building activity, August showing 136 buildings planned to cost $2,797,520, as against 154 buildings costing $4,356,350 in the same month a year ago.

The greatest shrinkage, however, appears in the Borough of Brooklyn, where there has been a decided let up in suburban development work. Last month 381 buildings were planned to cost $2,367,430, while in the same month a year ago 1433 buildings were planned to cost $6,958,625.

In the Borough of Queens a little more work has been doing owing, no doubt, to the confident expectation that the opening of the Pennsylvania Railroad tubes under the East River and bringing the principal points on Long Island nearly a half hour nearer to the business section of Manhattan Island will cause an increased demand for housing accommodations in this section of Long Island. Permits were granted for 336 structures, representing an investment of $1,367,220, as compared with $1,327,245 in August, 1909.

Since January plans were filed for 2901 structures, estimated to cost $10,828,000. While these figures are somewhat under the total of the first eight months of 1909, the decrease is wholly due to the lack of tenement construction, the laws regarding which apply to three-family structures in outlying sections, as they do to the largest apartment buildings in Manhattan.

Oakland, Cal.

Building in Oakland is keeping up well, though there is no great rush in any particular line just now. The building report for August is not so large as some previous months this year, but it is larger than some had expected.

The total valuation of the permits issued during the last month was $453,346. This is a slight falling off as compared with the same month last year, when the total went above $600,000. Building of frame residences continues active, not only in Oakland proper but in the outlying cities and towns. There is no great amount of activity in the erection of brick buildings, and more particularly of the larger class of brick buildings.

On Aug. 24 the architects of Oakland, Cal., organized the Oakland Architects' Association, with a membership composed of most of the leading architects of the city. The organization will be allied with the American Institute of Architects. The officers of the new organization are: Louis J. Stone, president; J. C. Newson, vice-president; W. J. Wright, secretary; C. W. McCall and S. B. Newsom, committee on publicity; W. J. Wright and D. V. Deuel, committee on by-laws, and L. S. Stone and J. C. Newsom, committee on building laws.

Plans have been completed for the new hospital to be erected at the Masonic Home in this county at a cost of $40,000. The building will be of red pressed brick with white mortar and white terra cotta trimmings. O'Brien & Werner are the architects.

Philadelphia, Pa.

A falling off in the volume of building operations occurred in August, and while builders look forward to more active conditions in the early fall, there is without doubt an over-supply of small dwelling houses in some sections of the city, and a disposition to defer further extensive building in that direction until the demand catches up in a measure with the supply. The rapidly-increasing construction of tenement houses is also believed to have exerted some influence in the restriction of small dwelling operations. Statistics compiled by the Bureau of Building Inspection show that permits for 1189 operations were issued in August authorizing work estimated to cost $2,634,-265, which, compared with August, 1909, the high record for that month, is a decline of 287 operations and a decreased expenditure of $3,704,610. The total for that month was above normal, however, due to the authorization of the construction of three office buildings at an approximate cost of $3,000,000, so that the actual decrease, as far as general building is concerned, has not been so large.

The falling off in August has placed the record for the total expenditure during the first eight months of the year considerably below that for the same period in 1909, that for the current eight months being $28,369,960, against $32,131,220 for the same period last year.

Notwithstanding the slowing down in new work during the past few months, builders and contractors have had a busy month with the work already under construction. There is also a large amount in sight, negotiations pending for a good quantity of dwelling house construction, as well as additional municipal building, and it is generally anticipated that a better movement in new work will develop during September.

The eleventh annual baseball game between teams representing the Master Builders' Exchange and the Lumbermen's Exchange was played in this city on Sept. 8. In this the lumbermen were the victors by a score of 16 to 12. The proceeds of the game were divided, as is the usual custom, between charitable organizations, the Red Bank Sanitarium, Children's Country Week Association, the Modified Milk Society, the Kent Day Nursery and the Free Ice Fund participating.

Anderson & Haupt filed plans recently in the Bureau of Building Inspection for a 4-story and basement flat house, to be built at the southwest corner of Fifty-first and Walnut streets. The building is to be 84 ft. 9 in. x 155 ft. in dimensions, and contains 24 six and seven-room suites, each with bath. The Penn Building Company has the contract for the erection of the building.

Estimates are being taken by the H. B. & A. C. Stevenson for 196 two and three-story houses, which are to be erected on a block bounded by Allegheny avenue, Clearfield, Twenty-fifth and Twenty-sixth streets. The houses are to be built at a cost estimated from $1,800 for the two-story to $3,500 for the three-story houses.

Ground has been broken for a 10-story annex for the St. James Hotel at Thirteenth and Walnut streets. The new building, which will be located at 1216-1218 Walnut street, measures 47 x 132 ft. on the ground plan, and will be of steel, brick, terra cotta and stone construction. The building will contain about 300 rooms, and the estimated cost is close to $300,000.

Among some of the dwelling-house operations recently begun may be noted one for 22 two-story brick dwellings at Yewdell and Cedar streets, West Philadelphia, by James C. Enburg; 16 two-story dwellings, 14 ft. x 41 ft. 9 in., each on Helen street above Ontario, by F. M. Faulkner, and 21 houses on South Sixtieth street, in the vicinity of Osage avenue, by Nathan Raidman.

In general construction several good operations have recently been started. R. C. Ballinger & Son began work on a stone and concrete stable at Thirtieth and Chestnut streets, for George Abbott. A factory building at Fifth and Columbia avenue has been started by Jos. C. Harvey, while William Steele & Sons Company have started a warehouse for the George W. Blabon Company, at Blabon avenue and the Philadelphia & Reading Railway. The aggregate estimated cost for the above operations is $140,000.

Pittsburg, Pa.

An appreciable improvement was noticeable in August building as compared with previous months, there having been 422 permits issued for improvements estimated to cost $1,335,393. Of this total $1,102,865 is the estimated cost of new buildings, and of this total $900,840 is for 149 buildings in five wards. The permits issued last month cover several large structures, but the great majority were for dwelling houses ranging in cost from $3,000 up to $10,000.

Portland, Ore.

At a time when most of the leading cities of the Pacific Coast, as well as the rest of the country, are showing a dropping off in building operations, Portland comes out with the greatest activity in its history. During the month of August the aggregate value of the building permits issued in this city was $2,555,875, a gain of 155 per cent over the same month last year, and a good substantial gain over the record of any month in any previous year. This brings the city's total building record for the first eight months of the year up to $11,973,637, a gain of over 45 per cent over the same eight months of last year. Portland's showing for the month just passed is more evident when it is noted that it is more than a million dollars more than that of any other city on the Pacific Slope.

Rochester, N. Y.

The building figures for August show an appreciable increase over the same month last year, and were the third largest of any month this year. The report of Fire Marshal H. W. Pierce indicates that 334 permits were granted for buildings estimated to cost $1,109,232, which is an increase of $247,491 over August last year.

For the 8 months of the current year the total estimated cost of new work for which permits were issued was $6,909,379, as against $6,331,340 in the same period of last year.

A number of important operations were commenced last month, including among others a $50,000 school building, a $50,000 factory building, a $40,000 theater, an $8,000 apartment house, and an addition to the Mechanics' Institute to cost $75,000.

St. Paul, Minn.

While the volume of operations was in excess of the month before August fell slightly behind as compared with the corresponding month in 1909, both as regards the number of permits issued and the estimated cost of the work projected. Last month there were 389 permits granted for new buildings to cost $1,138,461, while in August last year 415 permits were granted for new work to cost $1,222,051.

For the 8 months of the current year there were 2637 permits granted calling for an expenditure of $7,300,828, while in the corresponding period of last year 2944 permits were issued by the Bureau of Building Inspection calling for an outlay of $7,597,246.

San Francisco, Cal.

It is beginning to look as though building will be rather quiet in San Francisco and throughout California this fall and winter, although contractors are still hoping for some improvement in the indications as the money from the summer's crops comes into circulation. As a matter of fact a good deal of work is now under way, particularly in the construction of brick and concrete structures ranging about four stories in hight, but the new work which was anticipated for the summer seems to be slow in getting under way. The value of the permits issued during August, showing an increase of about $100,000 over the month preceding, is still far below that of the corresponding month of last year. The August showing was $1,525,121, as compared with $1,452,999 for July, and $2,186,064 for the month of August, 1909.

The situation in materials is generally favorable to builders, with the tendency toward lower prices in most lines. Stocks of fir and pine lumber in San Francisco are rather light, though the wholesale houses have on hand very fair stocks. The retailers are carrying very little lumber, and notwithstanding the low prices are not anticipating future needs to any extent. Receipts of lumber from the Northern mills continue small, notwithstanding that every advantage in the way of low prices and low freight rates is offered. Lumber prices are nominally the same as ever, with the vraious kinds being held rather less firmly than for some time.

The cement situation is fairly satisfactory, the various mills reporting a good, steady demand locally and an active shipping call. Cement prices are steady. The demand for building stone just at present is not active, though a few large contracts are in prospect, and a good deal of stone is now going into buildings on contracts let earlier in the year. An insurance building for which plans are now complete will call for a large amount of Alaska marble, and the new Hall of Agriculture at the University of California, in Berkeley, will call for a large amount of granite. Brick, after a number of fluctuations, has settled down to about the same figures as last month. Competition between the larger manufacturers seems to be on the increase, but at present there is little or no over-production in the plants supplying San Francisco and vicinity.

The labor market is steady with no great over-supply of men in any of the building trades, but, at the same time, with enough to prevent any thought of a shortage. The practical failure of the hod-carriers' strike last month will, it is believed, have a beneficial effect on the building trades in general, and no further trouble is expected in this city unless there should be an unexpected revival in building. It appears that the building strike at the town of Stockton has gradually died out, with no pronounced victory on either side.

Among the more important buildings that are planned for immediate construction in this city are: The Hind Estate Building on Second street near Bryant, to be 4 stories and a basement high; the 2-story and basement brick building of M. Clark at Mission and Twentieth streets, to cost $20,000; the five-story and basement brick and stone Joss House of the Sue Sing Benevolent Association, on Waverly Place near Washington street, which will be a highly ornamental structure with a front of white glazed brick and white marble and with marble stairs, wainscoting, etc., on the interior, O'Brien Bros. architects; a 3-story cement block building, to be erected for Mrs. E. N. Fritz at a cost of $70,000; the 5-story and double basement reinforced concrete fireproof warehouse building of the Rincon Warehouse Company, at Federal and Second streets, at a cost of $116,000; the improvements at the Odd Fellows Hall at the corner of Market and Second streets, to cost $23,470; the J. B. Tradewell 3-story apartment building on Pine street near Larkin, to cost $29,000, for which contracts have just been let, Ross & Burgren architects; the G. G. Burnett Estate 5-story building, to be erected on Larkin and Turk streets at a cost of $75,000, for which bids have already been asked, C. A. Muessdorfer architect; the 7-story and basement Rivers Bros. apartment building on Golden Gate avenue near Market street, to cost $160,000, C. A. Muessdorfer architect; the Eagles' Hall on Golden Gate avenue near Hyde street, to cost $120,000, C. A. Muessdorfer architect; and the 6-story G. B. De Barnardi apartment house on Bush street near Powell, C. H. Barrett architect.

Seattle, Wash.

Activity continues to dominate the building industry, and the volume of operations is on a scale considerably in excess of that for the corresponding period last year. According to the report of F. W. Grant, Superintendent of the Department of Buildings, there were issued in August 1323 permits for building improvements involving an estimated outlay of $1,457,745, as contrasted with 1143 permits for new buildings to cost $1,189,655 in August last year.

Of last month's operations 269 permits were for frame residences costing $395,725, while 246 permits were for frame business buildings costing $168,370. There were six permits for brick buildings to cost $321,600, and five permits were for reinforced concrete buildings involving an estimated outlay of $294,500.

For the eight months of the current year there were 8943 permits issued for construction work estimated to cost $11,454,235, while in the corresponding period last year there were 10,119 permits for building improvements to cost $13,569,603.

Topeka, Kan.

Building operations in this city during the last month received a decided impetus as compared with the preceding months. The records compiled in the office of the fire marshal show that during July the cost of buildings for which permits were issued was almost double the cost of those projected in June. According to these figures the total estimated cost for buildings in July was $278,786, while in June it was $153,870 and in May $150,000.

Several of the permits granted last month were for rather large and costly work, among which mention may be made of the paint shops at the shop yards of the Atchison, Topeka & Santa Fe Railroad, to cost $26,000; the new Van Buren Street schoolhouse, to cost $42,000; the exhibits building at the fair grounds, to cost $23,000; remodeling of the Crosby store on Kansas Avenue, at a cost of $50,000; a cold storage plant for the Charles Wolff Packing Company, to cost $60,000, and a handsome residence for E. H. Crosby, on Harrison Street, to cost $20,000.

Washington, D. C.

Indications point to an active fall season in the building line, as the permits issued in August call for an estimated expenditure considerably in excess of July, the increases being distributed over every section of the district. It seems to be the present opinion that there will be more actual construction work performed in the district during the closing three months of the year than was the case in the corresponding period last year.

In August, 486 permits were issued calling for an outlay of $1,275,721, while in July 424 permits were issued involving an estimated outlay of $794,134. The more important work projected last month included 118 brick dwellings to cost $510,828, also 11 brick stores to cost $44,200. There was one permit for a bank and office building to cost $125,000, and one for a church to cost $215,000.

Samuel J. Prescott and B. T. Pillow, president and secretary, respectively, of the Builders and Manufacturers' Exchange, have in hand an extensive programme of entertainment for the Inter-State Builders' Association, members of which will visit Washington on Sept. 17. The field day, which will be held in that city on that date, will be largely social in character, and it is the aim of the association to hold meetings of this character each month, especially in the summer season, with a view to promoting more friendly relations between the various Builders' Exchanges of this immediate section. One of the features of the afternoon's entertainment will be a baseball game between the nines from Baltimore and Norfolk. In the evening there will be a banquet with music and speeches.

LAW IN THE BUILDING TRADES

By A. L. H. Street

RIGHT OF CONTRACTOR TO RECOVER FOR WORK DESTROYED

Under the California statutes one is not entitled to pay for work partly done, where he has contracted to complete it for a lump sum, unless full performance has been excused, prevented or delayed by the other party. A builder agreed to erect a building occupying the full width of a lot for $3,680, and received $2,100 when the work was partly done. The lot was graded above the adjoining lots, which did not belong to the owner of the building. The contractor told the owner that he did not believe that the soil would support the building, but negotiations for support by a retaining wall and by banking the soil were abandoned and the work was nearly completed. A heavy rain caused the soil to subside and the walls collapsed, resulting in serious injury to the building. The owner refused to restore the building and the contractor refused to complete the work. Held that the contractor is not entitled to recover the balance due for work done and materials furnished. (California Supreme Court, Carlson vs. Sheehan, 109 Pacific Reporter, 29.)

RIGHTS OF PAID SURETIES ON CONTRACTORS' BONDS

The strict rule usually applied to discharge a contractor's surety from liability where there has been a departure from the contract without the surety's consent, does not apply to paid sureties, who must show that they have been actually injured by the departure. Hence, in the absence of proof that an extension of credit to a contractor by a material man injured the contractor's surety, he cannot assert it as a ground for discharge from liability on the bond. (United States Circuit Court, Eastern district, Pennsylvania, United States vs. United States Fidelity & Guaranty Company, 178 Federal Reporter, 721.)

RIGHTS OF OWNER ON BREACH OF BUILDING CONTRACT

Though a contractor does not erect a building according to contract the owner is not entitled to deduct from the price any larger sum than is necessary to remedy the defects in construction and material, make the building conform substantially to the agreement and compensate for delay. Substantial compliance with such contracts is all that can be required of contractors. (Texas Court of Civil Appeals, Graves vs. Allert & Fuess, 128 Southwestern Reporter, 940.)

RIGHT OF ARCHITECT TO PAYMENT FOR SERVICES.

As a general rule, an architect is entitled to compensation for services rendered where work is stopped on the plans before they are completed. (Springfield, Mo., Court of Appeals, Hellmuth vs. Benoist, 129 Southwestern Reporter, 257.)

LIFE IN A NORTHERN WISCONSIN LOGGING CAMP

BY MATT RILEY

THE methods of lumbering as carried on throughout the United States and Canada are as varied and perhaps more so than any one branch of our industries, and some reference to the routine of logging operations in Northern Wisconsin may not perhaps be without some little interest to many readers of the paper, especially those living in other parts of the country. If, for instance, an up-to-date lumberman from Canada, the State of Maine, Michigan or Wisconsin, where operations are conducted somewhat on the same general lines, should happen to change his location for the South or West, he would need to discard most of his old methods and practically learn the business over again. The sleigh could not be used in the South, nor yet on the Pacific Coast, where the enormous proportions of trees would make the average man feel helpless, he being a stranger to such gigantic specimens.

When I made the Pacific Coast my stamping ground some years ago the regulation log road was cut from 25 to 30 ft. in width. The peeled logs of perhaps 18 in. to 24 in. diameter would be imbedded about half of their thickness in the soil crossways of the road and spaced about 7 or 8 ft. apart with a notch cut to a depth of 4 to 5 in. on the upper part of each "skid" in the center of the road. These notches served the purpose of keeping the logs from swerving from side to side as they were hauled tandem fashion like a string of railroad cars, one log "dogged" to another until—well, I won't say anything about the length of the string, as some of the readers might conclude that I have very little respect for the truth. These logs would always be peeled and a "snoot" cut on what was to be the underside when hauling. The skids were always well greased, it being one man's duty to carry a pail of grease and sweep each one of the skids.

One man called the "bull puncher" would handle as many as 12 or even 14 teams of oxen and the pay these "bull punchers" used to get would make a good many professional men feel like changing their occupation and following this line of work. The oxen were usually fed and taken care of by other men, the labors of the drivers ceasing as soon as the barn yard was reached at noon and night. While on duty they would invariably be accompanied by a "chainer."

The railroads on the Pacific Coast as well as in other parts of the country have to a great extent revolutionized lumbering so that systems which used to be the regulation just a few years ago have now become the rare exception, with the result that at the present time a great many of "Mr. Bull Punchers" skid roads have given way to a greater number of cross ties surmounted with rails of steel over which run modern log cars propelled by steam or gasoline, especially designed to carry the same old giants of the forest from their long peaceful homes; possibly to the same old "landing" that was so frequently visited by "Mr. Bull Whacker" in days gone by when the air rang with the stentorian notes of his husky voice, the echoes of which have since died out among the surrounding hills, as he has no occasion now to raise his voice to such a pitch that an auctioneer's "speel" would sound like a whisper in comparison.

The felling of timber in different localities has been as varied as the hauling. In a good many parts the standing trees are notched with axes for felling, the scarf being cut on the side to which the tree is intended to fall, and sawn the balance that is necessary, wedges being driven in behind the saw to keep it from "pinching" and also to throw the tree in the proper direction. Two men operate a cross-cut saw, standing "over it," as one would say, with the teeth toward their bodies, and it seems miraculous with what precision a tree can be thrown by proper notching and sawing. In some cases it is necessary to saw through to the notch on one side and allow the other side to hang in order to give the tree a twist whilst falling to avoid lodging on some other tree or trees. The gyrations of such a tree must be anticipated by the lumbermen or a good part of their labors will be for naught and the wood be left in a dangerous condition with lodged trees "hanging up" and which are liable to come down with the wind at any time.

When I was in the South it was the custom to chop down the trees the same old way our northern great grandfathers practiced. The cutting of cypress logs is about as wet a job as our northern river driver has when floating the logs down stream to the mills. As the home of the cypress is in swamps where the depth of water varies, lumbermen must use rafts or flat bottom boats on which to work, as the bottoms of the swamps are scarcely more buoyant than the waters over them. However, he sometimes has the advantage over his northern brother in that his logs are already in water that is deep enough to carry them to the mill.

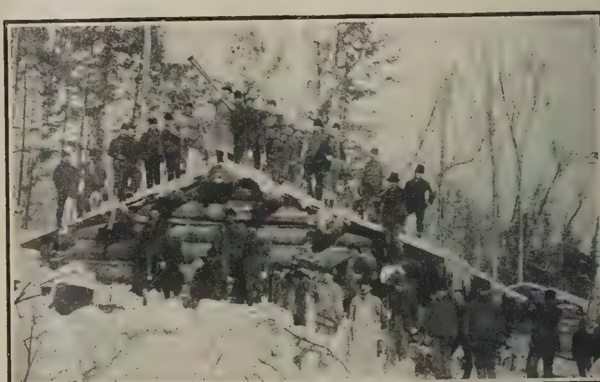


Fig. 1.—View of one of the camps showing the "cook" in pose for announcing that dinner is ready.

Life in a Northern Wisconsin Logging Camp.

Some kinds of timber growing along the Pacific Slope are so tough and gnarly for a considerable distance up from the ground that they are chopped off several feet above the ground, the chopper using what is called a "spring board" on which to stand while up in the air doing his work. This spring board, if memory serves, is about 4 ft. long and about 6 ft. wide, with one end tapered a little from both edges, on which is fastened a horse shoe with the heel calks about even with the narrow end of the boards and standing off, from it a notch or pocket is cut almost square into the tree the depth of the axe bit and slightly wider than the end of the spring board, so that a man starting from the ground cuts his first notch some distance up, inserts his spring board with the calks of the horse shoe pointing up to keep it from slipping out; then he gets on to his board and cuts another notch, using another board. He can in this way rise to any desired hight by pulling up the lower of his two boards and using it in the upper notch that has already been cut. This may seem to a great many a dangerous business—to scale up one of these monstrous trees and stand on a small piece of board to chop away until the tree falls. It is dangerous, but the men get used to it.

Here in Wisconsin where I now live and once a great timbered part of the State, where a half dozen sawmills were in operation all at the same time, there is at present not one left and all that marks the sites of those once busy hives of industry are perhaps the crumbling remains of masonry, of a foundation or slab burner. For the accommodation of the few who still have some timber left a small sawmill outfit is kept in connection with a planing mill, but I suppose an average of three weeks each year is the extent of the run for this.

When I was on a trip up North a few days ago I met a couple of lads who worked for me last summer and who have made a practice of going to the woods every winter. In course of conversation I ascertained that one of them had some camp pictures, and while I was unable to buy them at any price I did succeed in borrowing two pictures showing camps—Figs. 1 and 2—also one showing the load of logs—Fig. 3—but this only on the promise that they would surely be returned.

The camp shown in Fig. 2 is a building 40 ft. wide by 140 ft. in length. The right hand end as seen in the picture is used for the kitchen, and next to it is the dining room. The opening which is seen is an alley or hallway cutting the building into two parts and separating the dining room at the right from the sleeping quarters at the left. The ventilators showing on the roof are over the sleeping quarters. The camp was floored with dressed and matched maple flooring and scrubbed twice a week. Only 60 men were kept in this camp through the winter that the picture was taken, although it could easily be made to accommodate twice that number if circumstances required it.

The photograph of the load of logs, Fig. 3, was taken at Hermansville, Mich., just across the Wisconsin State line, the picture representing the load just after a six-mile haul had been made. It was contemplated earlier in the season to haul a big load so as to have pictures of it taken and to that end logs of good scale were picked. The set of sleighs were also built for that express purpose and "bunks" made for them 12 ft. long. I would state by way of explanation that bunks are what would be called by most people bolsters and are the top cross timbers that carry the load.

About the time all was in readiness the weather moderated so that the roads were almost broken up. The logs that had been picked for the big load had, however, been hauled out in the meantime and the big load idea abandoned for the season, when the temperature dropped considerably but not enough to make a good solid road. Under these conditions the load shown was put on to the sleighs, the logs being taken just as they happened to be on the skidway, so that the picture will give the reader a better idea of saw logs than possibly he would have obtained from seeing a photograph of logs which had been picked especially for the purpose. This is not considered anything extraordinary for a big load as regards to scale but may seem to some who have not had any lumbering experience that it is about all that could be taken on these sleighs. Had the roads been firm enough, however, there would have been at least 3000 ft. more added, as there were only a few chains used on this load, namely, the "Corner binds" which will be noticed over the "first tier" or "bunk tier"; then comes the "first wrapper" over the "third tier"; then the double wrapper" over the "fourth tier." This could have been wrapped with a second double wrapper and then brought up to a peak in the center, in which case the topmost log would be called a "peaker."

Fig. 2.—View of another camp, with the "crews" out in front, some having with them the implements of their calling.

Life in a Northern Wisconsin Logging Camp.

With loads of this kind we must all agree that it is hardly the safest thing in the world on which to ride. As will be seen, the third tier of logs is wider than the first, the fourth being about the same width as the first, which must put a tremendous strain on the "double wrapper."

The water tank shown in Fig. 4 of the pictures will afford a fair idea with a few particulars of explanation of what a winter logging road really is. An ice road as we see in the picture is built with the utmost care and before Jack Frost gets too cold-hearted the roads are gone over and every little unevenness of the ground is smoothed away. The ground is slightly trenched just the width the sleigh runners are apart; then when the weather becomes cold enough the water tank is started out, water holes having been prepared along the road where possible and convenient.

The first aim when starting with the tank is to get a bottom for the road. Another inspection of the picture will show that the tank is at a water hole with a bucket, the latter being a pork or liquor barrel which the blacksmith has ironed by putting extra heavy band iron hoops on it along with a bail of about ⅞ in. round iron. This bail is attached to lugs that run down on opposite sides of the barrel and all well riveted. The bottom is reinforced by having an extra thickness of hardwood riveted on with an eye bolt in the center to receive the pole which is used for keeping the bucket in position when filling and pulling back after dumping. The horses pull the bucket up by means of a rope or chain which runs over a pulley at the top of the derrick as shown in the picture. The top of the tank is open directly under the derrick so that when the bucket leaves the skids, coming up over the side of the tank, it is dumped by gravity. When the load is loaded and hauled to the part of the road to be sprinkled the plugs at the rear—one over each sleigh track—are losened or

Life in a Northern Wisconsin Logging Camp. Fig. 3.—A load of logs after a six-mile haul.

taken out as the case may be, so that the water running down and freezing in the ruts soon has the desired effect—two paths of glare ice over which a team of horses can pull a load that it would be impossible for two or three teams to haul over a snow rut. The sprinkler is run at night so as not to interfere with the log traffic. "Road monkeys"—men who work on the roads—are kept busy smoothing down and repairing, as well as sweeping, something after the same method as the "white wings" on the city streets.

Where there is a descent of any kind on the road a "sand man" keeps that part sprinkled with sand so that the loads may be kept in check. Where hills are to be climbed snatch or "tow" teams are kept in readiness to hook on and tow over the heavy parts of the road. The log cutting and skiding follow the erection of the camp and is carried on along with the road making in early fall before the snow interferes too much with the work, every part of which is systematized about as well as an up-to-date machine shop, each man following his own particular part of the business, whether it be cooking, teaming, scaling, sawing, swamping, using the hook, barn boss, chore boy, blacksmith, tinker or handiman, he finds plenty of work to do and a home for all through the long winter months, winding up in the spring with a good supply of cash. He then departs for his home, or possibly he is an old-timer and takes in the drive which follows immediately the ice is broken up and the streams are clear. The logs are rolled into the water or perhaps a whole rollway is let go at once, crashing into the water, to be taken care of and kept in the channel by lumber jacks, who feel perfectly at home whilst jumping from log to log, crossing the river in this way, or perhaps standing erect on a partly submerged log, poling along, his feet protected with high water tight shoes the soles of which are studded with sharp calks protruding ⅝ or ¾ of an inch, which enable him to perform some wonderful feats in spinning a log until the surrounding water is churned to foam. Should "jack" have the misfortune to fall into the water, as sometimes happens to the best of them, he is always saluted with the old stock joke of being asked for some dry matches.

In Fig. 5 is shown a style of truck not much used in lumbering operations in the northern climate except occasionally when of necessity logs or timbers are "taken out" in the summer months. No mill or ship yard is regarded as complete without its "trucks," as they are named, and through the South, where there are no snow or ice roads, the "truck" was formerly the principal conveyance for logs and timber overland. As it is some years, however, since I was in the South, I cannot say but what the 8-wheel log wagon has to some extent taken the place of the truck.

On rivers where two or more concerns operate, a distinct company called a "Booming Company" is sometimes formed and may perhaps have members of each and every firm on the river as stockholders. The business of these booming companies is to take care of all logs, sort and deliver them to the different mills, each individual companies' property. The ownership of each log is known by the stamp marked on the ends put there in the woods or at the banking grounds.

The property of a well-equipped booming company's outfit represents a great expenditure of money, as this consists of tug boats, several miles of boom timbers with chains, cables, ropes of different lengths and sizes, pole drivers, derricks, hoisting engines, scows, small boats, log dogs, tongs, cant hooks, pike poles, pevies, horses, different styles of vehicles, the storage booms and sorting gaps, occupying several miles of water surface in a great many cases.

All this while we have said nothing about the doings of "Mr. Lumber Jack" in camp. Does he come in from his toil, swallow a meal of coarse food that has been but poorly prepared, take off his artics and woolen socks, throw his "mackinaw" jacket down at one end of his bunk, lay his head upon it and fall asleep directly he straightens out his frame? To all of this, with the last exception, which does occasionally happen, we might answer in the affirmative, as Jack's work is heavy, requiring a great deal of activity, the hours are long, even in the shortest days in winter, as Jack is up early in the morning, being awakened by the cook or chore boy beating a tattoo on a large sized tin pan, which is the first alarm. The teamsters have been quietly awakened before this time and perhaps are now in the barn, having fed their horses, put on the harness

Fig. 4.—Water tank being refilled at a water hole, Clifford, Wis.

and inspected each part of the equipment, putting everything in shipshape for the work of the day. He is perhaps now waiting for the second ring of the pan, which means "breakfast."

The interval between the first and second alarm is sufficient to allow all having ample time to rise, dress and complete his morning toilet. All hands are in waiting; the teamsters are edging through the door leading to the dining room and the particular occupation of each might be readily determined by the alert and anxious look he expresses, each one being desirous of getting as close as possible to the lead team when starting out, as a mishap to any of the loaded teams ahead of him means delay, and delay means what is called "cold beans."

Most cooks will keep warm meals for the teamsters in waiting a considerable length of time, but as all must have the required rest, he too "hits the hay" after leaving a dining table well supplied for the belated ones.

The breakfast alarm is now sounded, the teamsters crowding and hurrying into the dining room followed by the rest of the company, each one quietly taking his own particular place that has been assigned to him at table when taking his first meal in camp. Not a word is spoken, unless perhaps in an undertone, when one will ask his neighbor to "please pass" some particular dish beyond his reach. The teamsters hurry through the breakfast of good substantial food of all kinds—the best on the market—placed upon the table on large sized platters, each kind, such as bread, meat, potatoes, beans and what not, all placed about equal distances apart, with the salt, pepper and other condiments forming small clusters within reasonable reaching distance of all. One would be apt to get the impression, seeing the teamsters gulping down their morning meal, that it was being swallowed too rapidly to even leave a taste of it on their palate. Hot coffee is quickly swallowed, the benches are vacated, while the teamsters are seen shoving doughnuts or some other edibles into their pockets, to be eaten later on when they have more leisure. They make a hasty exit through the darkness into the barn, from which they reappear again with their respective teams of horses. They hook on to their sleighs and file into the road, under way for the skidways to be loaded.

Fig. 5.—Style of "truck" occasionally used if logs are "taken out" in the summer months.

Life in a Northern Wisconsin Logging Camp.

All this has been done in such an unreasonably short length of time that it has kept the loaders hustling to finish breakfast and get to the skidways in time to prevent the teams having to wait to be loaded. Teamsters and loaders have all been given orders as to just which roads and skidways at which to load and everything moves along like clockwork. There is a place for every man and every man is in his place. Loads are put on with hardly the exchange of a word, logs are rolled up onto the loads by means of horses, after the first or second tiers have been rolled on with cant hooks.

The horses doing the loading take a position on the opposite side of the road from the skidway, just as we have seen the horses in the tank picture. When a log is to be rolled up on to the load a chain or cable is passed over and under it with the one end dogged to or fastened to some part of the sleigh or load, then the horses are started, the chain or cable revolving the log over and over as it climbs up on two skids, one placed near either end of the load. As the two ends of a log are of an unequal size and would naturally roll up the skids with one end traveling at a greater rate than the other, this difficulty is overcome to some extent by placing the loading chain nearer the smaller end of the log while the hook men follow up and increase or retard the speed of each end as the case requires. Usually a full load is taken on at two different places, perhaps half of the load being taken on a branch road that is not in as good condition as the main one, so a supply is kept at all points along the main road to top out with.

By the time the sleighs are on their way to the landing, the "road monkeys" have polished up their respective beats, the "sand men" have sprinkled the downgrades with a plentiful supply of sand, the tow teams are at the foot of the up-grades and everything is arranged so that no time is lost, for it must be remembered that a certain number of trips are made in a day and nobody is anxious to lose a trip or eat "cold beans."

Meanwhile the skidders, sawyers and the rest have filed out from camp to their working places and are hard at work, each gang usually doing an allotted amount per day, either in numbers of logs or number of feet log scale. Sometimes the men are working at such a distance from the camp that it is too far for them to get to and from dinner, so the dinner is taken out to some convenient point close by, where a fire is kindled and tea made. Meat, beans, etc., were piping hot when they left camp and have not become cold by the time the tea is ready. The call is sounded, the men assembled and each is given a tin plate and is either helped or helps himself to a portion of the substantials to be washed down with a generous allowance of strong hot tea served up in pannikins, each holding a pint and upwards. The meal over, the smokers light their pipes and compare notes, while the "cookee" or chore boy or whoever brings out the dinner gathers up the dishes and remains of the repast to be hauled back to camp again on a jumper drawn by a pony.

The interval of rest greatly depends on weather conditions and amount of shelter afforded, also upon the amount of work accomplished during the forenoon. The chore boy has started for camp, provided he has not washed up the dinner dishes on the spot, as is sometimes done, and spoons, knives, forks, plates, cups and other gearing are left to do service on future occasions. The lumber Jacks go back to the same old grind, and as night brings home all stragglers, the entire crew are once more assembled, unless it happens to be that some of the teamsters are late along with some of the landing men, providing they board at the same camp, which is not customary, especially when the haul happens to be a long one.

Supper is eaten perhaps more leisurely and comfortably than the two preceding meals, and soon all are found once more by the sheltering walls of the sleeping camp, swapping stories perhaps of outrageous happenings or good sound logic, all kinds of which may be heard even among a parcel of "lumber jacks." Sometimes songs are in order, when the unexpected is liable to happen; voices may be heard which have had scarcely any or no training that would bring showers of applause from the musical critics in far more populous places than the lumber woods. Again, one is compelled to listen to some poor piccoloed voiced victim who imagines his discords to be entertaining, or perhaps he has been forced into a display of his musical ability with the alternative of suffering the consequences, which means a shower of stags—old shoes, which have been cut down, leaving only enough of the uppers to hang on to the wearer's feet and are worn in camp as slippers—or thrown up in a blanket. He may be fortunate enough to finish his song, but chances are greatly in favor of his suffering the consequences before his song is half unwound. Perhaps one may hear some old-timer with an audience of one or two innocents, telling of seeing "windigo" tracks in the woods where he had been at work during the day. These tracks may be described as of any outlandish size, from 2 ft. across up to 10 or 12 ft. apart, or perhaps he is telling of his travels and describing places he has visited, such as "Rock Candy" Mountains, the "Lemonade" Springs, "Cigarette" Groves, "Doughnut" Forest, "Milk" River, "Whiskey" Lake and what not, each and every place named on account of their being producers of the actual articles their names imply. If any of his audience are credulous enough, he may send them around the next day to get the loan of a "cross haul" or help him to capture a "snow snake" or some other non-existing animal.

Perhaps before breaking-up time in spring, those who have been the butts of a lot of stock jokes have developed somewhat in that line themselves and have given other novices a few chases around hillsides, trying to head off "side hill gougers," animals that are described as having legs longer on one side of their bodies than on the other and are therefore compelled to inhabit hillsides only and may be easily captured by turning them in the opposite course that nature intended them to travel, as they then roll over and over down the hillside and fetch up helpless on the level ground.

Of course a great deal of this has changed since the winter of the "blue snow." Uncle Sam has established his rural mail routes, literature of every description is now sent broadcast to every one with a post office address, so that if we listen to a gang of lumber jacks quoting scripture and debating about Jonah swallowing the whale or the impossibility of a jackass going through the eye of a needle, or perhaps an argument as to whether Grover Roosevelt or John L. Sullivan made the best President of the country, we know at once that this is not a display of ignorance but merely a means of whiling away long winter evenings in a stretch of country still clothed with nature's overcoat minus the skirt parts and perhaps a few mighty bad rents in the sleeves. All this perhaps miles away from the abode of woman, the great civilizer, sometimes "Jack" living for months without seeing a solitary woman, not one even so small that a double-barreled shot gun would make a pair of bloomers for. So we shall not wonder at "Jack" being like a pauper cemetery—open for anything—and when some one tells an outrageous story, such as driving 90 hundred thousand million feet of saw logs down the tote road on the dew, we will make some allowance for him when he says such a thing is just as possible as it would be to work a pound of butter into a live wild cat with a red hot pegging-awl.

We will now play that it is springtime. The camps have broken up. A great many of the hands have gone back to their homes; have changed their late occupations and are now tillers of the soil, sawmill hands, mechanics of some sort or another. They have all come down, drawn their pay and with few exceptions have dispersed quietly. Enmity that may have existed in a few cases has been forgotten, and "Jack" is now at home with malice toward none. He regales the family with tales of his winter's exploits and is all in all a good citizen, looming up as a shining light in comparison with the lumber jack and river driver of years ago, when each camp or company was possessed of a "bully"; not that this acquisition to an outfit was always sought for, but seemed to be an unavoidable possession in those days.

Lumber companies had more or less friction, and this rivalry existed among the workmen to such an extent that there seemed always to be a challenge out that was usually agreeably accepted and sometimes sought for by both sides. In case one side was too greatly outnumbered by the other, the lesser number would try to avoid a conflict, but was not always successful in this, and a free-for-all fight would soon be under way. In such a case, no matter how much a man might wish to avoid fighting, there was no way out of it but to do his best and take whatever was handed out to him. The companies' "bullies" or the high arch-"bully," the boss of the river, was supposed to wear "chips" on their shoulders at all times, so that there was no preliminaries such as signing articles to "go to it" at some future day, but the unwriten rule was to go at it and into one another on sight.

HOUSES BUILT OF COBBLESTONES

ANYONE who has noted the tendency of domestic architecture in the way of country seats and summer homes cannot have failed to note the extent to which cobblestones are being used in the construction of houses of this character. The wealthy people in the eastern part of Pennsylvania appear to have adopted cobble stones as a building material and a number of handsome and costly dwellings of this nature have lately been finished in the vicinity of Philadelphia. The mountain districts of Pennsylvania abound in the material for the erection of cobblestone dwellings and one of the more noted architects of the country makes a specialty of designs for bungalows and summer homes erected from this material.

Commenting upon the subject, a recent issue of a Philadelphia paper says: The evolution of cobble building in Pennsylvania is an interesting story. The builders tell us that there is nothing common or useless in the eyes of the optimistic man, who is able to find utilitarian and artistic possibilities in everything nature created, and Pennsylvanians earliest appreciated the stones which encumber field and pasture. For many years the farmer, with back-breaking toil, gathered and heaped them, in great piles, with anathemas, and in these piles the snakes make their nests.

Then came the architect one day who was not bound with the fetters of conventionality. In his search for that which was novel and unknown he came across one of those piles, and, while he sat on a stump and mused of the heartrending toil it represented, his mind was flooded with inspiration. The plans for the next house he drew provided for a wide porch, with supports and posts built of these same rough and generally useless stones. When the house was finished it satisfied both his artistic soul and his patron. Then straightway he proceeded to build another house with a great stone chimney on the outside. This, too, he pronounced good, and so the use of the cobblestones came into excellent repute among the architectural clan. The stone piles melted, the snakes were forced to find a new refuge in which to nurse their brood; even the stone walls which the farmers of old had reared with infinite patience and labor, because they had nothing else to build fences of, were carted away to become building material in the hands of masons.

A stone porte-cochere is another suggestion which is growing in favor both in frame houses and the house that is not of wood but of plaster, with a tile roof, and the combination seems equally effective.

In addition to the use of cobblestones as an integral part of the house, many and charming ways are being found of utilizing them in other parts of the country or suburban estate. Very effective and massive gateposts are being made from them, and the list of possibilities includes summer houses, well houses, sun dials and similar accessories to an extent which is not as yet really appreciated by the owners of the suburban and country homes.

Cobblestone floors and cobblestone roofs are a distinctly Pennsylvania fad. It is not unusual now to find a summer house, or a tiny lake house, with a curious and indestructible roof, formed of little smooth cobblestones about the size of hen's eggs, laid in cement. The same effect is carried out in the floors of summer houses or in porch extensions, where tiny cobbles are embedded in cement and form a more novel and picturesque feature than the present craze for floors of quaint tiles.

SUGGESTIONS FOR BUILDING A MODERN DWELLING

BY WILLIAM ARTHUR.

IN good hard soils cisterns are often finished in the same way with a ¾-in. coat. Portland cement mortar is imperative here, and 1 to 2 should be the properties.

In all cases it is safer to use a brick lining. This may be 9 in. thick if a man has plenty of surplus cash and wants a cistern that will last for a century, but in a good soil, or even a fair soil, a single course of brick laid flat is enough. The more pressure that goes against the outside the stronger the walls become, for the arch principle holds if there is a uniform strength in the soil, but the danger is in the soil falling away from the outside. Even if 9-in. walls are used in an extreme case, a single course is sufficient on the bottom.

The arch is put over the top, the neck carried up a little above ground and a cast iron cover put on. Round cisterns are usually built, and they are best.

An overflow pipe should be put near the top and connected to the sewer if there is one, or run to lower ground. A cut-off should be put on the downspout leading to the cistern.

When building in a suburb of St. Louis I found out that the people used cistern water for all purposes. All the cisterns were equipped with brick filters.

In cities with a good water supply cisterns do not seem to be so common as they were formerly, but they are worth the $50 to $75 that they cost. There are many houses with a separate system of piping for the cistern water. This is very convenient in the bath room if the fixtures are prepared for the pipes.

A cesspool may be built and finished like a cistern, with a brick lining. What is known as a leaching cesspool, where the liquids flow into the surrounding soil, should never be used if there is a well within a hundred yards.

The usual size of a cistern is about 6 ft. diameter by 8 ft. deep. Cesspools about the same diameter and 12 ft. deep.

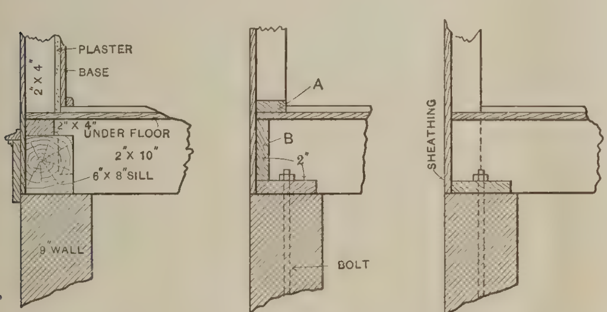
In country districts privy vaults have to be used if there is no cesspool. They should have a masonry lining—sides and bottom—laid and plastered on the inside with Portland cement. This is the only safe method of keeping the well water pure.

The carpenter takes charge of a frame house from the top of the masonry up to the ridge, and about the first thing he does is to run a girder through the center to hold up the floor and partition loads. This girder may be made in one piece, or several joists may be spiked together. If the spiking is well done the one is as good as the other.

In large houses brick walls are run to carry the joists and the partitions above. In the Underwriters Code a line of "fore and aft 8-in. brick partitions" is called for in all houses over 20 ft. between bearings. It is not required in such houses, and no city will make it compulsory. To take the case of flats, where most of the light comes from one side, and a dark basement would be the outcome of such a law. In many cases the bearing partitions above can be set on the girder. In most houses that will continue to be the method of construction.

The size of the girder depends upon the distance between the supports. In general a 6 x 10 is safe enough with posts 6 x 8. A little saving is often made in the girder at the expense of the house. A 6 x 6 is not uncommon, with 4 x 6 posts, especially in houses built to sell. Between 6 x 10 with 6 x 8's, and 6 x 6 with 4 x 6's there is a difference of about $3.50. It is better to save this somewhere else than in the main structural parts of a house.

There are various kinds of sills put on the walls. Some cities make a solid sill compulsory. A 6 x 6 is often used, but a 6 x 8 is better, especially when the joists are 10 in. deep, as they should be. A box sill seems preferable in some ways. With this style neither sill nor joists have to be cut. Three kinds are illustrated in Figs. 1, 2 and 3.



Figs. 1, 2 and 3.—Various Kinds of Box Sills.

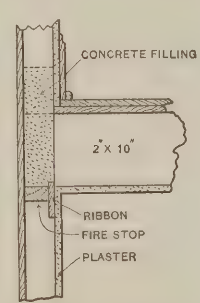


Fig. 4.—Showing Construction of Fire Stop.

Suggestions for Building a Modern Dwelling.

Those shown in Figs. 2 and 3 are preferred by many to Fig. 1 and cost less. When sills and joists are cut, a bad fit is often the result. The only part of the joists that has a bearing is that above the level of the sill. When a joist rests directly on the plate or wall the full strength is obtained. With first-class work and blocking on the masonry under the full width of the joist the solid sill is as good as the others. Some would say better than the others. It is seldom, however, that good work is done.

If Fig. 2 is used and the under floor laid on an angle, which is the better way to lay it, the plate "A" should not be nailed down before the floor is finished. This gives the angle floor an excellent nailing on "B" and binds everything together. Figs. 2 and 3 are bolted down to the wall.

One table of depreciation which is often published gives the life of sills and first-story joists at only 25 years. Twice as much would be nearer the truth. In case of rot there is undoubtedly a larger section of the solid sill than of the others. But the whole bearing of the joists rests on the masonry in Figs. 1 and 2, and that gives the full distance for dry rot in the one case as well as in the other.

If Fig. 1 is used with an angle under floor there should be a block cut in on top of the sill and level with the joists, to receive the angle end of the boards and block the passage of fire. Another piece should be nailed between the space behind the ribbon-strip for a fire-stop, as shown in Fig. 4.

It would, of course, be absurd to suppose that these stops would do much to keep back fire, but they help, and the building ordinances call for them. They block the draft between the stories, for what is often long enough for the firemen to drown the first story blaze.

The underwriters would like to have us fill in on top of the stop that goes behind the ribbon-strip to 6 inches above the second story joist with a mixture of lime and broken brick or plaster or any kind of a concrete substance to block the fire between stories, as indicated by the dotted lines in Fig. 4. This concrete would go clear around the building at the level of the second story joists, and on top of all partitions. It is a good idea, but costs money. It is seldom done. As already noted an 8-in. partition wall is recommended in the basement by the underwriters. Here, just in one part of a house, are two items that would cost from $80 to $100. So many such items are referred to all through this work that if they were all put in would run up the cost of a house at least 30 per cent.

Mostly all lumber now comes smaller than the size called for. This marketable size is held by the courts to be sufficient. The joists that are marked 2 x 10 are delivered at about 1⅝ by 9½.

For the ordinary house not less than a 2 x 10 should be used on both stories. The distance apart should not be more than 16 in. from center to center. Not less than 2 x 8 joists should be used for the attic, if there is to be almost any kind of a floor. Then in between joists when the distance from bearing to bearing is over 8 ft. two pieces like an X must be nailed in for stiffening. This bridging is usually of wood, about 1 x 3 in size. There is also galvanized iron bridging on the market.

For a wide house of, say, 30 ft., thus giving a span from girder to wall of 15 ft., it would be well to use 2 x 12 joists. The difference in cost is not so very much above the 2 x 10's. In the end, undoubtedly, all these things count, but they also make the distinction between a well-built and a poorly-built home.

It is important to see that the joists on the second floor are notched for the ribbon-strip and well spiked to the studs, for this keeps the whole frame together at the second story level.

Doubling of Joists

Around all stair openings, chimneys and hearths more than 4 ft. wide, and under all partitions running parallel with the joists, doubling should be done. Under partitions, bearing pieces may but cut in between the joists that hold the lead.

A good deal of poor building might be avoided by the application of common sense. It stands to reason that there is far more weight under a plastered partition than anywhere else on the floor, and naturally an exra joist should be put in to support this, and so avoid inequality of bearing.

The best way, when it can be done, is to run floor joists from wall to wall, but sometimes a house is too wide for that, and they are joined on a partition. This bearing partition should be made of at least 2 x 6's, and be bridged once in the hight. The joists for a house from 24 to 26 ft. wide are usually in one length. In Oregon and Washington, indeed, 32 is a common length.

Should a fire occur in a house with a bearing partition, the minute it is burnt the second story joists fall and the wreck is complete. When the joists run from wall to wall there is, at least, a better chance of saving the second floor, for a little more time is secured.

Shrinkage of Joists

Sometimes a plan is so arranged that the bearing partition, even when the joists are in one length, can run down and rest directly on top of the central girder or the brick wall recommended by the underwriters. This is a good method, for there is always more or less shrinkage in floor joists, and the wider they are the more they shrink when the winter heat is turned on.

When the partition is set on the girder the shrinkage on the end wood is scarcely anything, but when set on top of the floor it naturally has to sink with the joists, and the plaster is cracked. As a practical matter these cracks are of small account, but if the house is papered when newly finished the wall paper cracks with the plaster. The better way is to let the papering go for at least a few months, and especially for one winter's heat, and let the cracks develop. When the base shrinks also a thin white plaster line is often seen. This way of setting partitions is good in all cases if it can be done.

(*To be continued.*)

A Puzzling Feature of Round Towers in Ireland

Although the Irish round towers are simple in form and construction, they present puzzles to the observer not only as regards their origin and purpose, but also as to the use of some of the parts, says the *Architect and Contract Reporter*. G. H. Orpen points out in the Journal of the Royal Society of Antiquaries of Ireland that although innumerable visitors have seen the round tower at Glendalough, near Dublin, one feature appears to have been unnoticed by them as well as by archæologists. Almost directly, he says, under the elevated doorway, about 15 in. above the slightly projecting base, is a rectangular hole about 8 x 6 in., pierced right through the wall. The two side stones of this hole are "thorough stones," and it is roofed by two stones. The wall is about 4 ft. thick, and the doorway about 10 ft. above the ground. What was the purpose of this hole? It was certainly an original feature, and was not a loophole for a missile. Mr. Orpen suggests that it was a spy-hole, to enable the occupants of the tower to ascertain, before opening the door, who was demanding admittance. Such a squint was not uncommon in after centuries besides the doorway of castles and even of ordinary houses. There is an example at Athlone, in a house near the bridge bearing the date 1632. Mr. Orpen says that if his interpretation is correct it supports Petrie's theory that round towers were erected as "keeps" as well as belfries.

Example of Classic Roman Architecture

One of the purest examples of the classic Roman style of architecture in this city will be the new church of St. Jean Baptiste, which is about being erected at the corner of Lexington avenue and East Seventy-sixth street, New York City, in accordance with plans prepared by Architect N. Serracino. The building will cover an area 185 ft. by 98 ft. 4 in. and will have a seating capacity of 1550. The façade on Lexington avenue will be 98 ft. wide, with twin towers 150 ft. 8 in. in hight. The edifice will be built in the shape of a Latin cross with three naves and a dome, of which the diameter above the center of the cross will be 46 ft. The middle nave will be 66 ft. 4 in. high and the side naves 38 ft. 2 in.

The inside hight of the dome from the main floor to the top will be 129 ft. 6 in., while the hight of the dome above the curb line will be 171 ft. 2 in. It is expected that the basement of the church will be ready for use by July, 1911.

AN IDEA OF THE BUILDING ACTIVITY which prevails in the city of Dayton, Ohio, may be gathered from the statement that the architects just now are busier than they were during the middle of the summer and much of their work will be started this fall. The prospects are exceedingly good for a large amount of work in the spring.

New Publications.

The Bungalow Book. 160 pages. Size, 8 x 10¾ in. Bound in heavy board covers with embossed side title. Published by Henry L. Wilson. Price, $1.00.

This is the fifth edition of a very interesting collection of bungalows designed by Mr. Wilson, who is referred to as "the Bungalow Man." The early pages are devoted to a short sketch of the evolution of the bungalow from its primitive crudeness to its present state of artistic beauty and cozy convenience. In the course of his comments the author expresses the belief that every housewife who plans a house commenced with the kitchen, as it is a most important room and should be made as cheerful and convenient as possible. Saving of steps means conservation of energy and health and consequently promotes the general welfare of the family.

Where it is possible the sink should be in the center of the long drain board so that the dishes can be placed at one end and when washed laid at the other. The space underneath the drain board may be utilized for kitchen utensils.

In the modern kitchen much attention is given to the proper distribution of the various cupboards, flour bins, spice receptacles and the many little contrivances which appeal to the housewife. Here, too, the hard wall wainscot well painted, or better still, enameled, is valuable from the standpoint of sanitation, as it washes easily and does not absorb dust. White enameled woodwork, although more expensive than the natural finish or paint, makes an ideal finish for the kitchen." In this connection the author gives an illustration with description of what he has named the "Wilson Kitchen."

The large number of designs which are to be found within the covers of this work represent a wide range of exterior treatment and interior arrangement, while accompanying the illustrations and floor plans are brief descriptive particulars, with mention of the cost of the bungalows built in Southern California. Of course this figure of cost will vary according with the section in which the design is executed, for in the colder climates provision must be made for a heating system, which in Southern California is unnecessary, outside of that afforded by the open fireplace, which is a feature of either the living room or dining room or both. Many of the designs are shown by means of direct reproductions from photographs, showing the building as it actually appears in a completed state. Wash drawings are used in other cases, and in still others the appearance of the building is indicated by perspective drawings.

The closing pages of the work are given up to interior views of some of the principal rooms in connection with some of the designs represented. The entire work is attractive in its makeup and cannot fail to prove valuable for reference by the prospective builder.

A Primer of Architectural Drawing. By William S. B. Dana, Massachusetts Institute of Technology. 154 pages. Profusely illustrated. Bound in board covers. Published by the William T. Comstock Company. Price, $1.25.

This little work consists essentially of a progressive series of drawing-board problems representing an embodiment of the author's teachings in the Mechanics Institute of New York City. Within the covers of the book are 25 problems, each illustrated by means of a plate and with 161 explanatory detail figures. The problems embrace floors and walls of brick, stone and wood; the framing of floors, walls and roofs; the development of roof forms; bricklaying and bonding; brick walls, doors, windows and their casings; wood and iron stairs and the construction of a fireplace or chimney.

The author has presented the matter in a way to appeal to the young student who desires to ground himself in the fundamental principles of architectural drawing and thus place himself in a position to deal with the more advanced problems in architectural planning and designing. The work has also been prepared for use as a text book in schools where elementary drawing is taught.

Ottawa's New Building By-Law

The following extracts relating to the new building law of the city of Ottawa may not be without interest:

The new building by-law of the city does not cover the plumbing or electrical fittings, as these will come under separate by-laws.

At first it was proposed to limit the hight of buildings in the city to eight stories, but at the council meeting at which the by-law was adopted this clause was cut out. However, the by-law does not make any provision for the thickness of walls over eight stories, and this table will have to be added. All dwellings of over 80 ft. in hight must be fireproof. No frame building can be erected over three stories high. Dwellings on inside lots must not cover more than 75 per cent. of the area of the lot. A back yard 10 ft. wide for a dwelling 25 ft. high and widening 3 in. per every additional foot, must be provided. If there is an alley at the back, half the width of this may be included as back yard. In case there is a side yard the entire length of the lot, the back yard need only be 5 ft. In case of a corner lot, the dwelling may cover 90 per cent. of the lot. All ceilings in dwellings must be at least 8 ft. high and every room must have at least one window opening onto outside air. The aggregate of the window area for each room must be equal to 10 per cent. of the floor area. Attics, of course, are excepted from this regulation. Business buildings may cover the entire lot, but if upper stories are used as dwellings they must be reduced in size to comply with the clauses respecting dwellings. Enclosed courts must have horizontal intakes at the bottom whose area must be equal to 10 per cent. of the area of the court.

Particular specifications are made with the view to making foundations secure, such as that all buildings up to 40 ft. in hight must have foundations of at least 13 in. in thickness for concrete and 18 in. if of stone. The permissible load per square foot to which different kinds of soil under the foundation walls and piers of buildings may be subjected is as follows:

Gravel and coarse sand, well cement.	8 tons per sq. ft.
Dry hard clay....................	4 tons per sq. ft.
Sand, compact and well cemented...	4 tons per sq. ft.
Moderate dry clay or clean sand.....	2 tons per sq. ft.
Soft wet clay.....................	1 ton per sq. ft.
Quicksand or alluvial soils..........	½ ton per sq. ft.

The width of all footings and ranging timbers shall be at least sufficient to meet these requirements.

The load per square foot placed upon walls, piers or other supports of masonry constructed of first class materials of the several kinds mentioned shall never exceed the limit given in the following table:

Gravel and coarse sand, well cemented........	8 tons
Ordinary brick laid in Portland cement mortar..	5 tons
Hard brick laid in lime mortar................	6 tons
Hard brick laid in Portland cement and lime mortar	9 tons
Hard brick laid in Portland cement mortar....	12 tons
Pressed brick laid in lime mortar.............	8 tons
Pressed brick laid in Portland cement mortar..	14 tons
Rubble stonework in lime mortar.............	4 tons
Rubble stonework in lime and cement mortar...	6 tons
Rubble stonework in Portland cement mortar..	8 tons
Concrete, one part cement, two parts sand and five stone	15 tons

Water tanks erected over roofs of buildings are to be supported on sufficient brick bearing walls or beams, and pillars of metal, and so constructed as to protect the bearing walls and walls of building from water.

Before getting permits for a reinforced concrete structure, specifications giving the composition of the concrete must be filed.

All stone or lime offered for sale, if required, must be weighed on the city scales. Each vehicle for delivering materials must be numbered and its capacity stamped on it.

No projection will be allowed from a building over the sidewalk at less than 10 ft. above the walk, and (except in the case of main cornices) none may project more than 2 ft. Main cornices are limited to 4 ft. All canopies or hoods over the sidewalk must be supported entirely from the building.

All public buildings or places of amusement with a capacity of over 1200 persons must be fireproof. Smaller theatres, etc., must be of slow burning material. There must be emergency exists on each side of the auditorium whose area will aggregate half the area of the main entrance. None shall be less in width than 3 ft. 6 in. These exits must have two doors which open outwards. Main stairways and doors must aggregate in width 18 in. for each 100 persons' capacity.

Trade School of Massachusetts Charitable Mechanic Association

The eleventh term of the trade school conducted by the Massachusetts Charitable Mechanic Association at 111 Huntington Avenue, Boston, Mass., will begin October 11 and continue until March 24 next year. Classes in carpentry, bricklaying, sheet metal work, plumbing, electricity, drawing and pattern drafting will be held on Monday, Wednesday and Friday evenings under the supervision of John W. Wood, Jr.

This school, it may be interesting to note, was established in 1900 for the purpose of providing instruction in the trades for young men living in Boston and vicinity, the work being in line with the original purposes of the association, which was founded in 1795. The difficulty which young mechanics were experiencing in learning a trade without the aid of the old apprenticeship system induced the association to set aside suitable space in the Mechanics Building for classes in carpentry, masonry and plumbing and to undertake the financial obligation of putting classes in these trades in operation. The school is placed under the direction of an executive committee, the membership of which represents to some extent the trades taught in the school. The aim is to aid young men who are already working at a trade to gain the thorough training which modern conditions have made it almost impossible to acquire elsewhere.

The school provides a place where during his leisure hours the young man may practice his trade under the intelligent and sympathetic direction of an expert workman who perhaps owes his training to the old apprenticeship system. The instructor has time to give his whole attention to the problems the young man finds difficult, while the student has time to try again and again some operation essential to success in his trade until he can perform it with speed and accuracy.

It is interesting to note in connection with the class in masonry that a course of lectures has been planned on the manufacture and use of cement in building, the mixing of concrete and the making and laying of cement bricks. The work in carpentry is planned to give practice in joinery, cabinet making, house construction and boat building. The theoretical part of the trade is taught by occasional lectures and by means of lessons in geometry, together with the use of the steel square in laying out rafters and other parts of house framing. The catalogue which the association has just issued sets forth the courses of study in detail.

Rebuilding in Campbellton, N. B.

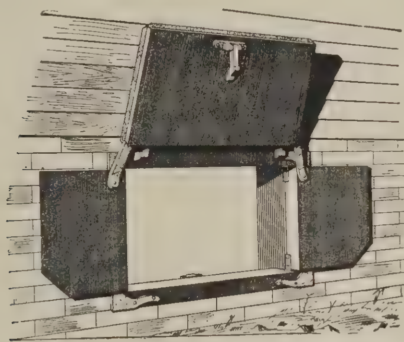
Following the disastrous fire of July 11, and which resulted in a loss conservatively estimated at $3,500,000, building operations have been conducted upon an active scale and 400 structures have already been erected, including dwellings, stores, warehouses, etc. In many cases concrete construction is being used to supplant the natural stone for building purposes, as it was found that concrete withstood the test of fire very much better than natural stone.

CONTENTS

Novelties.

The "Marvel" Coal Chute

A form of coal chute which is attracting a great deal of attention at the present time on the part of houseowners and builders is the "Marvel" illustrated herewith, and made by the Interstate Manufacturing Company, Oskaloosa, Iowa. This chute is referred to as being so constructed as to protect the clapboards or shingles covering the side of the house directly above the chute, and also protecting the foundation walls at the sides from damage. The manner in which this is accomplished will be readily understood from an inspection of Fig. 1 of the cuts, which shows the doors open, while in Fig. 2 we show the chute with the doors closed. The chute is made of heavy steel, with heavy cast iron door frame and corner irons. The outer door shuts tight against the frame, with a recess inside, which makes a tight fit and keeps out the wind and rain. The bottom of the frame on the wall is pitched downward toward the inside. The claim is made that the outer door is easily locked in an open position, holding the end doors open, as clearly indicated in Fig. 1. When closed, it automatically locks shut, thus rendering it burglar-proof. The chute is made in a number of sizes, thus adapting it to different wall openings.



Novelties.—The "Marvel" Coal Chute.—Fig. 1.—Appearance When Doors Are Open.

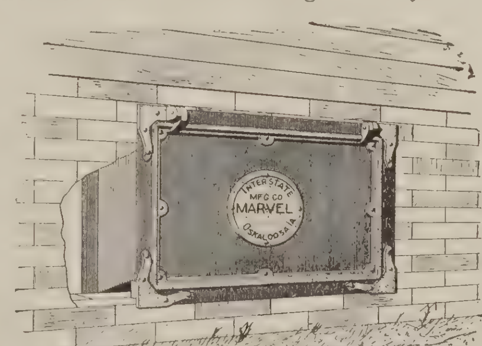


Fig. 2.—The Chute with Doors Closed.

The picture gives the impression of a handsome door, and it is stated that it can be finished in any color of paint or any style of grain to imitate that wood used in the furniture in the building.

Concrete Pile Construction

A handsome volume of 160 pages, profusely illustrated with beautifully executed half-tone engravings of buildings of various kinds, and setting forth the development, advantages and application of concrete piles, has just been issued from the press by the Raymond Concrete Pile Company, New York City and Chicago, Ill. The matter is arranged in a way to prove exceedingly interesting to the architect, the engineer and the building contractor, while the information embraced within the covers of the work constitutes a valuable contribution to the literature of pile construction. It was in June, 1901, that the Raymond Concrete Pile Company placed the first concrete pile in the United States, and the statement is made that between that date and January 1 of the current year the company placed more than a million and a half feet of concrete piling. The company has placed concrete piling in almost every section of the United States in such widely varying soils as the blue clay of Chicago, the silt of the Missouri River, and the sandy beaches of Coney Island and Atlantic City; in the foundations of structures ranging from manufacturing plants, docks, gas holders and smoke stacks to viaducts, office buildings, hotels and private residences. In the pages of the work under review is to be found a detailed exposition of the advantages offered by concrete piling, together with a description of the Raymond System and of some of the more notable contracts that the company has executed. The illustrations of structures supported on Raymond concrete piles and of other types of construction work executed by the company demonstrate the breadth of its experience. In the arrangement of the publication the matter is considered under such heads as the development of the concrete pile; the method of making and placing Raymond piles; the basis of the superiority of the Raymond Piling; the economy of concrete piling; specifications for Raymond piles and concrete docks, bulkheads and similar structures. Not the least interesting feature of the work is a list of some of the users of Raymond piles. As already intimated, the half-tone illustrations cover a wide range of work, and all are presented in the highest style of the printer's art. The catalogue is also published in Spanish.

Improvements at Disston Saw Works

Henry Disston & Sons, Philadelphia, Pa., are making extensive improvements to their works, which will greatly increase their facilities. A two-story structure, 180 x 43 ft., in plan, is being added to the extensive file-making department, while another two-story structure, 290 x 63½ ft., with an L measuring 181 x 69½ ft., is under way to accommodate the machine knife and jobbing departments. In the former, various kinds of machine knives are made, such as woodworking knives, chipper, bed and hog knives, paper trimming and leather-splitting knives, shear blades, etc., while in the jobbing department are turned out steel plates for cutting and creasing machines, cylinder presses, pattern plates, lawn mower, circular cloth, candy, paper knives, etc.; multiple clutch discs and flat steel springs of all descriptions. Incidentally a large amount of new machinery, perfected by Disston experts, is being installed in all departments of the establishment. Work will soon be started on a new and enlarged two-story fireproof building for the cold-rolling department. The new buildings have been specially designed with a view to obtaining the maximum amount of light and the best possible ventilation. No expense or pains are spared to provide every convenience for the workmen, and it is generally conceded that the policy adopted has done much toward producing the high quality that characterizes the Disston products.

Catalogue of Interior Decorations in Metal

The Kinnear & Gager Manufacturing Company, Columbus, Ohio, has issued an attractive catalogue known as No. 17 and relating to the subject of interior decoration in metal. Some of the 7½ x 10 in. engravings show a corner of a metal-ceiling design, so that the cornice border, panel, filler, field panels and the interlocking joints may all be seen to advantage. Many designs are shown complete. Engravings of this character occupy 63 pages, then a number of pages are used to show side-wall designs, wainscotings, friezes and cornices above. A variety of cornices are presented with the dimensions of the various parts and the profile, so that both the depth and the width can be seen. They vary from 2⅜ x 3⅛ to 12 x 16 in. in size. A variety of fittings are then presented, including beam molds, crosses, T's and mitres, foot and crown molds, borders, fillers, friezes and with diagrams showing their dimensions and the depth of the relief. Panels are then presented for centers, corners and sides from 1 x 1 ft. to 2 x 4 ft. in size. A valuable feature of the catalogue is pages giving broken views and diagrams showing the method of erecting interlocking slip-joint ceiling patterns as made by this company. Wainscoting designs for stairs, center pieces 8 ft. square, brackets, column and pilaster capitals, combination coves, are presented, and then the catalogue closes with some 20 sketches showing interiors and the different methods of selecting the designs to accomplish a desired effect. Accompanying the catalogue is a circular devoted to the Columbus door and trim, a patented wood core, kalamined or charcoal iron covered door for buildings of every description.

"Invisible Joint" Metal Ceilings and Walls

We have received from the Milwaukee Artistic Metal Ceiling Company, Milwaukee, Wis., a copy of its 186-page catalogue of "Invisible Joint" metal ceilings, siding, moldings, wall plates, centers, zinc ornaments, borders, friezes, cornices, shingles, etc., which it manufactures in great variety, thus adapting the goods to meet many requirements. The designs of metal ceilings are shown in many styles, embracing French renaissance, Gothic, Colonial, Louis XIV., L'Art Nouveau and Romanesque. The same styles are also shown in the designs of wall plates, field plates, borders, friezes and fillers. An extended list of ornaments is shown and directions are presented for applying the goods. The catalogue concludes with a telegra code and index. Accompanying the catalogue is a price list.

Display of Asbestos Century Shingles

One of the interesting features of the exhibit held in Lu Lu Temple, Philadelphia, Pa., in connection with the convention of Sheet Metal Contractors in that city, was the display of Keasby & Mattison Company, Ambler, Pa., the booth being constructed almost entirely of the company's products. In conformity with the other exhibits, the hight was 6 ft. 6 in., and the sides of the exterior were constructed of wood, while the roof, as shown in Fig. 3 of the accompanying illustrations, had four hips, each sec-

Novelties.—Fig. 3.—Exhibit of Asbestos "Century" Shingles.

tion being covered with a different style of the company's shingles. Two of these sections were the ordinary straight-laid, or American style, one with square butts, and the other with the corners clipped, which is the ordinary slate style; while the other two sections were covered with asbestos shingles, laid according to the regular French method and with the honeycomb method. Two of the sides of the interior of the booth were paneled with asbestos shingles laid in different methods and styles, while the rear was covered with asbestos building lumber, which is used as a substitute for wainscoting in bath rooms, kitchens, etc., as well as on the outside of buildings, to produce the half-timber effect. This material, the company claims, is admirably adapted to either of these purposes by reason of the fact that it is composed of nothing except asbestos fibre and Portland cement subjected to enormous hydraulic pressure, which compacts the sheet into dense slabs of stone-like material which requires no paint and which may be readily cleaned with soap and water.

Catalogue of Glue Heaters

The new catalogue for 1911, which has just been issued from the press by the Advance Machinery Company, 519 to 527 Hamilton Street, Toledo, Ohio, is a very attractive publication, measuring 6 x 9 in. in size and has sixty-four pages devoted to glue heaters. It describes fifty-six different types of glue heaters, made in all sizes from one pint to 500 gallons. Some of them are of copper and brass, some aluminum, some iron, some are part iron and brass, and some part iron and copper. They are made for use in connection with heating by oil, gasoline, steam gas and electricity. So far as the company knows the catalogue shows every recognized type of glue receptacle. The heaters are made for heating paraffine, glue, starch, casin, gelatin, dextrine, paste and gum. Reference is also made to a tank for handling cold glue, which has recently come into use and which is very largely employed in Russia. The point is made that the entire line has been developed within the last eight years, and represents the suggestions and ideas of glue manufacturers and glue users throughout the country. Special reference is made to the Wetmore patent glue heater, which consists of a glue receptacle surrounded by a water bath. The steam is introduced into the water direct or through special heating coils, so that the glue is dissolved by being immersed in water, brought to a temperature of about 170 degrees. This brings the glue to a temperature of 150 degrees, gradually reducing it. The latest improvement in the company's line of heaters is the temperature controller, which automatically shuts off the ...ow of steam as soon as the glue reaches a temperature ...o degrees, or any other temperature at which the controller may be set. The general idea is that glue should be kept at a temperature of, say, 150 degrees for two or three hours before it is really integrated, but should never be allowed to reach a temperature higher than 150 degrees, and it is to accomplish this that the regulator has been developed. The point is made that most of the large factories have the benches of the various workmen equipped with individual pots, so that the workman is supplied with hot glue at his bench at all times. It is an easy matter to withdraw the glue from the glue heater as soon as it gets hot enough, thereby preventing it from becoming overheated, but the glue must be kept hot until it is used, therefore some sort of an arrangement must be provided to keep the glue hot at the benches of the mechanics. The company makes provision for this, and points out that it is in a position to equip a factory so that the temperature of the glue may be regulated as desired by its thermostatic valve and temperature controller—not only in the central source of supply but in the pots at the benches of the workmen.

Berger's Prong-Lock System of Studding and Furring

The Berger Manufacturing Company, Canton, Ohio, sets forth at great length, in an attractive catalogue of 32 pages, the merits of the Prong-Lock System of Steel Studding and Furring for fire-proof walls, partitions and ceilings. In addition to explaining the application of the system and illustrating it in detail by many well executed engravings, there are a number of half-tone views of important buildings in connection with which the system has been employed. It is pointed out that the system is equally well adapted to interior partitions, outside walls and complete structures that are subjected to vibration, such as power houses, electric light and railway plants, factories, elevated railway stations, etc. Special reference is made to its simplicity, economy, strength, adaptability and popularity.

Bell-Ringing Transformers

A bell-ringing transformer, which has been brought out to displace the old-time batteries that have such a chronic habit of running down just at the time when the door bell, for example, should be in good working order, is illustrated in Fig. 4 of the engravings. The advent of the bell-ringing transformer marks another stride in the practical application of electricity to modern life. It relieves another care and does so at comparatively small expense, as it will readily displace five or six ordinary house batteries and will last a lifetime. The point is made that the original cost of this bell-ringing device compares favorably with the house battery system, and, as it requires neither repairs nor renewal, it is much cheaper in the end. The

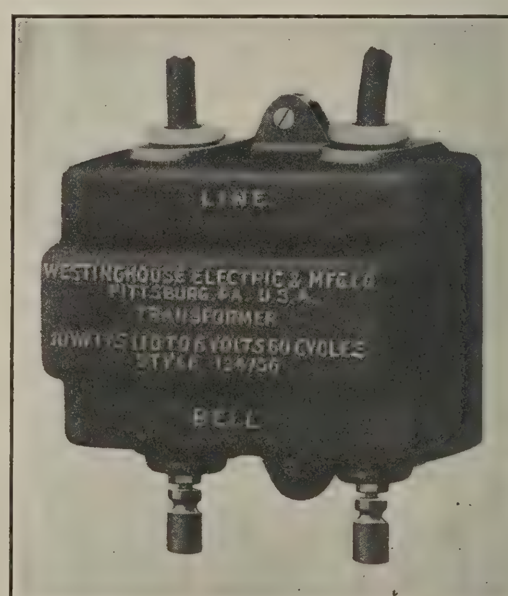


Fig. 4.—Bell Ringing Transformers.

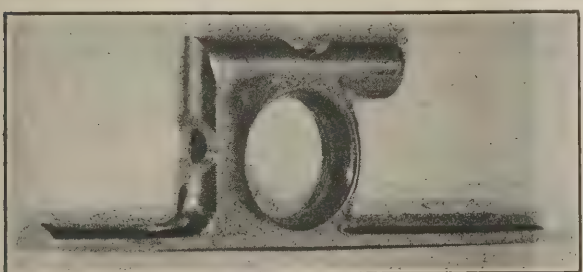
new transformer here shown has been placed on the market by the Westinghouse Electric & Manufacturing Company, Pittsburg, Pa., and is offered as a device that will permit the use of the regular lighting current in ringing the door bell.

Oiled "Lion" Brand Insulating Building Paper

We have just received from the Rosenberg Paper Company, Chicago, Ill., samples of its oiled "Lion" brand building paper, which is claimed to be water, air and vermin proof. It is a well-known fact, fully recognized by experienced builders everywhere, that the addition of a good building paper between the sheathing boards and the exterior covering of the frame of a dwelling or other structure tends to render it warmer in winter and cooler in summer, while an added factor is the saving in fuel during the cold months of the year. The "Lion" brand referred to is furnished in standard rolls of 22 to 24 lb. each and in widths of 36 in., and is supplied direct to contractors and builders. Those who are interested can secure free samples on application.

Improved Hand Plumb and Level.

Armstrong & Edwards, Centralia, Ill., are introducing to the attention of masons, bricklayers and builders generally an improved hand plumb and level, as illustrated in Fig. 5 of the engravings, and which is worn upon the finger in executing work, as shown in Fig. 6. The tool or device is referred to as being especially valuable in running corners where the work must be constantly watched to be kept in plumb. This little device is worn on the hand opposite the one using the trowel, and in no way hinders the workman. It serves both as a plumb and level, as may be seen from an inspection of Fig. 6. It is also particularly valuable in setting cripples and in short weather board runs where a level cannot be conveniently used. In connection with the straight edge door jambs may easily be



Novelties.—Improved Hand Plumb and Level.—Fig. 5.—General View of the Device.

set by one man. The great advantage of the device is that it is always conveniently at hand, so that there is no time lost by the mechanic in hunting up his level. The device is the invention of a master workman; is made of cast aluminum highly polished, is 4½ in. long, weighs 1½ oz., and is of a most durable nature. It is sold only by mail direct from the factory.

How the Weber Floor Scraper was Developed

In noting the many devices of interest to carpenters and builders at present upon the market, curiosity is often aroused as to the process by which they were developed and the causes which prompted their invention. Probably one of the most interesting experiences is that of John F. Weber, whose name is so closely identified with the Weber double-acting floor scraper, illustrated and described in these columns some months since. He began his career in a veritable atmosphere of carpentry, his father being a contractor, and one of his many duties was to scrape hardwood floors and mill work, at which he became so proficient that his five brothers came to look upon him as an authority on hardwood floors and flooring. His first idea of a machine to scrape floors came to him one hot summer day just as he had completed the scraping by hand of a large hardwood floor that had proven exceptionally tedious. His first machine was naturally a crude affair, with a piece of steel rail for a weight, but cumbersome as it was the machine served for rough, or first, work for a long time. With it, however, the floors had to be hand finished. By degrees improvements were made as the results of experience and observation, until finally the scraper which is now offered the trade by the Weber Manufacturing, 672 Seventy-first avenue, West Allis, Wis., was perfected. One of the strong features of the present machine is the adjustable blade holder, by means of which the blades can be instantly set at any angle for work on all kinds of flooring. Another feature is the automatic sharpening device, by which the blade can be quickly given a true edge without taking it from the scraper. One of the more recent improvements which may be mentioned is a sander, which may be used in connection with the machine or it can be used with a separate handle, according to requirements. Still another is what is known as the bowling alley scraper attachment, which produces a perfectly level surface. The adjustable handle enables the operator to work right up to the base board without marring it. The sandpaper device and scraper was illustrated in these columns in December last.

Mr. Weber has also given considerable attention to the question of cement houses, and according to his method they can be finished at an exceedingly reasonable figure. We understand that complete specifications can be obtained from him, and one set of blue print plans will be given with each floor scraper sold if requested.

The Shimer Cutter Heads

Samuel J. Shimer & Sons, Milton, Pa., have just issued from the press a very attractive catalogue and pattern book of 224 pages, bound in paper covers, and relating to the Shimer cutter heads, for the manufacture of which the concern is famous. The aim in issuing the catalogue is to make it a reliable pattern book for lumbermen and users of cutter heads, cutters, knives and bits. There are illustrated a number of new tools together with a great variety of useful patterns, many of which were designed for the Shimer cutter head. The latter, it is pointed out, "presents to the woodworker a tool which is complete as to its purpose, practical in its operation and economical in every sense of the word." Reference is made to the fact that the division of the chip, permitting of a reliable clearance protection to the cutters is brought out in a very practical way, and provides a reliable and safe means to prolong uniform results in every class of work to which the tools are applied. Some of the new features presented in the catalogue embrace a more accurate fitting of machine spindles; a finer running balance, also the jointing of cutter edges for the finer edge finish under high-speed matching. Reference is made to the fact that the heads for matching flooring, shiplap or jointing square edges cover a large percentage of the work done, and are all arranged to work upon the same surface-cut diameter, thus avoiding all changes of machine guides. The changes from one class of work to another are said to be always instantaneous, requiring no more time than that of taking off the one set and slipping on the other.

The system is fully set forth in the catalogue, and the manufacturer requests recipients of it to give the matter very careful reading. The catalogue also illustrates and describes the reversible and one-way cutter for the variety molder. The matter contained within the covers has been arranged with a great deal of care, and woodworkers generally will find in it much valuable information, while as reference book it will be found convenient and useful. Ample descriptive letter press is given in connection with the multitude of illustrations, and great care has been taken to cover salient features in a clear and comprehensive manner. The catalogue concludes with an index alphabetically arranged.

Eller's "Perfect Fit" Steel Ceilings

The Eller Manufacturing Company, Canton, Ohio, has just issued from the press an exceedingly attractive catalogue of 188 pages relating to the very extensive line of metal ceilings which it manufactures under the name "Perfect-Fit." The company has been engaged in the manufacture of metal ceilings for twenty years, and each and every piece that enters into any of its designs is stamped on steel dies, thus insuring accuracy in the different members of which ceiling is composed. The designs have been modeled by American, Spanish, French and Italian artists, and every plate, molding, cornice and mitre is guaranteed to fit perfectly. The metal ceilings are stamped from rehammered open hearth steel sheets, thus insuring great durability. All material is given a priming coat of the company's special "Meto" paint, and the point is made by the company that it furnishes free the necessary nails for applying the metal, also wooden brackets for molds and

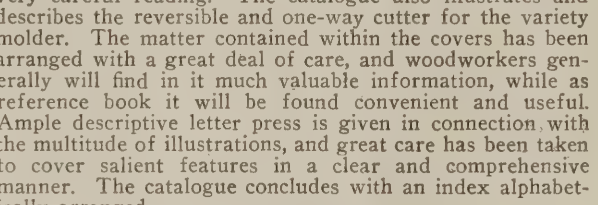


Fig. 6.—Method of Using the Plumb and Level.

cornices requiring them. The designs illustrated in the catalogue are of great variety, thus adapting them to meet many requirements. Their styles include Italian renaissance, French renaissance, Colonial, Empire, Gothic, Louis XIV., Oriental, Stucco, Romanesque, Rococo, etc. In addition to the ceiling designs are many designs for side walls and wainscoting, also panels in great profusion, centerpieces, molds, borders, corner pieces, friezes, coves, mitres, etc., etc. An interesting feature is found in the general instructions for erecting the company's metal ceilings and side walls, with diagrams for use in connection with measurement instructions. An index and price list completes the work. The company will take pleasure in sending a copy of this catalogue to any architect, builder or sheet metal worker who may make application for it.

A New Corrugated Iron Roofing

A new corrugated sheet steel roofing, marking a decided departure in construction of this sort, has been put on the market by the Edwards Manufacturing Company, Cincinnati, Ohio, a company holding that prominent position in sheet metal building material that its advocacy of the new roofing counts for considerable. It is known as Edwards' Patent Pressed Standing Seam Corrugated Roofing, and is a development recognizing that the great majority of buildings constructed of structural steel have steel rafters and purlins. Emphasis is placed on the possibility of getting tight seams and the direct application to the purlins without the use of rivets of any kind. As deterioration is so likely to take place at points where the sheets of the roofing have been punctured for riveting, it is felt that with this detail the roof has considerable merit. Figs. 7 and 8 of the accompanying illustrations will serve to indicate its general character and promise. It is emphasized that at points of riveting strains must be withstood, such as vibrations, wind pressure and the like, and all precaution possible should be taken not to weaken the sheets by puncturing the metal, with the consequent breaking of the galvanizing coating of the corrugated material, and thus exposing the sheets to oxidization. According to the new form of roofing, it does not appear to be necessary to overlap the abutting sheets for two corrugations, and it has been figured that this effects a saving of 11 per cent. in the material alone, aside from the fact that a tight side lock is aimed at. In the application of the sheets to the purlins it would appear that the roofing can be laid without the erection of scaffolding, as it can be placed on the roofing entirely from above. The detail cuts show the use of the cleats. Summing up the advantages, it is felt that first among these is the method of application, principally from the fact that the roofing can be applied without the use of rivets. It is also enumerated that the roofing can be applied more closely to the purlins than is ordinarily the case, that it makes a roofing of a high degree of water tightness, that it can be applied with a minimum loss of time owing to the fact that scaffolding is unnecessary and rivets do not have to be used. It can, of course, be applied to roof structures of timbers, including those with wood sheathing boards, the cleat in this case being nailed to the wood purlins or the sheathing. It is explained that the cost of the material is somewhat more than regular corrugated roofing, but that the saving in side locks and in the method of application makes up for the difference. Before placing it on the market, some of the roofing has been tested for a few years. The essential features are covered by patent. Further information can be had by writing to the company, which, besides iron and steel roofing, makes sheet metal building material, such as cornices, skylights, metal ceilings and the like.

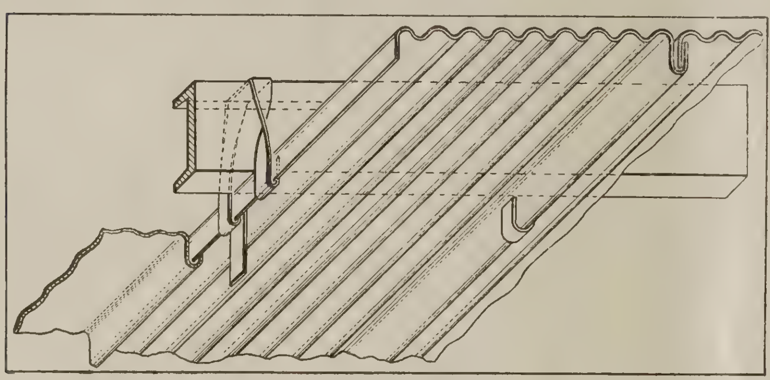


Fig. 7.—Showing Manner of Applying the Roofing.

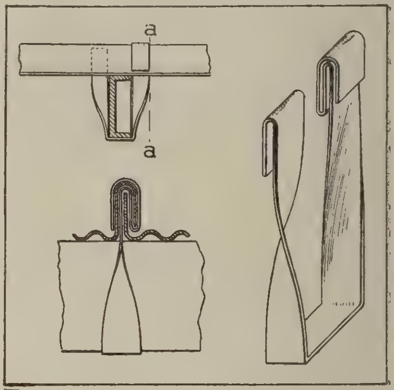


Fig. 8.—Details Indicating the Construction.

Novelties.—A New Corrugated Iron Roofing.

Congo Roofing

A feature of every roll of Congo roofing, made by the United Roofing & Manufacturing Company, successor to Buchanan Foster Company, West End Trust Building, Philadelphia, Pa., is a guarantee bond issued by the National Surety Company of New York City. The guarantee is for five years for one-ply Congo roofing; seven years for two-ply, and ten years for three-ply. The company points out that this guarantee was purposely made conservative and it feels that it could make considerably stronger claims for Congo two-ply, with the assurance that there would still remain a sufficient margin for durability to absolutely protect the company. Accordingly it now guarantees Congo two-ply for ten years, the same as three-ply. The company has also cut down the number of paintings required during the guarantee period. One-ply must be painted once during the guarantee period, and the two or three-ply are now required to be painted twice, once at the end of two years and again at the end of six. In reference to the guarantee bond the company states that it is so arranged that it may be filled out in a simple manner and sent to the company for proper registration. The bond has spaces where may be described the premises where the roof is used, stating the number of squares employed and the address of the sender, etc. A little pamphlet which the United Roofing & Manufacturing Company has issued sets forth at length the merits of Congo roofing and illustrations are given showing some of the buildings in connection with which it has been used. Accompanying the catalogue is a fac simile of the guarantee bond on the back of which are full directions for applying the roofing.

New Roofing Slate Concern

The Washington Standard Slate Company, recently incorporated in New Jersey, with a capital of $100,000, and which owns 38 acres of slate-producing land at Slatington, Pa., has completed its development work there and is about to place contracts for the necessary equipment. A frame building, 45 x 80 ft., is to be built to contain saw tables and the usual equipment for the manufacture of roofing slate and for blackboards. The property contains about 3000 ft. of slate, running about 42 ft. wide, in the celebrated Washington vein, and about August 1 the initial production of roofing slate will be approximately 50 squares. Additional development work later on will bring the production up to about 100 squares. W. J. Caskie, the well-known slate man of Slatington, Pa., has charge of the company's operations, located in Lehigh township, Northampton county, the county producing nearly one-half of the slate product of the United States.

James H. Payne, of McKeesport, Pa., is president of this company, and L. S. Larrabee, also of McKeesport, Pa., is secretary. Besides the mill office in Slatington, Pa., the concern has quarters in the Farmers Bank Building, Pittsburg. A branch sales office and yard is to be established shortly in the Pittsburg district, to supply the building and roofing trades in that district.

Herringbone Galvanized Wall Tie

Merwin Manufacturing Company, Erie, Pa., is directing the attention of contractors and builders to the galvanized wall tie which it is offering for bonding purposes in building construction. It is known under the name "Herringbone" and the claim is made that it saves the bricklayer's time clipping brick for bonds and therefore saves labor, as the use of the ties permit the bricklayers to work faster—a no small item to the builder or contractor. The tie is 7 in. in length and ⅞ of an inch wide, the ends for a distance of 3 in. being corrugated, thus giving a strong grip on the mortar on both sides. The point is made that any strain on the wall has a tendency to draw the mortar from each edge toward the middle of the tie, thereby increasing the bonding qualities proportionate with the strain. Another point is that the Herringbone tie is not weakened by having holes cut in it or part of the metal cut away, and there are no sharp points or angles to shear the mortar under strain.

Trade Notes.

The Herrick Concrete Mold Company, Carlinville, Ill., is sending out an attractive little pamphlet of a size convenient to carry in the pocket, setting forth the merits of the Herrick post molds, staple retainers and concrete pier molds, which it manufactures in such styles and sizes as to meet varying requirements. The post mold consists of only two pieces of gray iron, which clamp together at each end. The mold is placed on a solid floor or pallet, and is then filled with concrete and tamped. The mold is strengthened with reinforcing ribs, and the claim is made that it cannot spring or bulge while casting the post.

Milwaukee Business Men set aside Thursday, Sept. 15, as Milwaukee Day at the State fair, and the business houses observed the day quite generally, making the attendance from the city unusually large. Among the many exhibitors in the new concrete machinery pavilion was that of the Weber Manufacturing Company, Milwaukee, where "Honest John" himself took pleasure in demonstrating his floor surfacing machines to those interested. An interesting view from Mr. Weber's booth was the flight of Wright Brothers' aeroplane. As the day was most favorable, the bi-plane went the highest of any of the days, some 1,000 ft., and in its maneuvers circled the race track many times.

The Mastic Wall Board & Roofing Manufacturing Company, 78 East Third street, Cincinnati, Ohio, sets forth in another part of this issue some very strong claims for the Bishopric wall board and sheathing, the former of which is used as a substitute for lath and plaster. The wall board is made of kiln-dried dressed laths embedded in hot asphalt Mastic under a pressure of 500 lb. to the square inch and surfaced with sized cardboard. It is cut at the factory into sheets, 4 by 4 ft. in size, and of a uniform ⅜-in. thickness. The sheathing is made of the same materials as the wall board, but the finish is not necessarily so fine, therefore costs considerably less. The company will send to any architect, builder or contractor interested, a descriptive booklet, together with samples of the material if desired.

The Heppes Company, 4501 Fillmore street, Chicago, Ill., points out that the Utility Wall Board, which it is furnishing the trade, is cheaper than lath and plaster, and that as soon as nailed to the studding it is ready for the decorator, it being susceptible of papering, painting or kalsomining. The claim is made that the wall board is waterproof, is easily applied and renders the building in connection with which it is used warmer in winter and cooler in summer than would otherwise be the case. Its use obviates cracked walls, falling plaster and accumulations of dirt, while, at the same time, its use effects a saving of time, money and labor. Those who are interested in this wall board can secure circulars and samples by addressing the company.

Montgomery & Co., 105 and 107 Fulton street, New York City, have just issued No. 30 of the Tool-Monger, consisting, as it does, of a 372-page catalogue of tools, supplies and machinery for all branches of the mechanical trades. There is much within the covers of the catalogue that is of interest to the carpenter and builder, and he can secure a copy by making application to the company. Reference is made to various kinds of rules, breast drills, screw drivers, auger bits, pliers, dividers, saws, hammers, vises, wrenches, tool cabinets, etc., etc.

The Burriss metal shingle, patented in December, 1907, is manufactured by the Georgia Metal Roof Co., Inc., with offices and factory at 291 Marietta street, Atlanta, Ga. All of the machinery has not been fully installed, and for the present the company plans to devote its attention more specifically to the States of Georgia and Florida, and in connection with the shingle will carry roofing material and supplies. The shingles, besides having a patent lock for securing water tightness and general service, are of a design calculated to give a tile-roofing effect. It is emphasized that the shingle is built to withstand the contraction and expansion from heat and cold and from green lumber, and that it does not absolutely require closed sheathing, as the roll or bead on each side of the shingle is depended on to stiffen it so that the sheathing boards can be laid with 3 in. spaces between them.

The L. S. Starrett Company, Athol, Mass., makes announcement that its Chicago store is now permanently located in new and more commodious quarters at 17 North Jefferson street. It is in charge of A. T. Fletcher, and friends of the company are invited to call and inspect its complete stock of fine mechanical tools as well as the improved facilities which the company enjoys for favoring the trade with prompt and efficient service.

The Raymond Concrete Pile Company, of New York and Chicago, has opened an office in Room 626, Worcester Building, Portland, Ore., which will be in charge of Gordon B. Raymond. Prompt attention will be given to all inquiries regarding concrete piling, permanent docks, bulkheads and work of a similar nature. The company is now executing the contract which it was recently awarded for the placing of the concrete piles and foundations of the Oregon Railroad and Navigation Company's freight house at Portland, Ore.

"The Dutch Boy Painter" is the title of an attractive booklet devoted to the interests of good painting issued by the National Lead Company, 111 Broadway, New York City. There are pertinent comments on measuring and estimating buildings for painting, the cause and treatment of mildew, protective and decorative coatings, driers, discoloration of paints and white lead and oil decoration for a dining-room. The matter is illustrated by means of half-tone engravings, and the entire make-up is such as to render the little work of especial interest to painters and decorators.

The Concrete Products Company, 35 West Thirty-second street, New York City, is the licensee under the patents of A. A. Pauly, controlled by the Concrete Stone and Sand Company, Youngstown, Ohio, for the manufacture of concrete hollow tile made by the wet process on special machines with steam curing chamber. The Concrete Products Company controls the territory included by the States of New Jersey, Connecticut, Pennsylvania east of the Susquehanna River, and New York State to the northern boundaries of Dutchess, Sullivan and Ulster Counties. The company's plant is located at Flushing, L. I., and at present has nineteen machines in use.

"Simonds Guide for Carpenters" is the name of an interesting booklet of a size convenient to carry in the pocket sent out from the New Orleans, La., office of the Simonds Manufacturing Company, Fitchburg, Mass. The little work is, in fact, a collection of rules and illustrations gathered from different sources and intended as a guide for carpenters. Reference is made to rafter and brace framing; finding the rise and run of stairs; suggestions for filing saws; some interesting comments about painting; numerous tables likely to be found of interest to carpenters and builders, together with suggestions in cases of accident to mechanics. A portion of the booklet relates to Simond hand saws, the entire make-up being such as to render the little work convenient for reference.

The Enterprise Foundry & Fence Company, Indianapolis, Ind., has just occupied its new factory and foundry, which are thoroughly modern in all respects and which were found necessary in order to meet the growing demands of the company's business. There are two buildings devoted to the manufacture of fences, one covering an area 65 x 220 ft., and the other 130 x 130 ft. The foundry is 65 x 220 ft. This is equipped with Otis hydraulic cupola elevators and Adams molding machines as well as with electric traveling cranes of 10 and 15 ton capacity, built and installed by the Toledo-Massillon Bridge Company. The company occupied its old quarters for a period of twenty-seven years, but the new plant gives it a capacity of four times that previously enjoyed. A catalogue which the company has issued shows a large line of fences of artistic design.

Sheet metal goods for farmers are illustrated in the recent catalogue of the Friedley-Voshardt Company, Chicago, Ill. The booklet consists of twenty-two pages and is especially devoted to weather vanes and ornaments. The ornaments include horses of different kinds, colts, automobiles, mules, cattle, sheep, hogs, roosters, as well as bases on which the vane will stand. Some also have the points of the compass as a portion of the vane equipment. The catalogue also shows a sample of the metal ceilings and side walls, which the company can furnish, one piece mitres, for eave trough, and the new ornamental end piece. It also shows tanks for watering stock and tanks for dipping stock. The company also makes a line of architectural sheet metal work and zinc, bronze or copper statuary.

The Turner Construction Company, 11 Broadway, New York City, has just issued a classified list of contracts which have been executed in reinforced concrete by the company. This list comprehensively shows the adaptability of reinforced concrete to all classes of buildings, railroad structures, engineering works, etc. The classification embraces general manufacturing buildings, warehouses, mills, offices, lofts and stores, cold storage plants, stables and garages, power, boiler and pump houses, railroad structures, reservoirs, tanks, bins and kilns, stairs, prominent among which are the stairs and platforms in connection with the New York subway work, foundations and retaining walls, and miscellaneous buildings. The list is compiled up to April of the present year.

The Building Age

NEW YORK, NOVEMBER, 1910.

A Frame and Cement Bungalow at Tacoma, Wash.

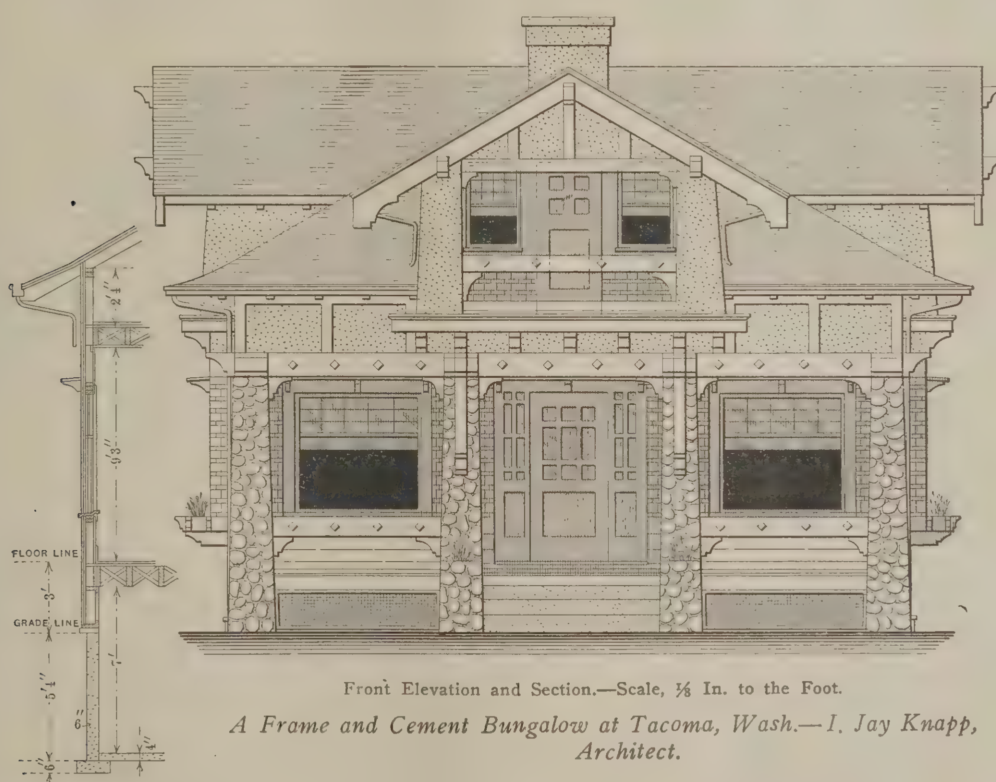
PROBABLY in no other section of the country is the cozy cottage type of dwelling designated as the "Bungalow" more popular or exemplified with more varied and attractive designs than on the Pacific Slope. The fact, however, that this type of building is so peculiarly adapted for the mountains, the lakeside, the seashore and the suburban site, is causing the "Bungalow-idea," so to speak, to rapidly spread all over the land, and its construction is a feature of many of the real estate improvement operations in and about some of the leading centers of business activity. While perhaps the majority of the buildings of the kind indicated are intended merely for occupancy during the milder months of the year, yet many are designed for permanent occupation and are finished inside and out accordingly.

A rather interesting example of the latter class is illustrated upon this and the pages which immediately follow. It has an exterior of clapboards and shingles laid on sheathing boards with building paper between, above which are panels of cement plaster on wire lath, and porch columns of broken boulders and cobblestones so disposed as to produce pleasing effects. The shingles on the side walls are laid so as to show 2-in. and 6-in. courses. The roof is covered with 6-in. sheathing boards laid 2 in. apart, on which are placed cedar shingles placed 4½ in. to the weather. A cellar extends under a portion of the house, affording space for heating apparatus and fuel supply, as well as a room for storage, vegetables, etc. A majority of the rooms of the bungalow are on the main floor, although there is a bedroom and open-air sleeping room in the attic.

According to the specifications of the architect the framing timbers are of fir, the first story and attic floor joists being 2 x 10 in. placed on 16-in. on centers; the studs are 2 x 4 in.; the rafters 2 x 6 in.; the attic collar beams 2 x 4 in.; the veranda joists 2 x 6 in., the latter being placed 24 in. on centers. The posts in the basement are 6 x 6 in. and the girders are 6 x 6 and 6 x 10 in. Where soil pipes pass through partitions the studs are 2 x 6 in. All door and window studs are set double and all large openings are trussed overhead.

The living and dining rooms have vertical grain narrow flooring, with a border 2 ft. wide around the rooms for staining. The balance of the flooring for the first story and for the finished room in the attic is of vertical grain boards 4 in. wide, blind nailed over every joist. The veranda has a flooring of strips 1⅛ in. thick, 3 in. in width, the joints being laid in white lead. The first and second story joists are lined with shiplap boards 8 in. wide and under the finish floors of all the rooms on the first story and the finished room in the attic is heavy deafening felt. The floors of the balcony and the open-air bedroom are of No. 2 shiplap 8 in. wide, covered with B quality Paradux roofing lapped 1½ in. and the ends turned up 3 in., the joints being well cemented and nailed with galvanized nails through large tin washers.

All interior finish throughout is of selected slash grain fir. The beam and cornice work, wainscoting, plate rail, head casing, window finish, etc., is in ac-



Front Elevation and Section.—Scale, ⅛ In. to the Foot.

A Frame and Cement Bungalow at Tacoma, Wash.—I. Jay Knapp, Architect.

cordance with the details presented herewith. The cold closet is fitted with portable heavy wire screen shelves and has ventilators top and bottom through the outside wall.

In the hall there is a telephone niche lined and cased and properly fitted. The china closet in the dining room is constructed in accordance with the scale drawings. All doors are of slash grain fir, doors 7 ft. high being hung on three butts. All outside and inside doors are of special design. With the exception of the doors in living and dining rooms the inside doors are of the two-panel variety. The openings between living and dining room and between living room and veranda have column and beam finish, as shown by the scale drawings. The sliding door is hung on Coburn hanger. The two bands of plastering in the living and dining rooms have a treatment in three tints, which the architect has found very satisfactory and beautiful in practice.

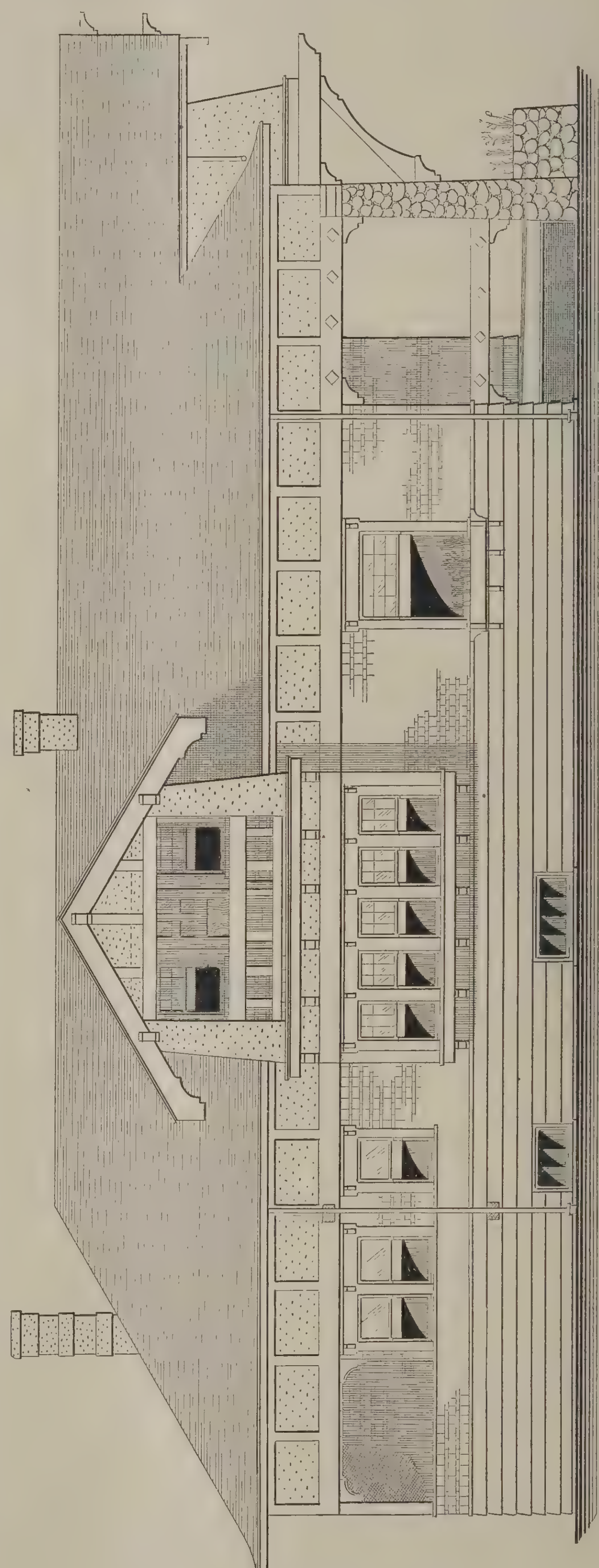
The brick mantel and hearth in the living room is built of hard clinker brick laid up in dark colored cement mortar with ⅝-in. joints, the latter being raked out ½ in. deep. The fireplace is lined with fire brick.

All walls and ceilings of rooms, halls and closets, except in the basement, are lathed and plastered two-coat work, the second coat being float finish made smooth and even. Metal corners are used on all exposed corners. The kitchen and bath room are wainscoted 4 ft. 6 in. high with adamant plaster scored to imitate tile. The line between the tile work and other plaster is covered with a 4-in. strip. The stairway to the attic is plastered, also the wine closet under the attic stairs, the ceiling of the vegetable cellar and the ceiling of the fruit closet under the cellar stairs. The exterior plastering where shown on the elevations is on close mesh wire cloth secured by galvanized staples to ½ x 1½-in. firring strips placed 16 in. on centers. The plastering is two-coat work, the second coat being of float finish.

All glass for exterior sash and doors is of 26-oz. crystal sheet; that for attic and basement of double strength, and the glass panels in the doors opening into the hall moss glass. The glass in the door to the pantry from the dining room and in the doors to the china closet is set in metal frames with brass finish. All other glass is double strength. The plumbing is open work throughout the house and done in accordance with the city ordinance. The building is intended to be located 20 ft. more or less from the lot line, and the water supply to be taken from the city main. In the kitchen is a 20 x 30-in. enameled cast iron sink roll rim with back in one piece. Next to the sink is a one-part laundry tray. The hot-water boiler is of galvanized iron and 30-gal. capacity. In the bath room is a 5½-ft. roll-rim enameled iron bath tub provided with 4½-in. Fuller combination bath cocks and nickel-plated trimmings and pipes. There is also an Ideal low-down tank wash-down siphon jet combination water closet, and an enameled iron wash bowl 11 x 15 in., with fixtures, brackets, etc., complete.

The building is wired for electric lights and fitted with switches as shown on the plan, the work being done in accordance with the rules and regulations of the National Board of Fire Underwriters and the city of Tacoma. There is an electric bell at the front and at the rear entrance, and there is also a push button in the dining room floor connecting with a bell in the kitchen. The building is heated by a hot-water system embracing an Ideal sectional hot-water boiler. All radiators are of the Rococo style made by the American Radiator Company.

The estimate of cost follows:



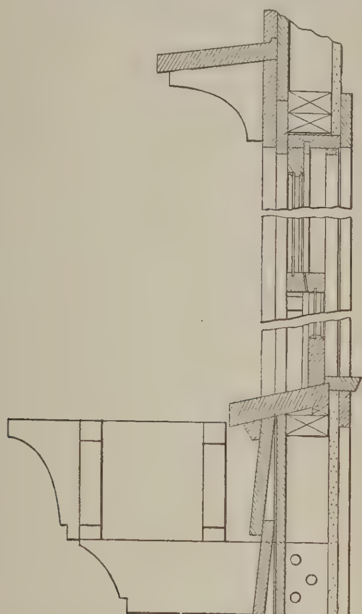
A Frame and Cement Bungalow at Tacoma, Wash.—Side (Left) Elevation.—Scale One-Eighth Inch to the Foot.

GALVANIZED IRON WORK.

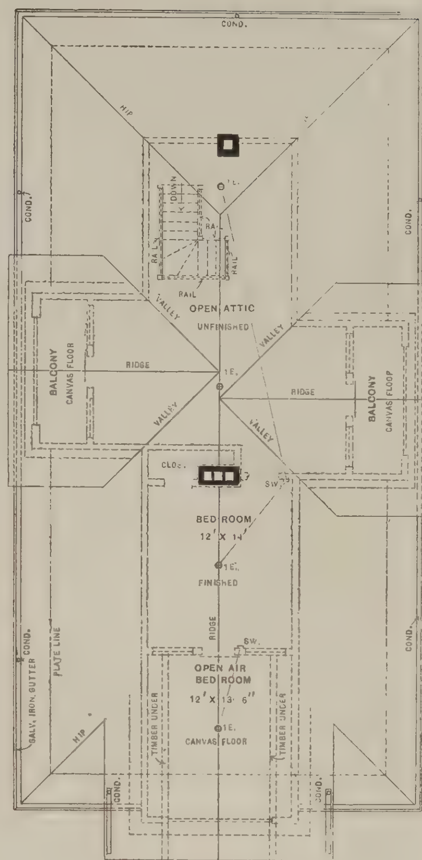
1 flashing for small chimney	$ .50	
1 flashing for large chimney	1.00	
75 lineal feet conductor @ 12 cents	9.00	
64 lineal feet valleys @ 10 cents	6.40	
76 lineal feet hips @ 15 cents	11.40	$59.72
136 lineal feet gutter @ 12 cents	16.32	
54 lineal feet ridge @ 15 cents	8.10	
28 elbows @ 25 cents	7.00	

MASONRY.

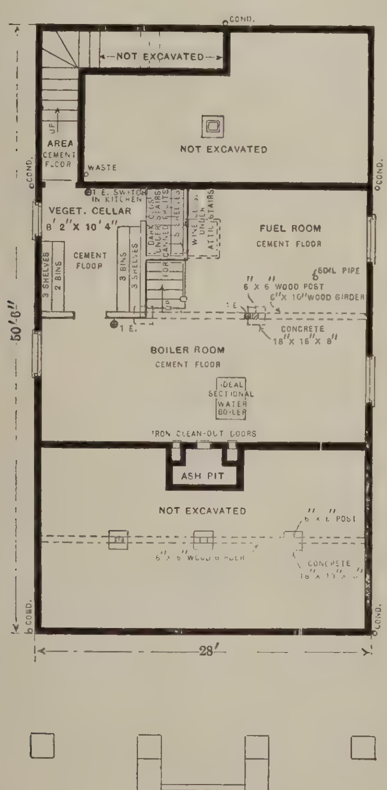
Excavations	157 cubic yards @ 25 cents		$39.25
Concrete	5 pieces 18" x 18" x 8" blocks @ 20 cents		1.00
Concrete porch piers	4 pieces 24" x 24" x 12" = 16 ft.	699½ cubic feet, 26 cubic yards @ $7.00	182.00
Concrete buttresses	2 pieces 24" x 42" x 12" = 14 ft.		
Concrete dwarf walls	238 linear feet 6" x 18" = 178½ ft.		
Concrete for chimney	1 piece 36" x 36" x 6" = 4½ ft.		
Concrete for ash pit	1 piece 4' x 7' 6" x 6" = 15 ft.		
Concrete for dwarf wall	108 linear feet 12" x 6" = 54 ft.		
Concrete walls	98 linear feet 5' 4" x 6" = 257 ft.		
	25 linear feet 7' x 6" = 88 ft.		
	29 linear feet 5' x 6" = 72½ ft.		
Cement floor	582 square feet @ 10 cents		58.20
Cement steps	10 pieces 3' long = 30 feet; 3 pieces 7' long = 21 feet	51 linear feet @ 50 cents	25.50

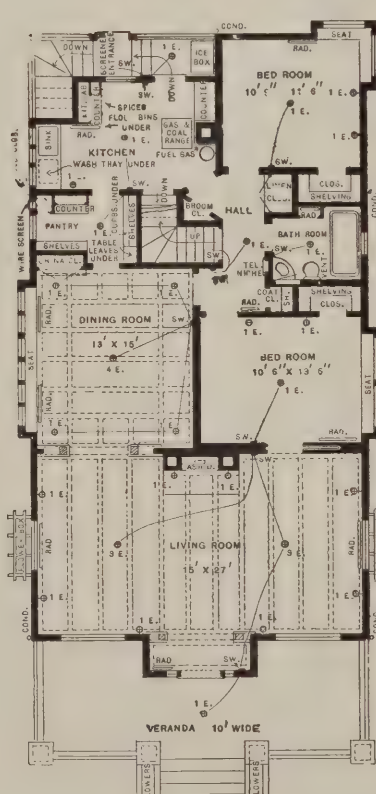


Section Through Living Room Windows.—Scale, ¾ In. to the Foot.



Attic and Roof Plans.





Foundation. Scale, 1/16 In. to the Foot. Main Floor.

A Frame and Cement Bungalow at Tacoma, Wash.—Floor Plans and Detail.

Brick work	Kitchen chimney, 1,000 @ $7.00 = $7.00		87.57
	Front chimney, 1,800 @ $7.00 = $12.60		
	24 lin ft. lining @ 40c. = $9.60		
	360 face @ $12.00 = $4.32		
	150 hearth @ $12.00 = $1.80		
	150 fire brick @ 3½c. = $5 25		
	25 lbs. angle iron @ 4c. = $1.00		
	One bricklayer, 4 days @ $6.00 = $24.00		
	One helper, 4 days @ $2.50 = $10.00		
	Mortar, ½ cement = $12.00		
Cobble-stone work	4 piers 2' x 2' x 10' 8" = $170.66	209.66 cubic ft., 8 cubic yards @ $20	160.00
	2 buttresses 2' x 3' 4" x 3' = $39		

WIRE SCREENS.

2 pieces 7' x 1' 6" = 21 square feet	123¾ sq. ft. @ 25 cents	30.95
2 pieces 8' 6" x 1' 6" = 25½ square feet		
1 piece 6' 6" x 4' 2" = 18¾ square feet		
1 piece 4' 8" x 4' 2" = 19½ square feet		
1 piece 2' 8" x 4' 2" = 11¼ square feet		
1 piece 6' 8" x 4' 2" = 27¾ square feet		

DEAFENING FELT AND PAPER.

1,400 square feet felt = 156 yards @ 4 cents = $6.24	12.99
1,500 square feet P. B. paper @ $4.50 per 1 000 = $6.75	
	$597.46

PLUMBING.

1 sink, P. 1200, Standard catalogue.
1 wash tray, P. 1296, Standard cat.
1 30-gallon boiler.
1 toilet plate, 31 H. Ideal catalogue.
1 3" roll rim tub, 5' 6" long.
1 basin, P. 555, Standard catalogue.
2 sill cocks.
3 stop cocks.
25 feet 4" soil pipe.
1 4" ⅛-bend.
1 4 x 2 sanitary tee.
30 feet 2" soil pipe.
1 2" Y.
1 2" cleanout.
1 2" ⅛-bend.
1 2 x 8 offset.
1 4" 3-way fitting.
1 4 x 2 sanitary tee.
1 4" ferrule.
1 4" bend
6 feet 1½" lead pipe.
1 1½" slipjoint tee.
7 feet 1½" galvanized pipe.
1 1½" elbow.
50 lbs. calking lead.
6 lbs. oakum.
7 lbs. solder.
6 lbs. sheet lead.
100 feet ¾" galvanized pipe.
100 feet ½" galvanized pipe.
10 ¾" galvanized fittings.
30 ½" galvanized fittings.
1 2" sanitary tee.
18 feet 1½" galvanized pipe.
2 1½" galvanized ells.
2 1½" ferrules.
2 1½" P traps.
3 feet 1½" lead pipe.
4 ¾" nipples.
12 ½" nipples.
80 feet 4" sewer pipe.
16 feet 6" sewer pipe.
1 6" curve.
1 4" curve.
Plumber 5 days.
Digger 4 days.
Carting and car fare.
Gasoline, cement, etc.

Total price for job.. $190.00

MISCELLANEOUS.

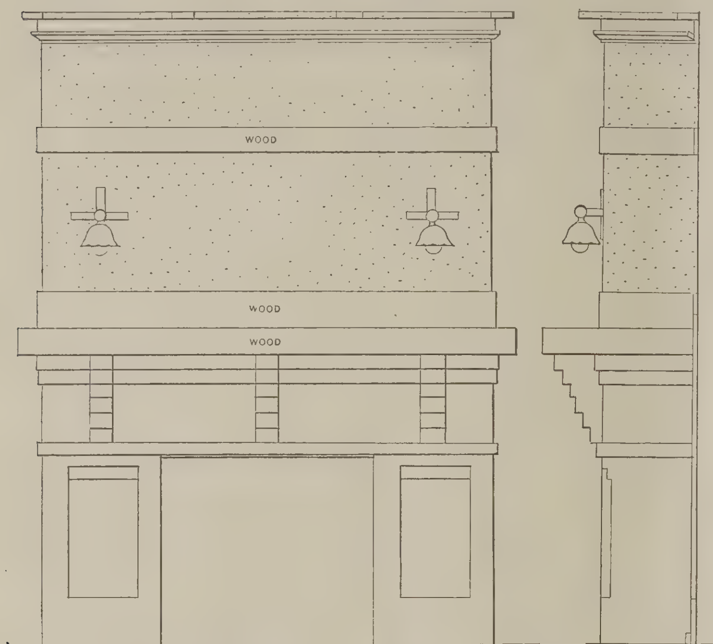
Wainscoting scoring, bath room and kitchen, one day, one man.....	6.00
Burlap for dining and living rooms, 78 yards @ 28 cents...........	21.84
Tinting walls and ceilings..	40.00
Painting and interior finish......................................	175.50
Hardware trimmings..	75.00
Sash weights, cords, nails, etc...................................	42.00
Cold air closet........ 2—6 x 8 registers @ 85 cents = $1.70....... 2 pieces heavy wire outside @ 5 cents = 10 cts. 7 pieces heavy wire shelves @ 10 cents = 70 cts.	2.50
Paradux roofing....... 1 piece 12' x 13' 6" = 162 sq. ft. 258 sq. ft. @ 2 pieces 4' x 12' = 96 sq. ft.... @ $5 per 100 =	12.90

PLASTERING.

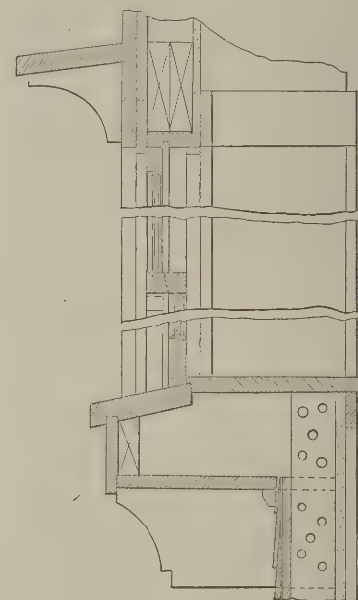
Room.	Ceiling.	Side Walls.	Total.
	——Square	Feet.——	
Vegetable cellar........	84	...	84
Vegetable cellar closet..	24	...	24
Attic room............	168	500	668
Attic room closet.......	18	...	18
Attic stairs............	...	133	133
Cellar stairs...........	...	108	108
Living room...........	405	747	1,152
Living room vestibule...	24	...	24
Dining room...........	195	393	588
Pantry................	47	2 2	299
Kitchen...............	124	432	556
Hall..................	57½	360	417½
Bath and closet........	87	612	699
Bed room..............	152	432	584
Bed room..............	132	400½	532½

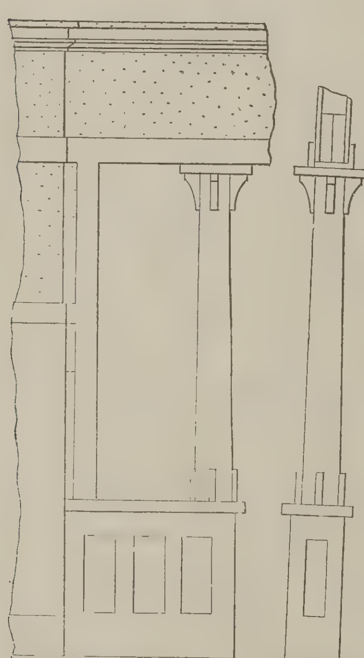
5,887 sq. ft. 655 yds. @ 23c. $150.65
Outside (including metal lath).. 738 — 738 sq. ft. 82 yds. @ 35c.. 28.70

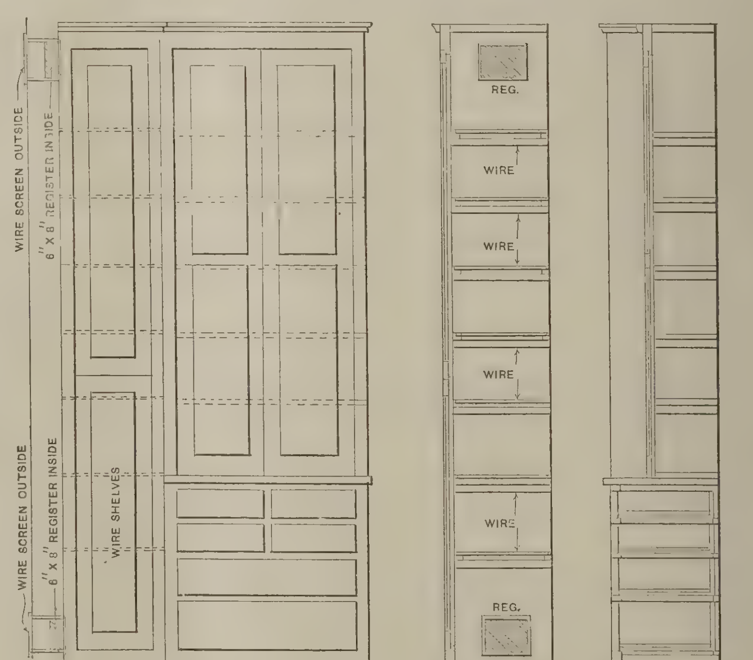
$179.35



Front and Side Elevations of Clinker Brick Mantel.


Vertical Section Through Dining Room Windows. Scale, ¾ In. to the Foot.


Details of Column and Beam Finish.—Scale, ⅜ In. to the Foot.



Elevation and Sections of Cold Closet and Cabinet in Pantry.—Scale, ⅜ In. to the Foot.

Miscellaneous Constructive Details of a Frame and Cement Bungalow at Tacoma, Wash.

MILL WORK.

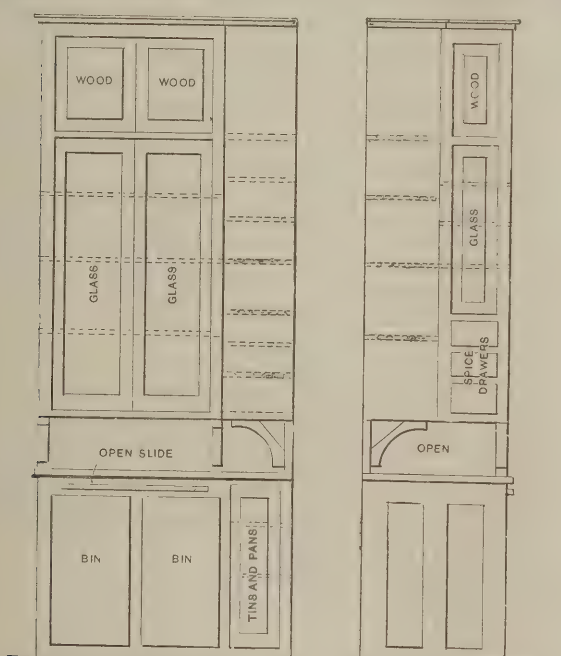
160 lineal feet exterior sill, 2 x 4	$4.80
48 lineal feet 2 x 12 4 x 4 planted on 2′ 0″, square feet	4.00
100 lineal feet 1 x 12 porch soffit	3.00
50 lineal feet 1 x 12 porch soffit	1.25
100 lineal feet 2″ cove	1.00
6 inside trims for outside doors	4.80
263 lineal feet ceiling beams, 15′ lengths	9.45
190 lineal feet wall cornice	7.60
250 lineal feet 3½″ battens	2.50
50 lineal feet plate rail and brackets	6.00
108 lineal feet head casing continued around room	2.16
108 lineal feet plain base, dining and living rooms	3.25
108 lineal feet base shoe, dining and living rooms	1.00
50 linear feet wainscot cap	1.00
200 lineal feet picture moulding	2.00
23 window trims	18.40
15 inside door frames	12.00
15 inside door trims	21.00
215 lineal feet base stock pattern, bed rooms, kitchen and hall	6.45
215 lineal feet base shoe.	
9 feet 12″ seat, bay window	1.10
12 feet 12″ seat, dining room	
8 feet 12″ seat, bed room	12.00
1 medicine cabinet with 14 x 16 bevel plate mirror	8.00
1 mantel shelf	4.00
4 inside door frames, basement	3.20
29 window frames, brackets and wide caps	42.00
1 triple front door frame	5.00
2 rear door frames	3.00
3 outside door frames, second floor	4.50
6 pieces 3″ x 12″ 12′ barge board	9.50
7 pieces 6″ x 12″ 6′ look outs, band sawed	8.75
2 pieces 6″ x 12″ 18′ look outs, band sawed	8.00
300 lineal feet 3″ bed mold	4.50
144 lineal feet 2″ bed mold	1.45
24 rafter ends for dormers	4.00
77 rafter ends for main roof	12.00

ELECTRIC WIRING.

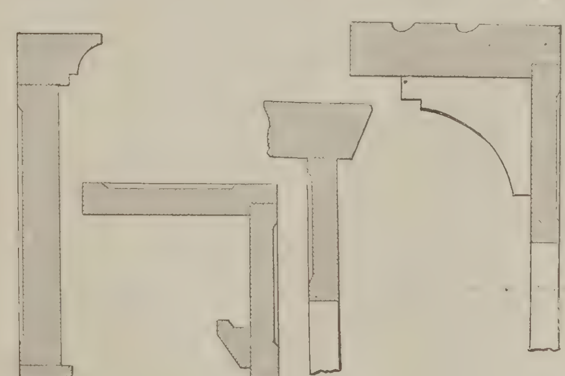
33 light outlets	
14 single pole flush switches, brush brass	
2 sets 3-way flush switches, brush brass	
1 cabinet box	
1 30-ampere, 3-pole switch and cutout	$91.00
5 branch cutouts	
1 4-point annunciator	
2 door pushes	
1 combination floor push for dining room	
Wiring for telephone	

LUMBER.

Joists	40 pieces	2 x 10	16 0	1,068 square feet.	
Joists	20 "	2 x 10	22 0	736 " "	
Joists	73 "	2 x 10	14 0	1,704 " "	
Joists	48 "	2 x 8	10 0	320 " "	
Sills	4 "	4 x 8	10 0	107 " "	
Bridging	320 "	1x 3	1 8	160 " "	
Rough boards	70 "	1 x 10	16 0	940 " "	
Studding	101 "	2 x 4	16 0	1,078 " "	
Studding	103 "	2 x 4	12 0	844 " "	
Studding	80 "	2 x 4	14 0	748 " "	
Collars	30 "	2 x 6	8 0	240 " "	
Rafters	70 "	2 x 6	20 0	1,400 " "	
Hips	4 "	2 x 8	26 0	110 " "	
Valleys	4 "	2 x 8	16 0	86 " "	
Plates	150 "	2 x 4	10 0	1,000 " "	
Girders	20 lin. ft.	6 x 10	....	100 " "	
Girders	28 "	6 x 6	....	84 " "	
Ridge	88 "	1 x 8	....	60 " "	
Ribbon	200 "	1 x 5	....	100 " "	
Posts	3 pieces	6 x 6	2 0	18 " "	
Posts	2 "	6 x 6	6 0	36 " "	
Posts	60 "	2 x 4	3 0	120 " "	
				11,059 ft. @ $9.00	$99.54
Sheathing	1,900 feet	7,300 @ $10.00			73.00
Floor lining	3,200 "				
Roof boards	2,200 "				
Flooring	1,200 "	No. 2 4″ wide @ $29.00			34.80
Flooring	900 "	No. 1 3″ wide @ $36.00			32.40
Porch flooring	420 "	1¼ x 4 @ $29.00			12.18
Ceiling	2,022 "	@ $25.00			50.55
Shingles, roof	25 M. @ $2.10				52.50
Shingles, roof	Laying 27¾ squares @ $1.00				27.75
Shingles, roof	Nails for 27¾ squares @ 15 cents				4.16
Shingles, side walls	9 M. @ $2.25				20.25
Shingles, side walls	Laying 10 squares @ $2.00				20.00
Shingles, side walls	Nails for 10 squares @ 15 cents				1.50
Shingles, hips and valleys	Extra for labor @ 2½ cents per lineal foot = 194 feet				4.85
					$433.48



Front and End Elevations of Kitchen Cabinet.—Scale, ⅜ In. to the Foot.



Head Casing — Cornice for Living Room. — Stool and Apron. — Plate Rail for Dining-Room.

Miscellaneous Constructive Details of a Frame and Cement Bungalow at Tacoma, Wash.

250 lineal feet 1 x 6 battens		3.75
500 lineal feet 1⅛ x 12		25.00
200 lineal feet 1 x 8		3.00
200 lineal feet 2″ bed mould		2.00
56 brackets, 12 x 14 6″, band sawed		16.80
8 flower box brackets		1.20
2 flower boxes		5.00
3 pieces 4 x 8 balcony rail ◆ planted on		6.00
3 pieces 4 x 6 bottom balcony rail 9′ 0″ long		3.70
2 pieces 4 x 8 7′ 6″ ◆ planted on		3.50
2 pieces 4 x 8 9′		4.00
6 pieces 14 x 12 12′		6.00
2 pieces 6 x 12 7′		2.20
1 sliding door frame		1.25
1 sliding door trim		2.00
1 cupboard for kitchen, 2 bins, 2 glass doors, 2 panel doors		24.00
1 cold closet and cabinet, pantry, 5′ wide, 9′ high and 20″ deep		30.00
1 linen closet, 3′ wide, 9′ high, 3 drawers and 2 doors, 2′ deep		15.00
1 work board, 2′ x 3′ 6″, shelves under		4.50
1 china closet, dining room, brass, hard metal, glass doors, 4′ 6″ wide, 7′ high		35.00
2 arch openings, square columns, brackets top and bottom, 4 pedestals, 3 panels wide, 1 at end		32.00
5 stationary bins and shelves in basement		12.00
1 stairway to second floor, one to basement, one from kitchen to cement steps		65.00
1 telephone cabinet		2.00
1 bath room cabinet over radiator		5.00
100 lineal feet shelving		3.00
100 lineal feet hook strips		1.00
2 sets of open shelving in pantry		10.00
All doors and windows, including glass and setting, as follows:		
Attic, 2 doors @ $1.25	$2.50	
Attic, 3 doors @ $5.00	15.00	
Attic, 6 windows @ $2.00	12.00	
Basement, 2 doors @ $1.25	2.50	
Basement, 4 windows @ 75 cents	3.00	185.75
First floor, 10 doors @ $5.00	50.00	
First floor, 7 doors @ $1.25	8.75	
First floor, 23 windows @ $4.00	92.00	
		Total, $752.31

SUMMARY.

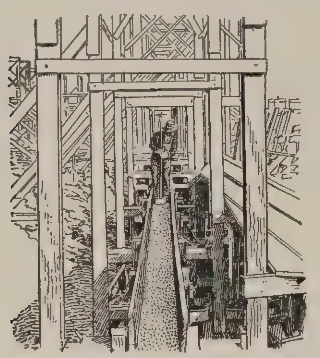
		Amoun 5
Excavations		$39.20
Concrete and cement work		266.77
Brick work, including mantel		87.50
Porch columns and buttresses		160.0
Cold air closet		2.50
Paradux roofing		12.90
Plastering, including outside work		179.35
Scoring wainscoting		6.00
Burlap		21.84
Tinting		40.00
Painting		175.50
Hardware trimmings		75.00
Sash weights, etc		42.00
Wire screens		30.95
Felt and paper		12.99
Lumber (including shingles put on)		433.48
Mill work		752.31
Plumbing		190.00
Electric wiring		91.00
Galvanized iron work		59.72
Framing, 4 men, 6 days @ $4.00	$96.00	
Outside work, 4 men, 6 days @ $4.00	96.00	336.00
Trimming inside, 4 men. 9 days @ $4.00	144.00	
Total		$3.015.06

Obviously these figures of cost will vary very materially if the building is erected in other parts of the country, especially in the East, where frame construction is somewhat more expensive than on the Pacific Slope.

The bungalow here illustrated and described was designed by I. Jay Knapp, architect, 403 South K street, Tacoma, Wash.

HANDLING CONCRETE IN HOT WEATHER

THOSE who have had extensive experience with concrete construction and in the manufacture of cement products are familiar with the difficulties that arise due to weather conditions, and realize that at different seasons of the year some variation in the methods of mixing, placing and protecting concrete, is necessary. Too often these facts are acquired and impressed upon the user through some unfortunate, costly experience, and a word concerning the proper handling of concrete work during the hot summer months, says the bulletin of the Universal Portland Cement Company, should be of interest and profit to the inexperienced and those not familiar with the characteristics of concrete.



To obtain the maximum strength and the best results with a properly proportioned concrete or mortar, a certain amount of water is essential and the material must receive special attention with regard to curing during the first few days. Just how much water is required is not definitely known, but it is generally conceded to-day that wet mixtures are the best for nearly all classes of construction and that, as a general thing, sufficient water is not used in the manufacture of practically all machine-made cement products. This being the case, it means that during the hot summer months, when the loss of moisture through absorption and evaporation is a maximum, special precautions should be taken in protecting the work from such losses, and a little more water should be used in the mixture.

Next in importance to proper proportioning and mixing the materials with sufficient water is curing, and it must be remembered that unprotected, improperly handled green concrete may be permanently damaged by the weather conditions prevailing during the summer months as well as by freezing. A comparatively slow, uniform rate of hardening in a warm, moist air is desirable. Wet mixtures harden a little more slowly than dry, heat accelerates the rate of hardening, and a too rapid rate of hardening is accompanied not only by a loss in strength, but also by the formation of unsightly, if not injurious, shrinkage cracks.

Proper Portioning and Mixing

The above facts can be easily demonstrated with a few pats or thin cakes, about one-half an inch thick and 4 in. in diameter, made from a mixture of cement and water and placed upon small pieces of glass. Cover one pat with a damp cloth in such a manner that the cloth, which should be kept wet for at least 12 hours, does not come in contact with the pat. Place another pat out in the sun, but protected from air currents, and the third in a strong draft or in front of an electric fan. In a short time the latter two pats will be covered with shrinkage cracks and at the end of 24 hours these pats will not be as strong or as satisfactory in any respect as the other, which will be absolutely sound and of a uniform color. The condition of these three pats is representative of what may be expected from improperly handled concrete work, and work that has been properly sprinkled and protected from the sun and air currents for a few days.

The marked difference in strength between a wet and a dry mixture and the increase in strength due to sprinkling alone, is clearly shown by the results of tests recently made by this company on cement tile. The seven-day strength of tile made of a wet mixture was over twice that of similar tile, except of a drier mix, and the 14 and 21 day tests show an increase of 59 per cent. and 79 per cent., respectively, for the wet over the dry mix. Tile made of a dry mixture that were properly sprinkled, at the end of seven days were 80 per cent. stronger than similar tile not sprinkled, and at 14 and 21 days there was a difference in strength in favor of the sprinkled tile of 55 per cent. and over 100 per cent. respectively; the increase in strength being due entirely to the proper curing of the tile by sprinkling with water. The same was true with tile made of a wet mixture, but the increase in strength of the sprinkled over the unsprinkled was not quite so great in this case.

In the construction of thin sections where a large surface area is exposed, such as concrete floors, roofs and sidewalk work, special care should be taken during hot weather to see that the work does not harden or dry out too quickly. Use plenty of water in mixing materials and see to it that the coarse aggregate, which at this season of the year is hot and dry, is well drenched with water before being used, otherwise it will absorb a large amount of the water the concrete should have, especially if a limestone or sandstone aggregate is used.

The forms and surfaces against or upon which concrete is deposited should be wet, and when concrete is used in connection with tile they should be thoroughly soaked with water just before the concrete is laid. As soon as possible the work should be sprinkled with water, and it should be well sprinkled at frequent intervals for at least four days.

Drying of Cement Plaster

Cement plaster construction should not be allowed to dry out too fast, but with this type of construction, shrinkage and drying cracks in any but the finish coat are not objectionable. To insure satisfactory work of a uniform color, the finished work should be protected from rapid drying, the sun and wind, by a curtain of some material, which should be kept wet and hung a few inches away from the surface of the work.

Machine-made concrete products, such as brick, block and tile, and those made with a dry mixture, require special attention during curing in hot weather. The mixtures from which these blocks are made do not contain sufficient water to start with to produce the best results; hence every precaution should be taken to see that none of this water is lost by absorption or evaporation. The manufacturer who adheres to an ironclad rule as to storage and sprinkling at all seasons of the year will find that the quality of his product will vary with the weather conditions. During hot weather the finished work should be left inside or protected from the sun and dry currents of air for an additional length of time over that considered necessary during the comparatively cool, damp spring and fall weather. Sprinkling should also be more thorough, more often and continued over a longer period. Too much water cannot be used for curing, and to insure a strong product of a uniform color the treatment must be uniform.

Do not complain of the cement being quick-setting if you find that it is not possible to lay and finish in one operation as large an area of sidewalk on a hot day as on a comparatively cool one. Remember that during hot weather, cement work hardens much more rapidly, due to the heat and to drying out through absorption and rapid evaporation, and let the weather conditions be a governing factor in the handling of your work. As a general thing, use more water and protect the work from the hot sun and dry winds until it has attained sufficient strength to withstand their harmful effects.

HEATING AND VENTILATING COTTAGE HOSPITALS

By Chas. L. Hubbard

THE requirements to be provided for in the heating and ventilation of cottage hospitals are similar in some respects to those of both dwelling houses and school buildings. Many of the rooms are small, like those of a dwelling, but a much larger volume of fresh air is required. Buildings of this kind are usually provided with an indirect gravity system for the wards, operating, etherizing and sterilizing rooms, with direct radiation in bath and toilet rooms, corridors, etc. Figs. 1 and 2, showing the basement and second floor of a typical ward building, may be used as an illustration of the design of heating systems for this class of work. The first story, not shown, is identical with the second, except the ten private wards are replaced by a single large ward accommodating 12 beds. Referring to Fig. 1, the space under the main ward is separated from the rest of the basement by a brick partition and serves as a fresh or cold air chamber for the heaters supplying the entire main portion of the building. Air is admitted to this chamber through two inlets, one located on each side of the building, in order, so far as possible, to take advantage of changes in the direction of the wind.

When convenient it is well to provide openings of this kind upon three or even four sides of the building for the same reason. When two inlets are used, as in Fig. 1, each should be made of sufficient size to furnish the full volume of air required. When four inlets are used, they should be proportioned so that any two of them will furnish the full supply.

A section through one of these inlets is shown in Fig. 3. The window opening is surrounded with a galvanized iron casing, having an opening in front below the level of the window sill. This opening is covered with a wire netting and has extending across it flaps or checks of Canton flannel, about 6 in. in width, strung on light rods, fastened across the opening in a horizontal position. As the plane of the opening is inclined and the checks hang vertically, they present no resistance to the entering air. Should there be a strong or moderately strong wind entering the inlet on the opposite side of the chamber and tending to produce an outward current through the opening on the windward side, the checks will immediately close against the wire netting, stopping the opening and thus utilizing the wind pressure in forcing the air upward through the flues into the rooms above.

The heaters or stacks in this chamber are enclosed in galvanized iron casings having open bottoms to allow the air to pass up through them freely. The connections between the stacks and uptake flues are of galvanized iron, and are provided with mixing dampers for admitting cool air from the chamber in sufficient quantities to regulate the temperature of the rooms above. The chains operating these dampers are carried up by flues to the rooms with which they connect and pass out through a catch plate fastened either upon the register face or on the wall just above it. The exposed warm-air pipes in the cold-air chamber and the uptake flues within the outer walls are protected with insulating material.

The fresh-air inlets to the rooms are in the outer walls below the windows. In buildings of this kind better results are usually obtained by bringing the warm air in near the floor than at an elevation.

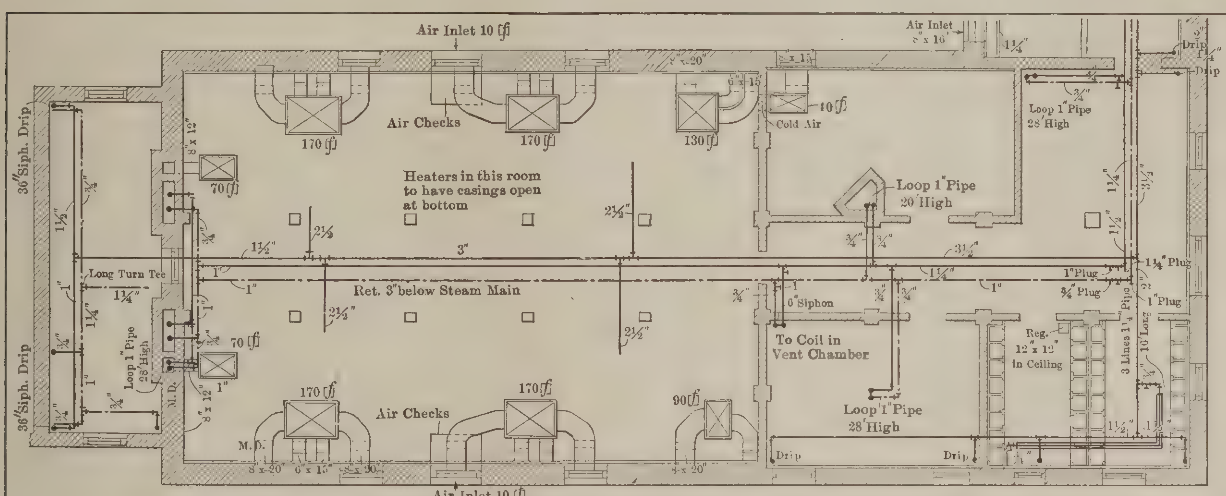


Fig. 1.—Basement Plan of Hospital, Showing Details of Gravity Steam Heating System.

Heating and Ventilating Cottage Hospitals.

The discharge ventilation, in most cases, is effected through galvanized iron uptakes connecting with a plastered chamber in the roof space of the building, which, in turn, is vented through a hooded roof ventilator. Sufficient draft is produced within the vent flues by the use of aspirating heaters, consisting of loops of steam pipe in some of the smaller ones and of a so-called trombone coil in the fireplace flue of the main ward on the first floor. The vents from the small, private rooms on the second floor depend for their draft upon a heating coil carried around the walls of the gathering chamber in the roof space mentioned.

Bath and toilet rooms, diet kitchens, etc., are provided with vent flues only, heat being furnished by means of direct radiators of the wall pattern. If fresh air is supplied to these rooms in the usual manner, it is likely at times to produce a slight pressure, and so cause a flow outward through doors into other rooms and possibly carrying disagreeable odors with it. By making the whole air movement inward to these rooms and heating them by means of direct radiation, all difficulty from any such result is avoided.

Cottage hospitals are best heated from a central boiler plant, which is usually placed in a separate building, as shown in Fig. 4. This removes all noise and dust from the wards, and, when combined with the laundry, it places all machinery and high-pressure steam apparatus together under the direct charge of the engineer.

In the plant shown, a pressure of 70 lb. is carried on the boilers for laundry work. This is reduced to 40 lb. in the boiler room before entering the underground main leading to the ward buildings. Referring to Fig. 4, we see that three branches are taken from this main in the central building between Wards No. 3 and No. 4. One of these passes through a regulating valve, which reduces the pressure to 5 lb. for heating purposes; another reduces to about 25 lb. for sterilizing and cooking, while another connects directly with the coil in the large hot-water heating and storage tank.

The heating returns in all of the buildings are sealed by means of a single waterline trap, located in the basement of Ward No. 3. This discharges into the main underground return, which connects with the return pumps in the boiler room. The returns from the high-pressure line and the hot-water boiler discharge into the same return through their own individual traps.

In the boiler house, two horizontal tubular boilers are provided for winter use, and a smaller one of sufficient size for operating the laundry and for sterilizing and cooking purposes in the summer time is set in the same exposure. These figures are for Southern New England, where the temperature seldom goes below zero, and are for rooms about 9 x 13 ft. in size. In the case of large wards each window may be considered the same as a single ward, when of the same size, and the corners should be treated as corner rooms.

In work of this class the size of the ducts and flues may be based on the square feet of heating surface in the stacks with which they connect. These may be proportioned on a basis of 2½ sq. in. of sectional area per square foot of heating surface for first floor rooms, and 2 sq. in. for the second floor. Heated vent flues may be made the reverse of the supply flues—that is, larger on the second floor and smaller on the first.

When the individual vent flues are not heated, but connect with a warm chamber in the attic or roof space, as shown in Fig. 2, they should be made somewhat larger than would be given by the above rule, and the vents from single wards should not, in general, under these conditions, be given much less than 1 sq. ft. of free area. Vents from bath and toilet rooms, like those in Fig. 2, should be at least 1 sq. ft. in area and should, in all cases, be provided with aspirating coils containing about 10 sq. ft. of heating surface for increasing the draft in mild or heavy weather.

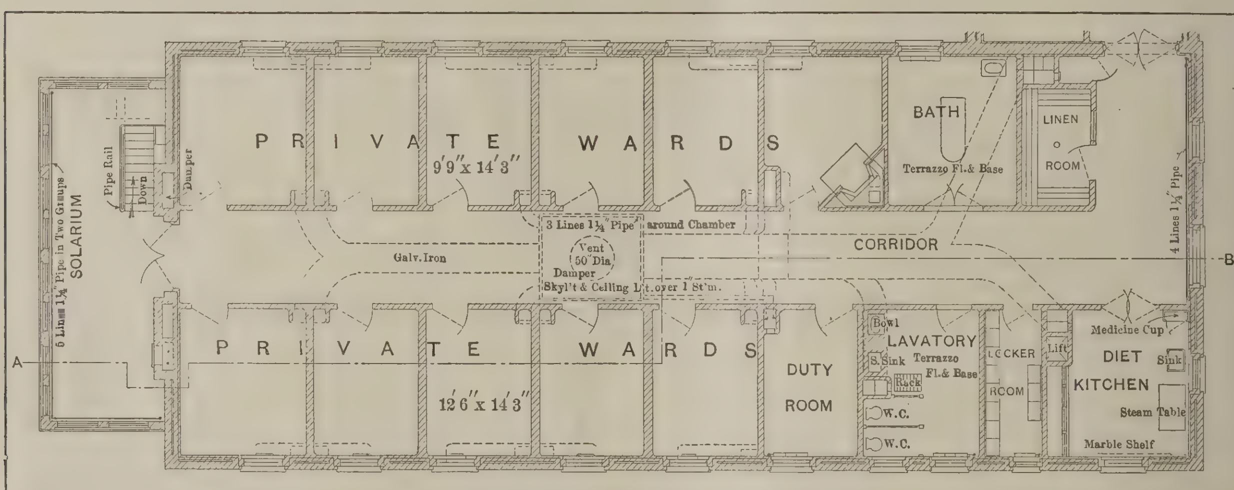


Fig. 2.—Second-Floor Plan, Showing Details of Heating System.

Heating and Ventilating Cottage Hospitals.

battery. The return pumps are operated automatically by means of a regulator, which is connected into the main return, and which starts and stops the pumps as the water level rises and falls. The exhaust from the pumps is condensed in a small feed-water heater.

The following computations are for general conditions and may not correspond in all cases with the dimensions shown on the plans, which have been corrected in some cases for special conditions.

The direct surface may be computed by multiplying the wall surface in square feet by 20, the glass by 85, and dividing the sum of these by 250 for cast iron radiators of good form. This is for rooms having a southern exposure and for the very best construction. For a northern exposure the radiating surface should be increased about 30 per cent., and if the windows are rather loosely fitted, a still further increase of about 20 per cent. should be made for all radiators, whatever the exposure.

For the indirect radiation it has been found for the average 8-in. pin radiators, with steam at 5 lb. pressure, that 30 sq. ft. of surface is sufficient for single wards which have one exposed wall and with one window when located on the southern side of the building.

For rooms of the same size having a northern exposure use 40 sq. ft., and for corner rooms with two windows use from 50 to 60 sq. ft., depending upon the

The roof vent may be from 0.6 to 0.7 of the total area of all the flues connecting with it. In order to secure the best results, the area of the cold-air inlet for a stack, or group of stacks, should be the full size of

PIPE SIZES FOR INDIRECT RADIATION

Steam Pipe, In.	Return, In.	Radiation, Sq. Ft.
1	¾	40
1¼	1	70
1½	1¼	90
2	1¼	250
2½	1½	450
3	2	750
3½	2	1,100
4	2½	1,600
5	3	2,500
6	3	4,000
7	3½	6,000

PIPE SIZES FOR DIRECT RADIATION

Steam Pipe, In.	Return, In.	Radiation, Sq. Ft.
1	¾	80
1¼	1	150
1½	1¼	200
2	1¼	500
2½	1½	900
3	2	1,500
3½	2	2,300
4	2½	3,200
5	3	5,800
6	3	9,000
7	3½	13,000

all the warm-air flues connecting with it, and if this pipe is of considerable length or contains bends it should be made still larger, the amount depending on conditions. The writer remembers one case where the cold-air duct had to be made twice the size of the warm-air ducts before satisfactory results were obtained.

This may be based on the amount and type of heating surface, which includes direct and indirect radiators and aspirating coils; also the steam required for water heating, sterilizing and general laundry work must be considered.

The boiler power for heating work may be found by multiplying the direct surface by 250, the indirect by 800, aspirating coils by 350; adding the results and dividing the sum thus found by 30,000, the result will be in boiler horsepower. The power for laundry work, water heating, etc., may be found approximately by assuming that 2½ gal. are to be used per hour per occupant as a maximum. If this quantity of water is heated from 50 to 180 deg., it will require about 1/10 horsepower per occupant, from which the total power can be easily found in any particular case.

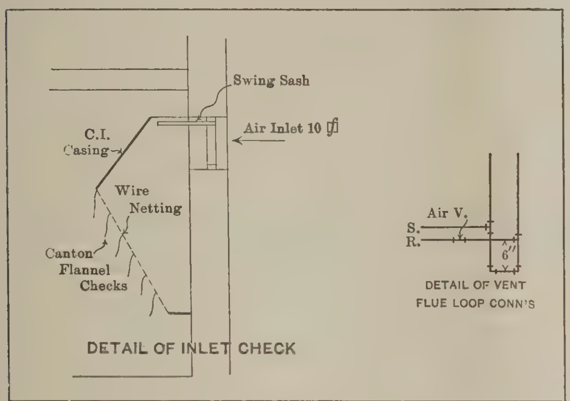


Fig. 3.—Details of Ventilating System.

During the summer season only sufficient steam is required for laundry and toilet purposes, sterilizing, cooking, and for heating the aspirating coils when required, so that it is customary to provide a special "summer boiler" for this purpose, it being much more economical to operate than attempting to run one of the large heating boilers much below its normal capacity. It has been found by experience that about 0.2 horsepower per occupant is sufficient for these various uses.

The sizes of supply and return pipes may be based upon the heating surface supplied. The accompanying tables have been found satisfactory for the lengths of run ordinarily found in this class of work.

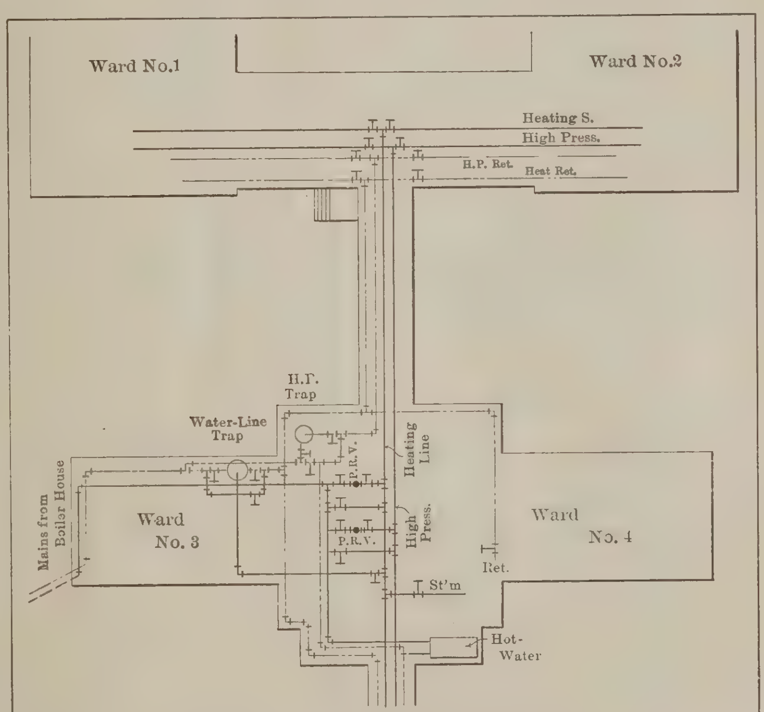


Fig. 4.—Piping for Heating a Cottage Hospital.

Heating and Ventilating Cottage Hospitals.

Stone Work in the New Pennsylvania Railroad Terminal in New York City

The recent opening in part of the new Pennsylvania Railroad Terminal in New York City lends interest to some features of the construction and quantities of materials used in the work. The new station building is the largest single structure ever built at one time. It was started in May, 1904, and six and one-half years elapsed from the time the old buildings on the site were razed until the construction was declared to be completed. The stone work of the station, covering about eight acres of land, was completed on July 31, 1909.

To inclose this vast area necessitated the building of exterior walls aggregating 2458 feet—nearly half a mile—in length, and has required 490,000 cubic feet of pink granite. In addition, there have been utilized inside the concourse 60,000 cubic feet of stone. It took 1140 freight cars to transport these 47,000 tons of stone from Milford, Mass.

In addition to the granite, the construction of the building has called for the use of 27,000 tons of steel. There have also been set in place some 15,000,000 bricks, weighing a total of 48,000 tons. The first stone of the masonry work on the building was laid June 15, 1908; the entire masonry was thus completed in approximately thirteen months after the work was begun.

According to the builders, there is not a cubic foot of burnable material in the entire building. Stone, steel and concrete form the principal materials and insure the structure against damage by flame.

Fast Construction Work

A very interesting example of the speed with which the skeleton steel framework of some of the towering commercial buildings in course of erection in New York City is found in connection with the new 12-story and basement office and loft building under way at the corner of Broadway and Fourth street. The steel required in the framework was something in excess of 2200 tons. The first column was set August 20 and the framework was completed October 6, so that the time consumed in the erection of the steel frame was a little less than seven weeks. At the time the steel frame was finished the masonry work was completed to the eighth floor, the boilers were in place, the stone work was finished and the concrete floor arches set up to the 12th floor.

An unusual feature of this particular building is that it has 275 ft. of north light to 15,500 sq. ft. of area. This is due to the fact that the structure is oblong in shape, fronting an entire block length on Fourth street, and having at the same time 46 ft. of frontage on Broadway. The steel work of the building was erected by the Thompson-Starett Company, which has established a record for speed in work of this nature in connection with several important operations in this and other cities.

CEMENT HOUSE AS PRIZE IN GUESSING CONTEST

ONE of the features of the Third Annual Cement Show held in Chicago in February last was a guessing contest, the prize being the materials necessary for the construction of a cement house, these to be furnished by the exhibitors and the house to be built wherever the winner of the contest might stipulate. The successful contestant was Miss Lillian M. Williamson, of Englewood, Ill., and the house is being constructed in Walden, a pretty suburb south of Chicago, the plans and specifications having been drawn by Architect Francis J. Barton, of Chicago. Cement is used throughout the building wherever possible, the idea being to make it a perfect example of what is possible in cement residence construction at a moderate cost. The walls and partitions are of hollow cement tile, while the exterior of the walls is to be finished with a rough-cast cement plaster coat. The foundations are of solid plain concrete and the floors and stairways of reinforced concrete. Red cement tile are used for the roof, which is surmounted by two concrete chimneys with round tops.

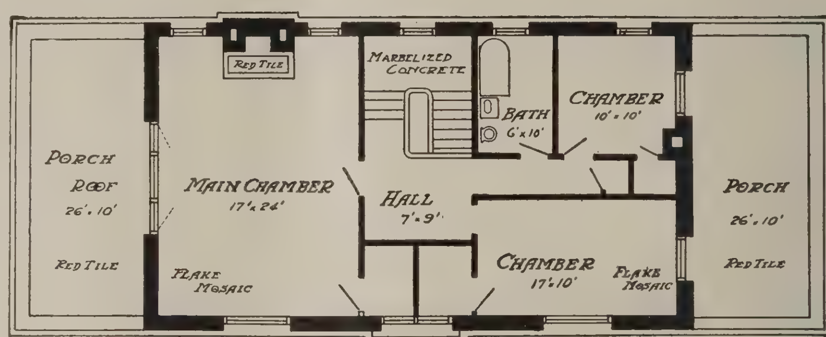
In general outline the house is rectangular in shape; has a screened porch at each end and a small entrance portico in the center. About the only exterior decoration will be a simple molding at the second floor level and a molded cornice relieving the plain concrete wall.

The house will have two fireplaces, with window seats on either side and a square of red tile in front of each. The fireplace and mantel will be of solid reinforced concrete with molded decorations. The floors will be surfaced with a special composition of varying colors in the different rooms and the base boards of the same material as the floor will be carried up as a border. The bookcases and china closet are built-in and have leaded glass doors. The dining room is unique in having a beamed ceiling with an oval central panel from which the beams radiate, carrying out the idea of decoration by means of actual structural details.

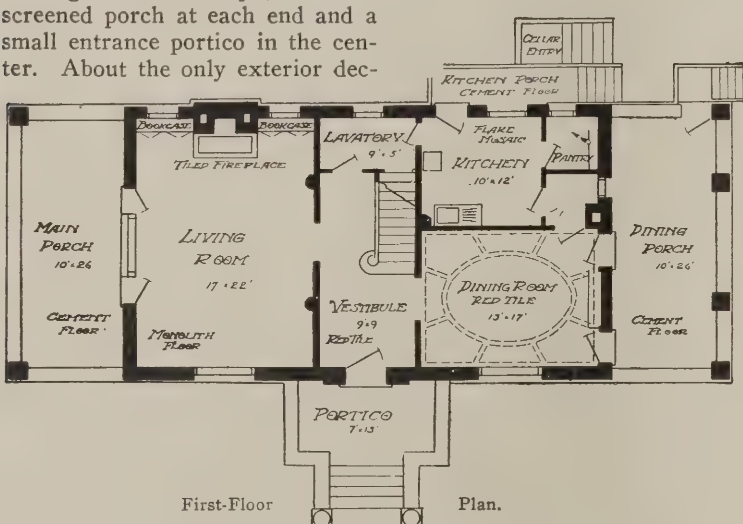
The modern idea of living nine months of the year on the porches of a house rather than inside has been provided for in this design by two spacious porches, one opening off the dining room and the other off the living room. These are entirely separate from the entrance portico, giving the full privacy of an interior room, with the advantage of screened exposure on three sides. The porches open off the living and dining rooms through two large French doors, making each porch a unit with the interior room.

We understand that more than 30 of the exhibitors at last year's Cement Show donated the materials used in the building of the house and Architect Barton offered his services free of charge.

The house is typically modern and it has been the aim of the designer to make every line harmonize with its material. In the open doorways the flat arch is used and where beams and columns are needed for support they are plainly exposed. The floor plans presented herewith indicate the general arrangement of the rooms.



Second-Floor Plan.



First-Floor Plan.

Cement House as Prize in Guessing Contest.—Architect, F. J. Barton, Chicago, Ill.

Rapid Work on New Municipal Building

We understand it is the intention of the Thompson-Starrett Company to duplicate on the new Municipal Building, now in course of construction at the Manhattan end of the Brooklyn Bridge, the many records the company has made on buildings erected for private enterprise. The idea is to show the people of New York that the company can make just as good a record for the city as it can for a private owner, and it will be its chief aim to avoid those ruinous delays which have to such an extent harassed municipal building in the past.

The contracts for the stone and for the steel—there being of the latter something over 26,000 tons—are said to be the largest ever placed in connection with a single building, and the work of handling this material from the grade level to the dizzy hights to which it will be carried will necessitate the installation of nearly 20 steel derricks, all of which equipment will be electrically controlled.

All sub-contracts have been awarded for such lines of work as are not performed direct by the Thompson-Starrett Company, and the materials are being manufactured to be delivered in their logical sequence as the progress of the building requires.

The structure was designed by the well-known architects, McKim, Mead & White, and the contract calls for the completion of the building by the 1st of January, 1912.

DESIGN FOR A WATER TANK TOWER

BY PAUL T. LESHER

CARPENTERS, contractors and other builders are frequently called upon to construct towers to support water tanks adapted for use in various locations, and especially is this the case in connection with long stretches of railroad where it is necessary to have at stated intervals a water supply for the locomotives. The water tank which is commonly used to supply locomotives is 12 ft. in diameter, 10½ ft. deep, the capacity being 8800 gal. and the weight of the water 73,400 lb. The tower here illustrated and described is 34 ft. high and weighs about 8000 lb., while the platform weighs about 7000 lb. Fig. 1 represents an elevation of the tank and tower, Fig. 2 an enlarged view of the railing support, while Fig. 3 is a plan of the platform.

The following clearly indicates the method of calculating the sizes of the various members of which the tower is constructed:

We will first consider the wind pressure and in so doing will assume that there is no water in the tank. The surface of the tank exposed to the wind is its diameter multiplied by its hight, which in this case is 12 × 10½, or 126 sq. ft.

For the wind pressure per square foot of vertical surface we will assume 40 lb., and, as it is customary to use only one-half of this value for pressure against circular sections, the wind pressure will be 20 lb. per square foot, and the total pressure 20 times 126 sq. ft., or 2520 sq. ft., the number of pound pressure acting at a point midway between the top and bottom of the tank, or about 40 ft. above the base of the tower.

In determining the stresses in the tower by means of the stress diagram, it will be more convenient to have this force acting at the top of the tower, which lowers the force about 8 ft., and the amount of the force acting at the top of the tower due to wind pressure on the tank can be found by simple proportion, as follows:

2520 lb. : × : : 32 ft. : 40 ft.

and × or our new force is 3150 lb.

As we have 2 bents in the tower resisting this force and as we are required to find the stresses in one bent, the force acting at the top of one bent due to wind pressure on the tank will be one-half of 3150 lb., or 1575 lb.

For the wind pressure on the side of the tower 15 lb. per square foot should be ample, considering that it is an open frame. This will give the panel loads as indicated in Fig. 5, the horizontal load at the top of the tower including both the pressure on the tank and the pressure on part of the tower.

We now come to the vertical forces that are to be considered in the stress diagram. The weight of the tank is 2900 lb., the platform 7000 lb. and the tower 8000 lb., giving a total of 17,900 lb. As this pressure is supported by the four columns in the tower, the pressure on each column will be ¼ of 17,900, or 4475 lb. For convenience in calculation we will call this 4500 lb., as indicated in the frame diagram Fig. 5.

We are now ready to draw our stress diagram as Fig. 6. Lay off to a scale of ½ in. equals 5000 lb., the horizontal wind force *e d, d c, c b* and *b a* on the load line *e a* and the vertical dead load force *a i* and *i h* as shown in the diagram Fig. 6.

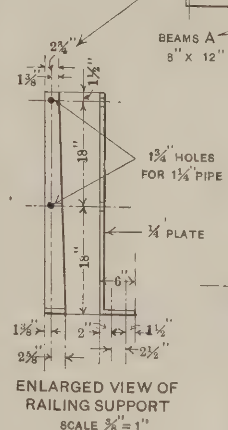


Fig.2

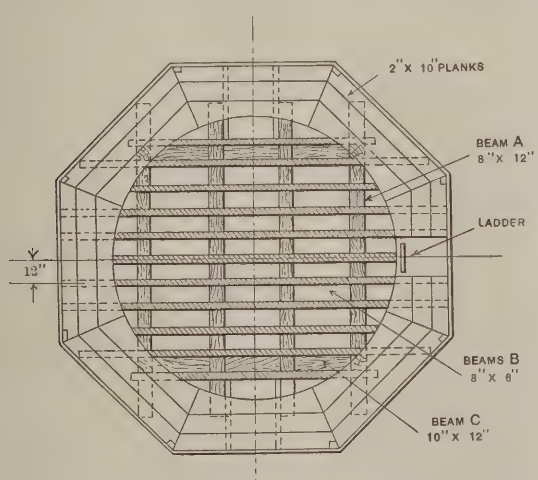


Fig. 3.—Plan of Platform.—Scale, ⅛ In. to the Foot.

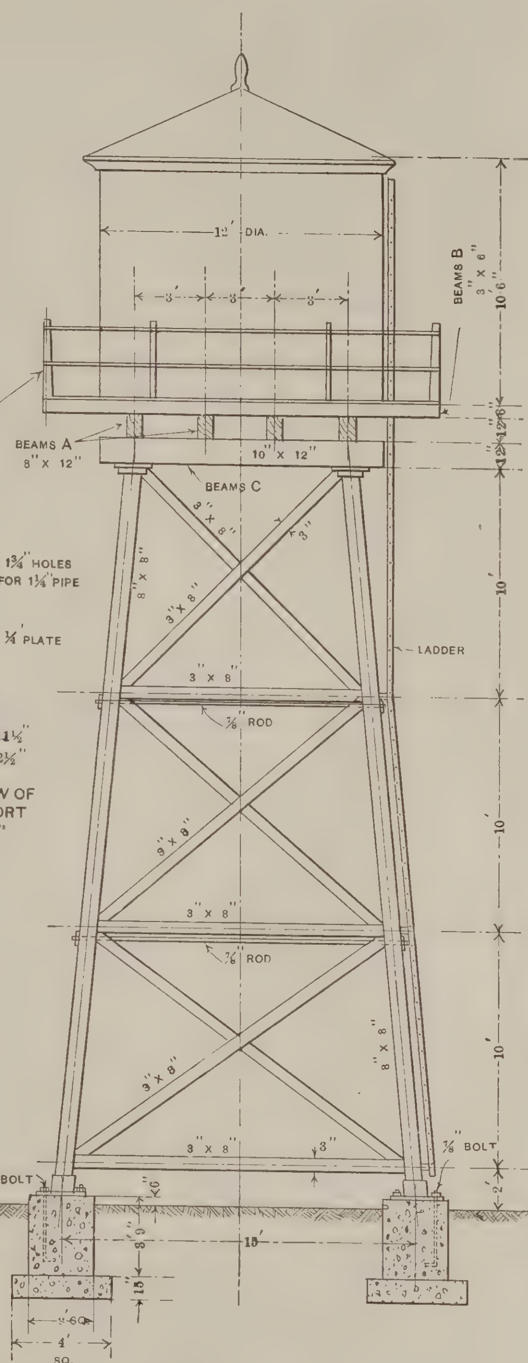


Fig. 1.—Elevation of Tank and Tower.—Scale ⅛ In. to the Foot.

Design for a Water Tank Tower.

We will first consider the forces acting at joint 1 in Fig. 5. The force *i h* is laid off to scale in the stress diagram, then start at *h* and draw a line parallel to the line H J in the frame diagram Fig. 5. Next from *i* of the stress diagram draw a line parallel to J I of the frame diagram and where this line intersects with that drawn from *h* place the letter *j*.

We now have determined the stresses around this joint, going from *i* to *h*, then from *h* to *j* and from *j* to *i*, which are the starting and finishing points. In going from *i* to *h* we went in a direction toward the joint; from *h* to *j* the direction was toward the joint, so we will place an arrow head pointing toward the joint and close to it on the line J H in the frame diagram Fig. 5. From *j* to *i* we went in a direction toward the joint, so we place an arrow head toward the joint and close to it on the line I J in the frame diagram Fig. 5. By means of these arrow heads we are enabled to tell whether the member is in compression or tension. When the arrow heads on a line point toward each other the member is in tension, and when away from each other the member is in compression.

Joint 2 will now be considered. The forces acting at this joint have already been drawn in the stress diagram and are represented by the lines *a b* and *a i*. In going around this joint we start at *b* going to *a*, and then to *i*, from whence we pass to *j*, and then from *j* draw a line toward the joint parallel to the line J K of the frame diagram Fig. 5. From *b* draw a line parallel to the line B K until it intersects the line drawn from *j*. At this intersection place the letter *k*. Place the arrows in the frame diagram Fig. 5 around this joint as explained in connection with joint 1.

The stresses at the other joints are found in like manner and when the stress diagram is completed we can scale the stresses in the different members. A table of the stresses is given in Fig. 4.

We will also draw frame and stress diagrams, Figs.

MEMBER.	Stress with Empty Tank.	Stress with Filled Tank.	Max. Stress.
	Pounds.	Pounds.	Pounds.
B K	+ 2,300	+ 20,500	+ 20,500
C M	— 700	+ 17,500	+ 17,500
D O	— 4,200	+ 14,500	+ 14,500
J H	+ 4,600	+ 23,000	+ 23,000
L H	+ 6,800	+ 25,000	+ 25,000
N H	+ 9,800	+ 28,000	+ 28,000
I J	+ 500	+ 2,500	+ 2,500
K L	— 2,000	— 1,700	— 2,000
M N	— 3,000	— 3,000	— 3,000
O F	+ 1,500	+ 100	+ 1,500
J K	+ 3,300	+ 3,300	+ 3,300
L M	+ 4,500	+ 4,500	+ 4,500
N O	+ 6,000	+ 6,000	+ 6,000

Fig. 4.—Table of Stresses, in which — Denotes Tension, and + Denotes Compression.

Sc = the ultimate breaking value of the column per square inch of cross section.

u = the ultimate compressive value of the column per square inch of cross section.

l = the length of the column in inches.

d = the least unsupported or unbraced side of the column in inches.

u = 4000 lb. for yellow pine. Will assume d to be 8 in.

Our formula is then

$$Sc = 4000 - \left(\frac{4000 \times 120}{100 \times 8}\right) = (4000 - 600)\ 3400 \text{ lb.}$$

Using a factor of safety of 4, the safe load per square inch will be one-quarter of 3400 lb., or 850 lb.; then 28,000 lb. divided by 850 equals 34 sq. in. required in cross section of column. 33 in. divided by 8 in. equals 4⅛, the number of inches required in the other side of the column.

As allowance must be made for bolt holes and notching and defects in the timber, it will be best to use 8 x 8-in. timbers for the columns.

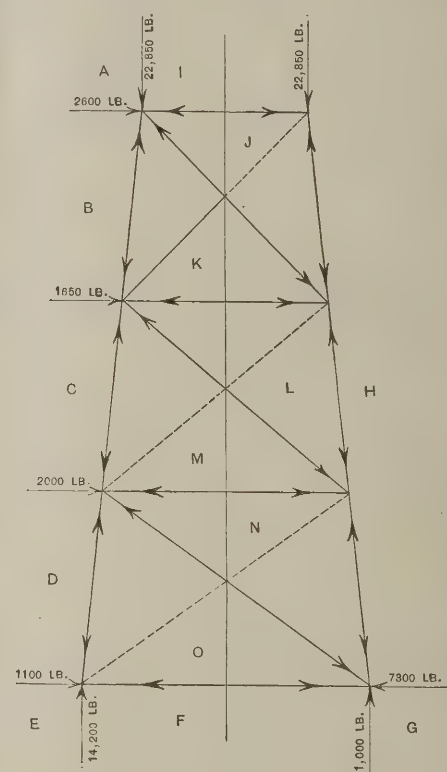


Fig. 5.—Frame Diagram.—Scale, 1/10 In. to the Foot.

Design for a Water Tank Tower.

7 and 8, regarding the tank as filled with water and use the same wind pressure as before. In this case the column load will equal ¼ the weight of the water plus 4500 lb., which was used in the first case. The weight of the water is 73,400 lb. and ¼ of this is 18,350 lb.; add 4500 lb. and we obtain 22,850 lb., which is the load on one column.

The stress diagram is then drawn as in the first case. The stresses found in both these diagrams are given in the "table of stresses."

The wood in the tower and platform is long-leaf yellow pine. In the table of stresses we find that the maximum compression in the columns is equal to 28,000 lb., which occurs in member N H. We will consider this member as a column 120 in. in length supporting a load of 28,000 lb. and will use the following formula for the column:

$$Sc = u - \left(\frac{u \times l}{100 \times d}\right) \text{ in which}$$

In considering the diagonal bracing we find that member N O carries a compressive stress of 6000 lb. We will then design all the diagonal bracing to take this stress, as it will make a more uniform looking tower to have the diagonal bracing all of the same size. We will consider member N O as a column 192 in. in length, with the least side equal to 3 in.

The column formula will then be as follows:

$$Sc = 4000 - \left(\frac{4000 \times 192}{100 \times 3}\right) = (4000 - 2560) = 1440 \text{ lb.}$$

Using a factor of safety of 4 the safe load per square inch will be ¼ of 1440 lb., or 360 lb.; then 6000 lb. divided by 360 lb. equals 16.7, the number of square inches required in the cross section of the column. 16.7 sq. in. divided by 3 in. equals 5.6 in., length of other side. Will use 3 x 8-in. timbers.

Members K L and M N are in tension; M N carrying the largest tensile stress, which is 3000 lb. We find that a ⅞-in. rod will carry this stress with safety, so ⅞-in. diameter rods will be used for members K L and M N.

In addition we must provide a bearing for some of the thrust caused by the ends of the diagonal bracing, so at members K L, M N and O F we will use 3 x 8-in. timbers.

In Fig. 5 we find that E F represents a force of 4200 lb., which is the force required to hold the column down to the base, when the wind exerts its pressure when the tank is empty. This force must be resisted by the foundation bolt, and it will be found that a ⅞-in. bolt will answer the purpose. The foundation also must not weigh less than 4200 lb., as it is the foundation that counterbalances the overturning moment.

In Fig. 7, F G represents a force of 31,000 lb., which is the maximum pressure the foundation will exert upon the supporting soil, when the tank is filled and the wind exerting its pressure. Assuming the supporting soil capable of supporting 2500 lb. per square foot, the area in square feet of the foundation base will be 31,000 lb. divided by 2500 lb., or 12.4 sq. ft.

The construction of the platform is shown in Fig. 3.

Beams B in turn rest upon beams A. Using the load of 76,300 lb. as given above and adding the weight of the platform, which is 7000 lb., the total load resting on the four beams A will be 83,300 lb. and the load on one beam will be 20,825 lb.

Beams A have a span of 108 in. and the bending moment will be

$$\frac{w\,l}{8} \text{ or } \frac{20{,}825 \times 108}{8} = 281{,}138 \text{ inch-pounds.}$$

$$\text{Section modulus} = \frac{281{,}138}{2000} = 140.6.$$

Assume a depth of 12 in., then $\frac{b \times 144}{6} = 140.6$ and $b = 5.9$ in. Will use 8 x 12-in. timbers for beams A.

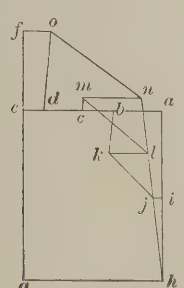


Fig. 6.—Stress Diagram when Tank is Empty.—Scale, ½ In. Equals 5000 Lbs.

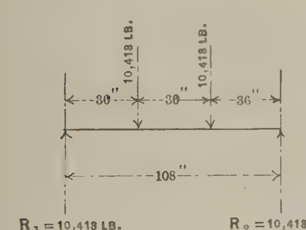


Fig. 9.—The Loading on Beam "C."

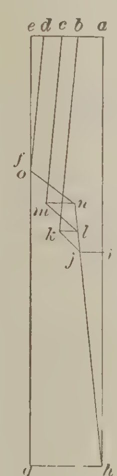


Fig. 8.—Stress Diagram when Tank is Filled.—Scale, ½ In. Equals 10,000 Lbs.

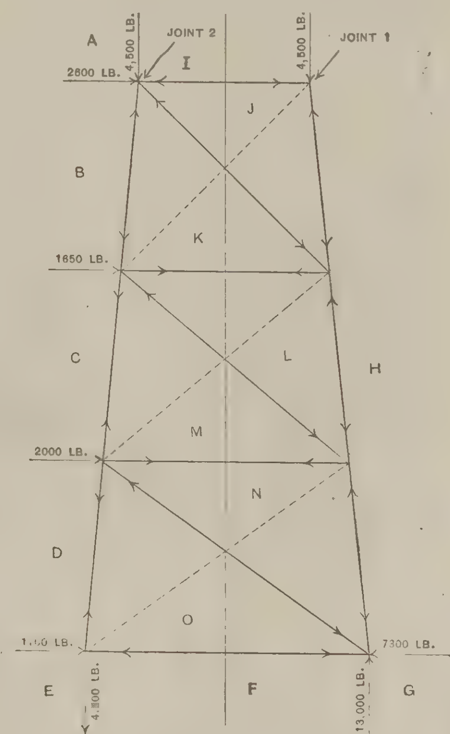


Fig. 7.—Frame Diagram when the Tank is Full of Water.—Scale, 1/10 In. to the Foot.

Design for a Water Tank Tower.

The first supporting members for the tank are the beams B, which are 11 in number. The tank filled with water weighs 76,300 lb., therefore the load on 1 beam will be 1/11 of 76,300 lb., or 6936 lb. The maximum span of the joists is 36 in. For a beam uniformly loaded the maximum bending moment equals $\frac{w\,l}{8}$, in which w equals the load in pounds and l equals the span in inches.

Our bending moment will then be $\frac{6936 \times 36}{8}$ = 31,212 inch-pounds, and this divided by 2000 lb. (the safe fibre stress per square inch for long-leaf yellow pine) equals 15.6, which is the section modulus required. The section modulus of a rectangle equals $\frac{b\,d^2}{6}$ in which b equals the breadth in inches and d the depth in inches. We will assume a depth of 6 in. for the beam, therefore $\frac{b \times 36}{6} = 15.6$, and b equals 2.6 in. Will use 3 x 6-in. timbers for beams B.

Two beams A exert pressure upon beams C and as the end reactions of each beam A equals $\frac{20{,}825}{2} = 10{,}413$ lb., the loading on beam C will be represented by Fig. 9. The maximum bending moment in this case equals 36 in. × 10,413 lb., or 374,868 inch-pounds.

$$\text{Section modulus} = \frac{374{,}868}{2000} = 187.4.$$

Assume a depth of 12 in., then $\frac{b \times 144}{6} = 187.4$ and b equals 7.8 in.

As beam C is also required to take a compressive stress of 2500 lb. caused by the wind pressure, we will use 10 x 12-in. timbers for beams C.

The hand railing is made of 1¼-in. pipe and a wooden ladder is provided for the tower.

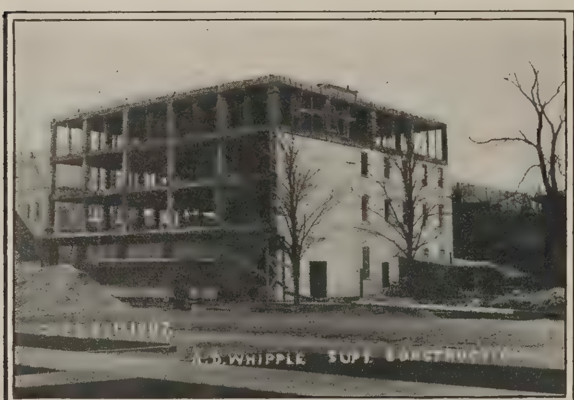
ALTHOUGH ABERDEEN is the home of Scotch granite, a shipment of 350 tons recently was exported to that city from South Carolina quarries, to meet a demand for a variation in color from the native stone.

WORK AND METHODS OF THE CONCRETE CONTRACTOR

BY ERNEST McCULLOUGH, C. E.

TO ascertain the amount of concrete to go into a certain job is rather easy. Multiply the length in feet by the width in feet and the thickness in feet to obtain the total number of cubic feet in volume. It may be that the thickness is in inches, in which case multiply the length and breadth in feet by the thickness in inches and divide by 12 to get cubic feet. Divide the number of cubic feet by 27 to obtain the cubic yards.

The average man is generally confused when he tries to ascertain the amounts of cement, sand and stone to use in filling a space with concrete. Many writers have tried to explain this part of the work, but the rules are generally cumbrous, for the voids in the materials are taken into account or the writers make assumptions based on the weights of the materials. Some years ago William Fuller made a study of the amounts of these materials that had been delivered on a number of pieces of work and measured up the concrete made with these materials. From this study he evolved a rule fitted to the barrel containing 3.8 cu. ft., which rule has been modified by the writer to fit the bag now used instead of the barrel. The rule is as follows:



Work and Methods of the Concrete Contractor.—Fig. 1.—First Job of a Local Contractor, Showing Building in Progress.

Add together the number of parts of each material and divide 40 by the sum. The quotient will be the number of bags of cement required for one cubic yard of concrete.

In the shape of a formula the rule appears as follows:

$$b = \frac{40}{c + s + g}$$

in which b = bags of cement per cu. yd. of concrete.
c = parts of cement in mix (usually 1).
s = parts of sand in mix.
g = parts of stone (or gravel) in mix.

Take, for example, a 1:2:4 mix, which means that for 1 cu. ft. (1 bag) of cement there will be used 2 cu. ft. of sand and 4 cu. ft. of broken stone or gravel. Adding, $1 + 2 + 4 = 7$ and $40/7 = 5.71$ bags of cement per cubic yard of concrete. The sand equals $5.71 \times 2 = 11.42$ cu. ft., or $11.42/27 = 0.424$ cu. yd. of sand. The stone equals $5.71 \times 4 = 22.86$ cu. ft., or $22.86/27 = 0.847$ cu. yd. of stone.

A mix specified as 1:3:5 is often used and the procedure is as follows: $1 + 3 + 5 = 9$ and $40/9 = 4.45$ bags of cement. The sand equals $4.45 \times 3 = 13.35$ cu. ft., or $13.35/27 = 0.494$ cu. yd. The stone equals $4.45 \times 5 = 22.21$ cu. ft., or $22.21/27 = 0.825$ cu. yd. The table on next page has been computed by the foregoing rule for all the mixtures likely to be specified for any work on which the average contractor may bid.

Before discussing the matters that have led to confusion on this question of amounts of materials, we will take up the subject of the amount of water required, something upon which very few writers touch. This is a most important item, for the contractor must often pay for water used, and if he has no way of estimating the amount he will use he often has to pay too much. Sometimes he must haul water in barrels to isolated places and cannot afford to make a mistake in his calculations. The writer once had to have water hauled in barrels for three miles from a river and the cost was very high. Fortunately he estimated in advance the amount he would probably want and made a lump sum contract with the man who did the hauling. The water man had no idea so much water would be required and claimed to have made barely enough to feed his horse, so would have gone hungry himself had not his wife been kind enough to feed him without charge.

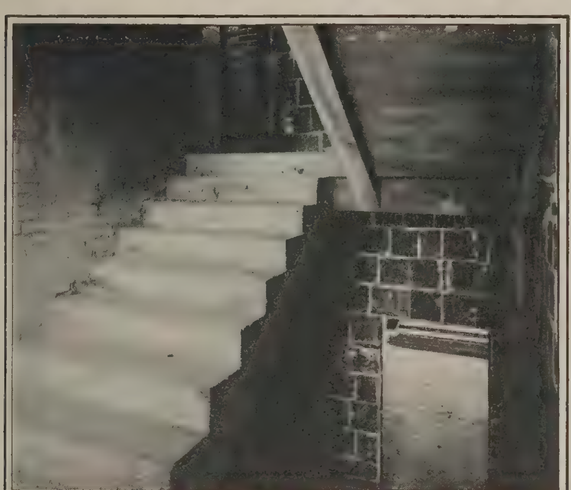
The writer has used for years a rule that is safe enough to warrant adopting. He uses a weight of water equal to the weight of the cement. To save figuring, it may be expressed as 11 gal. of water for each bag of cement. The gallon referred to is the United States gallon, weighing practically 8⅓ lb. The British gallon, used also in Canada, weighs 10 lb. The amount of water here provided is much greater than that given by other authorities, who take into consideration merely the water required for the proper setting of the concrete. The writer bases his rule upon bills he has paid for water on jobs where a meter was attached, so the measurement was exact. In hot weather this allowance is about right, but it is very liberal in cool weather. The contractor must remember that water is used for wetting forms and for cleaning off old surfaces before placing new concrete. When the weather is hot and the stone is very dry it must be thoroughly wet before mixing, for the same reason that brick must be wet before applying mortar, to prevent it absorbing moisture required for setting. On every job there is a certain amount of water wasted unless a very close watch is kept, so the amount of water called for by this rule is not excessive.

Fig. 2.—Appearance of the Same Building a Few Days Later.

Professor Baker in his treatise on "Masonry Construction" (10th ed.) says that Portland cement requires for its complete hydration from 12 to 14 per cent. of its weight in water. The densest 1:2:4 concrete requires water equal to 32 per cent. of the weight of the cement, and this water occupies about 12 per cent. of the volume of the concrete. The weight of water in a wet mixture in terms of the weight of the total dry materials calls for about 10 per cent. of water for mortar and from 7 per cent. to 8 per cent. for concrete. He also says that, as a rule, with well-graded ingredients in the usual proportions, plastic or quaking concrete will require about 8 lb. to 10 lb. of water per cubic foot. Taking up the different mixtures, the water to produce a plastic or quaking consistency in terms of the weight of cement is about as follows: Neat cement, 20 per cent.; rich mortar, 25 to 30 per cent.; rich concrete, 30 to 33 per cent.; lean concrete, 33 to 50 per cent.; very lean concrete, 50 to 100 per cent. It is presumed that the foregoing percentages were the result of laboratory experiments.

In Falk's "Cements, Mortars and Concretes," a rule is given which Gillette in his "Hand Book of Cost Data," and also in "Concrete Construction, Cost and Methods," by Gillette & Hill, presents as follows:

Multiply the parts of sand by 8, add 24 to the product and divide the total by the sum of the parts of sand and cement. This gives the percentage by weight of water of the combined weight of the cement and sand.



Work and Methods of the Concrete Contractor.—Fig. 3—Stairs in the Building Shown in Previous Pictures.

By this rule the stone is ignored. For a 1:3:6 concrete Mr. Gillette figures that 23 gal. of water per cubic yard of concrete will be required. By the rule of the writer 44 gal. will be more nearly correct, assuming that water is required for something more than merely mixing the concrete.

The writer has searched pretty carefully through the literature on the subject of concrete and finds that little is said about the amount of water required, although it is easy to find how much water is used by cement testers in making cement, or cement and sand, briquettes. While some writers may have given more definite data than is here presented, the writer has not yet learned of it. In some places the cost of the water is so important an item it is strange that more study has not been given to this phase of the subject. Contractors pay little attention to it, but it is hoped that every man who reads this series of articles will hereafter make definite measurements and report the quantity of water he uses on a number of pieces of work, trying to show how much water was used for certain reasons such as mixing, cleaning set concrete, washing and wetting forms, wetting down the stone pile, etc.

TABLE I.

QUANTITIES OF MATERIALS REQUIRED TO MAKE ONE CUBIC YARD OF CONCRETE.
Voids in stone, 45%; voids in sand, 40%; net weight of cement, 94 lbs. per bag.

Proportions.	1:1:1	1:1:2	1:1:3	1:2:2	1:2:3	1:2:4	1:2:5	1:2:6	1:3:4	1:3:5	1:3:6	1:3:8	1:4:6	1:4:8
Bags of cement......	13.32	10.	8.	8.	6.67	5.71	5.	4.45	5.	4.45	4.	3.34	3.64	3.08
Cubic yard sand.....	0.494	0.371	0.296	0.593	0.495	0.424	0.371	0.33	0.556	0.494	0.445	0.37	0.539	0.457
Cubic yard stone.....	0.494	0.742	0.89	0.593	0.741	0.847	0.926	0.99	0.742	0.825	0.89	0.99	0.809	0.914

Concrete is a man-made stone and not artificial stone, as it is so often termed. Like nearly everything that is scientifically compounded by men, it is an improvement on much of the natural stone used in buildings. Natural stone is attacked by two enemies, carbonic acid and water. Water is the greatest solvent in nature, and, combining with sulphur, the most common substance in nature all stone attacked by the combination must decay. Carbonic acid is a common acid floating in the form of a gas in the atmosphere until, combining with the ever-present moisture, it forms an acid that consumes the cementing substances in stone. Modern conditions of living involving the use of vast quantities of coal keep the air of cities charged constantly with carbonic acid, so the old stone houses that have existed for several centuries are to-day going rapidly to pieces. This is where properly made concrete is better than stone. Portland cement is acid-proof and the sand used in making concrete is generally the best and most resistant material of rocks that have decomposed. Gravel is also a survival of the fittest in rocks, which explains why good gravel is, for certain purposes, the best material to use for the coarse aggregate in the making of concrete. Take good gravel or the very hardest of stone, such as first-class granite or trap-rock, mix with well-selected sand and put in enough first-class Portland cement to more than fill the voids, and if well mixed there is no reason why an everlasting stone should not be obtained. For many purposes to which the stone would be put the cost of shaping the granite or trap-rock would be prohibitive, so a cheaper and less enduring stone is used. The good stone, however, may be readily and cheaply broken in a rock crusher to any required size and thus be used to form stone that is cast and not carved. The stone and sand in a properly made concrete being materials that are "a survival of the fittest," the concrete should last indefinitely provided the proper cementing material is found. This is the Portland cement, which, being acid-proof, covers every grain of sand and every piece of gravel or stone, so that the air is excluded, and thus these time-resisting materials are protected not only by their own strength, but by the protecting coat of resistant material.

That is the theory of good concrete, but poor workmanship often defeats the purposes of the user, so it is important that the man who uses concrete should understand fully how it is made and how it should be made. Merely throwing some ingredients carelessly together and adding cement so that something is produced that goes by the name of concrete is not the proper thing at all. Concrete is composed of a matrix, or mortar, and an aggregate. Some writers speak of sand as an aggregate, but there is only one aggregate and that is the coarse material used as bulk producer, the cement, sand and water forming the mortar or matrix. Theoretically and practically there should be enough matrix to coat every portion of the surface of the aggregate and fill the voids. The matrix should contain enough cement to fill the voids in the sand, and also coat each grain of sand and each piece of aggregate for protection from the atmosphere. A thorough understanding of this brings us to a consideration of why the different proportions arose in the making of concrete.

In the early days of concrete it was considered very essential that the aggregate should be broken into as regular-sized pieces as possible. Nearly all stone was broken by hand and it was observed that solid stone when broken regularly doubled in bulk, or, as it is expressed scientifically, "contained 50 per cent. of voids." Extremely coarse sharp sand was considered essential, and this sand also contained 50 per cent. of voids. The cement was assumed to fill the voids in the sand and in this way came the 1:2:4 mix. The sand and cement were carefully mixed dry and then slightly wet while the stone was wet and thrown over the mortar, which had the consistency of damp brown sugar. There being a belief that the cement was partially dissolved by water and thus carried into all the interstices, or voids, the concrete was thrown in a moist state into the forms and heavily tamped until the water rose to the surface and the mass became quaky. Any greater amount of water, it was feared, would wash out the cement or cause the finer particles of cement and sand to settle down to the bottom, leaving poor concrete on top.

In the course of time men used gravel and ordinary sand, the percentage of voids being reduced as the materials were graded in size. Ordinary sand was discovered to contain about 33 per cent. of voids, so 1:3 mortar was accepted as a "dense" but not necessarily a "rich" mortar. Some gravel was found that contained only about 20 per cent. of voids, so concrete was made having proportions expressed as 1:3:5. In course of time men commenced to experiment with local materials and stone commenced to be broken by machinery, so the sizes ranged from very fine to coarse and this grading made great differences in the proportions expressed. It must be borne in mind that these differences were more apparent than real, for no doubt each produced a fairly compact concrete. The trouble was that men up to a few years ago did not deem it necessary to go into detail in describing their work, so the common man took it for granted that a "rich" mix necessarily meant a better concrete than a "lean" mix, whereas one might be just as good as the other so long as the voids were properly filled. However, the old style, happy go lucky, careless way of describing results has left its fruits, so that men to-day argue over the comparative merits of a 1.2.4, a 1:2:5, 1:3:6 mix, etc., when the amount of voids in the aggregate and sand may make the lean mix of well-graded materials a far better material than the rich mix of coarse materials fairly uniform in size and shape.

The "40 rule" above given is found to be fairly correct for the common run of crushed stone, which contains about 45 per cent. of voids, and the common run of sand which contains about 40 per cent. of voids. These are the averages usually found in stone and sand as delivered on the average job. If the voids are smaller then the rule gives a surplus of material, a desirable result, for it is cheaper to haul back a surplus when cleaning up than to stop in the middle of a job and frantically send for little dabs to finish up, only to find that the dealer is out of material, or the wagon is away, or something wrong, so that men must be laid off until the order can be filled.

The contractor must work with the materials given to him and the specifications generally fix some definite proportions. To make a dense mix, however, regardless of exact proportions and depending upon the voids to be filled, is sometimes desirable, and in the next article this will be discussed and rules given.

The pictures which accompany this article relate to a four-story building with floors, beams and columns of reinforced concrete, while the outer walls are of brick. Two of the photographic reproductions represent the building at different stages of construction, while the third is that of a reinforced concrete stairway in the building, the stairs designed as a slab carried on small beams or stringers. This was the first job of its kind by a contractor in a town of about 7000 population, but he made money on it, having employed an experienced superintendent.

Modern Fireproofing Methods

A very interesting paper tending to show that modern methods of fireproof building construction could be depended upon to prevent fires was read by the well-known contractor, Frank B. Gilbreth, at a meeting of the American Society of Mechanical Engineers, held in New York City on the evening of October 11. The paper was entitled "Fires: Effects on Building Materials and Permanent Elimination," and in it the author discussed the enormous annual fire loss of the country and showed the effect of a destructive fire on a typical steel frame building, while it outlined the methods by which the permanent elimination of fires may be assured. Mr. Gilbreth called attention to the fact that the total fires in the United States in 1907 amounted to almost half the cost of the new buildings constructed in the country for the year. The total fire loss, including that of forest fires and marine losses, amounted to more than $456,485,000. In addition to this waste of wealth and natural resources, 1449 persons were killed, and 5654 were injured in fires. The buildings consumed, if placed on lots of 65 ft. frontage, would line both sides of a street extending from New York to Chicago. A person journeying along this street of desolation would pass in every 1000 ft. a ruin from which an injured person was taken.

The results obtained indicate that the total annual cost of fires in the United States, if buildings were as nearly fireproof as in Europe, would be $90,000,000, and that therefore the United States is paying annually a preventable tax of more than $366,000,000, or nearly enough to build a Panama Canal each year.

The author of the paper has made careful observations of the great fires at Toronto, Sioux City, Baltimore, San Francisco, Chelsea and elsewhere. He believes that no structure of the future should be built of wood or contain any wood. The increasing cost of lumber and the improved methods of fireproof construction, he holds, have made it possible to build non-combustible structures at no greater first cost than wooden ones.

Mr. Gilbreth believes that permanent eliminations of fires can never be thoroughly and completely brought about without government aid, and suggests the following lines along which government assistance can be directed:

Passing laws restricting the use of wood in buildings.

Levying taxes discriminating in favor of fireproof houses and against wood in construction.

Educating the people by government documents on how to build fireproof houses.

Establishing a government bureau for disseminating information regarding honest, unbiased fire tests on material, together with government experiments on different full-sized buildings.

By means of lantern slides H. deB. Parsons, a consulting engineer, showed the effects of fires on a number of office buildings, while H. B. Keasbey, Professor Ira H. Woolson of the National Board of Fire Underwriters, C. A. P. Turner, and others interested in various phases of fireproof building construction participated in a discussion of the subject.

A FARM RESIDENCE AT BELLE CENTER, OHIO

We take pleasure in bringing to the attention of our readers the plans of a rather attractive farm residence embodying features likely to prove of special interest to those living in the farming sections of the country. An examination of the floor plans will show that the house is of liberal proportions, with six rooms, hall and commodious pantry on the first floor, and six sleeping rooms, sewing room, bath room and ample closets on the second floor. The attic is finished, affording ample space for additional rooms if desired. The space is entirely free, as the roof is self-supporting, thus furnishing an excellent place for a playground in stormy weather for the young folks or for games and dancing in the case of a social gathering.

The half-tone illustrations, which are direct reproductions from photographs, show the appearance of the finished building with its surroundings, the ample lawn in front with numerous shade trees, and a well-built wall which serves to enclose the entrance side of the plot upon which the house stands.

The basement walls are constructed of concrete blocks made and seasoned on the ground the year previous to the construction of the building. For the concrete work the "Alta" brand of cement was used. The cellar is 8 ft. in the clear and has cement floors and full-size windows protected by cement curbing, which render the basement rooms so light that they are well adapted for every-day use should circumstances require. The first story is 9 ft. in the clear, while the second story is 8 ft. 6 in.

The large balcony or "porch," as the owner calls it, at the side and rear of the second story is a special feature, as it may be used for a variety of purposes, such as an out-of-door sleeping room, a delightful place for a sun bath, or for a quiet afternoon nap.

On the first floor the parlor, music room and guest chamber are finished in wild cherry; the main hall, living room, dining room and bath room in quarter-sawed white oak; the reading room in black walnut, and all other rooms in Georgia pine. The parlor, living room, dining room, music room, reading room and guest chamber have hardwood floors with center and borders. A dumbwaiter connects the pantry with the cellar, and a chute is provided extending from attic to laundry for conveying soiled linen to the basement.

Provision for lighting the rooms, halls and porches of the house is made through the medium of a 35-light "Pilot" acetylene plant. The house is heated from a hot-water plant made by the American Radiator Company and provides 1000 ft. of radiating surface. This is supplemented with an open fire in the living room and another in the plant room in the basement.

The plans and specifications for this house were prepared by Shawver Brothers, Bellefontaine, Ohio, while Thomas Marlow, Kenton, Ohio, was the contractor. The plumbing was done by Doll & Whitcomb, Bellefontaine, Ohio, at a cost for labor and materials of $320. The lighting plant cost $200; the heating plant $625, and the dwelling complete $5,000.

A complete water system is provided and ample provision is made for all waste water by a sewer system.

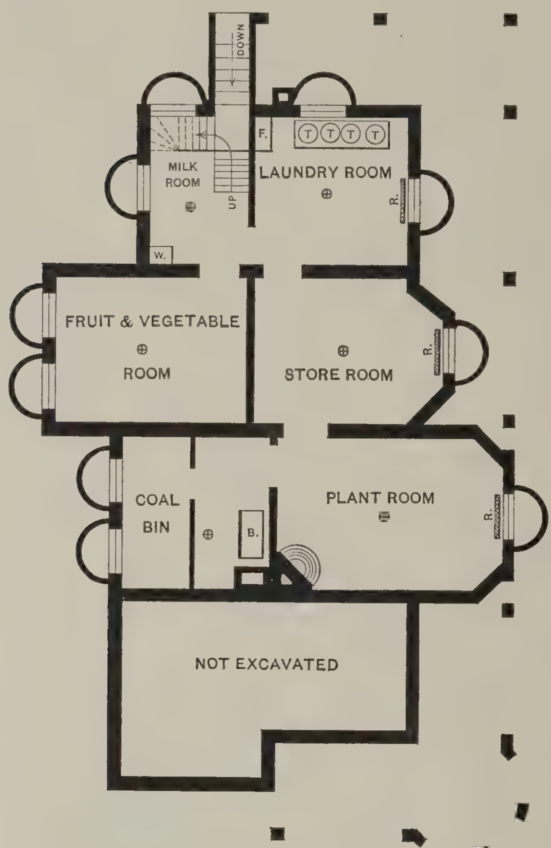
General Appearance of House as Viewed from the Main Approach.

A Farm Residence at Belle Center, Ohio.—Designed by Shawver Brothers, Bellefontaine, Ohio.

Barnstaple's Twisted Church Spire

The curiously twisted steeple of the Parish Church in Barnstaple, England, which is always an object of interest to visitors, attracts even more attention now that it is enveloped in scaffolding, erected in connection with the work of restoration, which is proceeding at a most satisfactory rate.The lead, which has been stripped off in order that the woodwork may be repaired, has been partly re-cast in a temporary foundry erected for the purpose in the churchyard, and is being replaced exactly as it was taken down, so that the appearance of the spire will be in no way altered. The lead is particularly rich in silver, which has led to a claim being advanced that the Barnstaple steeple is, in color, one of the best examples of ancient lead steeples in the country.

Some time recently the weathercock on the top of the spire was taken down for the purpose of being regilded. At one time this was fairly frequently done, as the church registers show by payments every few years of one guinea "for a cradle borrowed from Braunton Church to take down the cock on the steeple."



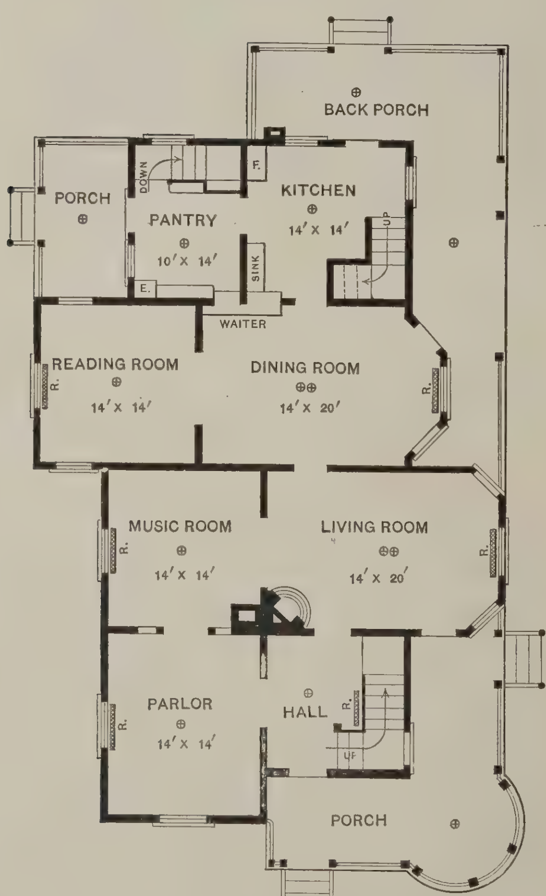
Foundation.

a brass plate upon it states, it has not been removed until now.

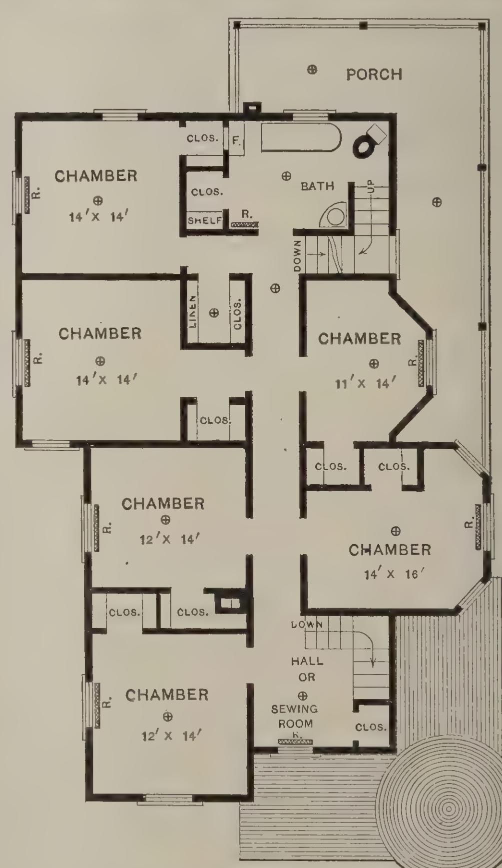
Various names and initials figure on the weathercock, with dates of some of the occasions upon which it was repaired, and what are apparently bullet-marks give rise to the suspicion that at some date or other shooting at the cock on the church-steeple was a sport indulged in by some of the frolicsome sons of Barum. There is no evidence, however, that they first robbed the church's lead-roofed spire to make the bullets, as has occurred in some country places, so they may be forgiven much. The earliest date on the cock is 1683, and it is recorded that James Kimpland was then churchwarden. Other inscriptions are: "1714, W. J. and L. G."; "1840, G. K. Cotton and W. Snow"; "1866, J. B. Pascoe and J. N. Harding."

W. Jewell is recorded as being the gilder on one occasion, and other churchwardens' names given with no

View of Side of House, Showing Front and Rear Porches.



Main Floor.



Second Floor.

A Farm Residence at Belle Center, Ohio.—Floor Plans.—Scale, One-Sixteenth Inch to the Foot.

Since 1887, however, when the weathercock was taken down and regilded by William Allen, of Barnstaple, as date are Christo Hunt, C. J. Joce and J. Garland, and the initials R. B.

REINFORCED CONCRETE FOR LONG SPANS FOR LIGHT LOADS

AMONG the important papers presented at the recent meeting of cement users in Chicago was one by Emile G. Perrot, architect, relating to the above subject, from which we take the following:

While there has been no doubt of the economy and practicability of reinforced concrete for massive construction and where heavy loads are carried, the advisability of its use for light floor loads, especially if the spans are long, has been questioned even by those who favor its use in other instances. The dead weight of the material itself has often operated against its use, especially where the carrying capacity of the soil required the unit pressure to be kept to the minimum, or from other like causes.

We all agree that clear spans of forty or fifty feet in buildings are not usual and are generally avoided on account of their increased cost; hence a description of such a span, with its cost as compared with steel girder construction for the same span, is of interest.

While the author does not wish to take any credit for originality in the design of this floor, as the same general scheme has been used many times before for shorter spans, it is because of the unusual length of the span that its details become an important factor in the design.

The Floor Spans

The spans in question form the floors over the swimming pool and gymnasium of the Turngemeinde Club House, Philadelphia, and are 53 ft. 1⅞ in. clear span. There are two floors with these spans, of an area of about 4700 sq. ft. each, having five girders on the first floor and six on the second floor, spaced 13 ft. 9 in. centers. Those of the first floor are only 36 in. deep below the joist, on account of head room. The top portion or T-head is 5 ft. 4 in. wide and 14 in. thick. These girders are reinforced with twenty-one 1⅛ in. square twisted bars, and the stirrups are 1 x ⅛ in. flat iron. Great care was taken to place the bars accurately in position, and the bottom bars were supported in the bottom of the moulds on cast cement chairs, while the spacing of the bars and stirrup was maintained by iron rods and the wiring of one bar to the other.

The floor panels between the girders consist of 5 x 12-in. concrete joists, with a 2-in. reinforced concrete slab over same, and 12 x 12 plaster block centers between each joist, thus making a flat ceiling between girders. The joists are reinforced with one 11/16-in. square twisted bars and eight ¼-in. stirrups. In the top of every third joist were placed two ¾-in. square twisted bars over the girders to act as tie. These rods were only 5 ft. long, but two were used in each case, lapped in the center so as to project beyond the T-head into the joists. The slab is reinforced with ¼-in. rods run in both directions, 12 in. on centers or thereabouts.

Girders for Auditorium Floor

The girders supporting the auditorium floor, on account of the higher ceiling, are 42 in. deep, with T-head, 4 ft. 9 in. wide. The reinforcement in the bottom consists of eighteen 1⅛-in. square twisted bars, bent the same as for first floor.

Each floor is designed for a live load of 120 lb. per square foot, as the top floor is an auditorium and the floor below a gymnasium.

There seemed to be some doubt amongst the members of the building committee as to the advisability of constructing such long span of reinforced concrete, but in order to obtain the actual difference in cost, between steel and concrete, we designed the girders of Bethlehem steel girder sections, reinforced with top and bottom cover plates and properly fireproofed. The size of the steel girders was 30 in. deep, 200 lb. per foot, with two cover plates on each flange, one ⅝ x 15 in. and one ½ x 15 in. We obtained bids from the building contractor for the difference in cost of these girders, we having likewise made an estimate of the difference in cost. The contractor's price for them was $6,500 additional to his contract price, although our estimate of the difference was somewhat less, being $4,664, based on prices obtained from outside sources. Taking our figures as a basis, as there are 5,400 sq. ft. in the two floors, the difference in cost for the structural steel, fireproofed, is 50 cents a square foot more than the reinforced concrete, with no increased advantage.

The weight of the structural steel for a girder as compared to the weight of reinforcing steel is as follows:

Total weight of steel girders, with strap iron reinforcement for fireproofing and bearing plate, about 17,000 lb.

Total weight of reinforcing steel in one reinforced concrete girder, 36 in. deep, 5500 lb.

This shows that it takes about one-third the amount of steel for reinforced concrete as compared with structural steel for girders and beams. The amount of saving in concrete would be the overhanging portions of the T-head, which amounts to 2¼ yards per beam, when the extra thickness of concrete on the girders is taken into account, due to the wide flanges on the steel girders; likewise there would be additional plaster blocks necessary to take the place of the T-head omitted, the cost of which would have to be deducted from the saving effected by omitting the T-head.

The subcontractor for the reinforced concrete work gave the cost of the plaster blocks, delivered at the job, as 14 cents per square foot, and setting of same, including the nailing on of a fine wire screen at each end to prevent the concrete running into the hollow part of the block, as three cents a square foot additional.

The Plaster Blocks

The plaster block weighs 25 lb. per square foot, as compared with 40 lb. per square foot for terra cotta tile, which cost the same price as the plaster block, but which are not as easily handled, being only 12 in. long, whereas the plaster blocks are 3 ft. long and can be sawed to fit any position.

The walls of plaster blocks are about 1½ in. thick, and there are two cells in each block, separated by a vertical wall in the middle, which strengthens the block, so that traffic can take place over them before and during the time of pouring the concrete.

Immediately before pouring the concrete, it is necessary to thoroughly soak with water the plaster blocks, as they absorb a considerable quantity of water from the concrete if not thoroughly wetted; in fact, the parts of the floor where the blocks occur and where they do not are clearly marked during the earlier stages of the setting of the concrete by the difference in its color, the concrete which does not come in contact with the plaster requiring more time to set.

For moderate spans, the use of concrete joists with either the plaster block or tile filler are desirable, where a flat ceiling is sought and the load light.

THE DISTINCTION OF BEING THE FIRST LICENSED ARCHITECT is held by Leo A. Desjardins, of Denver, who made the highest average in the three days' examination recently held for those who desire to practice architecture in the State. Mr. Desjardins made a mark of 276 out of a possible 300. The second best record was made by D. E. Linn, of Colorado Springs, with a mark of 254, while the third license went to P. M. Johnson, of Denver, with a percentage of 222. C. H. Hinke, of Denver, was fourth, with a percentage of 214.

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Formerly Carpentry and Building

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NOVEMBER, 1910

Effect of High Ceilings

Some time has been devoted to the study of the effect of high ceilings by an English architect, who is responsible for the statement that a building can be better heated and ventilated when the ceiling is not too high. Every heating contractor is aware that every foot in the hight of the ceiling adds to the wall exposure, possibly to the size of windows, and certainly to the amount of air in the room, which must be changed frequently and kept at a comfortable temperature. The architect mentioned points out that by reducing the hight 1 ft. where it has been planned to use a 10-ft. ceiling, in many instances an equally good appearance and effect can be secured. He also points out that such a reduction in the hight of the ceiling reduces the work of the heating apparatus 10 per cent., which can be expressed in tons of coal saved or in dollars and cents in the bill for the heating, to say nothing about the first cost of the heating apparatus necessary to make up for the additional heat losses and the additional work to be done. The point that is worthy of consideration at the hands of all heating contractors, however, is the effect of the hight of the ceiling on the heating work to be done. In many instances, particularly when older buildings are to be heated, the size of the rooms in plan is considered rather than the hight; and while this is unquestionably essential, to overlook the hight is to take no account of the additional work on the heating apparatus for which provisions should be made. Frequently it is the neglect to consider the hight of the ceiling that leads to the use of a smaller heating apparatus than would otherwise be selected and surely smaller than is needed. It is incumbent on the heating man to satisfy his customers in the coldest weather. Under these circumstances, it is well for him to pay more attention to the hight of the ceilings and to the additional wall and glass surface with high ceilings. It has been a custom to consider cubic contents alone until the effect of the exposure is a new matter to those who do not know that the thumb-rule cubic contents calculations were derived from the study of wall and glass exposure by the more profound students of heating of an earlier day.

Fireproofing Dumb-Waiter Shafts

Many of the fires which occur in city apartment buildings would be confined to relatively small proportions if it was not for the draft effect produced by dumb-waiter shafts. Again, these fires would be confined to the shaft alone if the shaft were suitably fireproofed. This fact has led the New York City Building Department to issue an order that their construction provide material that will not be subject to conflagration. Naturally this will entail some change in building construction and make it necessary for those who erect buildings to know something more of what can be done in the fireproofing line. This has excited some opposition, doubtless because those who need to know these new things have neither the information nor do they wish to spend the energy required to become familiar with what can be supplied without great difficulty. They in turn point out that the building department should not be influenced altogether in the interest of the fire insurance companies, and express the opinion that the activities of the fire insurance companies are responsible for the changes required.

Insurance Against Losses by Strikes

A form of indemnifying insurance to protect employers against losses by strikes has been in use in Germany with beneficial results. The history of the insurance from a dollar and cents standpoint seems to show that the existence of this form of protection has had a very salutary effect upon both employer and employee. The form of insurance makes it unnecessary to pay any claim where it can be shown that the employer has been in any way unjust. It works, therefore, to minimize intolerance on the part of the employer. It has an equally satisfactory influence on the attitude of the employee. He is likely to be very careful about engaging in a strike when he realizes that the employer is protected by insurance against losses arising from strikes, and he is therefore deterred from causing annoyance if there is a chance that he has not a good side of the argument. These facts are brought out, as stated, from the figures, which show that some $48,900,000 insurance was written in one year and only $36,523 was paid to claimants. Incidentally the ratio of losses paid to insurance written was 74.6 cents to $1,000. In view of the close attention now being paid to employers' liability insurance, the experience is interesting, to say the least.

An Odd Lease Necessitates a Peculiar Construction

In connection with the erection of the new Hotel Rector, at Broadway and Forty-fourth street, New York City, it has been found necessary, by reason of an odd lease of a portion of the site, to so construct the building that a portion of it may be converted into a separate building should the occasion arise.

It appears that Mr. Rector was unable to secure control of a small lot on the immediate corner, 26 by 70 ft. in plan, which he needed to complete his site. As he owned all the rest of the land covered by the new hotel, he took a long lease of the small lot; but the owner of it stipulated that the building to be erected on the site should be such that the lessor or his heirs might resume possession in case they so desired at the expiration of the lease. The lessor probably wondered just what his position would be if something should occur making it necessary to break this lease and what he or his heirs would do with a fraction of a 17-story hotel building occupying its site. Perhaps there would be no way of getting rid of it without taking down a good deal of the other part of the building.

Accordingly, the lease to Mr. Rector provides not only that he shall erect on this corner lot a building which shall cost at least $100,000, but that the building shall belong to the lessor. To carry out that provision the new Hotel Rector has been built with columns and girders so placed that, if necessary at any time in the future, it will require only the building of interior walls to make that part of the hotel occupying the corner lot an entirely separate structure.

Another of New York's Odd Buildings

At intervals in the past we have referred in these columns to some of the freakish buildings which are to be found within the confines of New York City, but the latest oddity is a five-story flat house in which there are stores on two floors with a dwelling floor between them, the store floors being on a level with the streets. The building occupies a site at the southeast corner of East 161st street and Eagle avenue. In the building there are four stores on the first floor, and there is one store on the third floor, with a story of living apartments on the second floor. At the same time, all the stores—the four on the first floor and the one on the third floor—front in the ordinary manner at the street level. The explanation is found in the different levels at which the street and the avenue cross.

Exhibition of New York City's Activities

The Committee on Budgetary Publicity of the Board of Estimate and Apportionment of New York City has opened what is known as the Budget Exhibit at 330 Broadway, Manhattan. It is believed that this exhibit represents a new departure in municipal management and typifies the present tendency throughout the country to stimulate a civic interest in economic administration. It is designed primarily to afford the citizens of the city of New York an opportunity to ascertain the principal facts relating to the work involved in maintaining the municipality and the annual cost, in order that each individual may judge for himself the adequacy of service and the reasonableness of expenditures therefor.

Attempt has been made to present these facts in the simplest and most attractive way by means of graphic and statistical charts, physical objects, models, technical apparatus, photographs, etc. The character of these exhibits is so varied and unusual and the scope of the departmental functions so wide that the exhibition not only presents a spectacular interest but possesses an educational value as well.

One of the features of the exhibit are noonday talks on municipal problems.

Some Notes on Pigeon-Houses

In former times pigeon houses were necessary adjuncts to the manor house, as the pigeon formed an important item in the "menus" of our forefathers. It is not to be wondered at, therefore, that the places wherein the birds were kept should have been given considerable importance. In many cases separate buildings were set apart for the birds, while in other instances the pigeon house would occupy some central gable, and form a pleasing feature of the house.

A common type is the circular one, the birds entering from a lantern in the top. The Yorkshire barns have rows of pigeon holes in their gable ends, with a sundial or "date stone" above them.

The laws as regards the keeping of pigeons were very strict in the Middle Ages. Only the lord of the manor was allowed to keep them, and anyone killing the birds was subject to the death penalty.

The Scotch pigeon houses are either circular, as at Corstorphine, or square, with a blank wall to the north. The circular pigeon houses would have a post in the center with a revolving arm attached, on which a ladder would be placed so that all the nests were easy of access.

In the south of England will be found a number of detached pigeon houses, square or circular in plan.

Points about a Garage

In regard to the size of a garage, it is said that a large machine requires a width of at least 10 ft. and a length of 20 ft., and headroom amounting to 10 ft. should be provided. The first floor should be directly on the ground, so as to give ample strength for jacking up parts of the machine. It is constructed exactly like a sidewalk and should not be less than 6 in. in thickness. Top surfaces should be coated with a waterproof finish, so that oil and water will not be absorbed by the concrete. It should also be sloped to drains beneath the floor, with outlets at convenient points.

What a Barrel of Cement Means

At the first annual convention of the American Society of Engineering Contractors, recently held in St. Louis, Mo., a decision was practically arrived at as to the quantity of cement that a contractor should find in a barrel when he opens it. A chief engineer on the Ashokan dam has been specifying 4 cu. ft. as the standard of measurement for a barrel of cement, and a chief engineer on another large public work has been requiring only 3.6 cu. ft. Four-tenths of a cubic foot per barrel makes a vast difference when multiplied by a million barrels.

The standard adopted by the society was: 4 cu. ft., weighing 56 lb. each, of loose cement.

The membership of the society is composed of engineers, contractors and manufacturers of engineering supplies, and it is consequently organized on broad lines.

CORRESPONDENCE

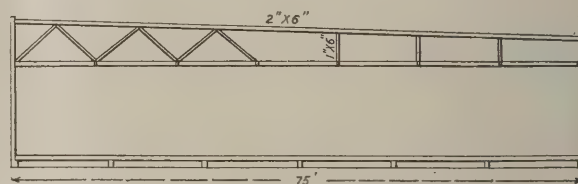
Design of Truss for Shed Roof

From J. F. T., Seattle, Wash.—In looking over the issue of the paper for August I notice the request of "J. S. W.," Tallulah, La., for a design of truss for a flat roof 75 ft. long and 25 ft. wide, the roof having a fall of 4 ft. from front to rear. I am enclosing a sketch of a truss which I used in connection with a boiler shop of the same dimensions erected 12 years ago in Fort Smith, Ark.

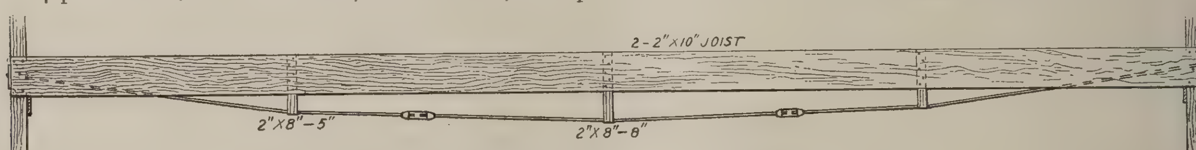
The following specifications if carried out will do the business: Place the ribbon boards on the sides of the studs for the ceiling joists 2 by 8 or 10 and 2 ft. apart; also two 2 by 10's every 10 ft. apart, and build up a false scaffold throughout, under the center of the joists. Nail one end of them to the studding. On the other side nail 1 x 4 in. over the top of the others in order to keep them from raising. Then jack up the joists under the center or false scaffold, so as to give about 1 in. spring; then double 2 x 10-in. joists every 10 ft. apart, with a 2 x 6 or 8-in. block, placing the center block about 3 in. lower than the two on the outside and spike them tight together. Put in the hog chain with the swivels or turnbuckles, the chain running through to the outside of the 4 x 4-in. studs, with an S on each end of the chains. Draw them up tight, first raising the center scaffold, and the correspondent will find everything secure.

The roof may be of asphalt or gravel laid upon a piece of shiplap.

The correspondent can brace up the roof joist with 2 x 4 placed 6 ft. from the walls, if he desires, on top of the ceiling joists, as shown in one of the sketches.



Method of Bracing the Roof.



Side Elevation of Roof Truss, Showing General Arrangement of Parts.

Design of Truss for Shed Roof.—Contributed by J. F. T., Seattle, Wash.

I saw this same sort of a truss some six years ago in *Carpentry and Building.* I have been taking the paper 17 years and consider every number worth a dollar to me.

Exterminating Wood Borers in Floor Timbers.

From G. W. W., Groton, Mass.—Can any of the readers afford information as to a remedy for small borers of some sort which seem to be working extensively in the floor timbers and floors of an old but substantial house? The trouble seems to be more especially on the lower floor and in the cellar. The borers make a hole about 1/16 in. in diameter and leave a fine wood powder in little heaps upon the floor and along the cellar bottom, where it drops down from the stringers above. The cellar has been shut up for a long time without much ventilation and is not very well lighted. We are airing the place as best we can, but would like an effective remedy for exterminating the pest.

Method of Raising Trusses of Long Span

From J. E. R., Lawrenceville, Va.—I look with keen interest for each issue of *The Building Age* and place it with the best text books I possess, because it is so full of what has been done as well as exemplifying what might be done. Now that some very valuable lessons have appeared on determining the sizes of materials for various trusses, may I ask some of the experienced workmen to furnish the editor with a few illustrations of simple methods which they employ in raising trusses, especially hammer beam trusses, as well as those of long spans?

A Question of Roof Pitches

From A. H. J. C., Kennebunkport, Me.—A correspondent wants to know why, if the length of the common rafter represents the run of the hip with a 12-in. pitch, the length of the common rafter is not equal to the run of the hip with an 8-in. pitch.

Brother James Bremner says it does. Of course it does, as he explains, on unequal pitches and odd-shaped roofs; but in my opinion the correspondent in question meant a regular-shaped roof, and if any one should roof a house to meet the requirements of Mr. B.'s suggestions they would be dragged off to the foolish house at once. He also states that 3 in. is ¼ pitch, because it is ¼ of 12; that 6 in. is ½ pitch, because it is ½ of 12, and that 8 in. is ⅔ pitch, because it is ⅔ of 12.

How simple it is! I suppose, according to that, 12 in. would be full pitch, because 12 equals 12. Now we have full pitch we can not have any more without laying that rule aside, and it is a mighty poor rule that we can work only part way with it.

We might say 8 in. to the foot, 6 in. to the foot, or 16 in. to the foot and that would do very well; but ⅓, ⅔ or ½ pitch is all bosh. But if they have to be reckoned by pitches, ⅓ pitch is 30 deg., and is neither 4 in. or 8 in. to the foot; ¼ pitch is 22½ deg., and is neither 3 in. or 6 in. to the foot; ⅔ pitch is 60 deg., and is neither 8 in. nor 16 in. to the foot.

Code of Bell Signals for Hoisting Engineers

From C. H. C., Spokane, Wash.—It is our preference and we always use the mine hoist engine signals as established by the legislators of Colorado for our construction work, numbering floors for the purpose of construction similar to mine levels.

1 bell.—When not in motion to "Hoist."

1 bell.—When in motion "Stop."

2 bells.—"Lower."

3 bells.—"Run slow" or "Man to get on." Man gets on, then 1 bell is given to go up, or 2 bells to go down as desired.

Level bells.—"Ready to shoot, etc."

In addition to "Level" indicator on the engine we use marks on the cable and winding barrel as well, to enable the engine to do close work, correcting as occasion requires for expansion, contraction, etc., of cable.

We hope a Federal code of bell signals and hand signals may soon be established and printed in construction and mining works, so an engineer in any part of the United States will not be confronted by a change of signals, which is responsible for many accidents. As conditions now exist, an engineer can scarcely go from one job across the street to another under another contractor without being confronted with some change in signals.

A Hod-Hoisting Appliance

From George Conner, Malden, Mass.—Although perhaps somewhat tardy in doing so, I wish to take exception to the cut, Fig. 2, on page 248, in regard to hoisting material in a building. When the car arrives at the different floors, how can a tender get the hod on his shoulder quickly? Now your cut, Fig. 1, is good, but I would suggest that you take away the rod below the beam where the wheelbarrows are, leaving the eye above for the cable. Get three double hangers made from ½ x 3-in. flat iron that will carry the hods. When the car arrives at a floor the tender walks up to a hod, puts his shoulder under it and quickly walks away, as the car must be unloaded as fast as possible.

You do not want to have the cable fixed so that when one car is up the other must be down. Have them on two separate drums, as there may be some delay unloading or some other delay that ties up the other car.

I was probably the first one to use elevators to hoist hods in this way and it gave good results. Speed is the main thing in getting up stock.

Wheelbarrows are very much used on certain kinds of construction. In general work it often becomes necessary to take up terra cotta, cut stone or some other material, so each car requires to be independent of the other. Many Boston contractors use four wheelbarrows on the elevators instead of hods. They have a dozen or more wheelbarrows in use, men keeping them filled below and ready to put on when the car comes down, while men on the floors above take them off as the car ascends. The car requires to be large enough to admit of at least four wheelbarrows at once, running them on from both sides if necessary. Where a large force is employed in hoisting mortar they generally dump the barrows in a bed and temper it up as they use it, keeping it continually going up and getting a supply ahead when necessary.

Referring to the sketches here presented, I think the readers will understand that the hod balances itself in the iron V, which is rough on the edge next to the hod, while the lower end of the handle presses against a bar that is movable when wheelbarrows are used or when the car is employed for some other purpose. The hod man just walks up to the car, puts on the hods when it is at the bottom, and these are taken off by another man when it reaches the floor for which the materials are intended, thereby keeping the car continually going up and down. The contractor will naturally require quite a lot of hods on a large job, especially if many masons are employed.

The end and side elevations of the hod-hoisting car here represented in Figs. 1 and 2 clearly indicate the construction and arrangement, so that further comment would seem to be unnecessary. It might, however, be interesting if some other readers of the paper would tell what sort of an apparatus they use in hoisting hods to the upper floor levels of a building in course of construction.

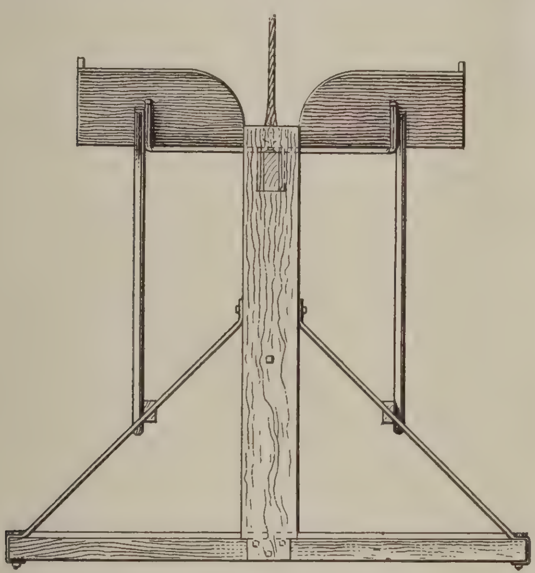


Fig. 1.—End Elevation.

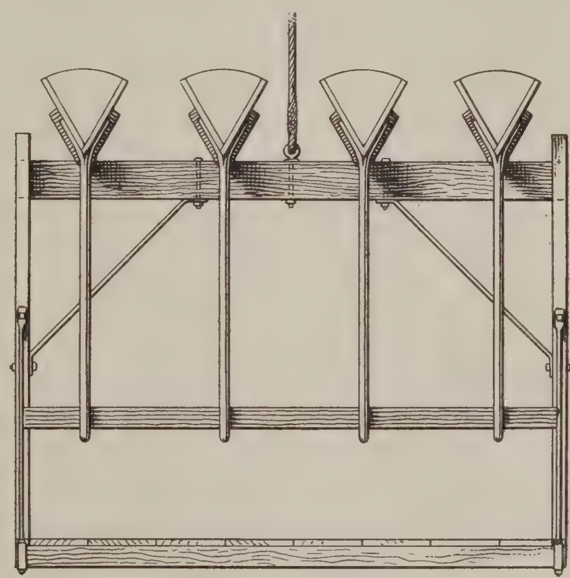


Fig. 2.—Side Elevation.

A Hod-Hoisting Appliance.—Drawings Accompanying Letter of Mr. Conner.

J. Bremner Replies to "Charitable Justice"

From J. Bremner, Portland, Ore.—The correspondent signing himself "Charitable Justice" in the September issue appears to fully agree with me in regard to the conditions necessary to make the hip run of a roof equal to the length of the common rafter of any pitch whatever. Although it would be too much to expect every one to understand the trigonometrical operations involved by sines, co-sines, tangents and co-tangents, etc., still it would be advisable for those considering this subject to always keep in mind the fact that the pitch of a roof can be altered without changing its hight; in consequence of which the slope at one side of the hip can for the sake of producing the result desired be kept at a 45-deg. pitch, while the other can be set at any other pitch whatever and the jack base of one hip in that case will be a *rectangle* instead of a *square*. It was in reference to such a roof that I used the expression "a two-pitch roof" in my letter to distinguish it from the uniform pitch roof that would be placed over the square base marked *a b c d* in my diagram. It would of course be ridiculous to call the pitch of one plane face of a roof a "two pitch." A gambrel roof has two faces and two pitches on one side, but not four. This will, I trust, explain the alleged misunderstanding of the correspondent.

He is quite correct in stating that a man may become useful and perform great humane deeds without having any knowledge of Euclid. The anecdotes of the philosophic youth who began to learn Euclid for the first time goes to show that he saw it in the same light also. Of course at the first start he was confronted with the indispensable definitions.

First.—"A point is that which hath no space." "Absurd!" he says. "How could a thing occupy no space?"

Second.—"A line is length without breadth." "Worse and more of it. How could I see a line that had no breadth?"

Third.—"A surface is length and breadth without thickness." This was the last straw which broke his back, and, like Shakespeare with the physic, he threw Euclid to the dogs (into the fire). He did not wait to get hold of a solid, which has length, breadth and thickness.

The correspondent correctly states that the getting of the hip length is a problem in solid geometry involving two problems in plane geometry, each of which may be found by the 47th proposition of Euclid. The square root of the sum of the squares of the base and perpendicular of a right-angled triangle equals the hypotenuse. In what has been called a two-pitch roof there is a long common rafter on one side and a short one on the other side of the hip. This gives a long run and a short run. With a ridge there would be only one common rafter on one side running down from the end of the ridge. With a deck above, there would be several common rafters on both sides of the hip.

Now my way of putting it to obtain the length of hip in three different directions of lines is by a particular combination of compounding of the hight, the long common rafter run and the short common rafter run.

The hip run is compounded of the long run and the short run, and this compounded is again compounded with the hight to produce the hip length. So the compounding of the long and short runs and hight give the hip length.

But the long and short common rafter, compounded with the short and long run respectively, give each the hip length; and since the long and short common rafter are each produced by a compounding of the hight with its own run, it follows that in each case the hip is produced, as before, by the compounding of the long and short runs with the hight.

Now you must understand that the above is my own adaptation. I did not pick it out of any book and, of course, I stand or fall by it. I could give a diagram to illustrate it, but will have mercy on the engravers of this periodical, who have so much to perform of this kind of work and, I must say, always do it in a most excellent manner. Of course the term "quadrilateral"—meaning a four-sided or lined figure—is correct, but when applied, as in the diagrams, both to a *square* as well as a rectangle, would it not be more definite to use instead the terms "square" and "rectangle" for clear and understandable distinction? All crows are birds, but all birds are not crows. All squares are quadrilaterals, but all quadrilaterals are not squares. Neither are all quadrilaterals rectangles.

Another term which I notice the correspondent uses I consider a great deal worse, being altogether incorrect and to my mind quite unjustifiable, namely: "right triangle" for right-angled triangle. All triangles must be *right* triangles if they are triangles at all. There are no *wrong* triangles, but a right-angled triangle can only be a triangle which contains a right angle. Therefore, it is incorrect to say that only a right-angled triangle is a "right triangle." I submit, however, that the term is shorter in expression and distinctive enough if universally understood, though not literally correct.

I hope the correspondent did not make the statement which is contained in his letter, that "there can be no fixed ratio between the length of the common rafter and run of the hip," with any intention of conveying to the readers the incorrect impression that I said there was any such fixed ratio. I should never be guilty of saying so, as, of course, there can be, as he says, no such fixed ratio.

Having no means of knowing the mind of "W. H. P." nor his object in asking the question in that way, it is quite possible I may have been entirely wrong in my conjectures and that the present correspondent might possibly be correct as to his having been in a cloud of misapprehension and error. If so, he will be enveloped in the same cloud as long as he lives, if he never gives or has given the subject any thought.

I notice that the correspondent in another part of his letter agrees with me in condemning the popular expression frequently used for a pitch of roof, but further on proposes the very method which I recommended in my letter and condemns me for a method which I never proposed. Now compare the two propositions: What I wrote was "the pitch of a roof is not the ratio of its hight to its span, but the ratio of the hight of its run or half span. Accordingly, what is called a one-third pitch is correctly a two-third pitch; that is, an 8-in. pitch." What "Charitable Justice" wrote was: "To my mind the nomenclature which would give the pitch as the undivided ratio of the rise to the run would be in accord with mathematical usage and a roof the run of which is 12 ft. and the rise of which is 8 ft. would then be called an 8/12 or ⅔ pitch roof, etc."

Now, I ask in fairness, do not these two statements—the one my own and the other his—mean exactly the same thing? I think they do. Yet he says his nomenclature or method of expression would be more intelligible than mine. Is that "charitable justice"? Yes. Echo answers, yes. There would be no use of the correspondent putting up the flimsy excuse of his not being able to understand what I meant by the expression "two-pitch roof," which I applied to a roof having two different pitches—one on one side of the hip and a different one on the other side—against my direct statement as above quoted. Indeed, the whole letter of the correspondent shows so clearly that he thoroughly understands the entire subject that I cannot for a moment believe that he were ever in the least doubt about the meaning of my expression "two-pitch roof."

The system of expression for a roof pitch, of which we are both in favor, is by no means a new one. If I am not mistaken, it has been advocated for use in England many years ago, and "Hicks' Builders' Guide"—a splendid little work—recommends its adoption, though I have not at hand a copy of it to which to refer; but the old-rooted popular usages and prejudices, however absurd and unsatisfactory, are very hard to conquer.

I fancy now that I have written so much on this particular subject and made my position regarding it so definite that it would be superfluous for me to say anything more.

I miss from the September issue the valuable and ingenious articles of Mr. Crussell, "The Jobbing Carpenter." He is certainly quite master of his subject every time.

Laying Floor Strips in Cement Concrete

From F. B., Chicago, Ill.—Laying beveled floor strips embedded in 5 in. of cement concrete on a 12-in. bed of cinders is not so easy a matter as I thought it would be. Can any of the readers acquaint me through the columns of the Correspondence Department with any method for turning out a satisfactory job of this kind? Anything of a temporary nature is speedily knocked to pieces by the ignorant labor usually employed to place the concrete. Laying these strips on floor tile or reinforced concrete would also seem to present peculiar difficulties of its own.

Note.—It is possible our correspondent could derive some valuable suggestions from the article in *Carpentry and Building* for September, 1909, illustrating and describing the method of constructing wood floors on concrete beds. With the exercise of ordinary care in tamping the concrete after the wooden strips or sleepers are placed in position no great difficulty should be experienced.

Taking Hewn Timber Out of Wind

From James Herche, Oakland, Cal.—In answer to the inquiry of "J. W. B." regarding the best way of taking timber out of wind, I beg to submit two methods, the first of which has been in common use up to the present time, while the second was devised by me several years ago in order to expedite and simplify the old process. For either method it is necessary to prepare a skidway; that is, two timbers laid parallel to each other at a suitable distance and blocked up to a proper hight from the ground, so as to render the framing of the timbers easy and comfortable, taking care that the skidway be fairly level and out of wind. On this skidway place as many timbers as one can frame without crowding.

Take two wind battens; that is, parallel straight edges of 1 x 4-in. pine and about 4 ft. long. Lay the timber to be framed on its widest side, if of unequal dimensions, such, for example, as 10 x 12 in., 12 x 14 in., etc., but if for equal dimensions place the best side on top. Next take the wind battens and lay them across the timber you wish to take out of wind, one at each end, placing the battens on edge. Now sight across the upper edges of the wind battens and any twist or distortion in the timber will be readily detected, being accentuated by the length of the wind battens. Tack two cleats across the timber alongside of the battens; remove the latter and with a rabbet-plane placed alongside the cleat, proceed to dress down the "high" points at opposite sides of the timber. Try the wind battens again, placing them in the shallow groove just made by the rabbet-plane, and if the "high" points are still found to be too high, repeat the operation until both battens are in a parallel plane to each other. Next, remove the cleats, roll the timber over on one of its adjoining sides and tack the cleats on the top side equidistant from each end as in the first position. With the rabbet-plane square up this side at both ends, holding the blade of the 2-ft. square into and against the grooves on the first side.

With a compass scribe off a point 1½ in. from the grooves at both ends on all four sides. With a chalk line spring longitudinal lines over these compass marks, and from these lines, as a base, lay off all tenons, mortises, gains, etc. This method, while giving good results, is, however, entirely too slow and cumbersome for this progressive age.

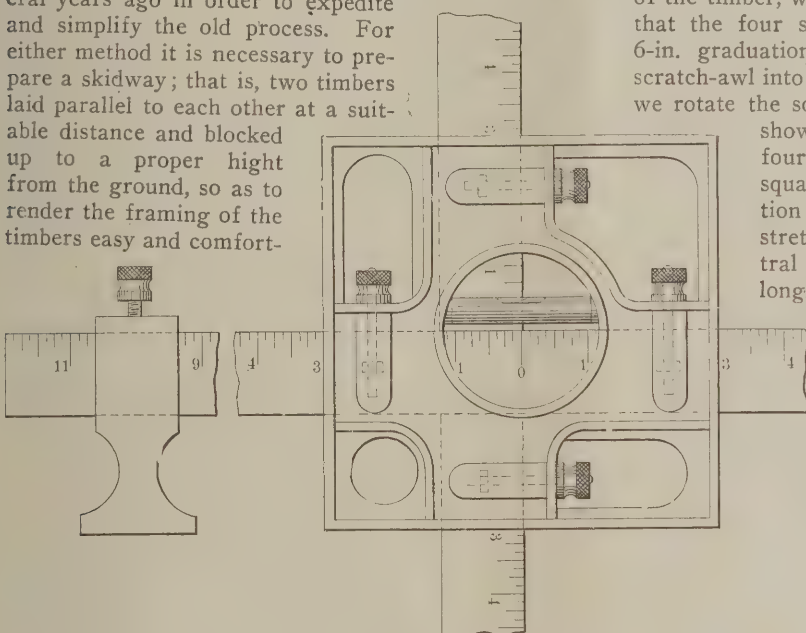


Fig. 1.—General View of Timber Square.

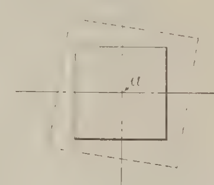


Fig. 2.—End of Timber, Showing Position of Scratch-Awl.

Taking Hewn Timber Out of Wind.—Sketches Accompanying Letter of James Herche, Oakland, Cal.

With reference to the second method, I would state that I make use of a timber square, Fig. 1, which I designed and patented. It consists of a cast iron head, square in form, provided with a leveling device. On the back are two grooves running at right angles to each other and parallel to its four edges. Into these grooves are fitted three graduated steel blades, one 24 in. long and the others each 12 in. in length. In applying the tool for taking timber out of wind the blades are adjusted in such a manner that the graduations commencing with zero in the center extend in all four directions. The device is now placed against the end of the timber, which is, say, 12 x 12 in., in such a way that the four sides of the timber coincide with the 6-in. graduation marks on the blades. Inserting a scratch-awl into the center of the timber as at *a*, Fig. 2, we rotate the square around the awl until the bubble shows it to be level, when we scribe off the four center lines along the blades of the square with a pencil, repeating the operation at the other end. This done we stretch a chalk line directly over the central cross lines at both ends and spring the longitudinal lines in this manner in all four sides. For laying off tenons, mortises, etc., unscrew the 2-ft. blade and bring the end of it even with the head, leaving the blade to project at one end only. Laying the edge of the 24-in. blade in line with the longitudinal chalk-line mark on the timber, all the necessary cross lines may be scribed off.

For the benefit of "J. W. B.," I would suggest that he might produce a fairly good substitute by making the blades out of hardwood, half lapping them at the center at right angles in the shape of a cross, and attaching in the middle one of those small leveling devices such as are used to screw on to a straightedge and which may be purchased at any reliable hardware store.

From Subscriber, Spokane, Wash.—If we "had it to do," hewn or sawed, we would proceed to skid timbers conveniently high and about the right level for working; then place a square blade across each end of the stick and sight over the top edge of the nearest square lengthwise of the timber at the top edge of the other square. With a jack rabbet plane, good and sharp, and spurs on each side just long enough to cut the ends off shavings, we would "spot" the timber near the end, cutting most wood off the high side straight to the opposite top corner. Place the square on this and see that it touches the timber the full width of the stick; that is, that the cut is straight—neither hollow nor round—then go to the other end, do the same thing, replace the square and look over the top edges. If exactly in line the stick is out of wind at these places or spots. If it is not in line cut more off the high corners until parallel. Then take a pencil and mark along the side of each square, so as to give a guide to replace the square in the same position as when the test is made.

We next turn the stick on its side, place the square along the pencil mark, with the tongue of the square pressed to the timber. If not square, "spot" the same way until the tongue fits all the way across, and the blade does the same at the pencil mark. Then try the other end the same way. Now marking the corner of the stick with squared angle for faces, if wishing to frame with, say, ½-in. "dap" or boxing, we measure 2 in. from angles, faces, etc., at test marks, lining from these the length of the timber on three sides. The tongue of the square placed at the line and scribing on the other edge gives 1½ in. from the line, and if the stick were straight ½-in. "dap," by using the lines to lay out the work. If properly done all will come true and in line regardless of the shape of the timber.

If it is desired to true full timber, lines at angles made at spots and other lines, the size of the timber wanted would give the points at which to hold the chalk line to get the work lines to which to hew.

This class of work we thought a thing of the past, so little of it is done in these rush days.

Painting Galvanized Iron House Fronts

From C. A. M., Brooklyn, N. Y.—I will be glad to learn of some practical way to paint galvanized iron house fronts so that the paint will not come off in a short time. I have tried painting one front three times, each time differently. I tried rubbing off with acid first, then with vinegar, and at last I used sandpaper, painting, of course, the entire surface with good red lead and some light house paint color, but have found that it was of no use, as the paint is all off. The house in question is on the sunny side of the street, and the sun shines on it the most of the day. All of the metal brick front is well nailed on.

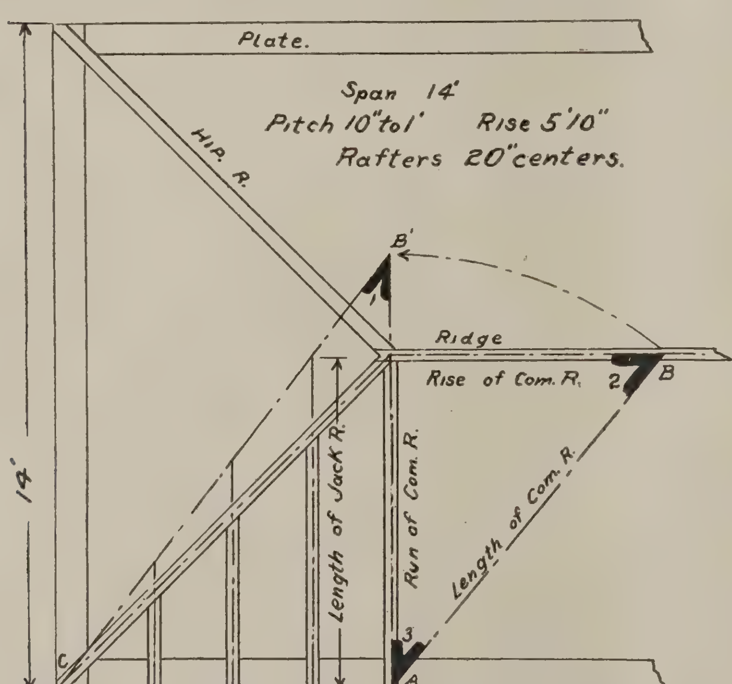
Answer.—In many instances it is recommended that the galvanized iron front be exposed to the weather for two or three months so that it will oxidize and take on a gray smudged color, which can be rubbed off on the hand; then the right paint will adhere. If the galvanized iron must be painted at once after erection, the surface may be prepared by washing with a solution of muriatic acid, vinegar and water that is just strong enough to change the color of the crystalization on the surface of the iron. After the washed surface has stood for twenty-four hours and has changed in color it should be carefully washed with water to take away all of the acid or other matter that might continue to eat into the protecting material. After this has been done the surface is ready to be painted with a red oxide of iron paint. A good paint may be made by mixing equal parts by measure of dry red lead and first-class mineral brown ground together dry and then mixed by hand with equal parts of pure raw linseed oil and pure spirits of turpentine without the use of any Japan or liquid dryer. This method has been used successfully and with satisfaction.

Making a Tapering Spar

From W. J. H., Phelps, N. Y.—I would like to ask the brother readers of the paper what is the best and quickest way to make a tapering spar; that is, tapering from center to ends. The spar is to be, say, 25 ft. long and is to be used as a yard to a sailing vessel, the yard to be 6 in. in diameter at the center and tapering to 3 in. on the ends.

Finding Lengths of Jack Rafters

From E. H. Bentzel, Hampton Institute, Va.—I am sending a sketch which shows a simple method of finding lengths of jack rafters and can be used on any pitch roof without having to remember any figures. The drawing can be made to scale on a board by means of a steel square and by using only the outside line of the plate and center lines of the rafters and ridge makes the method very simple.



Finding Lengths of Jack Rrafters.—Scale One-Quarter Inch to the Foot.

Referring to the accompanying sketch, find the length of the common rafter as represented by the line A B, which is equal to the hypotenuse of a right angle triangle, the run and rise of which will be that of the common rafter. Carry B over to B′, then the line A B′ will equal the length of the common rafter. Draw a line from B′ to the foot of the hip rafter as at C and extend the run of the jack rafter to the line B′ C.

By scaling this line and taking one-half the thickness of the hip rafter we will have the length of the jack rafters. We shall also have found three cuts as the angle at 1 will be the cross cut for the jack against the hip; 2 will be the plumb cut for the common rafter, and 3 the heel or foot cut for the common rafter.

This method will hold good if the jack rafters are not spaced uniformly, and if they are spaced on a given center by finding the difference in the lengths between the first two rafters, counting from the corner of the building, and adding this difference to the length of the second will give the length of the third, etc. It is unnecessary to measure the length of each jack.

Recipe for Silvering Mirrors

From B. T. M., Pana, Ill.—Will some of the many practical readers of these columns give me a recipe for silvering mirrors—one that can be poured on the glass? In the issue of *Carpentry and Building* for December, 1905, there are three recipes by Dr. Draper, but they do not seem to be altogether a success, as they streak and spot, and at the same time the silvering will not stick to the glass.

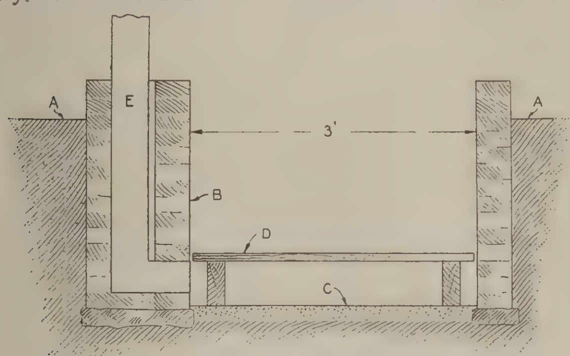
Note.—The following may be found of service if carefully prepared: The first requisite is to have the side of glass to be silvered very clean and dry, and is best to clean glass first with fine chalk or whiting dampened with alcohol, then wipe it over with a little alcohol and rub dry with fine tissue paper. Make a liquid preparation by melting in a porcelain crucible one drachm of lead, one drachm of tin and one drachm of bismuth. When these are melted, and before the mass cools, add ten drams of mercury (quicksilver).

It is now cool enough for immediate use. Lay your glass flat with the clean side up and pour the liquid over it, so that all of the surface is covered, then raise the plate to nearly perpendicular position and let it drain off quickly. When the liquid has become perfectly dry and hard on the glass it should be coated with drop black ground in japan, thinned with turpentine, which will insure greater opacity and wearing properties.

An Underground Cold Storage Pit

From W. J. Hydon, Phelps, N. Y.—In reply to "E. H.," Springfield, Ill., I would say that I constructed in my cellar a cold storage pit as he describes, and a few particulars concerning it may not be without interest. The inside dimensions were 20 in. wide by 36 in. long by 29 in. deep. In making this pit I had neither plans nor the experience of any person to guide me, so it was a sort of "cut and try" job. I had had the matter in mind for some time, so one day I went at it in this way:

Our cellar has a dirt floor, a sort of sandy loam and dry. I mortised a hole in the cellar floor the size I



Cross Section of An Underground Cold Storage Pit.

wanted, cemented the bottom of the pit and bricked it up all around, leaving a hole on the southwest corner for the air tube at the bottom. Above the cellar bottom and on the brick lining I made a wooden door frame about 4 in. deep and put a rim of cement around it, as I intended to cement the entire cellar bottom. I then hung a door on the frame that was balanced, so it could be raised handily and kept open to put things in. The door had holes cut on the end away from the air inlet for the current of air to pass up through.

Referring to the sketch sent herewith, which represents a sectional view through the pit, A is the cellar bottom, B is the brick wall lining the pit, C is the cement bottom, D is the slat tray, which is removable and so placed as to give a depth of 22 in. of pit when the tray is in place, and E is the air tube extending to a window above the pit. The cold air passes in at the bottom under the tray, then up through and out at the far end away from the inlet.

It was a good looking job when completed and everything being ready we gave it a try. A few days' trial in hot weather demonstrated the fact that instead of a cold storage pit we had an incubator. Well, I had company one day and I was telling about the cold storage not working. They told me if I left the door open I would have no trouble and I therefore dispensed with the door and the pit has worked all right ever since. To have a cold storage work properly it must have lots of air and I intend to make a sort of dumb-waiter or slide open on top, covered with wire cloth and fitted to work in this pit, as it is not easy to reach down for things that are sometimes quite heavy.

Practical Value of "The Building Age"

From B. H. R., National City, Cal.—Will some of the readers of an analytical turn of mind explain why it is that certain questions presented in the Correspondence department receive numerous replies while others which would be interesting for discussion pass by apparently unnoticed?

In this connection I wish to state that for the money *The Building Age* is the best paper of its kind extant; in fact it surpasses in excellence the higher-priced journals devoted to the building trades, and I especially recommend it to all young builders.

Cedar vs. Redwood Shingles

From C. B. C., Binghamton, N. Y.—I would like to obtain through the Correspondence columns of the paper some information on the shingle subject. Which will last the longer, cedar or redwood shingles? If cedar, which is the best, as I understand there are several kinds?

Nearly all the shingles used here are Washington and Oregon cedar—all sold as *red* cedar, but it seems to me a great many of them are not very red. We can also obtain the redwood if desired.

I am about to build for myself and would like to put on shingles that will endure the longest.

Dividing the Circumference of a Circle

From J. Bremner, Portland, Ore.—The identical general method for dividing the circumference of a circle into any required number of equal divisions shown by "Jack Plane," Portland, Ore., in the September issue, is given on page 43 of "Davidson's Linear Drawing," and illustrated there by Fig. 55 in exactly the same way for a pentagon (five-sided polygon) as the diagram given by the correspondent. "Jack Plane's" discovery, therefore, comes somewhat late, as Davidson's book was published in London more than 17 years ago. It contains several other methods, both special and general, for the solution of all sorts of problems of this kind.

Calculating Safe Loads on Wooden Beams or Girders

From C. H. C., Spokane, Wash.—Referring to "The extreme variance of statistical formula for calculating * * * load on wooden beams," complained of by the Portland correspondent in the September issue of the paper, we presume the Auslander formula, as he states it, is to determine the *maximum load* for a rectangular beam supported at both ends, that will *not* produce a deflection exceeding (probably) 1/30 part of an inch per foot of span "when the load is uniformly distributed"; while that referred to as People's formula appears to be to obtain the "safe load," using 6 as a factor of safety. The load in this case could, we think, be in the center. It will be noticed that "deflection" does not enter into the latter computation—only the safe load; hence the difference.

Design Wanted for Opera House and Masonic Temple

From A. E. B., Battleford, Sask.—I would like very much to have some of the architectural friends of the paper furnish for publication plans and elevations for an opera house costing about $17,000 to $20,000; also plans and elevations for Masonic temple costing about $3,500.

Building Construction from an Investment Standpoint

At the recent convention of Building Managers and Owners held in the city of Washington, D. C., one of the interesting papers presented for consideration was that on "Building Construction From an Investment Standpoint," by G. Richard Davis, of New York. His treatment of the subject was of special interest to the delegates for the reason that it was a topic with which many were not altogether familiar, and it gave to those in other cities an insight into the methods employed in New York City in building construction, more particularly in the large apartment houses. The ideal structure from the standpoint of the investor, the author pointed out, is that building which is so constructed as to yield a maximum income at a minimum cost of erection and maintenance consistent with the best methods and workmanship of construction.

What every owner wants to know is how it is possible to obtain a maximum income from a first-class building at a minimum cost of construction and minimum cost of maintenance. The author stated that, interviewing 100 tenants, all occupants of a high-class apartment house, putting to them the question as to what points they considered the most vital in renting apartments, the answers obtained were practically unanimous in placing the importance of the following considerations in this order: First, location; second, light and air; third, size of rooms; fourth, arrangement; fifth, equipment, and sixth, character of finish, style, etc

An important consideration is how the building is finished, for the more attractive the structure the quicker it will draw tenants. A pleasing elevation of a building is desirable, but it is needless to say that extravagance is as bad as false economy, or more so, and the amount of money spent on the front elevation of many of our finest buildings has greatly increased the cost of construction, while adding little or nothing to the rentability of the building.

The second point is how to build a building at a minimum cost consistent with obtaining a first-class structure. A good architect, a good engineer, first-class superintendence and plenty of it, are all vital and necessary. Nothing is too good to put in a building to complete its mechanical and structural equipment. The best lasts a long time, and poor material and workmanship bring continuous trouble and the worst results. A broad knowledge of building construction, of the different kinds of makes and substitutes and the latest invention in the building material world, the desirability, the cost, and substantially of each of them, are things that every builder should know.

The third phase of building construction is that of obtaining the minimum cost of maintenance after the building is constructed. To do this the building must be properly constructed, properly equipped, and, withal, economically so. Consideration should be given always to the economical cost of maintenance. One boiler in a building of any size is a mistake, no matter how large; two boilers are more economical; their original cost may be greater, but the cost of maintenance is less. A small coal room is a mistake; it costs more to buy coal in small quantities than in large. Two pumps are necessary; the cost of their maintenance is much less by using one pump for one month and the other pump for the following month, giving each machine a chance to rest, and, if necessary, to make slight repairs.

The substitution of ceramic tile for mosaic tile on a floor which is subjected to very hard wear; the substitution of soft wood for hard wood when the additional cost of the latter is so very little more and the durability is so much greater; the using of light iron pipes for steam risers and plumbing lines instead of heavy pipes, and the employing of poor contractors to do work, are all things that cost little to do right at first.

A House of Vanishing Rooms

A cozy dwelling, remarkable in many respects, and occupied by the builder and his family, consisting of wife and child, stands upon a large tree-shaded plot in Evanston, one of Chicago's most attractive suburbs. At the outset it may be important to state that the house is of stucco, 25 x 26 ft. in plan, and cost $1,600 to build, and contains, by an ingenious arrangement, five rooms and a bath. The ground floor has a living room 19½ x 12 ft.; bedroom, 13 x 10½ ft.; bath room, 8½ x 5½ ft.; kitchen, 3 x 9 ft.; closet just outside the bathroom, 5 x 3 ft., and guest room, 7½ x 5½ ft.

Even the most careful figuring will not succeed in compressing all those measurements within the space of 25 x 26 ft. That is because of certain arrangements which led a writer in *Country Life of America* to call it "the house of vanishing rooms."

Exactly in the middle of the ground floor is a base burner stove, which, upon a supply of 4 tons of coal, warms the entire house all winter. Over the main floor is a large attic, now used for storage; but two rooms can be finished off there if the downstairs supply proves inadequate.

There is a curious closet between the bathroom and the sitting room. One-half is a clothes closet, the other a stairway leading to the attic. When shut up these stairs are a tier of boxes serving as clothes hamper, hat boxes, and so on. Pull the lower ones forward and they form a first-rate flight of steps.

Under this closet a door leads to a fair-sized compartment built below the floor—there is no cellar—and giving additional storage room.

The roomy bookcase, if approached from the rear—that is, via the clothes closet—is a linen chest. There is an automatic gas heater in the attic which supplies hot water to kitchen and bathroom.

The visitor staying to dinner wonders where the dining-room is, and whether he is expected to eat in the kitchen. His youthful hostess has disappeared some time since, and he hears sounds in the kitchen that tell him a meal is in process of preparation.

The kitchen is attractive enough for anyone to mistake it for a dining-room, but when the critical moment arrives the host presses a button in the hospitable mantelpiece of the living room, the burlapped wall beneath the mantel slowly rises and disappears, and the dining table, in all its splendor of china and glass and snowy napery, appears through the opening, and when well on the living-room side the partition silently resumes its wonted place again; then chairs are drawn up, and you sit down to enjoy the repast.

At the end of the meal the table is gently pushed back into the other room, the way it came, awaiting the pleasure and leisure of the mistress of the house to clear up.

Perhaps the greatest marvel is when the guest room appears out of an empty wall. A large, roomy couch is rolled over to the windows, and the panel behind it adjoining the bookcase, by the touch of a button, again swings out into the room. It may be swung out at right angles to make a larger room, but is usually left at a three-quarter angle, turning in slightly, and there you behold the guest chamber!

It is a pretty room, with its fresh muslin curtains at the window, snowy counterpane on the bed, low, comfortable chair, and high, built-in dresser, which is in weathered oak to match the rest of the furnishings. When this panel is closed, the space is only large enough to hold the bed, chair and dresser (which is built into the panel), but when opened out it gives a guest room of very fair dimensions, and a screen placed across the 3-ft. opening made by the folding out of the wall allows plenty of privacy. In the morning the wall is pushed back into place and the living room resumes its normal size again.

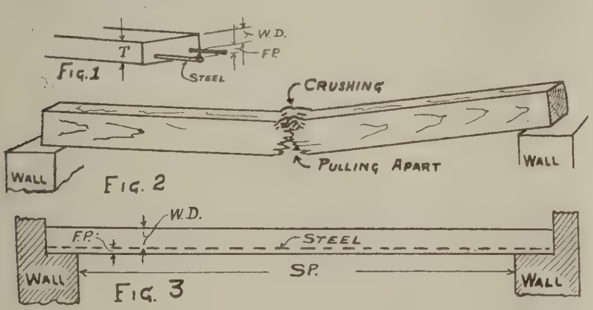
DESIGNING REINFORCED CONCRETE

BY H. H.

HERETOFORE calculating or designing reinforced concrete work was done by formulas in higher mathematics, but in this article all technical terms are eliminated and the theory reduced to plain arithmetic. The subject under consideration is floor slabs with simple one-way (steel rods one way only) reinforcement, with each end resting on a wall, therefore not continuous over beams or girders. I will briefly explain how to build reinforced concrete floor slabs, the essential features being, first, the load per square foot the floor must carry, which we call the live load, and, for short, abreviated by L. L.; the weight of the slab or floor, known as dead load, D. L., and the sum of the live and dead loads, known as total load, T. L. Second, the distance between supports, which is termed the span or Sp. The distance between the two walls upon which the floor is built is called the span.

Third, the materials and the proportions to be used. Concrete made of one part cement, two parts sand and four parts gravel (aggregates) makes very good work for reinforced floors, while one, three and five parts respectively would make much poorer work, it having less strength. The place and amount of steel are also important points.

Fourth, the factor of safety which governs the strength. For example, a safety factor of one to four denotes that the floor will break when loaded to four



Designing Reinforced Concrete.

times the amount it has been built to carry. Therefore, a floor built to carry 100 lb. live load per square foot will break when loaded to 400 lb. per square foot.

The following are the usual requirements for live load for various purposes:

Roofs, 40 lb. live load per square foot; dwelling-house floors, 60 lb.; hotel floors, 75 lb.; stores, 100 to 150 lb.; public buildings, 175 to 200 lb.; barns, 200 to 250 lb.; shops, etc., 250 lbs.; grain bins, 300 to 800 lb., depending on the hight of the bin; bridges, 300 to 1000 lb.

Concrete floor slabs have a physical construction which is clearly indicated in Fig. 1, being a section through a floor slab. The total thickness of the slab is represented by "T"; the working depth by "W. D.," so called for the reason that it gives the strength, as it must be compressed or the steel stretched to cause the floor to bend. This is more clearly shown in Fig. 2, which represents a horizontal timber breaking from being overloaded.

The same principle is involved in concrete floors. Therefore we put the steel rods near the botom, as they are strong enough to prevent stretching, but bend too easily to be of much benefit in compressing. Concrete, however, withstands compressing, while it has slight stretching power. Consequently we design the floors as shown in Fig. 3, the working or compressing depth or thickness being shown at "W. D." Steel resists pulling, which we term the tensile strength. Therefore, we use just enough steel to be as strong in tensile as the working depth (W. D.) of concrete is strong in compression, which gives us a uniform system of construction, which is termed a uniform design.

Now let us design a floor, having, for example, a live load of 180 lb. per square foot and a distance between walls or span of 10 ft. First we must find the dead load, which is done by taking the square root of the live load and multiplying it by half the span in feet. The square root of 180 is 13.4, which, multiplied by 5, equals 70 lb., which is the dead load; thus giving a combined live and dead load of 250 lb. per square foot. (This is only approximately the dead load.)

Having found the total load and span, we must find the working depth of the concrete, which is done by taking the square root of the load and then multiplying it by the span in feet, adding the length of span and dividing by 30, which will give us the working depth in inches as follows:

Square roof of 250 = 15.8.
15.8 × 10 = 158.
158 + 10 = 168.
168 ÷ 30 = 5 6/10 in., the working depth of our slab or floor.

The thickness of concrete below the steel is generally known as fireproofing (marked F. P.) and it should never be less than three-fourths of an inch thick, and in heavy floors never less than one-tenth of the working depth. In this case we add three-fourths of an inch and we have a total thickness of nearly 6½ in. and will call it 6½ in., as the more depth the stronger the floor.

Basing our concrete as being made of one part cement, two of sand and four of gravel, we know it is good for a compression strain of 2600 lb. per square inch and steel is good for a tensile (pulling) of 64,000 lb. per square inch. Therefore, we will use a safety factor of one to four, which places the concrete at 650 lb. compression per square inch and the steel at 16,000 lb. tensile per square inch. But as the concrete near the steel is not subjected to the same compressive strain as that at the top of the slab, we can only count on one-fifth or one-sixth of this compression. Therefore, a floor slab 12 in. wide with 5 6/10 in. working depth has 67 sq. in. of compressive concrete. Taking one-sixth of this we have but 11 in. in direct compression, which is worth 650 lb. per square inch, or a total of 7150 lb., for every foot of width, and as steel is good for 16,000 lb. per square inch, we need a trifle less than half an inch of steel area per foot of floor slab, which sums itself into a simple rule of using three-fourths of one per cent. of steel in relation to the entire working depth of the concrete, and the working depth being 5.6 in., we have 67 sq. in. per foot width. Hence ¾ per cent. of this is one-half of an inch of steel.

Having explained this we will take another example, using figures only.

With a live load of 100 lb. per square foot and a clear span of 20 ft., how thick must be the slab and how much steel will be required?

Square root of 100 = 10 × 10 (½ of 20) = 100 lb., which is the dead load.
100 + 100 = 200 lb. total load.
Square root of 200 = 14.14 × 20 = 282.8.
282.8 + 20 = 302.8.
302 ÷ 30 = 10 in. W. D.
10 × 12 = 120 in. compressive area.
¾% of 120 = .9 of an inch steel area per foot wide, and the total thickness is the working depth of 10 in. plus .1 of itself for fireproofing, which makes it 11 in. thick.

Steel rods should always be limited in thickness to one-eighth the thickness of the floor slab. In fact, the smaller the better, as smaller rods require a greater number to make up the required area, for reinforced concrete is not unlike the body of a fish; those having many small bones are much stronger than those having few and larger bones. The use of wire netting and expanded metal is therefore meeting with much favor as a reinforcing material, but it must always be borne in mind that the cross sectional area of any netting, etc., must equal the area of steel irrespective of the recommendation of those who offer the material for sale.

THE PASSING OF BLACK NAILS FOR EXPOSED WORK

By A. Reader.

THERE is a great deal of complaint regarding the trouble that comes from the use of ordinary black nails in exposed work, particularly in shingle and slate roofs and, to a lesser extent, for clapboarding, laying veranda floors, etc. The matter has not only been referred to editorially at considerable length in publications devoted to the building interests, but many of the leading publications devoted to the farming interests have printed communications from their readers relative to the matter and have also referred to it editorially, making the evidence conclusive that the dissatisfaction regarding the short life of the ordinary black nail for exposed work is well founded and that owners of frame buildings are waking up to a fact that has long been apparent to observant architects and carpenters; viz., that the high cost of material entering into the construction of a frame building makes it incumbent that every reasonable precaution for protecting it be taken.

Prolonging Life of Shingle Roofs

There is no question but what the life of a shingle roof can be greatly prolonged (some authorities say doubled) by the use of nails heavily coated with pure zinc. As a matter of fact, an iron cut nail so coated is equal in lasting qualities to a copper nail, besides possessing other qualities that a copper nail does not; better holding power and less liability of bending in driving being some of them.

Veranda floors laid with black nails become loose after a few years on account of the rusting of the nails. Painted clapboards become disfigured with rust stains from the same cause. The disastrous effects of using black nails are, however, probably most apparent in shingle roofs, as they soon commence to rust and, with the rusting of the nail, the hole in the shingle made in driving it commences to enlarge, making it necessary to replace the roof while the shingle are yet good. This trouble occurs in from three to eight years after the shingle have been laid, dependent on the climatic conditions of different localities. These facts are responsible for what appears to be the rapid passing of the common black nail for exposed work and also for the present enormous demand for what are, by a misnomer, known as "galvanized" nails.

What Constitutes a "Galvanized" Nail

The object of this article is to deal particularly with the question of what constitutes a "galvanized" nail. For many years the term "galvanized" was applied solely to the process of coating articles of iron and steel by dipping them into a bath of pure molten zinc. The process was misnamed; it should have been called "hot zincing." The term "galvanizing" is now also applied to the process of depositing zinc electrically, or by what is known as the cold process of galvanizing. Iron and steel coated with different alloys, and even with zinc dross, pass as galvanized and the sherardizing process is often called galvanizing; consequently, the term "galvanized" means nothing definite, so far as durability is concerned. For several years lead-coated nails passed as "galvanized" and do to this day in some localities. A coating of lead applied to a nail affords little, if any, protection; neither does a coating of electro galvanizing. This is also true in the matter of nails thinly coated with zinc by a mechanical process, as many of them are.

It seems to be the general opinion of those who have watched results carefully and long enough to form an intelligent opinion, that a coating of not less than 10 lb. of pure zinc to the 100 lb. of nails is the only coating that can be relied on absolutely. Nails of this character have been used along the sea-coast for more than 30 years, particularly in New England, and writer has in his possession some twenty samples of zinc-coated iron cut nails that were in actual use, on as many buildings, for more than 30 years. They are in as perfect a state of preservation as the day they were driven, which statement holds good in many other cases that have come under writer's observation.

It is the experience of writer, extending back for more than 35 years, that only such nails as have been treated to a coating of from 10 to 12 lb. of pure zinc to the 100 lb. of nails, by the old-fashioned hand-dipping process, can be relied on to afford the protection that a galvanized nail is supposed to afford.

To buy nails simply because the keg containing them is branded "galvanized" is as ridiculous as it would be to accept tinned table knives as silver-plated. There is as much difference in the quality of so-called galvanized articles as there is in the different classes of silver and gold-plated ware.

A contractor that will knowingly use an inferior nail simply because the keg is branded "galvanized" is doing his customer an injustice, to say the least. If architects, instead of specifying "galvanized" nails, would specify "zinc coated by the hot process," it would not be so easy for dishonest or indifferent contractors to evade the clear intent of the architect in specifying "galvanized" nails, which intent on the part of the architect is to give his client something durable and of at least as long a life as the material in which they are used.

What will probably be the tallest building on the western water front of New York City, between Fourteenth and Forty-second streets, is the new 12-story structure covering a plot 100 x 100 ft. in plan to be erected at the southeast corner of Twenty-fifth street and Eleventh avenue, and estimated to cost $300,000. Owing to the proximity of the building to the water front, the foundations will have to be carried to bed rock 70 ft. below the street level. The plans were drawn by Architects Edward I. Shire and L. R. Caufman.

Plans have been filed for a 12-story fireproof elevator apartment house to occupy a site at the corner of Park avenue and Seventy-eighth street, New York City, to cost $1,000,000. According to George and Edward Blum, the architects, the building will have a façade of brick, with limestone and terra cotta trimmings, and will contain apartments for 48 families.

FORMS FOR CONCRETE WORK

SINCE freshly mixed concrete is a plastic material, forms of some kind are necessary to hold it in place and in shape until the cement sets up and the concrete becomes hard. Lumber, though expensive, is the material most commonly used. By exercising his natural ingenuity and customary care in the matter of construction of forms, the farmer has built so cheaply of concrete that his cost statements are frequently doubted by the builder in the city. Much of the work done on the farm requires almost no forms at all. In this class are walks, floors in buildings and feeding floors.

The first requisite of good forms, says a writer on the subject, is that they should be tight, so that the liquid cement may not run out between the cracks,

"Forms" for Concrete Work.—Fig. 1.—Showing Method of Bracing the "Forms" to Prevent Bulging.

cause pockets or hollows and thus ruin the looks of the work as well as decrease its strength. Consequently straight boards are most desirable unless one chooses to fill gaping cracks with stiff clay and tack strips over them. Dressed lumber is usually straightest and yields a neater finish to the concrete. But for ordinary purposes rough lumber is sufficiently good. Naturally the siding must be stiff enough not to bulge out of shape when the forms are first filled with concrete. This does not mean that very heavy siding is necessary. In fact, 1-in. boards are usually sufficiently strong. The bulging may be prevented by settling 2 x 4-in. studding from 20 to 30 in. apart, according to the thickness of siding boards or sheathing used.

The thoughtless cutting of boards into short lengths means a waste of lumber and a useless increase in the cost of concrete. Unnecessary nailing not only calls for more nails, but adds to the difficulty of removing and the danger of splitting and ruining the boards. The reason that concrete is so unusually cheap for the farmer is that he plans his forms to spoil as little lumber as possible and he finds a use for all of the lumber after it has served to hold the concrete in place. In this way the material for forms costs practically nothing.

Most concrete work on the farm is built in what is known as the *box form,* which, with variations, consists of one box within another, between which the concrete walls are molded. Such forms are used especially for walls of buildings, tanks and troughs. Ordinarily the studding need not be cut in lengths equal to the hight of the wall: it may without inconvenience be allowed to project above the top of the siding. Nor does it need to be sharpened (and later battered up at the other end) for driving into the ground. There is a quicker, easier and cheaper way. Set the ends of the studding on the ground and hold them in their proper position by a timber, called a *liner,* lying on the ground against them; or "toe-nail" the ends of the studding to a plate which will serve the same purpose. Stakes driven into the ground and against the plates or liners will fix them firmly in place. The studding may be held plumb by bracing it with odds and ends running from the top to stakes driven into the ground a few feet away from the form. If the forms are so high and will be filled so rapidly as to render possible the springing of the studding, tie the opposite pieces together by means of bailing or other pliable wire passed through the joints in the siding. Space the forms at the top by means of cross cleats.

For the outside wall of box forms boards of full length need not be cut at all. The extra length may be allowed to extend beyond the corners. This saving can not always be effected with the inner wall, yet odd pieces of boards may often be used in such a way as to prevent useless cutting. In nailing on the siding, arrange the boards so that all end joints will not be made on the same upright. If the lumber is crooked, draw the boards together so as to prevent cracks. Since the siding is generally between the studding and the concrete, heavy nailing is not needed to hold it in place until the concrete comes against it. Often cleats, clamps or screws are used to save the lumber and to render easier the removal of the forms. The forms should always be planned with this end in view. In placing the concrete avoid unnecessary lifting by leaving off a few of the boards at the top of the form until they are needed. However, if chips or blocks fall inside the forms, carefully remove them before proceeding with the work.

See that the forms are lined up properly before beginning to fill them, as they *must not* be disturbed after the concrete is in place.

If new forms are wet, before the concrete is placed, and allowed to remain in position until it has thoroughly set, bits of concrete will seldom stick to them. For very particular work, or where forms are to be

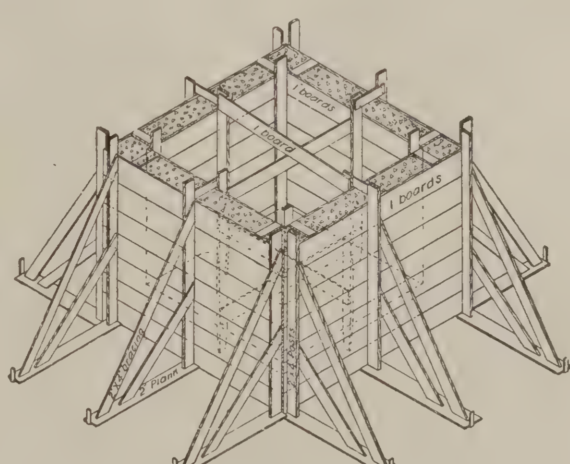


Fig. 2.—"Forms" Filled with Concrete.

used more than once, it is advisable to coat them, previous to erection, with soft soap or oil. Linseed, black or cylinder oil is suitable, but kerosene is not good. Upon taking down the forms immediately clean off all bits of concrete clinging to them. For this purpose a short-handled hoe is convenient, but it must be used with care so as not to gouge the wood.

All other things being equal, the strength of concrete is dependent upon its density or compactness. Where possible, the easiest way to render concrete dense is by mixing and placing it wet. For very wet concrete the forms must be tight, so that the liquid cement cannot escape. To give a neat finish to the surfaces, which will later be exposed, force the larger stones back from the outside by running a straight spade or a wooden paddle down in the concrete next to the wall forms and working it back and forth.

It frequently happens that very wet concrete cannot be used. To make a drier mix dense and strong, tamp or ram it into place with a heavy wooden or iron tamper.

In a way, the successful making of hay and concrete are very much alike—both must be well cured. Exposed surfaces of freshly placed concrete should be shaded to protect them from rain, dust and the hot rays of the sun. Freezing injures freshly placed concrete. Hot water and salt are sometimes used to counteract the frost action; but, on the whole, it is better to attempt no outside work in winter. During the early months of spring and fall see that no frozen sand, gravel or rock is used in the work. *In summer* ordinary forms, for walls supporting no loads, may be removed after the concrete is three days old, but *in cooler weather* they should not be touched short of five days.

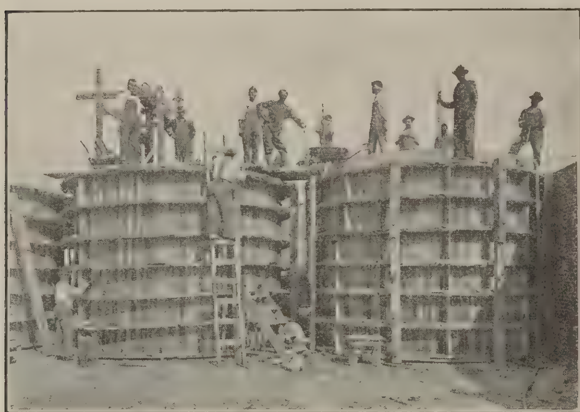


Fig. 3.—Modern "Forms" for Round Concrete Tanks.

Forms for Concrete Work.

Methods of Quarrying Stone

Fortunately for the quarrier, there are certain structural features common to rocks. However massive a stone may be, as it lies in the earth, nature has herself made it partly ready for man's use by breaking it into blocks, in one way or another, so that by taking a little trouble the quarryman can lift it out. Whether the stone is eruptive or sedimentary, it has, in most cases, been broken for him with some degree of uniformity by seams or fractures called "joints." Nature need not have laid down the sedimentary rocks in layers, nor filled the eruptive rocks with cracks that have a most remarkable way of intersecting each other so as to divide the rock into long, quadrangular or rhomboidal masses.

But Nature evidently knew that along about now the great builders of the land would be ready for and in need of an enduring, handsome and workable material in large quantities, and she arranged things so that when America would "grow up to granite" it would be easier for them to get it out. It was more difficult for the Fathers to quarry and cut stone than to saw lumber or burn clay, and they consequently first used wood for their buildings, then brick.

According to the way the joints run, there are "block quarries" and "sheet quarries," and some are, therefore, better adapted for certain lines of business than are others. In the quarry near Vinalhaven, Me., blocks nearly 300 ft. in length and only 10 ft. in thickness have been loosened from their bed, and the problem was not how and where to get rough material, but how to shape it.

To quarry for mill blocks, dimension stone, broken ashlar, etc., requires a wide knowledge of mechanics, no matter how amiable and workable the quarry may be. It is easy for the man who knows, but he is one who has been long trained to handling stone, and the training has made him a man of distinct type—a calm, far-sighted, deliberate, careful workman, almost as unemotional as the stone itself.

The methods of quarrying vary with the kind and quality of material, but everywhere the desired object is to get out well-shaped blocks with the least outlay of time and money, says a writer in *Construction News.* In granite quarries having numerous vertical "heads" or "joints," the work is easy, and the driving and blasting are generally done with horizontal holes. Of course, a quarryman selects at the outset, when he can, quarries which can be worked easily. In the leading granite quarries of Maine and Massachusetts no machinery is used for getting out stone except steam drills and hoists. They are favored with plenty of natural joints and geological breaks and are profitable to operate. In the Hallowell quarries, where the sheets of granite are entirely free from one another, all that is necessary to loosen the block is to drill a line of holes and to charge and fire them simultaneously, and then the blocks are further divided by the wedges.

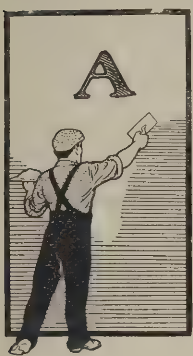
When stones of large dimensions are required, the blocks must, in the first place, be taken from a quarry where the granite lies in large masses; and then, oftentimes by means of sand blasts, a large body of the rock is pushed out, so that it can then be cut up with "plugs" and "feathers" into any desired size.

For quarrying marble and other soft rocks channeling machines are largely used. First, it is necessary to get a large, smooth surface, over which the machine can be operated, as the channeler is essentially a locomotive, with gang drills and boiler mounted on wheels, moving on a portable railroad laid on a quarry bed. The machine cuts vertical channels from four to six feet in depth and two inches in width across the entire surface of the quarry, the channels being any desired distance apart. When this operation is finished a "key block" is taken out by breaking it up, in order to make room for steam drills, which drive horizontal holes from eight inches to two feet apart along the bottom of the block, which is then split from its bed by means of wedges. This under-drilling is called "gadding." The frequency and depth of the horizontal holes must depend on the nature of the rift in the rock.

In sandstone and freestone quarries where the beds are from six to ten or more inches thick, without natural heads, the shearing is done by hand or with channeling machines, to make open ends. Then holes are driven of large dimensions on top of the ledges, two feathers (small pieces of half-round iron) are placed in each hole and tapering wedges and plugs are placed between them and driven in until the ledges break into large blocks clear across the quarry. A system of blasting is used in many quarries where the ledges are four to twelve feet thick or more. When a large mass of rock has been split from a quarry bed it can then be split into blocks of the desired size by means of wedges. If the rock is at all free it can be split almost as true as timber can be sawed. Nearly every stone, it must be remembered, has a distinct grain and rift along which it can be relied on to split.

Among the important work which the city of Washington, D. C., will soon witness in the building line is a new structure for the Bureau of Engraving and Printing, which is estimated to cost $1,750,000. The building is to be 850 ft. long, 4 stories in hight, classic in its type of architecture and is to be constructed on the site of the present building, which will be absorbed as the work progresses.

WHAT BUILDERS ARE DOING



AS the building season draws toward its close there is something of a falling off in the amount of vested capital involved in building operations throughout the city of Atlanta, Ga. The figures for September show a decline of nearly 25 per cent as compared with the same month a year ago, although for the nine months of the current year the record is nearly a million and a half dollars ahead of the corresponding period of 1909.

According to the figures available there were 354 permits issued last month for new buildings, alterations, repairs, etc., to cost $334,728, while in September last year 339 permits were issued for improvements involving an outlay of $439,791.

For the first nine months of the current year 3437 permits were issued, and the cost of the buildings was $5,721,-500. From January 1 to September 30 of last year there were 3336 permits issued for buildings estimated to cost $4,235,071.

Boston, Mass.

For the month of September this year there were issued from the office of the Building Commissioner permits for the construction of 30 brick buildings, 83 frame buildings and for 182 alterations. From Jan. 1 to Sept. 30 of the current year there were completed 684 wooden buildings at a cost of $3,391,700 and 202 brick buildings at a cost of $6,293,450. The 1402 alterations for which permits were issued cost $2,850,239.

In the corresponding period of last year 752 wooden buildings were completed at a cost of $4,213,200, and 137 brick buildings at a cost of $4,193,800. There were 1474 alterations completed at a cost of $2,195,941.

Some of the building is evidently due to the fact that many owners of small lots have come to the conclusion that prices of materials entering into construction will not be much, if any, lower than they are at present, and they are therefore going ahead with plans to build. The impression seems to prevail in many quarters that a decided increase in prices of building materials is not far distant.

Dealers have much stock on hand and are in a position to get quantities more provided they pay the price. Spruce dimension lumber has stiffened, and it is not believed that a figure below $23 will again be heard of, except in a few unimportant instances. Common brick is held high. Many manufacturers have signified their intention of closing down their yards for the winter. Consequently a strong rise in price will result if the demand continues. Sales of common are reported at $5.25 to $5.50.

Perhaps as much interest is manifested in the paint situation as in any other branch of the building question. Paint manufacturers have not only raised the price of high-grade house paint 20 cents a gallon, but have found it necessary to make corresponding advances on all goods in the paint line affected by linseed oil and turpentine, according to the quantities of these ingredients used in the composition.

Dealers report an advance of a dollar a thousand in six grades of cypress, a dollar in two sizes of maple, both hard and soft; oak flooring, quartered-sawn, of from 50 cents to $4. Yellow pine flooring is advanced 50 cents. Hardware is held at top prices.

Much building is looked for in the suburban wards and in the nearby suburbs of Boston. Dealers in second-hand materials have orders ahead for everything that can be used in dwelling-house construction. Brick is in constant demand, and not one is wasted.

Persons who wonder what becomes of the material from old buildings that are being torn down in various sections of the city would do well to visit some of the yards where building wreckers store the lumber, brick, steel, doors, windows, shutters, blinds, etc., and see what becomes of every scrap. They also would be somewhat astonished at the prices asked for these articles. The buyer must not for one moment think, because the building wrecker has got the materials from an old building for little or nothing, he is going to sell on that basis. Well, hardly. He asks a good, stiff price, and he gets cash for it on the nail. Not alone is this second-hand building material sold in Boston and its vicinity, but quantities are shipped to distant points to be used where it will do the most good.

Buffalo, N. Y.

Building permits for the month of September issued by the Bureau of Building aggregated 253 with a total estimated value of $606,000, as compared with 258 permits with a valuation of $581,000 for September, 1909.

The bulk of the month's building business for which permits were issued was for dwellings of the smaller class, but a fair sprinkling of commercial buildings and industrial plants is included.

Among the more important of the business and factory structures for which permits have been granted, or for which plans have been completed for erection this fall, are the following: The Haberstro store and office building, seven stories and basement, on Broadway, $75,000; a ten-story office building on Washington street (plans under way), $100,000; alterations and additions to office building, Niagara Square and Delaware avenue, for the Spencer Kellogg Company, $35,000; two-story office building for the Buffalo Dry Dock Company; three-story office building for the Fleischman Company; a five-story and basement addition to the F. N. Burt Company's factory No. 1, $50,000; a new building for the Buffalo Box Factory, $25,000; an extensive factory building for the Buffalo Leather Company; a forge, blacksmith and machine shop for the Niagara Machine & Tool Company at its new plant, Northland avenue, and the New York Central Railroad Belt Line; a large addition to the plant of the John R. Keim Company, Kensington avenue and the Erie Railroad, and additions to the plant of the Danahy Packing Company and the factory of the Bergman Tool Company. Plans are also nearing completion for the Washington Street Market, to be erected by the city, to occupy a square at Washington, Chippewa and Ellicott streets, of steel, stone, tile and glass, to cost about $700,000.

Cincinnati, Ohio

Although building operations were active during September the number of permits issued totaled only 818, with an estimated value for improvements of $560,295, as against 929 permits for August to cover building costs of $694,550. During September last year 712 permits were issued with value of authorized improvements placed at $643,450. Of the permits issued 45 were for brick, concrete and stone buildings, 50 for frame buildings and 106 for alterations and additions.

Due to the fact that the electric railway companies are paying common laborers from $2 to $2.25 per day, with free transportation to and from work, this class of labor is very scarce. Plasterers are in demand, and those available are asking and getting 70 cents per hour.

On account of a recent disastrous fire, which destroyed a large public garage, the Building Commissioner has issued stringent orders for all garages to fireproof their buildings.

A large number of moving picture show halls are being constructed in the suburbs, the proper ventilation for which has puzzled a number of local contractors, and published suggestions from outside builders would no doubt be welcome.

In the list of new buildings on which construction work will soon commence is a dry-cleaning plant for the C. W. Loughead Company, plans for which were made by Architects Stewart & Stewart, Bell Block, Cincinnati. There will be three separate buildings; the main one will be 50 x 160 ft., brick construction; the dry-cleaning structure will be 20 x 65 ft., and the garage for the company's delivery vehicles 40 x 60 ft.; both of the latter-named buildings will be of reinforced concrete with concrete roof. The owners have inspected a number of similar establishments in the East and West, and propose to make this the best arranged plant of its kind in the country.

Among buildings nearing completion is the large C. P. Taft apartment house on Fourth street. The Ohio Mechanics' Institute has been completed up to the fifth story. When finished this will be the tallest reinforced concrete structure in the Central West.

Cleveland, Ohio

Building operations in this city continue quite active. The permits issued by the City Building Inspector's office during September were slightly larger in amount than during the previous month and were almost double in amount those of September, 1909. During September there were 784 permits issued for new structures to cost $1,618,817, as compared with 768 permits issued in August for buildings to cost $1,506,682. During September of last year the permits aggregated $814,000.

Work will be started shortly on the foundations for the new city hall building. Other important constructions for which bids will be received shortly is the new Y. M. C. A. building and the Cleveland Art Museum. A good volume of work is coming out in business blocks, factory buildings, apartment houses and residences.

Plans are being made for an exhibition of ideal homes, which will be held in the Central Armory next spring under the auspices of members of the Cleveland Real

Estate Board. This exhibit will be mainly to show the various products in the building lines that are either made or sold in this city.

Dayton, Ohio

No records are available showing the cost of improvements for September, but according to leading architects and builders the month showed up reasonably well, and October will probably be better. Building contracts that have either been let recently, or are being figured on now, include a $24,000 addition to the Antler Hotel and extensions for the Miami Hospital calculated to cost about $35,000. Among new church contracts is one for the United Brethren that will involve an expenditure of over $20,000, and another for the First Christian Church which will run up to about $15,000. Additions to the St. John's Armory are estimated to cost between $15,000 and $20,000, with a large percentage of this going to the heating contractor. The projected $15,000 building for the Andrews Bakery will be the most up-to-date of its kind in the Central West. Several residences, costing in the neighborhood of $10,000 each, are being constructed, and two or three others of this class are planned.

Good bricklayers and carpenters are in demand, so are steam fitters. The plumbers are also busy.

The C. W. Raymond Company, manufacturer of clay-working machinery, has nearly completed a large brick plant at the corner of Bolander street and Broadway. The main building is 100 x 325 ft., two stories; the power plant 40 x 160 ft., and castings department 30 x 80 ft., both one story. A two-story office building, 36 x 76 ft., will also be constructed. All the brick that were used in building these structures were made with machines of the company's own manufacture.

William E. Russ, a local architect, drew up the plans for the Wright Company's aeroplane factory, now nearly completed, and also for the boiler-house addition to the Dayton Motor Car Company's plant, construction on which has just commenced.

The Builders' Exchange is flourishing, although only about two months old. It was formed to further the interests of local builders, architects and others associated with building, including dealers in building materials. Already over 100 members have been enrolled and the secretary is daily adding other names. A suite of rooms has been secured in the Arcade Building, where the Exchange will have its permanent headquarters. The officers are: John Boren, president; John F. Baker, vice-president; J. Elam Artiz, treasurer, and F. O. Kemlein, secretary.

Los Angeles, Cal.

The building record for the month of September shows up very well, being considerably larger than for the month preceding, though smaller than during July or than the month of September last year. The record of the building office shows a total of 986 permits issued with a total valuation of $1,652,790, as compared with 837 permits with a total valuation of $1,875,909 for the month of September, 1909. During August of the present year permits to the value of $1,227,400 were issued.

Los Angeles builders are anticipating a more active winter than they had last year, as considerably more work has been planned or is now under way than was the case during the same period of last year. The labor disturbances may have some little effect in holding up work, but unless something unexpected happens it is thought that the worst of this is already past. Notwithstanding the near approach of the rainy season, the construction of new residences is holding up well. During September the permits for residences reached a total valuation of upwards of three-quarters of a million dollars, the average cost of each being something under $2,000. The lumber market is firm with a good demand, but the supply is ample for the winter's work. Other building materials are unchanged, with abundant supplies on hand.

Among the more important buildings planned for the immediate future are: The five-story reinforced concrete Rampart Investment Building at Sixth and Rampart streets, to cost $160,000, for which a permit has just been issued, Paul C. Pape architect; the eleven-story Title Insurance & Trust Building, to be erected on Fifth street near Spring, for which plans are now being drawn by Morgan, Walls & Morgan; the seven-story Hoffman-Meyer Building, to be erected on Broadway near Seventh street, R. B. Young & Son architects, for which the contract has just been let to the Barber-Bradley Construction Company for $72,000; a reinforced concrete paint shop, to be erected for the Los Angeles Railway Company on Fifty-fifth street near South Park, at a cost of $103,436, G. J. Kubris architect, Aiken Reinforced Concrete Company contractors, and the four-story brick J. W. Owen apartment house, to be erected at a cost of $50,000 at Orange and Valencia streets, A. L. Haley architect, Rowland & Pruess contractors.

Memphis, Tenn.

Building operations within the city limits continue to show a steady increase over the corresponding period last year, the total valuation given in the application for permits during September, as shown by the figures compiled in the office of Inspector Dan C. Newton, amounting to $324,840, as compared with $304,504 for September, 1909.

The bulk of the operations was confined to frame dwellings, for which 56 permits were issued for houses containing 310 rooms and costing $104,110. There were three brick veneer residences planned to cost $16,500; one police station to cost $16,000; an engine house to cost $26,000, and a reinforced concrete warehouse to cost $10,000. There were also four stone veneer residences planned estimated to cost $23,545.

New York City

The lockout and strike of the bricklayers referred to in our last issue was of comparatively short duration, the matter having reached a compromise on Oct. 7. It was arranged after several conferences between the International officers of the bricklayers' unions and the Mason Builders' Association that when members of the association have work to do in cities outside of New York which are not covered by the present local trade agreement the union rules must obtain in these cities and towns. The present trade agreement between the Mason Builders' Association and the local unions will expire the 1st of January of the coming year.

While the volume of building operations in the borough of Manhattan for September fell below the aggregate for August it shows a fair increase when contrasted with September a year ago. In the report of Superintendent R. P. Miller, of the Building Department, it is shown that last month 51 permits were issued for new buildings to cost $5,229,450, while in September last year permits were issued for 59 buildings to cost $4,660,700. The bulk of the operations last month were made up of tenement or apartment-house construction, of which class of buildings 16 were planned to cost $3,375,000, while in September last year 22 buildings of this class were planned to cost $3,730,000.

For the third quarter of this year the showing does not make favorable comparison with either the second quarter of the year or with the third quarter of last year, there being a heavy reduction both in the number of buildings planned and in the amount of vested capital involved. According to the authority quoted there were in the third quarter of this year 180 buildings planned to cost $18,115,860, while in the second quarter there were 298 buildings planned involving an outlay of $35,533,375. In the third quarter of last year there were 210 buildings for which permits were issued, involving an estimated outlay of $28,062,422.

In the borough of the Bronx a less number of buildings was projected last month than in the same month a year ago, but the estimated cost was somewhat larger owing to some of the structures being of a rather more pretentious character than was the case at this season last year. In September 114 buildings were planned to cost $2,492,600, while in the same month of last year 126 buildings were planned to cost $1,980,175. According to the plans filed with the Bronx Building Bureau in the third quarter of the year there is a falling off of about 4 per cent compared with the same period of 1909. There were 373 buildings projected in the quarter ending September 30 calling for an outlay of $7,676,345, while in the corresponding quarter of 1909 there were 517 buildings planned to cost $7,948,725. It must be remembered, however, that last year established a record for the borough of the Bronx. The decrease for the third quarter of this year is mainly in one and two-family dwellings, as tenement construction showed a slight increase.

In Brooklyn there was a decided falling off in building operations, the number of structures planned being 502, calling for an outlay of $3,113,200, while in September last year 758 buildings were planned to cost $4,021,250. For the nine months of this year the permits issued were 4728, calling for an outlay of $28,944,000, while in the first nine months of last year 8335 permits were issued calling for an outlay of $46,536,320. These figures do not include the amount estimated to be expended for alterations, which for the two periods named were $3,440,900 and $3,566,000, respectively.

The opening of the Pennsylvania Terminal early in September, by which the western end of Long Island was brought nearly a half hour nearer to the shopping district of the borough of Manhattan, was not reflected in any increased activity in building operations in the borough of Queens. In fact there was less doing in the building line than was the case for the corresponding month a year ago. September shows 349 permits to have been issued for new buildings to cost $1,484,600, while in September last year permits were issued for 410 buildings to cost $1,669,000. The features of the month were the activity which prevailed along the north shore points and the tendency to erect more expensive dwellings than was the case a few years ago. The feeling is expressed by builders that a modification of the tenement house law as regards three-family structures will tend very greatly toward increasing building activity in the future. For the first nine months of the year plans were filed for 3200 buildings to cost $11,872,000, while in the first nine months of last year permits were taken out for 3549 buildings estimated to cost $13,862,150.

Omaha, Neb.

September was not a particularly busy month in the building line, and had it not been for the million dollar permit issued to the Union Pacific Railroad Company for certain improvements the record would have fallen several hundred thousand dollars below the figures for September last year. There were only 98 permits issued last month for building improvements, costing $1,202,470, while in September of last year there were 134 permits issued for buildings to cost $514,275.

For the first nine months of the current year the record is fairly satisfactory, although it is not quite up to that of the corresponding period of 1909, which, by the way, was a record breaker. This year there were 1280 permits for buildings costing $5,288,483, while in the first nine months of last year there were 1315 permits issued for buildings costing $5,594,280. In the same period in 1908 there were 1219 permits for buildings costing $3,174,015.

Philadelphia, Pa.

The volume of building during September showed a gain, not only over the previous month, but also over that for the same period last year; in fact, the authorized expenditure during the month has not been exceeded in any September for over ten years. Notwithstanding the gain of over half a million dollars, as compared with the previous month, it will require decidedly more active conditions during the remainder of the year to enable the record for 1910 to equal that for last year. During the first nine months of last year the authorized expenditure totaled $34,865,720, while during the same period this year an aggregate of $31,653,875 is shown.

Building operations, which have been gradually falling off for several months, showed a revival during September, when 793 permits for 1459 operations were issued by the Bureau of Building Inspection at an aggregate estimated cost of $3,283,915, exceeding that for August by $649,650, while, compared to September, 1909, when the value of work authorized was $2,734,540, the gain in favor of the present month is $549,375.

Taken generally the prospects for fall building are considered, at this time, to be more promising. Builders of dwelling houses are proceeding conservatively, however, as they see the growing tendency in favor of the apartment-house method of living. There is a large amount of alteration work in sections readily accessible to the business districts, where large dwellings are being changed into apartment houses, which may ultimately have its effect on the building of the smaller dwellings. There is considerable work under way and more being planned in the construction of garages. Several of considerable size are now in course of erection and more are projected.

Prospective business in flat-house construction includes one 48 x 106 feet, three stories, of brick, with steam heat, from plans by H. DeHoff, Sixty-first and Chestnut streets, on which contractors are estimating, to be built at the northwest corner of Forty-fourth and Walnut streets.

Plans are also in progress by J. Frank Bradley, architect, for four flat houses of brick and stone trimmings, two stories in height, to be built at Forty-sixth and Sansom streets. Henry J. Beaufeldt, architect, also has plans prepared for an extensive sixteen-story apartment house, which it is proposed to erect at the northeast corner of Eighteenth and Walnut streets for a syndicate. Plans provide for a fireproof structure 62 x 122 feet, containing 55 suites of 4, 6 and 8 rooms with bath. The Thompson-Starrett Company, it is reported, has the general contract and will shortly be prepared to take sub-contracts. The entire construction will, it is estimated, cost close to $900,000. The materials specified include gray brick, limestone and terra cotta trimmings, while the interior finish will be of hardwood, marble, tile and mosaics. The recent purchase of a plot of ground, 50 x 220 feet, at Thirty-eighth and Chestnut streets, by Solomon Greenburg, has, it is stated, been made with the view of erecting a large apartment house on the site.

In the dwelling class of operations the following operations have been begun: In the vicinity of Butler & Gratz streets, H. H. Heist has started the erection of eight two-story houses and two two-story dwellings, the aggregate cost of which will be $27,000. J. C. Boggs has begun work on an operation of 76 two-story houses in the vicinity of Stella and Mayfield streets, to cost $125,800. They will each measure 14 x 31 feet on the ground plan. An operation of 35 houses has also been started by A. C. Swarz, in Lefevre, Gaull and Miller streets; the houses have 14 and 15 feet fronts and an average depth of 37 feet, while J. B. Vanderslice has started work on an operation of 15 two-story houses at Salmon and Croyden streets, each 14 x 38 feet. This work is estimated to cost about $22,000.

Pittsburg, Pa.

A feature of building operations last month was the amount of small construction work, the report of Superintendent S. A. Dies showing that no particularly large operations were included in the 337 permits issued in September. The estimated cost of the improvements for which these permits were issued was $835,800, which is a decrease of $1,160,461 as compared with the cost of the building improvements projected in September last year.

Of the work planned last month were 162 new buildings costing $686,283 and 50 additions costing $71,870. The rest was for alterations and miscellaneous work. Of the new buildings planned 65 were of brick, 47 of frame, 1 ironclad, 39 veneer, 1 steel, 5 brick and iron and 4 cement.

Portland, Ore.

The building activity in this city holds up well notwithstanding the approach of the rainy season. During September the building permits issued numbered 603, with a total valuation of $1,374,360, as compared with 509, with a total valuation of $1,288,300 for the same month last year. The September record, while far behind the high figures of the month preceding, do not indicate any dropping off in actual work, as builders are as busy now as at any time this year.

The number of new residences authorized during the month showed something of a falling off, due to the season. The number was 244, with a total valuation of $546,050, showing an average of over $2,000 each. Among the larger buildings for which permits were issued during the month were: The reinforced concrete warehouse of the Marshall Wells Hardware Company, occupying an entire block, bounded by Fourteenth, Fifteenth, Kearney and Lovejoy streets, to cost $200,000; the fitting of the Ladd & Tilton banking quarters in the Spalding Building, to cost $90,000; a three-story brick apartment building to be erected by Fred Hanibut on Trinity place at a cost of $35,000; the four-story brick hotel building to be erected by Friedenthal & Hirsch at Tenth and Stark streets; the four-story reinforced concrete Milton J. Jones Building to be erected on Fourth street near Morrison at a cost of $45,000, and the three-story addition to the Gambrinus Brewery to cost $15,000.

Application has been made for a permit for a ten-story fireproof office building to be erected by Maegly & Tichnor on the corner of Seventh and Alder streets. This permit will replace a permit for a six-story mill construction building to cover the same lot which was issued some time ago.

St. Paul, Minn.

A decided falling off in building operations occurred in September, the total value of the improvements for which permits were issued being almost half what it was in either August or July and nearly $400,000 less than it was in September a year ago. According to the report of the Building Inspector last month there were 350 permits issued for new buildings to cost $664,768, as contrasted with 389 permits in August for buildings to cost $1,138,461, and with 389 permits in July to cost $1,116,861.

In September last year there were 326 permits issued for buildings estimated to cost $1,036,716.

For the nine months of the current year 2987 permits were issued for building improvements to cost $8,045,596, while in the corresponding months of last year 3270 permits were taken out for new building improvements to cost $8,633,962.

San Francisco, Cal.

Notwithstanding a generally better feeling in building there is no prospect of any great revival in construction work in this city. As far as business buildings are concerned the city is fairly well supplied, and the only building of this sort that is to be anticipated during the next few months is the covering of vacant lots in desirable localities in the down-town district. Generally speaking, the buildings now going up in the business district are of a much cheaper character than was the case a year ago. Even on lower Market street a number of four and five-story concrete buildings are going up, where a year or two ago nothing less than eight or ten stories would have been thought of. The reason for the change seems to be that the banks have decided not to advance money for the construction of the more expensive class of buildings.

During the month of September the total value of the building contracts placed on file was a little less than a million and a half, or somewhat less than for the month immediately preceding. The falling off in building as compared with previous years since the great fire is well illustrated by a comparison with September, 1909, when the construction work reached a total of a million and three-quarters, and with September, 1908, when it reached over three and three-quarters millions.

The building of apartment houses, which has been the most notable feature of the present year's work, is being continued, a number of new buildings of this sort having been started. Two new features are the revival of residence building and the starting of a number of large warehouses of slow-burning construction. The large hill district west of Powell street, which by reason of having been included in the fire limits has been the slowest portion of the city to be restored, will, it appears, be covered with fireproof flats and residences. Before the great fire this was largely a wooden residence district. The new building law placed it within the fire limits, and as the lots were small and the section too hilly for business buildings, practically nothing but apartment houses and hotels have as yet been erected in it. Now, however, a start has been made on residence building, and builders are anticipating much work here during the coming winter and spring.

Building materials are unchanged as to price, though generally somewhat firmer than earlier in the year. The vogue for reinforced concrete business buildings and for large concrete warehouse structures has given the cement market a firmer tone. Brick, which has been in better demand for some months, is in pretty good shape from the brick man's standpoint, though an advance is not anticipated. The lumber market is also more firm, partly owing to an increase in the demand from the interior and partly to the revival in the foreign demand. There is no change in prices either for pine or redwood. Stocks in the city are probably ample for the winter, though much smaller than they were a year ago or even last spring.

Dr. Hartland Law has taken out a permit for the reconstruction of the Rialto Building at the corner of Mission and New Montgomery streets, at a cost of $200,000. The Rialto Building was one of the city's fine office buildings before the great fire, and about the last of these capable of being restored that has not been restored.

City and federal work continues to engage the attention of a number of local builders. The City Architect has completed plans for reinforced concrete swimming tanks at the North Beach Playgrounds, to be erected at a cost of $40,000. Plans are also being drawn for the Lowell High School, to cost about $340,000, and for the Marshall and Peabody schools, to cost about $68,850 each. The United States Light House Engineers have plans completed for the following, for which the necessary appropriations have already been made: Signal stations and buildings at Santa Cruz, to cost $29,000; new station, concrete light building and dwelling at Ana Caus Island, to cost $100,000; fog signal building and frame dwellings at Point Loma, to cost $17,500, and a frame station and dwelling at Army Point, to cost $10,000.

Seattle, Wash.

While the number of building permits issued last month was a trifle less than in September a year ago, the amount of vested capital involved was larger, due to the filing of a permit for a fireproof steel frame structure to cost $1,250,000. The bulk of the operations, however, consisted of frame dwellings, for which 252 permits were issued, involving an estimated outlay of $353,935. There were 280 permits for frame structures intended for business purposes, involving, however, an estimated outlay of $71,625. One brick dwelling was projected to cost $30,000, and a concrete building to cost $1,600. The report for September of F. W. Grant, superintendent of the Department of Buildings, shows that 1310 permits were issued for building improvements costing $1,849,395, as contrasted with 1319 permits in September last year for improvements costing $1,740,390.

For the nine months of the current year the Department issued 10,253 permits calling for an estimated expenditure of $13,303,630, while in the corresponding period of last year 11,438 permits were granted calling for an estimated outlay of $15,309,993.

LAW IN THE BUILDING TRADES

By A. L. H. Street

RIGHT OF CONTRACTOR TO RECOVER FOR EXTRA WORK

Where the parties to a building contract deviate from the original plan agreed upon, and the terms of the original contract do not appear to be applicable to the new work, it being beyond what was originally contemplated by the parties, the new work must be treated as extra work, for which the contractor can recover, though a written order of the architect therefor was not obtained. (Connecticut Supreme Court of Errors, Casey & Hurley vs. MacFarlane Bros.' Manufacturing Company, 76 Atlantic Reporter, 515.)

LIABILITY FOR INJURY TO EMPLOYEES CAUSED BY DEFECTIVE SCAFFOLDS

Since the labor law of New York requires building contractors to furnish safe scaffolds for workmen, persons entitled to use a scaffold furnished by a contractor may assume that it is safe, and he is liable for injury to them caused by a defect existing through his negligence, regardless of the actual employment of the person injured. Where a sub-contractor's representative had general supervision of a building, employees of the general contractor can recover from the sub-contractor for injuries resulting from defects in scaffolds constructed to facilitate the sub-contractor's work, such representative having suggested to the injured employees that they use the scaffolds. (New York Supreme Court, Appellate Division, First Department, Huston vs. Dobson, 123 New York Supplement, 892.)

WAIVER OF DEFECTS IN CONSTRUCTION WORK BY OWNER

The owner of a building waives a claim for inferior work and material by making payments to the contractor from time to time and by giving a note for the balance of the contract price, after having inspected the work during its progress and acquired knowledge of the quality of materials used and of the character of the work done. The settlement is presumed to have adjusted all matters under the contract, and before the owner can recover for defective performance he must not only show that defects existed but must show that the settlement was made without knowledge of them and without reasonable opportunity to ascertain them. (Iowa Supreme Court, Houlette & Miller vs. Arntz, 126 Northwestern Reporter, 796.)

RIGHT TO JOIN MECHANICS' LIEN CLAIMS—EFFECT OF SLIGHT FAILURE TO COMPLY WITH CONTRACT

A contractor who furnishes labor and material in erecting a building under distinct contracts with the owner preserves his right to enforce a mechanics' lien by filing a claim for the total amount due on the several contracts, if material or labor was furnished under all the contracts within four months preceding the filing of the claim. A slight omission to comply with a building contract will not preclude the builder from enforcing a mechanics' lien if the contract was substantially performed. (Nebraska Supreme Court, Grove-Wharton Construction Company vs. Clark, 126 Northwestern Reporter, 651.)

ACTS NOT ENTITLING CONTRACTOR'S SURETY TO DISCHARGE

A builder's surety is not discharged from liability on a bond to insure performance of a contract by payments to the builder on the superintendent's certificate, made in good faith and without fraud, though the superintendent failed to do his duty by permitting the builder to prepare estimates which included the value of material on the ground but not used in the building. Nor can the surety escape liability because the builders undertook contracts aggregating $200,000 on a capital of $400. (Washington Supreme Court, Y. M. C. A. of North Yakima vs. Gibson, 108 Pacific Reporter, 766.)

LIABILITY FOR ACCIDENTAL DEATH OF EMPLOYEE

A carpenter was called from his work on a building in the course of erection and, with other workmen, directed by their foreman to straighten by hand the leaning top of a tall wooden derrick which had been placed near the center of the third story of the building, in order to hoist heavy timber up for the construction of the roof. Through failure to temporarily tie down by ropes, furnished by the employer, the feet of the derrick, before forcibly disturbing its balance upon the supporting plank, it fell and killed him. Held that the proper adjustment of this building appliance for its intended and effective operation was a component part of a carpenter's duty, in the performance of which deceased and his fellows engaged as a part of their common employment, and that no actionable negligence chargeable to the employer had been made to appear. That the foreman was a fellow servant with the deceased and the other workmen, and, under the facts proved by the plaintiff, the deceased, in the attempt to straighten the top of the derrick by pushing its unfastened feet with a force so great as to raise them up out of the notches in which they rested upon the plank, assumed an obvious risk sufficient in law to defeat plaintiff's recovery. (New Jersey Court of Errors and Appeals, Loid's Administratrix vs. J. S. Rogers Company, 73 Atlantic Reporter, 488.)

UNSAFE WALLS AND BUILDINGS AND HOW TO TREAT THEM

BY OWEN B. MAGINNIS

IT goes without saying that the experience of a practical builder, covering a period embraced within the past 35 years, would be an extensive and varied one and exhibit many peculiar phases calling for the display of ingenuity and originality. Among these probably there is none more interesting than what might be technically termed "unsafe buildings and walls," and it is of these that the writer purposes to treat in the comments which follow.

Of "unsafes" there are many kinds, all of which are worthy of consideration by the architect, the building contractor, the engineer and the excavator. In fact, it is too often obligatory in these days, when old buildings and walls are being demolished to make way for modern structures, that all persons interested or connected with the work should possess a knowledge of how to proceed when such "unsafes" are either evident or develop as the work progresses.

How do walls become unsafe? From experience we find that buildings and walls become dangerous and unsafe from many causes, among which mention may be made of the following: By bad judgment or haste in building; the natural decay of the constituent materials; by exposure to climatic changes and chemical action; by constant usage, wear and tear, as well as abuse, such as by overloading, neglect, lack of repairs, fires, etc.

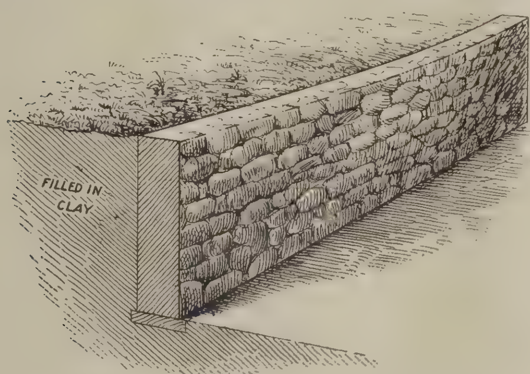


Fig. 1.—A Common Case of Bulging Wall.

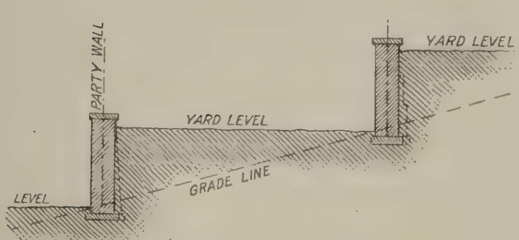


Fig. 2.—Section Showing Another Cause of "Unsafe" Walls.

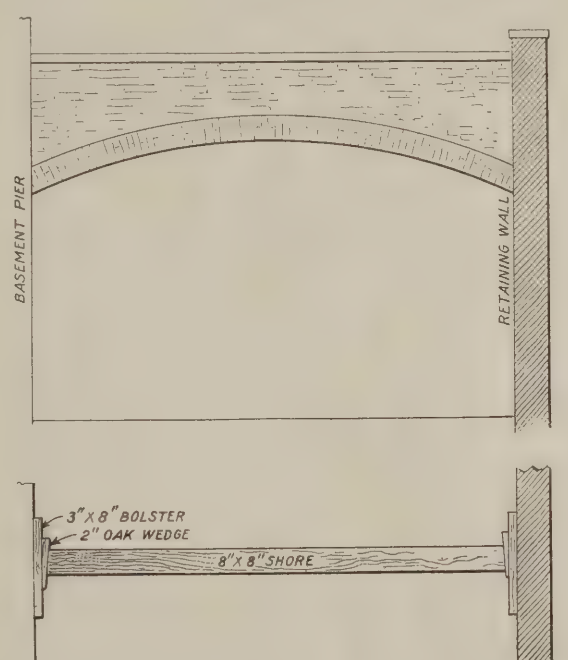


Fig. 3.—Method of Shoring and Buttressing a Front Retaining Wall.

Unsafe Walls and Buildings and How to Treat Them.

Let us, however, first take up the most frequent cases and suggest how they should be remedied. Referring to Fig. 1 of the accompanying sketches the reader will observe a very common "unsafe." It represents a 24-in. stone retaining wall supporting a bank of filled-in clay or earth, which presumably is the substratum of a street or yard. Having been recently built and known as what might be termed a "green wall," it has succumbed to the literal pressure of the filled-in material. The ends of the wall being held fast by the right-angled or square returns cannot yield to this pressure, but the unsupported stretch of wall, say it be 25 ft., 50 ft. or 100 ft. in length, must give way, so that the wall becomes out of plumb, bulged and unsafe, as represented in the picture.

This is one of the most common cases of "unsafes" and is caused by filling in the clay or earth before the mortar in the wall has "set" or hardened and before the wall has obtained its full bond. It is prevalent in yards which follow street grades and dip or slope, as represented in Fig. 2. It is a bone of contention between owners not alone on account of the matter of trespass, by reason of overhanging or being out of plumb, but also because of its being "party," as these walls sometimes are, creating the basis of disputes as to who is responsible for their safety.

The walls are best battered or stepped as indicated by the dotted lines. When they are party walls both parties are responsible, but when on separate property the owner must himself preserve its integrity and arrange with his neighbor in the matter of injury or trespass. Now as to the remedy. When this condition becomes manifest on front retaining walls it is a very simple matter to shore or buttress such a wall with masonry or timbers as indicated in Fig. 3, but should the wall be dangerous, cracked in sections or bulged, there is nothing to be done but to excavate the bank, etc., behind it, take down the wall and rebuild it in a good and substantial manner, making it safe according to law.

In this connection the Building Code of the city of New York is peculiar. In its last clause, section 22, it says:

> "When an excavation is made on any lot, the person or persons causing such excavation to be made shall build, at his or their own cost and expense, a retaining wall to support the adjoining earth; and such retaining wall shall be carried to the hight of the adjoining earth and be properly protected by coping. The thickness of a retaining wall at its base shall be in no case less than one-fourth of its hight."

Very well, indeed, but the reader will notice there is no provision made here for natural grade nor for party rights, all of which are a legal consideration.

A natural grade is not an excavation, but an existing condition; therefore, it is manifestly unfair to compel one owner to contribute to the expense of building a retaining wall to support his neighbor's bank unless it is "party" or by mutual agreement to the benefit of both.

Now as to party walls. Let us take a case which actually came within the experience of the writer. In demolishing a house built about 25 years ago, it was found that the east and west party 12-in. brick walls were about 8 in. out of plumb, leaning toward the east, as indicated in Fig. 4 of the drawings. Now, it was the intention of the owner to rebuild the house, replacing an old-fashioned high-stoop, four-story brown stone dwelling with a modern, up-to-date American basement dwelling, but what to do with the defective walls was the question. They were not necessarily unsafe, yet were defective in being warped and out of plumb.

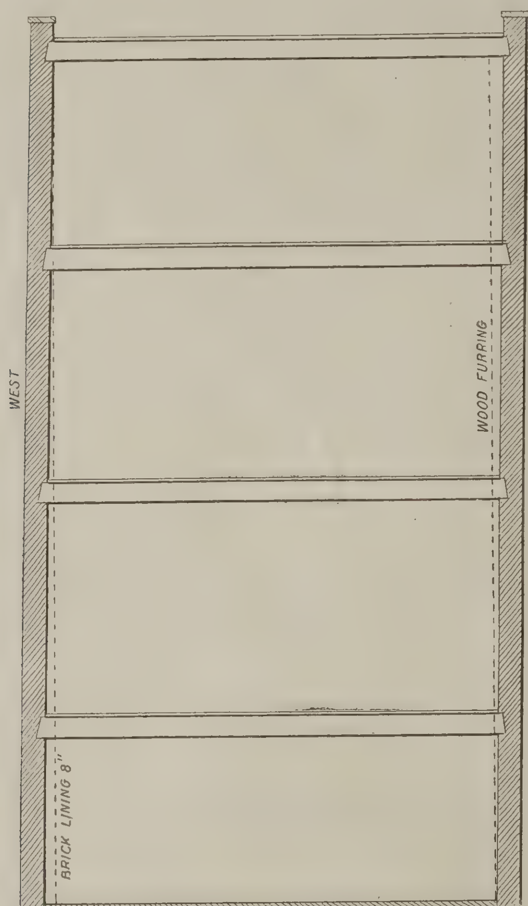


Fig. 4.—Showing How the Perpendicularity of the Interior Walls of a Building Out of Plumb Was Maintained.

Unsafe Walls and Buildings and How to Treat Them.

After careful consideration it was decided to line up the west wall with brick work, carrying it up plumb until it practically merged with the old wall and anchoring it to the latter with L-anchors and then fur out the old east wall with diminishing wood studding, thus preserving the perpendicularity of the interior walls.

It will be observed that this method maintained the integrity of the party walls without disturbing the tenants in the east and west dwellings adjoining.

Great indeed is the value of brick work, for it must be remembered that a brick wall properly anchored and tied, although out of plumb and solid in the mass, is not virtually unsafe unless both walls have passed outside the line of gravity. They will stand if kept exempt from jar and shock and the foundations secure from settling or slipping.

The matter of over-loading in the center of the span between walls will, as has frequently been found, cause the walls to draw in or buckle. This can only be remedied by shoring with girders and posts set, if possible, intermediate between the walls.

Exterior and isolated walls and piers of buildings, if out of plumb, bulged or, from unequal settlement, disintegrated by fire—or from any cause, in fact—must be braced, shored or needled. Broken or fractured walls of brick, concrete or stone must be rebuilt. In the case of the latter, if of rubble work, danger is never imminent; if of cobblestones or "nigger heads" it is dangerous, probably for the reason that the contraction of the mortar allows the stones to become loose and drop out by reason of their roundness and lack of bond. Square stones, or, in fact, any rectangular material, such as brick and tile, never.

Let us sum up the subject by noting what is unsafe in timber. Of course its natural diseases, knots, shakes, dry rot, subsidence, etc., under strains are included in this category. Similarly, too, with iron, cast or wrought, and steel. Cast iron is brittle; hence in recent modern practice its comparative disuse, except perhaps for columns and lintels. Steel and wrought iron must, in spite of their wonderful capabilities, be protected and kept safe by coatings of paint, cement, concrete, etc.

And so it goes: the best part of a builder's practice is not always the actual construction, for he must not alone be experienced in this, but also be so well versed in a knowledge of the action of the materials used in the construction of buildings that he may know how to act and proceed when any kind of an unsafe wall, part of or even an entire building is brought to his attention for advisement.

Unique Wall Construction for Small Concrete Buildings

An interesting building operation involving the erection of a number of concrete bungalows, each containing five large rooms and bath on the first floor and two rooms on the second, has recently been completed at Carnegie, a suburb of Pittsburg, by W. H. Parrish, a practical builder, who states that he can put up these bungalows at a cost of only 6 per cent. above that of a frame dwelling.

The roofs and floors are of timber construction. The walls differ from the customary monolithic construction in that ordinary 2-in. by 4-in. studs are partially embedded in the walls and serve during construction to support the inside forms. The studs are set up on 16-in. centers, and between them 1½-in. plank, 14 in. wide, are placed vertically with the outer side flush with the face of the stud. They are held in this position by simple spacing strips at top, middle and bottom. The concrete, of course, fills the 2½-in. depth of pocket back of the plank, and when the forms are removed the studs project 1½ in. from the wall surface. The lathing is nailed to these studs and a 1½-in. air space is thus left between studs. The outside forms use conventional sizes of lagging supported by 2-in. by 6-in. studs opposite alternate studs of the inside forms, to which the outer studs are wired. The outer lagging is 3½ in. from the inside studs, so that with the 2½ in. of concrete between studs the concrete wall is 6 in. thick. This gives an 8½ in. wall when the inside and outside plastering are completed. Reinforcement is provided above all wall openings.

A rather wet mixture of 1 part of Universal Portland cement, 2 parts sand and 6 of ½-in. to 1¼-in. slag is used. The outside is not spaded, so that the cement plaster will have a good bond. This plaster is a 1:1 mixture of sand and cement, with sufficient slaked lime to make it work easily.

All of the bungalows have modern heating and plumbing systems and cost, complete, less than $4,000 each.

New Publications.

Hendricks' Commercial Register of the United States. 1500 pages. Size, 8 x 10½ in. Bound in heavy board covers. Published by the S. E. Hendricks Company. Price, $10.00. Express charges prepaid.

This is the nineteenth annual revised edition of the compilation in question and is the most complete and comprehensive edition that the authors have thus far published. This edition requires 100 pages to index its contents, being 13 more than were required for the eighteenth edition. As there are upwards of 400 classifications on each page, the 13 additional pages represent the manufacturers of approximately 5000 articles which, it is said, have not appeared in previous issues. The total number of classifications is 35,481, each representing some material, specialty, tool or machine required in the architectural, hardware, engineering, mechanical, electrical, railroad, mine and kindred fields. The present edition also contains a total of 238 pages of new matter, the entire work representing upwards of 350,000 names and addresses.

An important feature of the present edition is the simplicity of its classifications. First, all manufacturers of a particular trade are classified under a general heading, and then each firm or corporation is placed under as many classifications as called for by the variety of their products. Much information is given following the names of thousands of firms, which is of assistance to the buyer and saves the expense of writing to a number of firms for the particular article required. There is also included the trade names of all the articles classified in the book as far as may be obtained, these particular names appearing in parentheses between the names and addresses under the classifications.

Some idea of the scope of the work along lines of special interest to readers of this journal may be gathered from the statement that 44 pages are required for the list of contracting builders; 25 pages are devoted to the names and addresses of architects of the country, while 40 pages are given up to roofers, tinners, etc. There are 12 pages of names of those dealing in masons' and builders' materials, and there are eight pages of names of sash, door and blind manufacturers.

The work has been prepared with a great deal of care and it will be found invaluable for reference by all connected with the building and allied industries.

Standard Specifications. By John C. Ostrup, C. E. 100 pages. Size, 6½ x 9½ in. Bound in board covers. Published by the McGraw-Hill Book Company. Price, $1.00.

Within the covers of this work the attempt has been made to incorporate a set of ten specifications relating to structural steel, concrete, timber and reinforced concrete, the specifications being condensed so as to avoid unnecessary repetitions; yet at the same time they are made to conform in every essential to the latest experiments and investigations, to the best authorities, to modern practice and to the author's own experience. The work is divided into ten parts, the first of which deals with the steel frame work of buildings. Here all phases of the subject are considered in a way to appeal to the contractor and engineer, tables and formulæ being given covering loads, stresses, etc. Parts two and three are devoted to bridges, while part four is taken up with a treatment of the subject of plate girders. Next in order come materials and workmanship, inspection, painting and erection, and then structural timber. The most complete specifications are probably those relating to reinforced concrete, which occupy part 10 of the work.

The author points out that any designs made or structures built in strict accordance with these specifications will insure creditable workmanship, as well as safety, durability and economy.

Advantages of Redwood for Building Purposes

While the general reading public is more or less acquainted with the fact that redwood timber is a product of the State of California, it is perhaps not widely appreciated that the growing redwood trees are practically confined to restricted portions of this State and that they are not found to any appreciable extent elsewhere. There are two species, but perhaps the best known is the *Sequoia Gigantica* or "big trees," which grow only in isolated groves on the western slope of the Sierra Nevada Mountains, and while they attain an immense size are not a particularly important factor in lumbering. The *Sequoia Semper-virens* are found chiefly in a narrow belt along the coast of Northern California and are the trees from which the redwood of commerce is obtained. As the name indicates, this tree is apparently "ever living," seemingly immune from the ravages of time or of the many assaults of the elements which menace and all too often prove fatal to less tenacious timber.

These characteristics render the wood one of the most valuable for the manufacture of siding, shingles, porch work and all material for use in exposed places or in a location subject to alternate periods of wetness and dryness. The claim is made that when properly painted it will show less change after years of service than any other known lumber. Owing to its freedom from pitch it will not ignite easily and when burning is easily extinguished. This feature makes it particularly valuable for shingles.

When properly dried, redwood will not swell, shrink or warp. Its freedom from pitch and the fact that it runs almost entirely to upper grades makes it desirable for interior finish. The wood is naturally beautiful and takes a very fine polish. It is easily worked and used extensively in some sections for this purpose. Panels as large as 3 ft. wide can be used without shrinking or checking.

Redwood is a satisfactory lumber for painting if its characteristics are understood. It is of a light, straight-grained compact structure and will absorb paint readily. The dark color of the wood makes three-coat work necessary, since the priming coat must be mixed extremely thin to fully satisfy the surface.

The fact that redwood is secured mostly from regions where the railroads do not penetrate has made it difficult to reach and to mill properly. Though easily seasoned the lumber first placed on the market was not handled properly nor thoroughly dried through lack of adequate facilities. This created a prejudice in some minds that has not been entirely overcome. Now, however, conditions have changed. Capital has been interested and the work is being carried on in a more intelligent manner and with proper equipment. As a matter of fact, redwood is fast coming into its own and is rapidly becoming recognized as one of the most valuable woods used in building. It has been used in the West for years and is gradually working its way Eastward as its merits become known.

Redwood has lately come into prominence throughout the Middle West and has been placed on the market manufactured into doors, porch posts, Colonial columns, balusters, rails, pickets, shingles, siding, mouldings, etc. For outside uses it serves an excellent purpose.

THE GROWING POPULARITY of hollow terra cotta tile in building construction is exemplified in the new fireproof passenger station which has just been commenced at Towaco, N. J., by the Delaware, Lackawanna and Western Railroad Company. The partitions as well as the walls will be of hollow tile, while the floors will be granolithic and the roof of steel. The idea is to make the building fireproof in every sense of the word.

Protecting House Painters in Belgium

The following extracts from a report to the State Department on the above by Consul H. A. Johnson at Liege, Belgium, may not be without interest:

There has recently been published the text of a new law tending to protect house painters against the dangers to which they are exposed in manipulating colors mixed with white lead or ceruse.

This law provides that contractors and master painters shall use only white lead ground and mixed with oil. The white lead thus used must be manipulated so as to avoid contact with the workman's hands, and splashing is to be prevented. Dry scraping, with either a scraper or pointed instrument, of surfaces covered with paint mixed with white lead is strictly forbidden.

Contractors and master workmen are required to see that painters working under them wear a costume and head covering specially reserved for working; that the clothes which the workman takes off before putting on his working costume are placed where they can be protected from all poisonous rusts, to provide for the use of their working force all articles required for rinsing and washing the mouth, for washing the face and hands with soap and properly drying them; must see that they clean themselves properly before taking their food; that all food brought to the workshops or localities where painters are working be kept in a well-closed box or receptacle until ready to be consumed. Any workman found to be suffering from the effects of lead poisoning, either chronic or intermittent, must be permanently discharged, and anyone whose general health is found on examination to be unsatisfactory must be temporarily suspended. A register must be kept, in conformity with the model supplied by the administration, in which a physician is required to note the results of the examinations of the workmen employed.

Contractors and master painters are forbidden to employ men addicted to drunkenness, and no alcoholic beverages are allowed to be brought into the workshops or introduced into the locality where work is being carried on.

Class in Real Estate

The Real Estate Class of the School of Commerce, Accounts and Finance of the New York University held its first session on the evening of October 4, the class being in charge of Walter Lindner, solicitor of the Title Guarantee & Trust Company.

The course includes systematic discussion of real estate values, law and management, including the following topics: Brokers, building loan operation, the planning of the building, the provisions of the building code, apartment house management, title insurance, taxes and assessments.

William C. Brocklesby, Hartford, Conn., a leading architect, is dead at the age of 62 years. He was a native of Hartford, the son of Prof. John Brocklesby of Trinity College, from which institution the son graduated in 1869. He obtained his specialized training in the office of a New York architect and then returned to Hartford, where he practiced his profession until his death recently, as senior member of the firm of Brocklesby & Smith, the junior partner being H. Hillard Smith. Mr. Brocklesby designed many of the well-known buildings of Hartford and vicinity. He was a member of the Connecticut Institute of Architects, the Players' Club, New York, and the Hartford Club. He leaves a widow.

Department of Labor Moves

The New York State Department of Labor, in which office is the State Factory Inspection Bureau, has moved its New York offices from 114 East Twenty-eighth street to the sixth floor of the Fourth Avenue Building, at the southeast corner of Fourth avenue and East Twenty-seventh street. Commissioner Williams found that the former quarters were not sufficiently large. In the new quarters the Factory Inspection Department is entirely separate from the Commissioner of Labor's offices.

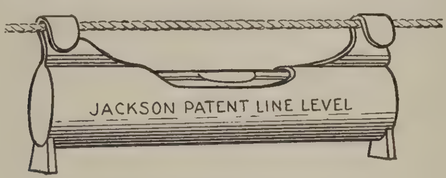
The Association Institute of the Central Department, Chicago Y. M. C. A., 153 La Salle street, announces a winter course in concrete design and construction. This course is planned to meet the needs of foremen of concrete work, cement salesmen, architectural and structural draftsmen, architects, engineers, contractors and builders. It is to consist of a series of lectures by Ernest McCullough, an engineer and technical writer of wide experience, and consulting concrete specialist. There will be two terms of 12 weeks each, one lecture being held on Thursday evening of each week. The Association Institute has issued a printed outline of the course, which may be had on application.

CONTENTS

Novelties.

Jackson's Aluminum Line Level

A device intended to meet the requirements of all mechanics in the building line, more especially masons, bricklayers, carpenters, millwrights, etc., has just been brought out by the Joseph Woodwell Company, Pittsburg, Pa., and some of its applications are illustrated herewith. By means of this tool it is claimed that levels can be taken in one-half the time of the old method of straight edge. It is pointed out that this is possible because the aluminum line level weighs only ¼ oz. and is easily attached to a line. Levels thus taken are guaranteed to be accurate on a



Novelties.—Jackson's Aluminum Line Level.—Fig. 1.—Level Attached to a Line.

stretched line from 1 to 40 ft., as shown in Fig. 1 of the cuts. Because of its construction it may be used as a pocket level. In Fig. 2 it is shown attached to an ordinary 2-ft. rule, and in Fig. 3 it is shown attached to a steel square. This tool is made from a good grade of aluminum,

Fig. 2.—Level Used on a Carpenter's 2-Ft. Rule.

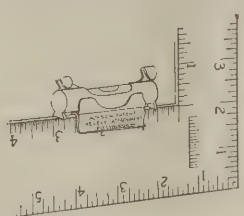


Fig. 3.—Level Attached to a Steel Square.

finely finished and fitted with a level glass. Owing to its lightness it is referred to as almost indestructible. The level comes packed in a neat leatherette case suitable for the vest pocket.

The Godfrey Grinder With Chisel Grinding Attachment

The El Starr Manufacturing Company, Milwaukee, Wis., is offering its line of Godfrey grinders in sizes to meet varying requirements and with attachments which are practical and convenient for doing all kinds of sharpening and grinding. In Fig. 4 of the engravings we show the No. 1 Godfrey Grinder with new chisel-grinding attachment and knife-grinding guide, which, in fact, can be attached to any of the company's machines. The chisel or plane bit is fastened with a thumb screw against a straight edge, as

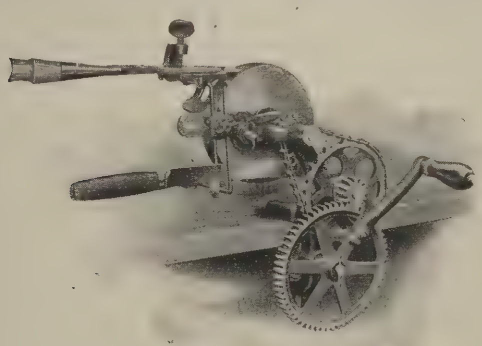


Fig. 4.—The Godfrey Grinder, with Chisel-Grinding Attachment.

shown in the picture, and any bevel is obtained by raising or lowering the tool. The grinders are fitted with corundum wheels, which, it is claimed, cut the hardest steel rapidly without heating, hence they can be used on the finest tools without fear of drawing the temper. No special arbor is used, and in case of emergency any wheel can be substituted that has a 1-in. or ½-in. arbor. They are attached to the grinder by simply slipping on to the arbor and fastening with a nut. The machines run at a high rate of speed, and to get the best results the company points out they should be turned swiftly and tools touched lightly. Practically all attachments are made of malleable iron to prevent breakage. A simple clamping device is used so that a machine may be quickly and firmly clamped to a table or board and instantly removed. The knife-grinding guides are adjustable to all sizes and kinds of knives.

Smith's Concrete Mixer With Gasoline Engine

In these days when concrete is being used in connection with building construction to an extent never before known the building contractor is interested in securing a mixer which is portable in form and which can be operated at a minimum of time, labor and expense. In Fig. 5 of the illustrations we show what is known as the Smith Concrete Mixer mounted upon a four-wheeled truck and operated by a small gasoline engine, all so compactly arranged as to be readily moved about from one job to another. The mixer is provided with a double conical drum, which is regarded as the ideal mixing receptacle. It discharges by tilting, while the drum revolves, practically after the manner in which one would empty a water pail by inverting it. The claim is made that the construction is such that it may be completely emptied in 10 seconds, while clogging is impossible. The long life of a Smith mixer is said to be due principally to the removable linings in the drum; to the absence of moving parts in or near the concrete; to the central and protected position of the running gear; to the alignment of all rollers on one central

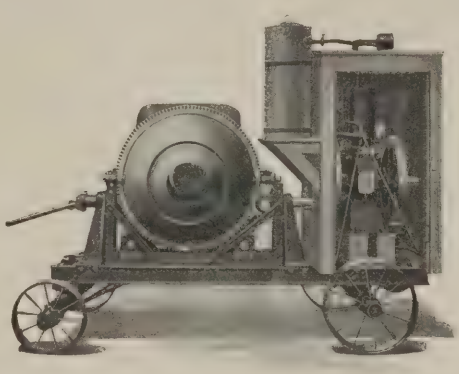


Fig. 5.—Smith's Concrete Mixer with Gasoline Engine.

ring; to the suspension of the drum and driving mechanism in a cradle, preserving the relation of the parts in spite of the twisting of the truck or platform, and, finally, to the use of a spur gear drive direct to the drum ring. This mixer is made by the T. L. Smith Company, Majestic building, Milwaukee, Wis.

Catalogue of Woodworking Machinery

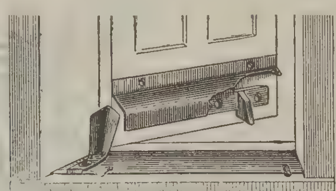
We have received from the J. A. Fay & Egan Company, 221 to 241 West Front street, Cincinnati, Ohio, a copy of "Catalogue No. 84," just issued from the press, and illustrating and describing a very extensive line of standard woodworking machinery which the company makes in such variety as to meet a wide demand. The catalogue consists of 384 pages, and measures 5⅜ x 7¾ in. in size. It is profusely illustrated, the engravings being for the most part direct reproductions from photographs of the machine, and these are accompanied by such descriptive particulars as will enable the woodworker to readily comprehend the salient features of the machine in question. The work is in effect an unabridged, condensed form of the company's general catalogue, which we understand will be sent, charges prepaid, to any address on application. The company points out that it makes a specialty of every class of machine illustrated and described in the catalogue, and that it supplies single machines or complete outfits for every kind of woodworking plant as may be required. The large catalogue referred to contains about 500 pages, consisting of 24 sections dividing the company's tools and appliances into groups, each group containing only machines of similar designs and purpose. The "Catalogue No. 84," at present under review, will be found of special interest and value to the woodworker, whether his operations be conducted upon a small or a large scale, as it will prove an excellent work of reference in his line.

Portable Sawmill

American Portable Band Saw Mill Company, Winston-Salem, N. C., is sending out a pamphlet which treats of a new type of portable sawmill having a band-saw instead of the circular saw ordinarily employed. Some of the advantages claimed for this mill are a saving in the amount of timber, as it is stated that the part now wasted in sawdust by the old type of circular mill is saved because of the narrowness of the cut; fine finish on the product, as the lumber is sawed so smooth that sandpaper rubbed lightly over the surface removes all saw marks and makes it ready for paint, thus eliminating loss in planing and cheapness of operation, as only three men are required, and two of these can be ordinary laborers. The log remains stationary on the truck frame, which rests on the ground, and the saw carriage travels to the log and feeds the saw into it and reciprocates over the log until it is sawed to the proper dimensions.

Axtell's Metallic Weather Strip

The near approach of the winter months, when inclement weather prevails, with its wind and snow and sleet, renders more than ordinarily interesting brief reference to the weather strip which is being offered by E. I. Church & Co., West Hanover, Mass., and the general construction and arrangement of parts of which are clearly indicated in Fig. 6 of the engravings. The weather strip consists of two pieces of steel 36 in. long by 1½ in. in width, and which can easily be cut with a file or cold chisel to fit narrower doors. The bottom plate is flat and to it is riveted the striker, the whole being hinged to the sill by two special galvanized staples. In closing the door the top plate engages the striker, thus raising the inner edge of the bottom plate under which the wedge on the latch side of the door easily slides. The claim is made that both plates produce a perfectly tight overlapped joint when the door is closed. There is neither wood nor springs to break or



Novelties.—Fig. 6.—Axtell's Metallic Weather Strip.

rubber to harden and pull out. The strips are not affected by ice, therefore they cannot be frozen down or pulled apart. There is no strain on the door, so that there is no likelihood of forcing it from its frame, and the door is held perfectly true. This all-steel strip can be used on swinging windows as well as on the doors.

"Presto" Steam and Hot-Water Boilers

The Pressed Radiator Company of America, Pittsburg, Pa., is distributing among the trade a 4-page leaflet calling attention to the merits of the Presto steam and hot water boilers. These boilers are of the vertical sectional type, the sections being assembled with heavy cast iron slip nipples, held together with wrought iron rods, which pass through the cored openings in the sections and do not come in contact with the fire or water. The cast iron nipples used are perfectly machined, and the holes in the section are reamed with the same exactness, thus insuring a perfect iron to iron connection. Special attention has been paid to the fuel-carrying capacity of the fire-pot, which is exceptionally deep. The ash pit is capacious and of proper hight to allow of the free circulation of air under the grates. The fire travel is upward between the overhanging heating surface of each section; this overhanging surface being provided with an opening on either side of each section, and the openings are so arranged with baffle-plates as to form a flue, through which the fire travels to the rear of the boiler, then passes upward, entering the outer row of flues on each side of the boiler. This course brings the heated gases to the front of the boiler, then back through the center rows of flues to the smoke outlet. The grates are of the rocking and dumping variety, and are adapted for burning either hard or soft coal. The several doors on the front section are fitted to the sections, thus doing away with loose door frames. Openings are cored in the back section to permit the insertion of a pipe coil in the fire-box for heating water for domestic purposes. The smoke hood on the back section is provided with Butterfly draft door, and so arranged that the smoke pipe can be taken off the rear or top of the smoke hood. The claim is made that the crown sheet and other heating surfaces of the different sections are so arranged that two-thirds of the total heating surface of the boiler is prime heating surface.

Atkins' No. 3 Nest of Saws

A very convenient outfit for the carpenter's "kit" of tools, and which combines high-grade compass and keyhole saw blades, together with a 20-in. silver steel blade with special hard temper, and with shape of tooth such that the blade will cut through any ordinary metal that may distract the user, is shown in Fig. 7 of the engravings. It is manufactured by E. C. Atkins & Co., Indianapolis, Ind., who point out that the combination is provided with an interchangeable double handle, and is designed for use in cases where the operator comes in contact with a nail, gas pipe or other piece of metal, and which may be sawed with the nail-cutting blade and then work continued with the ordinary hand-saw. An idea of the general style and shape

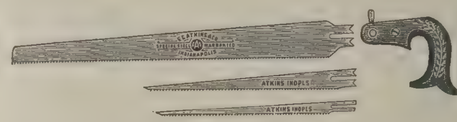


Fig. 7.—Atkins' No. 3 Nest of Saws.

of the outfit may be gathered from an inspection of the engraving. The sets are furnished in a neat box, each containing three blades and adjustable handle described.

Marvel Hot-Air Furnaces

In an attractive catalogue of 32 pages which reaches us from the Interstate Manufacturing Company, Oskaloosa, Ia., are set forth at length the merits of the various lines of hot-air furnaces made by this concern under the name "Marvel." Strong claims are made for these furnaces, which embody a number of interesting features and are made under original patents owned exclusively by the company. Among the features upon which emphasis is laid are the Marvel hot blast, through and over the fire in such a way as to result in a saving of fuel; a large feed door, asbestos lined and fitted direct to the chute without a cemented frame; a strong grate bar with wrought iron rod through the center, and so constructed that the entire grate or any bar may be removed through the ash door without loosening a bolt; water-coil opening at the side of the feed door for heating domestic water supply; steel base ring; deep ash pit; heavy wrought metal body and radiator; comparatively few joints, and powerful heating surfaces. Various features of the furnaces are illustrated in detail, while accompanying the text are tables showing sizes, capacities, etc.

The catalogue also shows the combination heaters made by the company and in capacity ranging from 30 to 750 ft. of hot-water radiation in addition to its warm air capacity. There are also schoolhouse heaters shown and a number of half-tone engravings of buildings in which the company's heating apparatus has been installed.

A New Corrugated Iron Roofing

In presenting to the attention of our readers last month the new corrugated sheet steel roofing, marking a decided departure in construction of this sort, which has just been placed upon the market by the Edwards Manufacturing Company, Cincinnati, Ohio, the cut showing the manner of applying the roofing was inadvertently printed upside-down. This, to those not altogether familiar with this kind of roofing, might infer that the sheets were fastened on the under side of the purlins instead of on the top. We, therefore, present in Fig. 8 the cut placed as it should be.

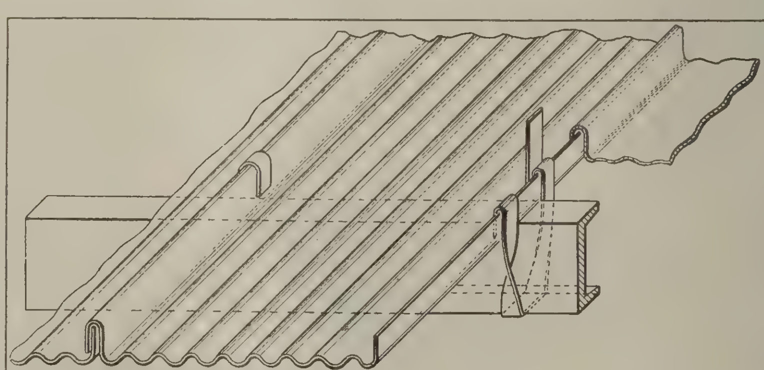


Fig. 8.—A New Corrugated Iron Roofing—Showing Manner of Applying to Purlins.

Porter Screens for Windows and Doors

We have received from the Porter Screen Manufacturing Company, Burlington, Vt., a copy of an exceedingly neat and attractive catalogue illustrating and describing the leading lines of screens manufactured by this concern.

The point is made that the lumber entering into the construction of these screens is carefully selected and thoroughly seasoned. For all outside window and porch screens the company recommends the use of pine, while window screen frames to be used on the inside of sash are usually of the same wood as the sash, with the runs or slides to correspond with the casings. Screen door frames, it is pointed out, should be made of the same wood as that used in the regular house doors, and if stops or hanging stiles are required these should match the door casings. All guides for Porter screens are treated with a special oil preparation which, it is claimed, insures perfect ease in the movement of the screens. The metal cloth used is varied according to requirements, some screens having bronze cloth, others galvanized cloth, while the standard enamel is made of hard steel wire coated with a durable black enamel, which is baked on after weaving and is used on all screens unless otherwise specified. The method of wiring is also a feature of these screens, each individual wire being securely fastened. In the catalogue under review, which is printed in colors, attention is given to sliding screens, both single and double; stationary screens with movable bottom panel; screens for pivot sash; bow screens and circular top screens; also stationary and swinging screens. The company manufacture porch screens in sections of various sizes to adapt them to the porch or veranda to be protected. A varied assortment of door screens is illustrated and some interesting comments are presented concerning guards and screen hardware.

Benjamin Electric Lighting Specialties

Some electric lighting specialties particularly adapted for shop and factory illumination are offered by the Benjamin Electric Manufacturing Company, 507 West Jackson Boulevard, Chicago, Ill. In Fig. 9 is shown an indoor wireless tungsten ceiling cluster fixture, to which the trade name Banner has been applied. This consists of the cluster, a standard 12-in. stem of $\frac{3}{8}$-in. iron pipe covered with $\frac{3}{4}$-in. brass tubing, a 16-in. deeply-hooded enameled steel reflector, a 4 x $4\frac{1}{2}$-in. canopy, and crowfoot. Two, three, four and five-light fixtures are made; 100-watt lamps being used in the three smaller sizes and 40 or 60-watt lamps in the other. Burnished brass is the standard finish. In the weatherproof fixture shown in Fig. 10 the cluster shell is of aluminum and the stem is the standard 8-in. length of $\frac{1}{2}$-in. iron conduit, with a suspension fitting. The reflector and cluster are attached to each other by a flange and the joint is made water-tight by two rubber gaskets. This is also made in four sizes to accommodate from two or five lights. In both these fixtures the outlets make an angle of 16 degrees with the vertical; this slight angle does not endanger the filaments of the lamps, but adds materially to the lighting efficiency of the fixture, as less light from one lamp passes through the others. In Fig. 11 is given a sectional view of a shock absorber that consists primarily of a strap-iron stirrup and a centrally-located loose bushing, supported by a coiled spring and tapped to receive the fixture stem. The compression spring forms a resilient connection between the support and the fixture. The stirrup has two feet, provided with screw holes for attaching to the supporting surface, and takes the place of the crowfoot ordinarily employed. An additional strap centrally threaded to fit a $\frac{3}{8}$-in. insulating joint is attached to the stirrup by two screws. This strap may be omitted for attaching the fixture to a wooden ceiling or block. In one case the device becomes a shock-absorbing hickey, and in the other a shock-absorbing crowfoot. For use with brass casing and canopy, a canopy support of $\frac{5}{8}$-in. brass tubing, with the upper end flanged outwardly, passes through the opening in the bottom of the stirrup and surrounds the bushing. In this way the canopy can be attached to the supporting element by a $\frac{7}{8}$-in. slip ring, thus leaving the fixture freely suspended, and effectually provides a means for preventing the transmission of shocks from the support to the fixture through the canopy and stem. There is also enough play between the movable parts to allow the fixture to hang plumb, although the support may be uneven. Machine screws are provided on either side of the stirrup, whose function is to keep the bushing from being displaced. These screws can, however, be removed and the absorber taken apart for the purpose of changing the springs or for removing or inserting the canopy support corresponding with the device. These all vary in stiffness according to the weight of the fixture with which the absorber is to be used. The lightest spring is for fixtures weighing from 1 to 4 lb., the medium from 4 to 10 lb. and the stiffest from 10 to 16 lb. In addition to the other desirable features this shock absorber incorporates an essential for successful devices of this character, as provision is made for absorbing the shock at the point of support of the entire fixture instead of above each individual lamp socket. The initial shock of a sudden or sharp jar from the ceiling is intercepted before it reaches the fixture proper, and any subsequent vibrations that might be transmitted are dissipated by the inertia resulting from the weight of the fixture before reaching the lamps themselves.

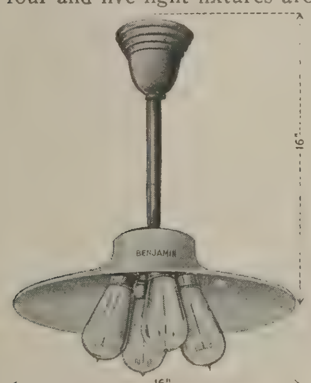


Fig. 9.—Indoor Cluster.

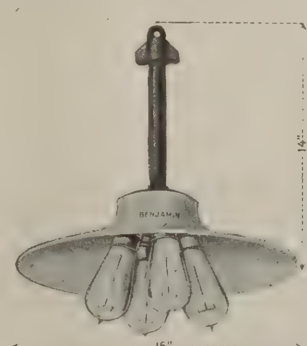


Fig. 10.—Outdoor Cluster.

Fig. 11.—Shock Absorber.

Novelties.—Tungsten Light Clusters and Shock Absorbing Hanger Made by the Benjamin Electric Mfg. Company, Chicago, Ill.

"Paragon" Drawing Instruments

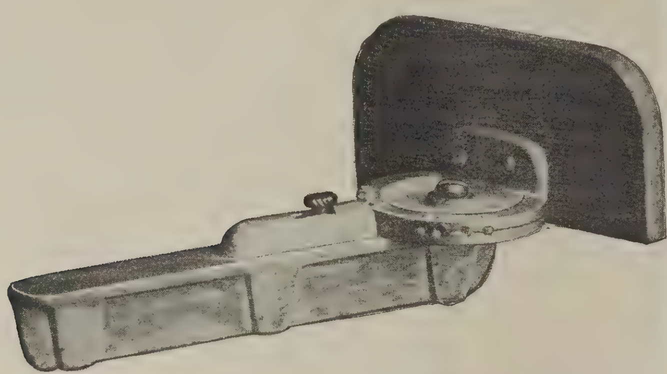
A folder sent out by Keuffel & Esser Company, 127 Fulton street, New York City, and with general office and factories in Hoboken, N. J., is devoted to an exposition of the merits of Paragon Drawing Instruments. These well-known instruments have been before the trade for many years, and have established for themselves an enviable reputation. They are specifically the American pattern, their highly practical and graceful design being the result of the company's close study of the requirements of draftsmen generally, coupled with the advice of practical users. It is pointed out that it is always a safe guide for the draftsman to purchase the best instruments he can afford, as in the end it is the most economical course. Good instruments will meet all requirements, while the saving of time effected, the better work accomplished by them, together with their permanence and the satisfaction obtained by their use, will justify their cost. The "Paragon" drawing instruments are made of rolled German silver and a fine-quality steel carefully tempered. The finish is what is known as "Mathematical Instrument Finish," which, in contrast to the cheaper buffed and highly polished finishes, has the advantage of leaving perfectly visible the perfection of workmanship and form. Accompanying the folder is a color card relating to Columbia liquid indelible drawing inks made by the company, also a 4-page folder relating to Payzant lettering pens with ink reservoir, these pens being particularly adapted for lettering engineers and architects' drawings as well as for the use of merchants in writing price and show cards, etc. Two pages of the folder are devoted to samples of lettering done with a pen of the kind in question.

The Hoke Reversible Hinge

A shutter hinge, which is the result of much thought and long study on the part of the maker, and which is claimed to embody such improvements as to render the hinge perfect in all its appointments, is being introduced to the attention of architects, builders and houseowners generally by the Hanover Hinge Company, Hanover, Pa. It is known as the Reversible Hoke Shutter Hinge, and is intended for use on either the right or left shutter, and being reversible it dispenses with the necessity of right or left parts. The claim is made that it will hold the shutter or door locked in an open position, thus preventing accidental closing and falling off on an upward pull when closing the shutter. It is arranged to permit convenient hanging, entirely obviating the heretofore required time and annoyance in neat adjustment, the two parts coming together like a clasp automatically adjusting itself to its natural position. This is obtained by the use of a pintle leaf, arranged for right and left-hand attachment to the window casing or other support, and a movable leaf mounted to swing on the pintle leaf, and arranged for reversible attachment to the shutter by inversion. The hinge is made in four sizes, and it is put up in packages containing the usual quantity with an equal number of shutter catches. The company points out that its No. 2½ is expressly adapted for frame houses, while No. 1, No. 1½ and No. 2 are for brick houses, depending upon the distance the frame is set in from the face of the wall.

Milks Pocket Miter Box

Every carpenter in the country will be interested in the handy little miter box which is being introduced by the Parsons Manufacturing Company, 1810 Washington avenue, Parsons, Kan., and a general view of which is illustrated in Fig. 12 of the engravings. It weighs only 8 oz., and can be applied to the work in any position and in any place where a saw can be used. It is, in fact, three tools in one, being a miter, a try square and a bevel square. It is known as Milks Pocket Miter Box, a portion of its title being derived from the fact that the tool is of such a nature that it can readily be carried in the pocket or carpenter's apron. The claim is made that by means of it the principal angles on any molding or strips of any kind can readily be cut, and that it is placed on a molding, instead of having to turn a long piece of material in order to get it in position to cut, as is often the case in connection with the ordinary miter box. It can be used on a ladder, is never in the way on a scaffold and is decidedly economical in use. It is made of aluminum, is strong, durable and absolutely guaranteed as to accuracy. Its use, it is claimed, will save many times its cost.



Novelties.—Fig. 12.—General View of Milks Pocket Miter Box.

Catalogue of Yale Locks and Builders' Hardware

The Yale & Towne Mfg. Company, New York City and Stamford, Conn., has just issued from the press a loose-leaf catalogue of locks and hardware containing over 900 pages and more than 4,000 illustrations, showing the various types of locks and miscellaneous hardware in actual use. A great deal of attention is given to the company's padlocks, locks and latches, special reference being made to the new Yale turret locks for use on fireproof doors, and the Mono-locks, which, as their name implies, are of the so-called "unit" type of construction. An extended line of door-closing devices, embracing not only the well-known Blount door check, but a variation of this which permits the door to be held open at will, is illustrated and described. The company's line of miscellaneous hardware is alphabetically arranged and is illustrated largely by half-tone pictures from photographs. Ornamental hardware is grouped by schools and preceding each group is a short article explanatory of the school. While space has been economized in this section as far as possible, more than 350 pages are required to show the company's extensive line, probably the largest made by any manufacturer. An important improvement in the illustrations consists in showing various types of locks and miscellaneous hardware as in use. This applies not only to such items as locks and latches (which are shown mounted on a sample board prepared like an actual door), door checks, etc., but to casement adjusters. The book is from the press of the American Bank Note Company, who makes a specialty of large books of this character, and both they and the Yale & Towne Manufacturing Company are to be congratulated on the production of a volume of the highest possible grade.

Continuous-Feed Glue Joint

A machine which has been especially designed for making fine glue joints in connection with interior building trim, cabinet work and in sash and door factories, as well as furniture works, etc., is one of the latest additions to the extensive assortment of woodworking machinery turned out by the J. A. Fay & Egan Company, 221 to 241 West Front street, Cincinnati, Ohio. The claim is made that this machine will make a glue joint better, faster and more perfectly than has ever been done before on a machine of this style. It works material from ¼ to 3 in. thick, from 1 in. wide up to any width and from 6 in. up to any length desired. As may be seen from an inspection of Fig. 12 of the engravings the frame is rigid, and is cast open in one piece. All parts are accessible, and all bearings are oiled from the outside. The cutter heads are located one on either side of the center of the machine and run longitudinally. They are mounted in heavy housings having vertical, horizontal and angular adjustments. The feed consists of an endless chain driven by a three-step clutch cone, operated by a lever close at hand. The power for feeding the work is transmitted by large bronze worm wheel and a steel worm running in oil, the end thrust of the worm being taken by ball bearings. The chain is of flat links with knurled faces, and all links are interchangeable, as the pins are not riveted and are thus readily removable. The chain runs over two octagonal wheels, one at each end of the machine. It is adjustable for making spring joints—that is, joints slightly hollowed on long material to insure against opening at the ends. Materials varying ½ in. in thickness may be worked without adjustment of the pressure bars, which are made up of a double series of knurled steel rollers, each mounted in independent housings and backed up by steel springs. Thus pieces of uneven thickness may be fed one after the other. The countershaft has both a tight and loose pulley, each 12 x 5½ in. The floor space required for the regular style of the above machine is 8 ft. 10 in. x 5 ft. 9 in., and with an extended table and adjustable rest it requires 14 ft. x 5 ft. 9 in.

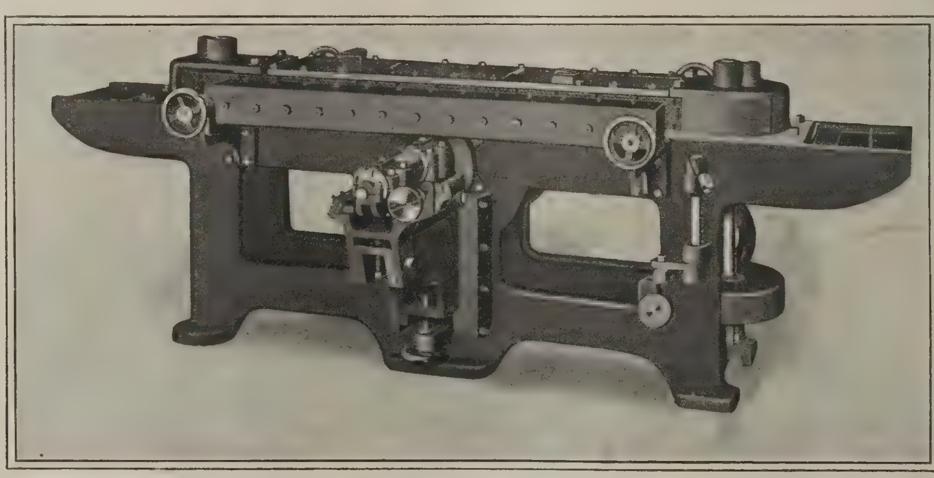


Fig. 13.—Glue Jointer for Inside Finish and Furniture Work, Built by the J. A. Fay & Egan Company, Cincinnati, Ohio

The Building Age

NEW YORK, DECEMBER, 1910.

The Modern Fireproof House as the American Type

IN their many offices throughout the country, American architects are constantly being asked by their clients to design for them English Country Houses, Spanish Mission Houses, French Chateaus, Norman Farm Houses, Italian Villas or Swiss Châlets, but never an American house. Nowhere in the foreign countries are clients reciprocating by asking their architects to design American houses for them. The fireproof house is our only contribution, and through their exclusive use here there may be developed an American type. How such a type may gain ground we will, in slight degree at least, endeavor to set forth.

House of Prof. James E. Lough, University Heights, N. Y.

Residence of J. H. Keiser, at Seagate, N. Y.

Houses of J. William Clarke, at Newark, N. J.

Another View of the Keiser House.

The Modern Fireproof House as the American Type.—Squires & Wynkoop, Architects, New York City.

In the first place, design in fireproof materials must be masonry design. Through the character of the material this work must be solidly constructive. What a change from the flimsy methods of our earlier work and how welcome to the designer, because our solid fireproof materials may not be so lightly dealt with as may the parts of a frame building. "Infinite pains" are required to produce a thing simple and beautiful, and the more difficult the problem the more successful the solution. This American type will be influenced by the permanency of its examples. A fireproof house is built of concrete or tile and concrete, materials as permanent as the Pyramids. Many a clapboard monument would not have been perpetrated had its designer not realized the shortness of its existence.

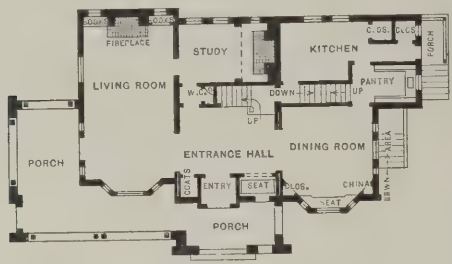
The most permanent of our architectural monuments have been without exception the most beautiful; and since permanency makes for beauty, it may be honestly expected that the American type will be an advance along artistic lines.

With the American type the owner will realize also the hidden value of a house. There is in every concrete building a more than necessary strength. This is not obvious, as is its charm of design or cleverness of plan. Many a builder and owner to-day does not appreciate such hidden value and will not pay for it, and these will have to be educated by the example of their wiser neighbors, who build for their children as well as for themselves.

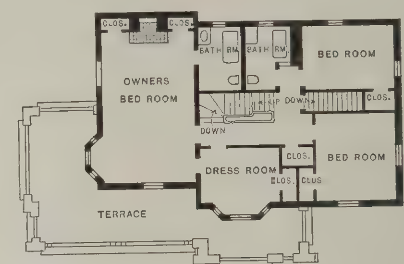
It may be well to describe the process of building these permanent houses, which we hope will give rise to the American type. Their materials are chiefly tile or concrete or a combination of the two. The greatest American has long experimented with a concrete house, and has interested architects in his efforts. His house is to be of the poured monolithic concrete type; that is, the forms will be erected all at once and the whole house poured like iron castings into a mould.

A better perfected scheme is the block house, where the walls are built up of tile or concrete blocks and only the parts doing work as beams are poured into molds. In this house the floors and often the roof are of concrete, although the necessary flatness of the roof is not idea may be carried out by the use of concrete, tile or even common brick. An effort is now being made to so beautify the appearance of the tile that it need not be covered.

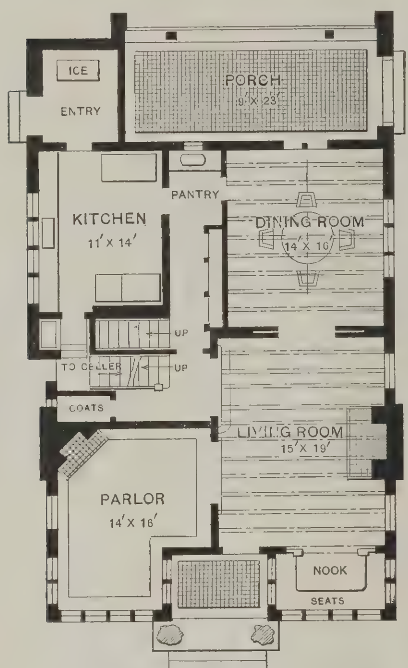
Although the use of permanent materials started with



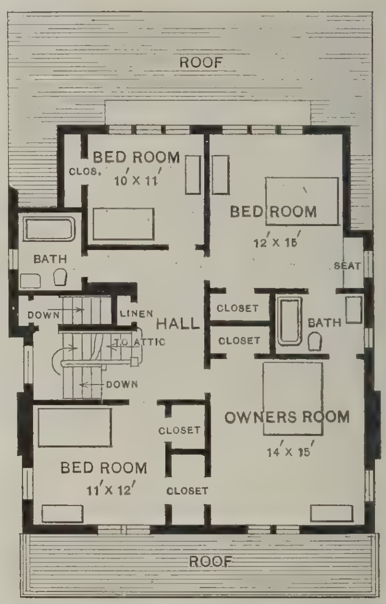
Main Floor of Prof. Lough's House.



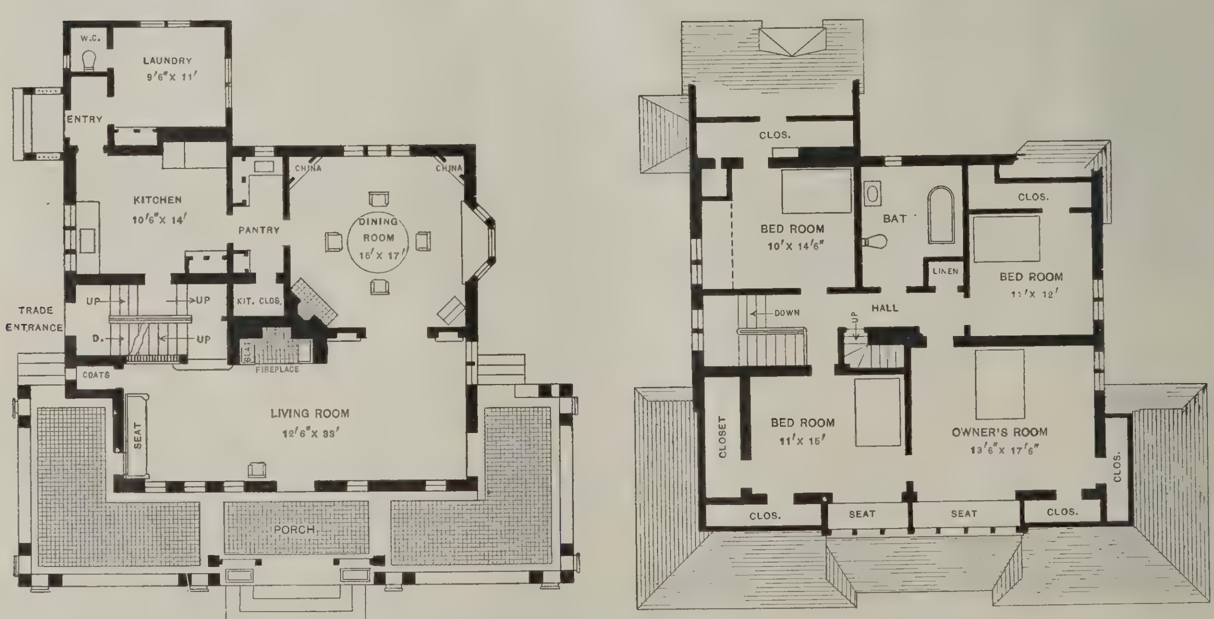
Second Floor of Prof. Lough's House.



First Floor of House of Chas. A. O'Malley.



Second Floor of House of Chas. A. O'Malley.



First and Second Floor Plans of House of J. H. Keiser, at Seagate, N. Y.

The Modern Fireproof House as the American Type.—Squires & Wynkoop, Architects, New York City.

yet a popular form. The terra cotta blocks used in this house are much the same as those used in skyscrapers for fireproofing. The exterior walls are covered with stucco, so that the appearance of both the concrete and tile houses is the same on the exterior. The block the largest buildings and jumped to small houses, yet there is every reason why it should fill the intervening space, in which case the designer will have an even better opportunity to create an American type. The fireproof qualities of concrete and tile are even more needed in the school, the theatre and the factory, than in the homes, where it was first discovered. These buildings have always been the objects of greater care in design, so greater progress in a characteristic use of permanent materials will result from these same public buildings.

In every case the type that comes to mind when the houses of different countries are mentioned is due in great measure to the conditions of its land and people. With us inventiveness and commercialism have led the way to the use of native and permanent materials, the use of which will produce in our design an American type.

As interesting examples of American dwellings tending strongly in the direction of the type indicated, there is presented herewith a series of views of cement houses designed by Squires & Wynkoop, 44 Cortlandt street, New York City. In the case of the first house, which is that of Professor James E. Lough, University Heights, New York, the main thing the designers endeavored to accomplish was to secure for the floor spans a form of construction which would be sufficiently strong for the purpose, and as this was one of the early houses of its type constructed within the limits of Greater New York, it was necessary to make tests for the Building Department. It was found that the floor would carry 90 lb. per foot, and from an inspection of the plans it will be seen that two bearing walls were introduced, thus dividing the building into three sections, so that no span was over 14 ft. Use was made of 4 x 6-in. beams placed 16 in. on centers, and the mixture was 1:3:5 Portland cement and the aggregate stone was not over one-half an inch. The reinforcement was a ⅝-in. square iron bar that was kept within 1 in. of the bottom of the beam up to a point about 1 ft. from its bearing, where it was bent up to the upper surface of the beam to take care of the shear that occurs at the bearing. This floor was tested to 100 lb. The whole beam and tile construction was covered with 1½ in. of concrete, in which the sleepers were bedded.

From an architectural point of view the interest in the house grows out of the fact that the architects were not tied down to ordinary building by the method of construction outlined. The plan, it will be seen, is irregular and the exterior treatment very free.

The houses of J. William Clark, shown in the row in the second illustration, are architecturally interesting, because they are located on a sharp slope, and yet they do not present the appearance of "sliding down hill." The details of the door and window frames were worked out very carefully, so much so that they are regarded as more nearly perfect than is usually to be found in houses of this character; in fact, every point was well worked out.

The residence of J. H. Keiser at Seagate, N. Y., presents some interesting features in that the exterior walls are mostly brick, owing to the fact that at the time the house was constructed the Brooklyn Building Department was making great objection to the use of tile. In some of the first story floors the tile construction was used and the house would have been largely reduced in cost had it been possible to have used tile in the exterior walls. Since this house was completed, however, large numbers of tile houses have been built in Brooklyn and at various points throughout the island.

Special interest attaches to the houses at Bogota, N. J., and illustrated on the third page of this article, by reason of the fact that the span of the floor beams was such as to require a tapered beam greater than any tile block made, so that it was necessary to form the bottom of the beam in metal "forms" and let them project into the room 3 or 4 in. The spaces between were plastered, which gave a concrete-beamed ceiling, this of course being perfectly proper in an English house of

Front View of a House at Bogota, N. J.

House of Chas. A. O'Malley, at Newark, N. J.

Rear View of House at Bogota, N. J.

End View of House of Chas. A. O'Malley.

The Modern Fireproof House as the American Type.—Squires & Wynkoop, Architects, New York City.

this type; in fact, it was done all over the house. A further interesting structural feature is found in the fact that no wooden floors were used—nothing but composition floors—and the color was varied, although for the most part a rich dark brown was adopted. The top floor of the house was made simply with a clear cement coating. The house shows how freely the construction lends itself to any form of architectural treatment. It is interesting to note that a small model was made before it was built in order to correct any errors in design. The roof is Akron clay tile and the only wood in the house are the rafters of the roof and the sheathing under the roofing tile.

The last house of the group is that of Charles A. O'Malley at Hedden Terrace, Newark, and has the beamed ceiling feature already mentioned. It goes, however, a step further in carrying a bearing partition on one of the long spans. Another feature is the grouting in connection with the walls that had to carry an unusual load. The holes of the tile were poured full and a reinforcement used consisting of vertical ⅜-in. round rods. The house has tile floors, side and bearing walls and a tile roof on wood beams and sheathing. The concrete beams are exposed where shown on the plans. The design is one easily constructable in tile.

New Smoke-Consuming Furnace

According to a recent report of Consul W. L. Lowrie, many inquiries have been made at the Carlsbad consulate concerning the smoke-consuming apparatus used by the municipality at the public abattoir, baths, garden cafés, etc.

A Carlsbad architect, Alois Sichert, has invented a form of smoke-consuming furnace which has been patented all over the world and which has shown excellent results in practical use. The idea is a simple one, but so effective that the poorest quality of Bohemian coal, a soft lignite, may be used with a combustion of 84.7 per cent. and practically no smoke or soot. This invention insures a draft of hot air driven down on the fire from above, beating back the smoke as it endeavors to rise and consuming it completely.

The coal is placed in a feeding box and slides therefrom over an inclined grate to a flat grate, until the whole surface of the two grates is uniformly covered. The inclined grate is provided at its upper half with narrow air apertures like a polygonal grate, and at its lower half with wider longitudinal apertures. The flat grate likewise has longitudinal apertures. The fire is started on the flat grate and forms an intense flame jet which extends over the inclined grate to the flues. During this operation the coal on the upper half of the inclined grate up to the feeding box gives off its gases and slides gradually downward onto the flat grate as the combustion on the latter proceeds, thereby continuously replacing the consumed coal. The necessary air is supplied to the grate through an air valve and this can be regulated in accordance with the degree of heat to be attained.

Air-Supply Passages

In the ash pit immediately beneath the flat grate are the inlet openings of the air-supply passages for consuming the smoke. Through these passages the air previously heated in the ash pit enters the ascending passages, passes into the arched passages, is heated therein and passes through apertures directly into the combustion chamber and, combining with the flame, produces a perfectly smokeless combustion. By this procedure all particles of smoke, soot and sulphur from the coal are entirely consumed. The flame burns quite white and passes out through the flues as a smokeless flame into the chamber in which it is to be used for any special purpose.

Moreover, in combination with each of the ascending flues, a further air-supply passage is provided for the direct supply of external air, so that in the case of coal containing a large amount of sulphur a sufficient quantity of air may be supplied through the ascending flues to the arched flues and through these to the combustion chamber, when with a low fire the valve is to a great extent closed. The passages can be controlled by dampers. If the grate surface is quite covered and an intense fire is required the valve must be fully opened. By this means, a large quantity of air enters the ash pit and passes through the air flues into the arched flues above the fire and through the apertures into the combustion chamber.

This process keeps step with the development of the fire in the combustion chamber. When a slower fire is desired, the valve is more nearly closed, the supply of air is less, and, therefore, the fire is lowered. With a slower fire less smoke is produced and less air is required to burn it.

Extensively Adopted in Carlsbad

The Sichert system is being used extensively in Carlsbad. It was first installed at the municipal slaughterhouse, and after 27 months' constant use the chimney is unstained by soot or smoke. About 60 kitchens in the city have been equipped with the smoke consumers. This is an absolute necessity in the large public gardens, where thousands of people are served refreshments each day during the "cure" season. There are no volumes of smoke to harm the trees nor soot to soil the white dresses of the ladies.

The boilers of the Elizabethbad, the newest municipal bath house, have been equipped with the Sichert apparatus. Here the poorest quality of Falkenau coal (a soft lignite) is used, and the chimney is smokeless. It would be impossible to use this grade of fuel without the consumer, as the bath is in a small park in the center of the city. As a matter of economy it may be mentioned that the city saved enough on its fuel bill at this bath in six months to pay for equipping the two boilers.

The system may be used on locomotives, and several American railroad men and coal mine owners who have visited Carlsbad recently are enthusiastic over the possibilities of the top-draft system.

Unique Roof Truss for Library Building

A noteworthy feature of the new library designed for the University of California by J. G. Howard, architect, is the main reading room, 210 ft. long by 54 ft. wide, with a maximum hight of 45 ft. The profile of the ceiling, approximately elliptical, was struck from five centers. The roof principals are of somewhat unusual form, owing to architectural requirements governing the position and slope of the roof and the position of the curved ceiling. Although ample depth was secured at the middle of the principals, the distance between the ceiling and the outer surface was so small that the web was formed of steel plates so as to impart the requisite strength to the construction.

Moreover, to secure the maximum possible depth for the principals, the upper and lower flanges were spaced so that the purlins when riveted in place should have their upper surface flush with the top of the principals, and that the beams carrying the ceiling supports should be flush with the bottom of the principals. Further lateral bracing was provided by lattice girders, 5 ft. 1¾ in. deep, riveted between the principals at the distance of 8 ft. 11 in. from the center line.

The principals measure 57 ft. 4 in. from center to center of the supporting columns, and they are spaced apart at distances ranging from 15 ft. to 30 ft., the reason for variations being found in demands made by the architectural designs.

DETAILS OF WOODEN CORNICES ON BRICK BUILDINGS

BY J. GORDON DEMPSEY.

IN designing a wooden cornice on a brick building, the architect or draftsman first takes into consideration the amount of water it will have to carry off and the size of cornice which will look best on the building. The sizes of the cornices that are generally used are shown in the illustrations. The details of the construction of the cornices are to give the reader a general idea of how they are built. There are very many designs and ways of constructing them, but the ones shown in the illustrations are most used. The cornices are all shown at the low point of the gutter where the leader would be connected. There are numerous ways of making this connection, which is always taken care of by the metal man or plumber.

It will be noticed that at the bottom of the fascia boards there is a slight angle in the cut. The idea of this is that any water which has blown against or has flowed over the cornice will drip off here and not run on to the rafters or on the brick wall. There are very good examples of this in Figs. 12 and 18. In Fig. 12 the water that runs over the edge of the roof will drip off here at the bottom of the fascia board. In Fig. 18, if all the water does not drip off at the end of the gravel strip, it will drip off here and not run on the rafter, which would allow it to run against the brick work of the building.

On some of the sketches the words "gravel strip" has been shown when slag roofing has been used. To be exact, this should be called a slag strip when used with slag roofing, but the name gravel strip has been given to this particular piece of flashing and is applied to it when either kinds of roofing are used. The use of the gravel strip on inclined roofs is to keep the slag or gravel from rolling off, also to act as a finish to cover up the ragged ends of the roofing. It can be made of copper, tin, galvanized iron or such metal as may be desired. It is fastened to the outside of the cornice with small nails and on the inside of the gutter, after two ply of felt have been laid, it is nailed on this and covered with the other three ply.

The "lookout" or rafter which projects beyond the brick wall is given very many styles of cuts on the bottom of the end. As a rule, it is given a cut to correspond with the angle of the mold.

The one-quarter round or cove, as shown on the drawings, is used to cover up any irregularities which

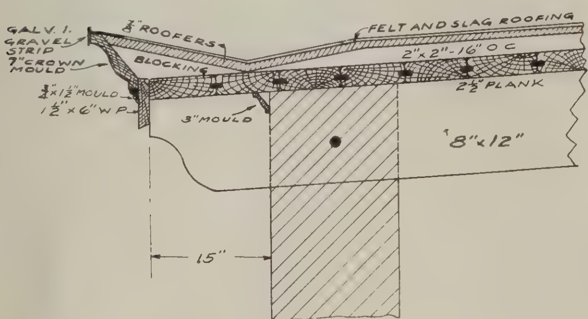


Fig. 1.

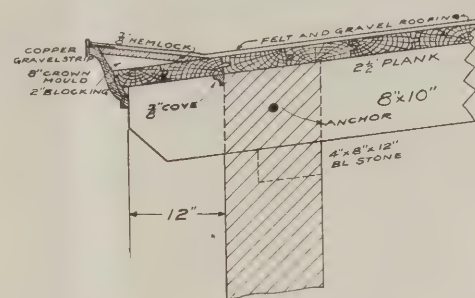


Fig. 3.

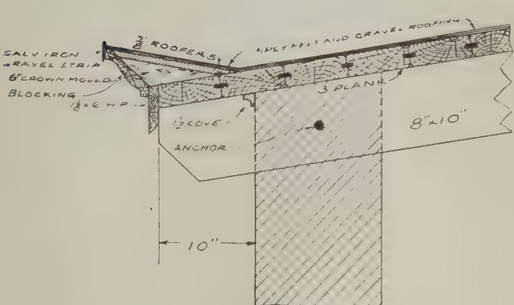


Fig. 2.

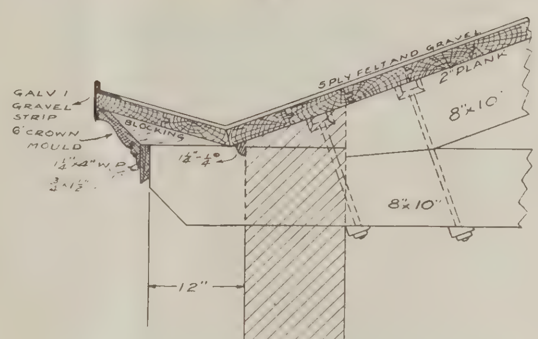


Fig. 5.

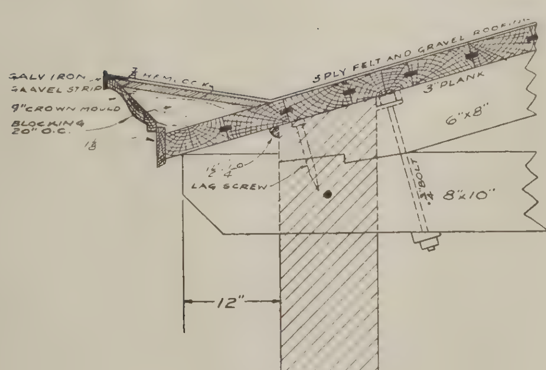


Fig. 4.

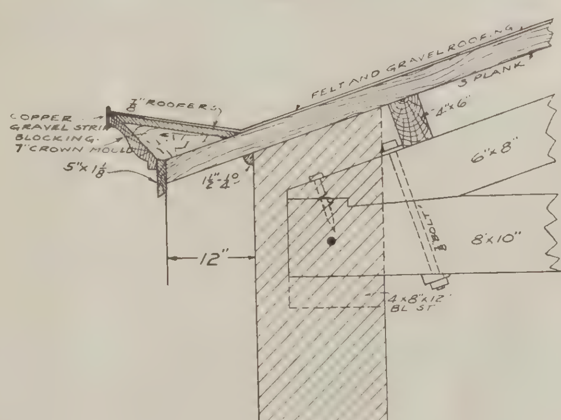


Fig. 6.

Details of Cornice Construction.—Various Styles of Wooden Cornices for Brick Buildings.

may occur in the brick work, and also to act as a wind stop to keep out the drafts that would come through the top of the brickwork.

They have been arranged into four classes; first, the cornices with outside leaders; second, with inside leaders; third, hanging gutters; fourth, the overhang. Figs. 1 to 9 inclusive are the ones with the outside leaders; Figs. 10 to 13 inclusive the inside leaders; Figs. 14 to 16 the hanging gutter, and Figs. 17 and 18 the overhang.

In Fig. 1 is shown a form of construction used a great deal with double roofs. The blocking is cut to the required angle from pieces about 2 in. thick and spaced 16 to 24 in. centers. The thickness of the blocking is case the blocking is fastened on the lookout. The roof plank is let project to the end of the blocking and the mold placed under it and nailed to the plank or blocking. This way of placing the mold gives the cornice a large straight piece at the top. This form of construction is used a great deal.

In Fig. 6 the roofing plank forms the overhang to which the cornice is constructed on. The overhang has been shown 12 in., but should be made of such dimensions as will look best on the building. Care should be taken in designing the cornice at the high point on a steep roof to make the rise in the gutter great enough to keep the water from running over it.

Fig. 7 shows a design of cornice where the lookout

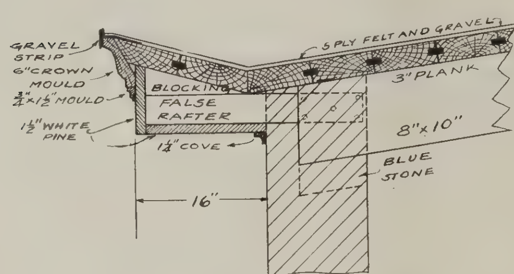


Fig. 7.

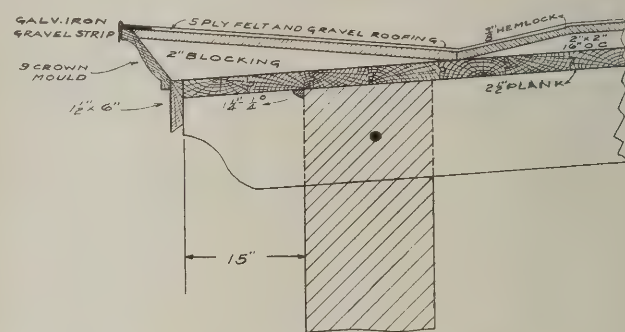


Fig. 10.

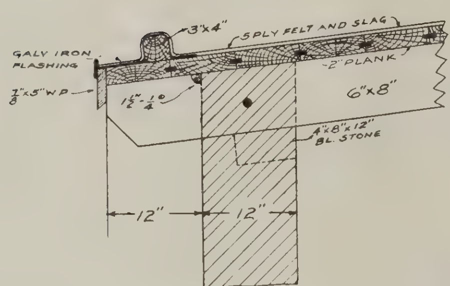


Fig. 8.

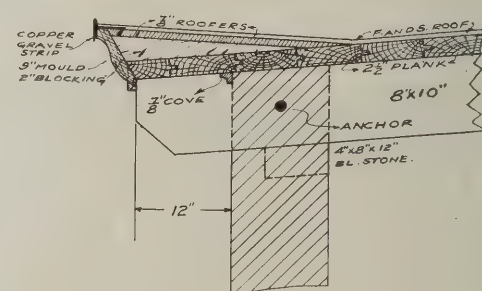


Fig. 11.

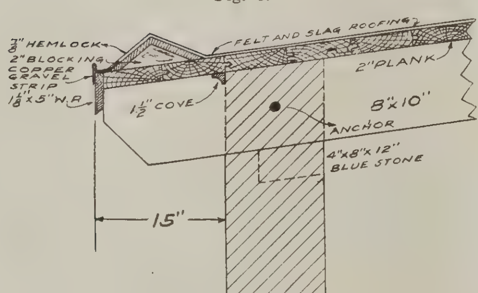


Fig. 9.

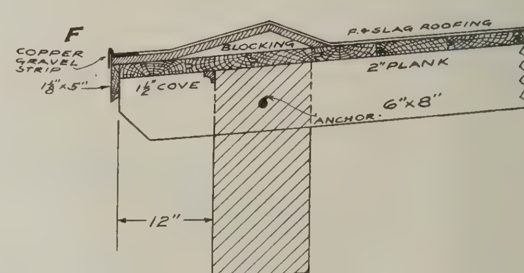


Fig. 12.

Details of Cornice Construction.—Various Styles of Wooden Cornices for Brick Buildings.

generally made about 2 in., but almost any thickness that will fill the requirements will do. The 3-in. crown mold can be changed to a cove, quarter-round or any other mold, as may be desired.

In Fig. 2 is a cornice for a roof with a single thickness of roof plank. The construction of this is something similar to that shown in the first sketch.

In Fig. 3 is represented a cornice where no fascia board is used. A larger size crown mold is shown than in Fig. 2, but should be made in accordance with the necessary hight of the cornice. By letting the plank project to the outside of the mold, as in Fig. 5, a smaller mold can be used in this way.

Fig. 4 represents a cornice on a steep roof. The plank projects over the end of the rafter about 2 in. This plank could be cut off even with the end of the rafter and the fascia board nailed on here, which would make a very different effect. It can be easily seen that by changing the finish of the cornice very slightly it will give it a very different appearance.

In Fig. 5 is another cornice for a steep roof. In this and blocking are closed in. This style of cornice makes a very effective appearance when it is the right size to correspond with the building. Different designs of cornices of this style can be worked up from this one by changing the detail of the finish.

The gutter shown in Fig. 8 is formed by using a 3 x 4-in. timber with rounded corners at the top. The idea of rounding the corners is to give it a better form for the flashing to fit on. The hight of the timber should be made according to the pitch and size of the roof. This style of gutter when covered with good flashing will last a long time. This style of gutter can also be made to be used with an inside leader by placing the 3 x 4-in. timber in the right position, so that the low point will correspond with the low point of the inside leaders.

The gutter in Fig. 9 is also one which is well adapted for use on buildings where the pitch of the roof is not very much. It is constructed very strong and is covered by the roofing, which makes it as strong as the roof of the building. These two styles of gutters are not used very much but give as good if not better service than the others.

Fig. 10 shows the cornice of a double roof with an inside leader. The finish of this cornice is similar to Fig. 1. It is much used by architects and builders. It is a very strong cornice and looks very neat on the building.

Fig. 11 is the style of cornice with an inside leader where no fascia board is used to make up the finish. It will be noticed that the mold is placed slightly higher up, which allows more of the rafter to be seen and also makes the hight of the cornice larger.

Fig. 12 is similar in construction to Fig. 9, except that it is used for an inside leader.

to project over the inside edge of the gutter ¼ in. to ½ in., which allows the water to drip in. The straps which are shown on the gutter are used for reinforcing it. If a felt-and-gravel roof were used instead the gravel strip would be formed as part of the gutter.

Fig. 16 is a square gutter with a different design of roof than in Figs. 14 and 15. This design and construction is used more or less on the ends of saw-

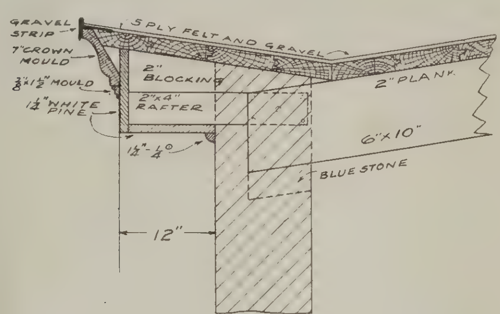


Fig. 13.

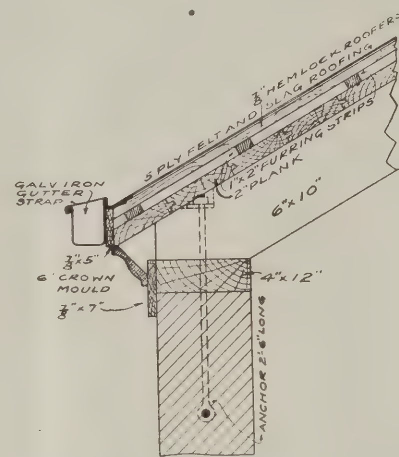


Fig. 16.

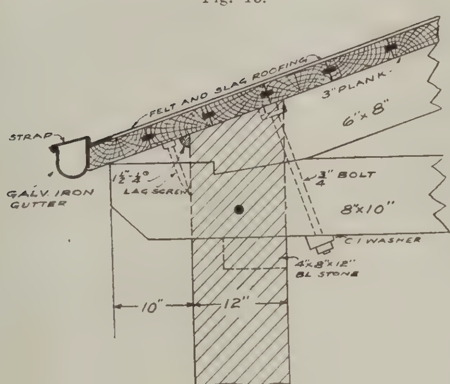


Fig. 14.

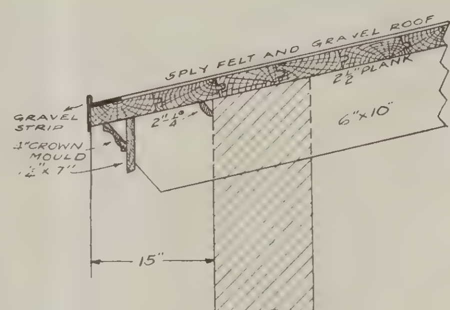


Fig. 17.

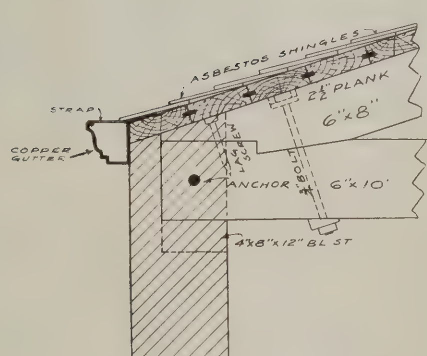


Fig. 15.

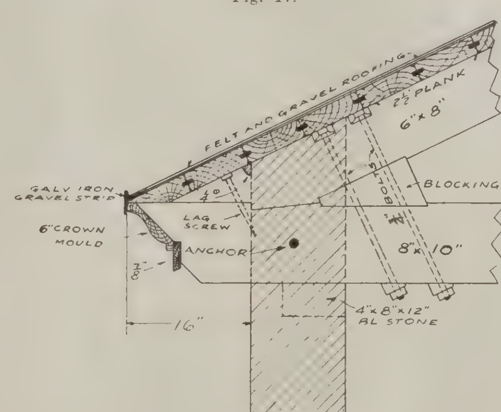


Fig. 18.

Details of Cornice Construction.—Various Styles of Wooden Cornices for Brick Buildings.

Fig. 13 is for an inside leader, the construction of which is similar to that in Fig. 7, except that the hight of the cornice is greater.

Fig. 14 is a semi-circular hanging gutter, the shape which is used the most. Straps spaced about every 16 to 24 in. on centers are fastened to the gutter, as shown in the illustration, and used for reinforcing it. The sizes of these gutters, as in Figs. 15 and 16, should be made according to the amount of water they will have to carry away. The gravel strip is formed as part of the gutter.

Fig. 15 is a hanging gutter with an asbestos shingle roof. The shingles or slate, if used instead, are allowed tooths. It makes a very neat appearance with the mold placed under the gutter and adds to the looks of the building. This mold could be left off and the ⅞-in. white pine run up to the roofing plank.

Figs. 17 and 18 represent overhangs from which different designs can be worked. A few ways of doing this would be in Fig. 17, by leaving both the crown mold and fascia board off or by letting the plank project beyond the edge of the rafter 2 or 3 in. and placing the mold on here. In Fig. 18 there are many different ways, such as cutting the 8 x 10-in. timber off at the end of the 6 x 8-in. and not using a mold or using a mold or just a fascia board.

Preservation of Timber in England in the Sixteenth Century

One of our valued correspondents in Northern Central New York State sends us the following relating to the preservation of timber in England in the sixteenth century, the particulars being based upon Statute 35 of Henry VIII., as follows:

Coppice or underwood felled at 24 years' growth. There must be left 12 standlings or stove oaks upon each acre, and in defect of so many oaks the same number of elms, ash, asp or beech of likely timber trees left until they are 10 in. square a yard from the ground.

In coppices above this growth when felled there are to be left 12 great oaks, or in defect of them other trees, to be left 20 years longer and to be inclosed for seven years.

By the statute men were bound to inclose coppice wood after felling. If under 14 years' growth, 4 years; if above 14 years' growth, 6 years inclosed, and for wood after felling. If under 14 years' growth, 4 years inclosed; if above 14 years' growth, 6 years inclosed, and for wood in common ¼ part was to be inclosed, and at felling a like proportion of great trees were left and inclosed seven years.

By this statute they were obliged to fell their oak timber in the months of April and May, as the bark was better for tanners' use at that season of the year. The price for felling trees was 12 pence a load; 50 ft. equal a load.

In looking over an old book, Mortimer's Husbandry, published in 1712, I found the correct prices of house work of all kinds and rules to apply on same, which I thought might interest the members of the craft:

Barn Work

For a barn that had a single stud or one hight of studs to the roof, the price was 2 shillings (50 cents) per foot.

For a double stud and girt, it was 2 shillings 6 pence per foot. Measuring barn on one side and one end. For example:

Suppose a barn is 60 ft. long and 20 ft. wide, making 80 ft. To hew the timber, saw it out, frame it and set it together, the price was 2 shillings 6 pence (62½ cents) per foot, and 10 pounds ($50) if the carpenter furnished the timber.

The House of 1712

Upon a good foundation two bricks or 18 in. thick for the heading course is sufficient for the groundwork of and common structure and six or seven courses above grade to the water table, where the thickness of wall was cropped off the thickness of a brick, or 2½ in., on each side.

For houses of three to five stories, the wall of such from foundation to water table should be three courses of heading brick, or 28 in. in thickness, and at every story a water table and offset on inside for joist to rest on, the joist to extend in wall one-quarter part for the better bond.

For partition wall, 1½ brick thick, and upper stories 1 brick or 9 in. thick.

To dig foundations 1 brick wide and 1 ft. deep the price was 1 penny per foot.

Where it was 2½ ft. it was 2 pence per foot, and so on.

Brick Work

Bricklayers' work was measured by the pole square of 16½ ft. square, taking out the door and window openings. Where a bricklayer has 2 shillings 6 pence per day, the laborer 20 pence and the price of brick is 14 shillings per M, lime 4½ pence per bushel, roofing tile 2 shillings 6 pence per 100.

The average price for bricklayers, to furnish everything, is five pounds a pole square of 272¼ sq. ft.—that is, for house work.

For walls the price is 4 pounds 10 shillings; to furnish material. For the labor only, it is 1 pound 2 shillings per pole square of 272¼ sq. ft., 1½ brick thick.

If a wall is more or less than 1½ brick thick, it must be reduced to a brick and half by multiplying the length and hight by the number of ½ bricks the wall is in thickness and divide the product by 3 and that by 272¼.

Bricks were 9 in. x 4½ x 2½ in. in size; 4500 will do a pole square, 25 bushel of lime.

Brickmaking

To burn a clamp of brick of 16 thousand, 7 tons of coal is as allowed (2000 lb. to the ton), or 10 bushels of coal per thousand of brick, and the workmen get 6 shillings per thousand to make them. A square yard of clay per 7 to 8 thousand brick.

Roofing Tile

Roofing tile is measured by square 10 x 10 ft., 3 shillings 6 pence per square for the labor.

To find all but the tile, it is 12 shillings. To furnish everything, it is 1 pound 6 shillings per square.

Roofing tile in England was laid in mortar, or cement, or lath, 3 bushels of lime per square. The cement was laid on the first course of tile near the middle, and next course bedded in it and pointed on the under side; 100 lath and 500 nails per square; nails were hand-made and courted.

Thatching roofs with straw was done from 2 shillings 6 pence to 3 shillings per square of 10 x 10 ft., and with reeds 4 shillings per square, 1000 reeds will cover three squares of roof, which cost about 15 shillings. Two good loads of straw will cover five squares.

Thatch is tied on with ropes or withes.

Timber Sawings

All sawing of lumber was done by hand in the saw piles. The price was 2 shillings 8 pence to 3 shillings per 100 sq. ft., measured at the middle length of the log.

Lath

Heart lath of oak are 1 shilling 10 pence per 100.

Sap lath of oak are 1 shilling 8 pence per 100.

Fir lath, 12 pence per 100.

Carpenter Work

Carpenter work is done by the square 10 x 10 ft. = 100 sq. ft.

At London, England, they will build a house four stories high for 40 pounds ($200) per square, if built of oak, and 30 pounds, if built of fir. This includes mason work, etc.

A 14-Story Addition to an Office Building

It has finally been decided by the owners of the eight-story office building at Broadway and Exchange place, New York City, to carry out the original plan of a 22-story structure and add 14 stories to the present building. When the structure was planned in 1907, for the Knickerbocker Trust Co., the cost was placed at about $2,000,000, but the panic coming on it was decided to postpone the work for a time, and it is now calculated that by waiting two years the company will save fully $300,000, as compared with the original estimate of cost.

The land was bought for about $1,700,000 in May, 1906. It occupies a frontage of 60 ft. on Broadway and 131 ft. on Exchange place, taking in the corner of New street. This was originally the southern part of the old Consolidated Exchange. McKim, Mead & White were the architects, and their original designs will now be followed.

The George M. Fuller Company, which put up the present structure, will erect the new stories.

WORK AND METHODS OF THE CONCRETE CONTRACTOR—II

By Ernest McCullough, C. E.

THE contractor is supposed now to know how to order his materials for any job when he is compelled to mix his materials according to certain specified proportions and to take what he can get. If he is permitted, however, to use his own mixture, his endeavor will be to obtain as dense a mix as possible. Dense concrete is the strongest and also the cheapest. In order to get a dense mix, something should be known about the voids.

The theory is that the voids in the aggregate will be filled by the matrix, which is composed of sand, having the voids filled with cement paste. There should be a surplus of matrix in order to fill the voids in the aggregate, and there should be a surplus of cement paste to fill the voids in the sand, and at the same time coat every portion of the sand and aggregate. It is not necessary to alone fill the voids, but every particle of sand and aggregate should be coated. This has been mentioned already, but it does no harm to mention it again, for even old concrete men have not thoroughly grasped the idea or there would not be so much inferior concrete in evidence in nearly every town and city.

It is a common thing to hear men say that there is only one way to do a thing, and that is the right way. This is true, but in the doing of everything more than one method can be used. In ascertaining the percentage of voids in concrete materials several methods are in common use, and the up-to-date contractor should learn them all and then use the method he prefers. The method commonly used is that of measuring the voids with water without weighing. Take a box exactly 1 ft. deep inside and exactly 3 ft. 2 in. square inside. It must be tight, so water can be held in it. Fill this box with the aggregate to be used, placing it in thin layers well compacted and tamped. Have also a box which will hold exactly 1 cu. ft. and with the sides graduated to show depths. Use this small box to measure the water which will be poured into the large box after the stone has been put in. To avoid trapping air, which will increase the apparent voids, the water should be slowly and carefully poured in at one corner of the box. It should also be carefully measured and the box filled. Suppose it takes 3 cu. ft. of water to fill the box, which contains already 10 cu. ft. of aggregate. The percentage of voids will be 30 because 3:10::30:100, the word percentage meaning hundredths.

After this take the stone out and place it on a platform, turning it over several times to get rid of the water. Then spread the stone over the platform in a thin layer, covering it evenly with 3 cu. ft. of sand. Mix the two together thoroughly and then place in the box in thin tamped layers. All this material should go in the box if carefully placed. Now fill the remaining voids carefully with water. The amount of water used this time represents the voids in the sand. If it takes 1 cu. ft. of water, then we know the voids in the sand are one-third the bulk. We also know that in the completed concrete the cement will be 10 per cent. of the bulk, for 1:10::10:100. One cubic yard contains 27 cu. ft.

Fig. 1.—Roof of a Concrete Silo, Showing Method of Construction.

Work and Methods of the Concrete Contractor.—II.

Assuming 1 cu. yd., there will be required the following quantities: 10 per cent. of 27 = 2.7 cu. ft. (bags) of cement, 30 per cent. of 27 = 8.1 cu. ft. of sand and 27 cu. ft. of aggregate. Cement shrinks 5 per cent. when water is added, and as enough should be used to give a surplus to coat the grains of sand, add 10 per cent. to the cement, making then 2.7 bags + 0.27 = 2.97, or practically 3 bags (cu. ft.). The amount of sand should be increased 5 per cent., to give a surplus of mortar, and this amounts to 8.1 × 0.05 = 0.405 cu. ft. Adding 8.1 + 0.41 = 8.51 cu. ft. of sand. This 5 per cent. surplus should be subtracted from the aggregate, which then becomes, 27 — 0.41 = 26.59 cu. ft.

Another method of ascertaining voids is by weight.

It is based on the specific gravity of materials. The following are the average weight per cubic foot of the materials mentioned:

Quartz, per cubic foot, solid, weighs.......... 166 lb.
Granite, per cubic foot, solid, weighs.......... 168 lb.
Limestone, per cubic foot, solid, weighs....... 171 lb.
Trap rock, per cubic foot, solid, weighs....... 181 lb.

Let weight per cubic foot solid = S
and weight per cubic foot broken = V

$$\text{Then } \frac{S - V}{S} = \text{per cent. of voids.}$$

To ascertain the voids by this method, take a box holding exactly 1 cu. ft., fill it with the sand or aggregate and weigh. Subtract the weight of the box, previously found, and the remainder is the weight of 1 cu. ft. of material = V. From the above table take

Fig. 2.—View of the Completed Silo, with Concrete Watering Trough in the Foreground.

Work and Methods of the Concrete Contractor.—II.

the weight of a solid foot and proceed as shown in the formula. For sand take the weight of 1 cu. ft. of quartz.

Example: The weight of 1 cu. ft. of sand was found to be 100 lb. What is the per cent. of voids?

$$\frac{S - V}{S} = \frac{166 - 100}{166} = 39.5 \text{ per cent. of voids.}$$

The Specific Gravity Method

The specific gravity of a material is the ratio of its weight to the weight of an equal bulk of water. When a substance has a specific gravity of 2.5 then it weighs 2.5 times water, which is always taken as having a specific gravity of 1. With the specific gravity method of ascertaining per cent. of voids the vessel containing the aggregate, or sand, may be of any size, but should contain not less than 1 cu. ft. The larger it is the more accurate the determination. First weigh the box and then weigh it when filled with the material, and the difference will be the weight of the material. Call this net weight V. Then fill with water, after emptying out the material first used, and ascertain the net weight of the water in the same way. Call the net weight of the water W. In the following formula Sg stands for specific gravity.

Then, the per cent. of voids

$$= \frac{(W \times Sg) - V}{(W \times Sg)} \times 100.$$

In determining the voids in sand it is customary to use 2.65, the specific gravity of quartz. Granite has a specific gravity of 2.72; trap rock, 3.00; sandstone, 2.41. Stone varies so much in density that the foregoing values are only averages, and owing to this a great many men use 2.6 as a general average for all aggregates as well as for sand. The specific gravity of water is 1, but the weight of a cubic foot of water is 62.5 lb., so the weight of a cubic foot of material having a specific gravity of 2.65 is equal to 2.65 × 62.5 = 165.63 lb.

Another method is used when the exact size of the box is of no consequence, bearing in mind always that the box should contain more than 1 cu. ft., as the larger the box the more exact the determination.

Let C = net weight of water when box is filled with water only.

B = net weight of aggregate, or sand, dry in box when filled.

C = net weight of material placed in box dry and enough water poured in to completely fill the voids.

Then, per cent. of voids

$$= \frac{A - B}{C} \times 100.$$

Example: A box was filled with water and the weight was found to be 125 lb. The water was emptied from the box, which was then filled with sand, the weight of which was found to be 200 lb. Water was then poured into the box and when full the weight was found to be 270 lb. (These weights are the net weights, the weight of the box being subtracted in each case from the total weight.)

The example is then performed as follows: Subtract 200 (B) from 270 (A), which gives 70 lb. Divide this by 125 (C) and the quotient is 0.56. Multiplying this by 100 gives the voids as 56 per cent. Such a percentage would indicate very large pieces broken into very regular sizes and irregular shapes.

We have seen how the materials will be proportioned so the voids will be filled. Such a method can be used only when there are no specifications for the mixture and the contractor can make a dense concrete according to his own ideas. Because it may not take a great deal of cement does not mean it will be a weak concrete. An excess of sand is always weakening. Cement is the very cheapest strength-giving element in concrete, yet in many cases men advocate "lean" mixtures of concrete in order to save cement. All possible efforts should be made to save mortar, but not to save cement. An excess of cement makes the concrete stronger, and by increasing the density makes it less porous, therefore more nearly water tight. However, a certain definite mixture may have been specified and the voids have been found to vary so greatly from the 45 per cent. in aggregate and the 40 per cent. in sand, mentioned as underlying the "40 rule for bags of cement," that the proportions should be varied.

Suppose that a careful determination has shown a certain aggregate to contain 33 per cent. of voids and the sand to contain 30 per cent. of voids, yet the mix specified is a 1:2:4, which means for each cubic foot of cement there must be 2 cu. ft. of sand and 4 cu. ft. of stone, or aggregate. The problem is to find how many cubic feet of sand and how many cubic feet of aggregate we will require for each cubic yard of finished concrete. As a cubic yard contains 27 cu. ft., multiply 27 by 33 to ascertain the cubic feet of voids in the aggregate. This is equal to 8.91 cu. ft. to be added to 27, making a total of 35.91 cu. ft. of aggregate and sand. As the sand is to be one-half the amount of aggregate, it is a simple matter to divide 35.91 by 3, which gives 11.97 cu. ft. of sand and double that quantity of aggregate. This is not exactly correct, for the mixture is based on 50 per cent. of voids in each, whereas the aggregate contains only 33 per cent. of voids and the sand contains 30 per cent. The sand contains only 30 per cent. of voids, but the cement must be equal to one-half the bulk of sand.

Avoiding algebra and working this out arithmetically let us call the aggregate 1, then the sand will be ½ and the cement will be ¼. Converting them into decimal fractions gives us 1, 0.5 and 0.25. In the aggregate there are 33 per cent. of voids and this makes 1.33. In the sand there are 30 per cent. of voids and this makes 0.50 plus (0.50 × .30 = 0.15) = 0.65. The amount of material then in 1 cu. yd. becomes 1.33 + 0.65 + 0.25 = 2.23. If the voids in both stone and aggregate had been 50 per cent. the amounts would have been merely 1 + ½ + ¼ = 1 + 0.50 + 0.25 = 1.75. The materials then have been increased a certain percentage and this percentage must be added to 27, the number of cu. ft. in 1 cu. yd., which gives 2.23/1.75 = 1.27, or the excess is equal to 27 per cent. Multiply 27 × 1.27 = 34.29. This gives the total cubic feet of aggregate, sand and cement required for 1 cu. yd. of finished concrete. Adding the parts together, 1 + 2 + 4 = 7. Dividing gives 34.29/7 = 4.9 cu. ft. (bags) of cement. 2 × 4.9 = 9.8 cu. ft. of sand, and 4.9 × 4 = 19.6 cu. ft. of aggregate. To convert the sand into cubic yards, 9.8/27 = 0.37 cu. yd. and the aggregate will be 19.6/27 = 0.73 cu. yd. This example has been worked out for the easiest case, but a little thought will enable any one to use the same principles in using the void system of proportioning concrete with any prescribed mix. The calculations show that there is an excessive amount of matrix with a 1:2:4 mix when the voids are so much less than 50 per cent.

Fig. 3.—A Concrete Road Bridge.

Work and Methods of the Concrete Contractor.—II.

One more method remains. This is a common-sense method for securing dense concrete with the materials that may be furnished and when the voids may not be exactly known. It is due to William B. Fuller, who devised the rule from which the "40 rule" was derived for proportioning materials. Have a clean iron or steel pipe about 10 in. in diameter and about 2 ft. long. Take some cement, sand and aggregate, sufficient to make about 1 cu. ft. of concrete when proportioned according to the specifications. Mix with about the amount of water it is intended to use and put it into the pipe, which is standing upon the platform of scales such as are used by most storekeepers. Tamp the concrete into the pipe and carefully measure the space it occupies in the pipe. Then weigh the pipe and contents. Throw out the concrete and clean the pipe thoroughly. Mix another batch, using the same amount of materials, but varying the proportions slightly; perhaps using a little more sand and less aggregate, or *vice versa.* Place this batch in the pipe, and tamp, measure and weigh. Make several trials until finally a mix is found which will produce the smallest bulk of concrete with the greatest weight. This means the most dense concrete possible with the proportions used. The proportions should be marked down on paper for each batch, and when the right mix is found use this proportion for all the work done with the materials received in the lot tested. Such a test can be made each day in a few minutes. What is wanted is the concrete that weighs the most per cubic foot. To get the weight per cubic foot square the inside diameter of the pipe and multiply by 0.7854, which gives the area. Multiply the area by the depth of the concrete in the pipe. The dimensions being in inches, it will be necessary to divide by 1728 to obtain the cubic feet. A little thought will show that the area will be the same in all cases, so that part of the above operation will be unnecessary. Therefore the depth alone will vary with the weight and the concrete having the least depth with the greatest weight is right.

As illustrating the first job of the kind ever done by the contractor executing the work, there is shown in Fig. 1 the roof of a silo in course of construction. The framework consists of Collins' slotted studding, although any metal studding can be used just as well. After the slotted studding, which really constituted the rafters, so to speak, were placed expanded metal lath was wired to them and the plaster applied. The body of the silo was made out of thin slabs reinforced with expanded metal lath, and the slabs connected by wiring the exposed edges of the lath together and plastering the joints.

Fig. 2 shows a view of the completed silo, with water tank in the foreground. Both were made of thin slabs of concrete on expanded metal lath. The lath projected over the edges and the projecting edges were wired together and plastered. All the work was done by men who had never before executed any concrete work or any plastering.

There is presented in Fig. 3 another example of concrete work, being the first of the kind ever done by the men who executed it. The picture represents a road bridge of 12 ft. span, the plans having been prepared by a competent engineer and the contractor followed directions. In addition to the covering of the earth and macadam, the bridge carried a 10-ton steam roller a short time after it was built. Bridges like the one shown do not burn; neither do they rot nor rust, and as the concrete gets stronger as time goes on, the bridge is better each day than when it was built.

I am indebted to the courtesy of the Northwestern Expanded Metal Company, Chicago, for the accompanying photographs.

AN INTERESTING EXAMPLE of cathedral construction in Valparaiso, Chili, is a building the work upon which has just been commenced, and which was designed by a native architect who was educated at the Cooper Institute, New York City, and who for 10 years practiced his profession in the United States. The cathedral is to be of reinforced concrete construction and will cover an area 195 ft. long by 162½ ft. wide. It will have a central dome 130 ft. high.

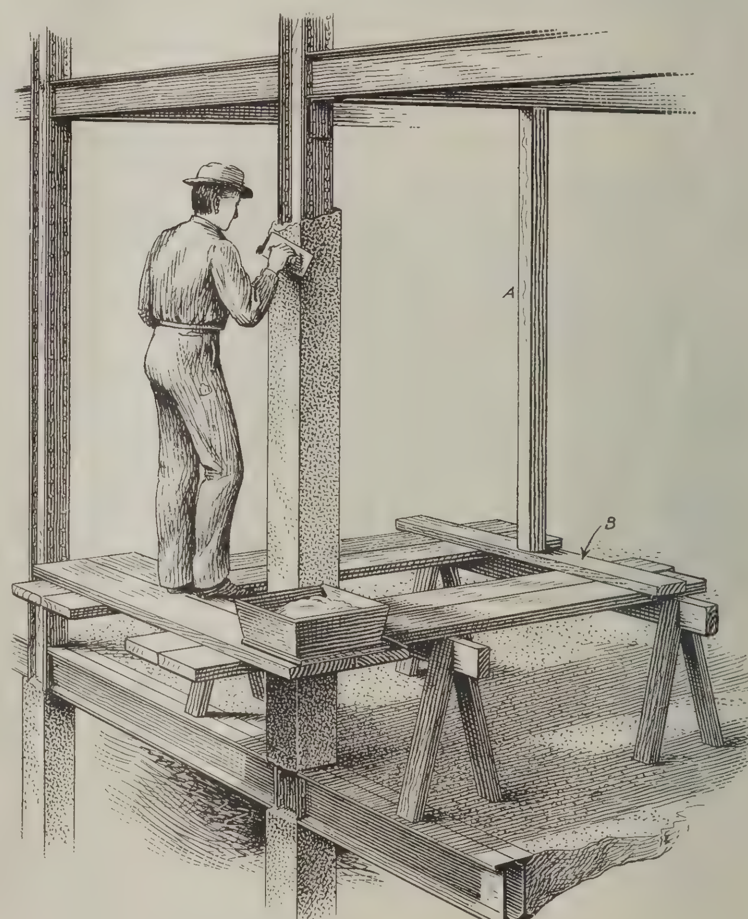
A FORM OF CANTILEVER SCAFFOLD USED BY BUILDERS

BY OWEN B. MAGINNIS.

IN the construction of modern buildings of great hight, many expedients are often necessary in order to facilitate the execution of the work, and experience has shown that the majority of these are due, in great measure, to the ingenuity of the mechanics who are engaged in carrying out the operation. A short time since there was presented to the attention of the readers of these columns a form of cantilever scaffold, which has been frequently used in connection with the erection of steel skeleton-frame office and business structures in New York City and elsewhere. Attention is now directed to still another style of cantilever scaffold, which is used about the line of iron columns extending around the outer edge of a structure, the position of the scaffold being such that one end of it projects beyond the building.

A study of this scaffold of the cantilever type shows that it differs from that described in a previous issue in that while the former was dependent on the weighting of its interior end to act as a counterpoise to the portion extending beyond the building, the one here shown is prevented from tilting by means of a cross piece and upright marked "A" and "B" on the drawing. In the case of the scaffold previously referred to planks were laid on the floor beams, while in the present case the planks are supported on masons' horses and used for supporting the workman while he paints and cements the outside faces of the front columns, channels and I-beams. The picture shows a mortar box placed near an outer column, while the workman upon the scaffold is enclosing in cement an iron column at one of the floor levels of a steel skeleton-frame building. The position of the scaffold is such that the workman is able to reach to the level of the floor above.

The planking used for this scaffold is 2 x 8 in. in dimensions, the cross pieces upon which the workman is shown standing being 10 ft. in length, while the planking running at right angles thereto is 16 ft. in length. The strut A is driven tight under the bottom flange of the I-beam to keep the planks upon which the workman stands from tipping up, while the cross piece B is a 2 x 4. The simplicity and rapidity of the construction of a scaffold of this nature render it extremely useful in cases of the kind mentioned.



A Form of Cantilever Scaffold Used by Builders.

Frostproof Brick

Of all qualities that brick should possess none is of greater importance than the ability to resist the disintegrating action of frost, and since a frostproof brick generally is also able to withstand a great external exposure with safety, it is desirable to devote a little time to this subject, said Robert Niedergesaess, of Seattle, in an address before the State Association of Clay Workers.

"Frost, as we know, is one of those powers which we cannot restrict in its action; water will begin to expand when its temperature drops below 39½ degrees F., and if confined and frozen will even burst a gun, yet a brick properly made will not be injured by it.

"A soft-mud brick is on the whole more frostproof than a stiff-made brick, and of the latter kind one made of mild sandy surface clay will stand more frost than another made of rich, strong clay, such as prevails in the Puget Sound country. The reason for this difference lies in the lamination which the stiff-mud process has to contend with. The stiffer the brick are made the more they are liable to be laminated, unless the greatest care is bestowed upon the mixing of suitable ingredients, which prevent the clay from slipping through the die in layers. A soft-mud brick is somewhat elastic and spongelike in texture, whereas a stiff-mud laminated brick offers between its layers too much resistance to the expanding and freezing water. I am speaking of brick equally hard burned and have in my mind a well made stiff-mud machine brick made in the sixties, that later on I saw going to pieces by peeling off in layers, whereas a less nice-looking old hand-made brick remained as good as ever. That experience taught me the necessity of mixing the clay with enough rough and gritty material, and now I can safely say without fear of contradiction, that of the many millions of sewer brick made, as indicated and used in Seattle sewers, none has ever shown any signs of disintegration. By the way, I will mention that many of them were found to stand a pressure of from five thousand to fifteen thousand pounds per square inch."

There are no mechanical contrivances which prevent lamination of brick made without proper mixing and working of suitable ingredients.

UNIQUE APARTMENT HOUSE IN FORT WAYNE, IND.

WE have in the past presented to the attention of our readers designs of dwellings of various kinds, many of which were arranged for either one or two families, with occasionally what might be termed a "flat" house for three families. We now take the opportunity of bringing to the notice of the readers what from its external appearance might reasonably be taken for a "twin" or double house, but which is in reality an apartment house arranged for occupancy by four families. It is a style of building somewhat typical in the section of country in which it is located and which possesses many interesting features of convenience and arrangement. The half-tone engraving shown herewith affords an excellent idea of the appearance of the finished building, while the floor plans upon the following page show the general disposition of the rooms.

It will be seen that each family has a living room, a dining room, two bedrooms, kitchen and a bath room, and that the second floors are reached by both front and rear stairs. The kitchen, bath room and one bedroom secure light from a rear court, which is open to the outside air down to the first floor. The interior side walls of this light court are of stucco finish made smooth and white, so as to serve as a light reflector for the rooms opening upon it as well as for a ventilating shaft.

The foundations and basement walls are of concrete, while above the grade line and extending to the window sills of the first floor the walls are of cement blocks with stone trimmings. The sill of the house above the cement range work is a 4 x 6, and the corner posts are 4 x 4 in. The exterior woodwork of the building is poplar, with cedar shingles covering the roofs.

The interior finish is of short-leaf Southern pine, all finished in a dark-oak stain, four-coat work, except the rear bedrooms and bath rooms, which are finished in white enamel. The floors throughout the building are of hardwood with a varnish finish. Keystone deadening felt is used throughout the building as an insulator.

The four-family apartment house here shown is located 1½ miles from the center of Fort Wayne, Ind., and was built last year complete, with plumbing, electric wiring, heating and fixtures, for less than $6,000. The architect who prepared the plans and superintended the construction was Ralph M. Snyder, Nos. 920 and 921 Shoaff Building, Fort Wayne, Ind.

General View of the Building as Reproduced from a Photograph.

A Unique Apartment House in Fort Wayne, Ind.—Ralph M. Snyder, Architect, Fort Wayne, Ind.

Domestic Styles of Architecture

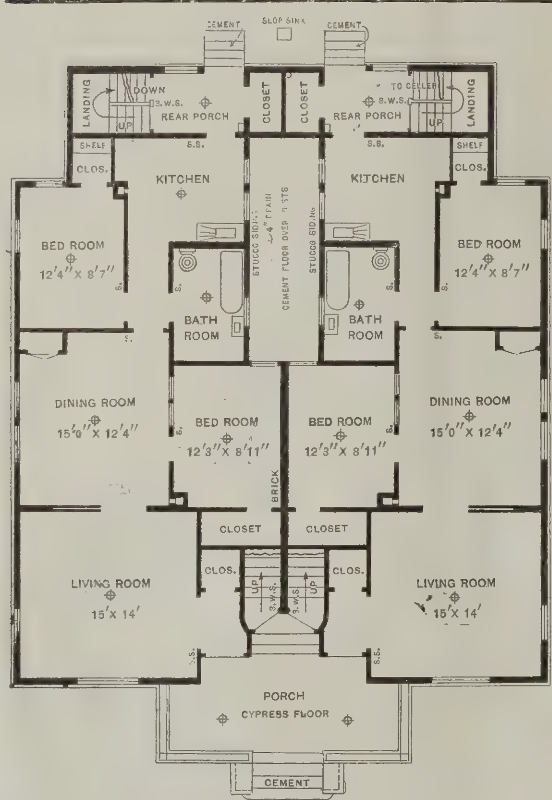
The four most popular styles of American domestic architecture are the Colonial, English domestic, bungalow and the mission styles. While examples of each style can be found in all parts of the country, the Colonial style is found mostly in the eastern and southern parts of the country, the English domestic style throughout the northern States, the bungalow style in the western coast States and the mission style throughout the West in general, but mostly in the southwestern States.

The English style of domestic architecture must necessarily be changed and modified to meet American ideas of home building, says Architect James Clausen in discussing the subject. For example: The Englishman seldom has a porch. His porch is his garden, which he surrounds by a wall of masonry or an impenetrable hedge. While an Englishman likes exclusiveness, climatic conditions always have a strong influence on the style and manner in which a home is built, which is the principal cause for the difference between the American and English ideas of home-building.

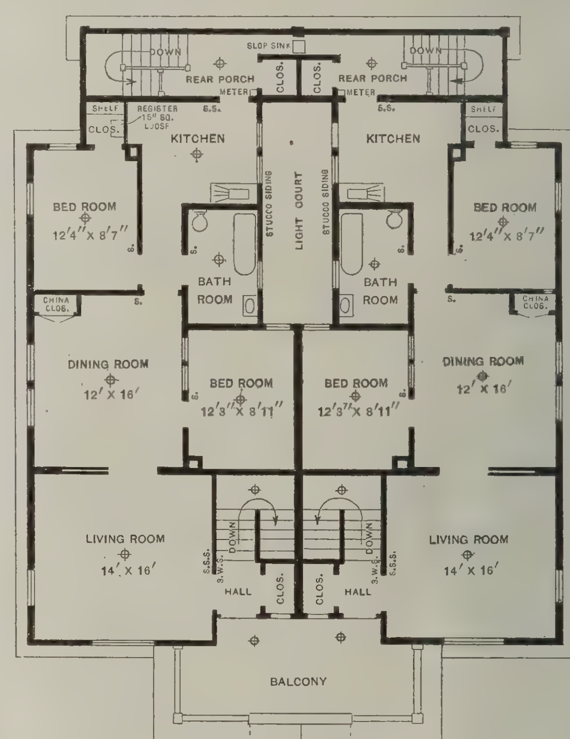
England's climate is mild. They are little bothered with such pests as mosquitoes and flies and her climate is not as variable from day to day as in most parts of this country. The Englishman can plan a social affair to take place in his garden on a certain date and inevitably knows just what the condition of the weather will be at that time. In this country, dual arrangements are always made for such an affair, so that if the weather does not permit of entertainment in the garden, porch and parlors can be substituted. The addition of the porch is the only marked difference between an English country home and an American country home in the English style. To make it meet its useful purpose and at the same time keep it in harmony with the style to which it does not really belong, is a severe test of an architect's ingenuity.

To plan an American country home without a porch is the openly connected rooms throughout the interior. The Englishman usually places his windows all on one side of the room, with but one door entering into it. While rooms arranged in this manner are undoubtedly easier to furnish and decorate, it is too exclusive an arrangement to suit Americans. It is considered quite the proper thing in this country to openly connect the main living room with the reception hall if possible with wide openings connecting with all other rooms, and having windows on as many sides of the house as possible, both for light and view. This, of course, means a lack of wall space, which necessarily makes the room a little harder to furnish. The location of all wall furniture must be prearranged during the planning of the house.

It is a noticeable fact that more English homes are found in this country on hillside locations than in cities built on level plains. There is good reason for this. The English style admits of more variance as to design than most domestic styles, which allows it to be adapted to a location not appropriate for most other



First-Floor Plan.



Second-Floor Plan.

A Unique Apartment House in Fort Wayne, Ind.—Floor Plans.—Scale, One-Sixteenth Inch to the Foot.

would be as much of an anomaly as Romeo and Juliet without a Romeo. English houses are nearly always masonry construction, therefore a house in the English style must either be of solid masonry or of a masonry veneer having the external appearance of a masonry house. English houses are usually in two classes, the rock-face stone house, usually in the Tudor Gothic style, and the so-called half-timbered house, having the exterior wall surface divided off into panels of various shapes and sizes, with the long divisions perpendicular by broad strips of wood with the spaces between covered with stucco.

Since an all-stone house is very expensive, the most practical English style for any house costing over $20,000 is the stucco veneer, at least for the first story. There are sometimes designed houses in a semi-English style without the panel wall surface, using a plain cement stucco throughout the second story, with merely the doors, design of the roof, etc., to emphasize its English character.

Another departure from the English style in the planning of American homes along the English style styles. Take the Colonial style, for example. It never looks well except on a level lot or on a terraced plateau. The many gables and ridges at various hights and lengths of an English house suggests hills and rugged country. It is almost impossible to plan an English home without at the same time taking into consideration the surroundings and especially the planting of the grounds.

In offering suggestions which might possibly prove useful to home builders, a writer on the subject recommends that if the house is the first to be placed upon the lot, put the building as far back as possible. If in the country or suburbs, have a good expanse of lawn in front and only a little in the rear of the house. Do not huddle houses together upon the fronts of the lots, and make this evident to everyone who intends to build alongside. Make room for plenty of flowers and shrubbery. Consider the lot as to its elevation, grades or shapes. To locate the house somewhere near the center of the lot in a hit-or-miss manner is likely to be afterwards regretted.

A STABLE OF CONCRETE CONSTRUCTION

A MOST interesting example of the growing popularity of cement as adapted to the construction of stables, small dwellings and similar building is illustrated by means of the engravings appearing upon this and the pages which immediately follow. At the outset it may be stated that it was the purpose to erect a perfectly simple yet substantial structure, giving first consideration to practical and convenient features rather than to artistic results, and the outcome is a building meeting all requirements, yet entirely pleasing from an artistic point of view. It is easy to see how readily the same methods of construction could have been applied to a dwelling with equally satisfactory results.

Economy being an important consideration in all work of this character, it may be stated that in this particular instance, the cost of concrete construction was much less than either frame, brick or stone, while it has the additional merit of never requiring painting, pointing or repairs. As the experts point out, the first cost of concrete is the last cost.

The building is 26 x 37 ft. in plan, with a 14-ft. shed or overhang. The outer walls are 11 ft. 6 in. high and these with the partition walls are of concrete 6 in. thick and were constructed as a unit. In other words, all walls were carried up at one time with a "form" only two boards high inside and outside—a method of quick construction greatly facilitated by use of the Dietrich clamp instead of bolts. The foundations are 24 in. deep and consist of a 12-in. wall carried to the grade line. The concrete for the foundation walls and columns was 1 part Giant Portland cement, 2½ parts Jersey gravel and 5 parts crushed trap rock ¾ in. and under in size.

The reinforcement consisted of ⅜-in. rods set perpendicular every 18 in. and the same size rods horizontally every 2 ft. 6 in.

The ground floor and the floor under the shed are of concrete laid off in 6-in. squares. Planks were laid over the concrete in the several stalls shown on the plan. The roof and second floor are of wood.

The walls were given a float finish to bring them to an even texture as well as to partly eliminate the board marks.

By using two rounds of boards for "forms" only 1000 ft. of lumber were required for "forms," scaffolding, etc., this method showing a saving of at least 70 to 80 per cent. of the lumber ordinarily required for forms. The little lumber used in this instance was afterward utilized in the carpenter work, leaving no waste when the job was finished.

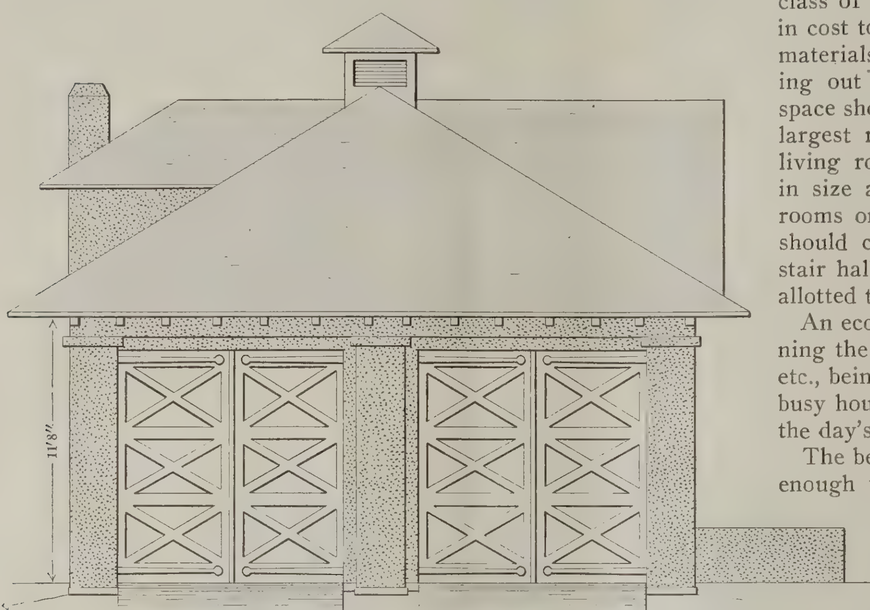
The walls of the building have always been dry and even free from condensation, notwithstanding the fact that a fire is kept going in the harness room in winter. It may be well in this connection to emphasize the fact that concrete as employed in this instance might be utilized to advantage in much larger structures; by which statement is not meant the skyscraper, the factory, or the office building, which involves important engineering problems from foundations to roof, but buildings of simple design, which might at the same time cover a large area. For example, this stable might have been many times as long or wide and yet have presented no problem more difficult than was encountered in making it of the dimensions stated. Had it been intended for a dwelling the walls could have been extended in any direction by the same simple process, so as to include all necessary apartments or as many as might be desired.

Referring to the floor plan, it will be seen that a carriage room with wash and drain occupies the front portion of the building. Beyond this at the left is the harness room, while at the right is the flight of stairs leading to the hay loft and underneath a toilet. Beyond the harness room are the hay and feed chutes, as well as the mixing trough and watering trough. The hay chute and watering and mixing troughs are of concrete.

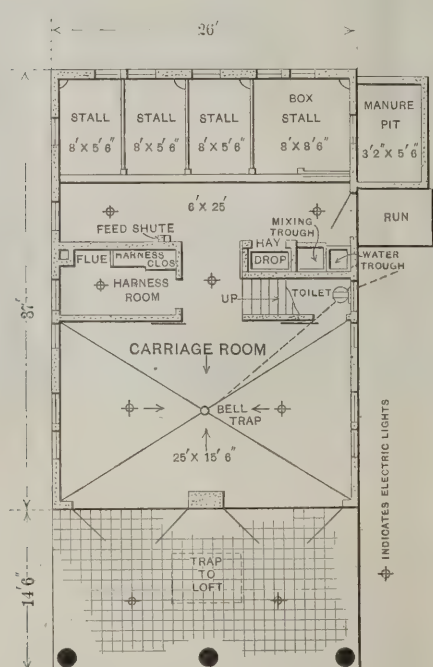
A Stable of Concrete Construction—Oliver Randolph Parry, Architect; C. R. Knapp & Co., Contractors, all of Philadelphia, Pa.

At the rear of the building is a box stall and three single stalls. On the second floor is the groom's room, the feed box and space for the storage of hay.

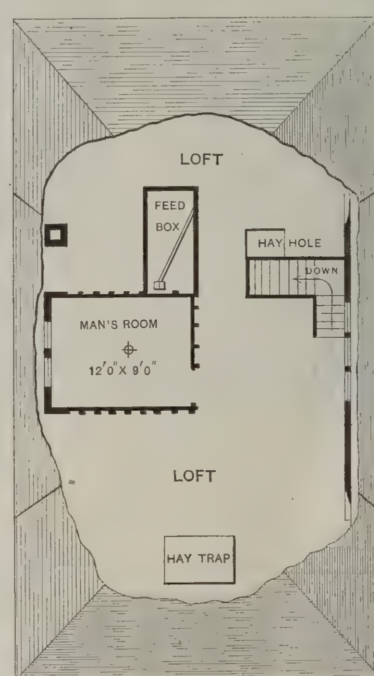
The cement stable here illustrated is the property of Mr. Robert E. Griffith at Haverford, Pa., and was designed by Oliver Randolph Parry, architect, 1723 Chestnut street, Philadelphia, Pa. The work of erection was carried out by C. R. Knapp & Co., Philadelphia, Pa., specialists in concrete work of this character.



Front Elevation.—Scale, ⅛ In. to the Foot.



Floor Plan.



Plan of Hay Loft.

A Stable of Concrete Construction.—Floor Plans.— Scale, One-Sixteenth Inch to the Foot.

Sanitary Home Building

At the recent Domestic Science and Pure Food Exposition held in Madison Square Garden, New York City, one of the notable addresses delivered was that by Oliver Randolph Parry, a well-known architect, of Philadelphia, in the course of which he called attention to some of the leading essentials of a modern home.

The speaker pointed out that, to insure sanitary homes, all unnecessary trim should be discarded, frame construction, in his judgment, making sanitary conditions well-nigh impossible. The ideal building medium, in his opinion, is reinforced concrete, monolithic construction.

The question of cost offers few difficulties. The best class of frame construction is about equal in cost to reinforced concrete, while other materials in general use exceed it. In laying out a home for a workingman the space should be so utilized as to insure the largest rooms where most needed. The living room, for example, should exceed in size and general proportions all other rooms on the ground floor. Next in size should come the dining room, with the stair hall or parlor next, and the kitchen allotted the least space.

An economic reason exists for thus planning the kitchen, the range, dresser, sink, etc., being so close together as to spare the busy housewife many unnecessary steps in the day's round of culinary duties.

The bedrooms should be of a size ample enough to accommodate necessary furniture only. Few persons, Mr. Parry thinks, fully realize the danger in the continual absorption of the oxygen in sleeping rooms. By way of guarding against the latter, Mr. Parry advocates double-wall construction with individual-room ventilation, a solution entirely feasible in reinforced concrete and not excessive in cost. The hall should waste no unnecessary space, and should, if possible, contain a window. The bathroom, equipped with the usual sanitary fixtures, should be directly above the kitchen. Above the second floor, intervening between this floor and the roof, should be a small attic, serving the double purpose of affording protection from the heat and cold, as well as providing needed space for storage purposes.

Such a house, constructed of concrete walls, with floors of concrete and a roof of concrete, or other shingles, or some equally effective fireproof covering, affords the man who works for a living an indestructible, fire, vermin and disease-proof home, warm in winter, cool in summer, subject to little or no expense under the head of repairs, and free of all worry and expense in the matter of insurance.

These homes in the city, Mr. Parry thinks, should be philanthropy. The investment would be an eminently safe one, and, under the most liberal management, not unprofitable.

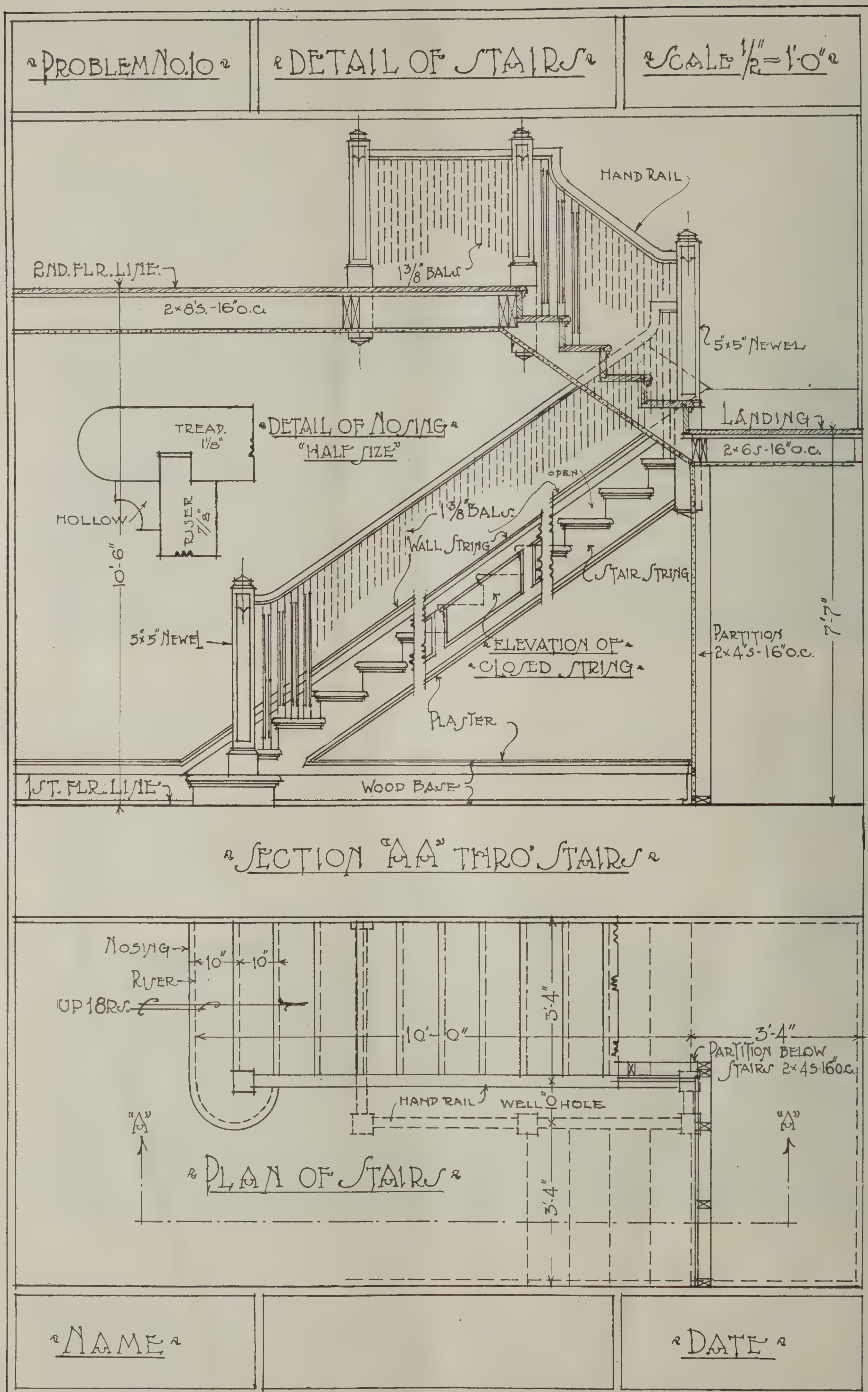
Mr. Parry advances the interesting and not unpractical suggestion that the government buy up waste land, divide it into parcels, construct colonies of working-

View of Stable and Surroundings as Seen from Beyond the Hedge.

A View of the Stable as It Appears from the Opposite Side.

A Stable of Concrete Construction.—Two Views of the Completed Building.

laid out in blocks, with a children's court or breathing place in the center. In the country, where ground is less expensive, each house might be given its allotment of garden space. The present congestion of population makes the establishment of homes of this description in the great cities a fit subject for the effort of private men's homes and thus induce thousands of worthy immigrants to leave the big cities and take up life for themselves and their families under more wholesome conditions. The idea, Mr. Parry stated, has been extensively taken up abroad and found a paying investment.



Lessons in Architectural Drawing for Beginners.—Scale of Sheet, Three-Quarter Original Size.

LESSONS IN ARCHITECTURAL DRAWING FOR BEGINNERS

BY ALFRED AUSLANDER.

IN our previous lessons we have considered the details of the exterior of a house and in this, the tenth lesson, we will begin with details of the interior. The first will be a detail of stairs, as this is considered the most important part of the building. It is illustrated on the opposite page. Before proceeding further, however, it will be necessary that the student make himself familiar with the terms used in connection with stairs:

Staircase.—This term is applied to the whole set of stairs, with the walls supporting the steps leading from one story to another. The same staircase frequently leads to the top of the building and thus consists of as many stories as the building itself.

Rise.—The hight from the top of the lower to the top of the upper (next) floor is called rise. (See sketch No. 1—7 ft. 7 in. rise.)

Run.—The horizontal dimensions from the face of the first to the face of the last step is called run. (Sketch No. 1 shows 10 ft. run.)

Steps.—The degrees of a staircase by which we rise is called "step."

Stairs.—The steps whereby to ascend and descend from one story to another are the stairs.

Tread and Riser.—The horizontal part of a step upon which the foot is placed is called the *tread,* and the vertical hight between the top of one step to the top of the next one is the *riser.*

Landing.—When the hight of the story is considerable, resting places become necessary, and these are called "platform" or "landing." This reduces the run of the stairs. In very high stories that admit of sufficient head room, and where the space allowed for the staircase is confined, the staircase may have two or more revolutions in the hight of the same story, which will lessen the hight of the steps. Sketch No. 1 shows what it is meant by "head room." This is the clear space to pass under and the least dimension for this should be 6 ft., and in designing stairs the student shall always try to get a greater dimension than the above.

Nosing.—The projecting part of the tread from the face of the riser is called nosing. The nosings of steps are generally rounded, so as to have a semi-circular section (see section on opposite page) and a hollow (moulding) is placed under them. The projection of the nosing from the face of riser varies from 1⅛ in. to 1½ in.

The most certain method of erecting a staircase is to provide a rod of sufficient length, to reach from one floor to the other, dividing into as many equal parts as the intended number of risers. Try every step as it is set to its exact hight, and in laying out or drawing a flight of stairs the student *shall* draw a vertical line and divide this line in the same way as the rod by erecting the stairs. See vertical dotted line 1 to 13 in Fig. 1 of the sketches.

This being done, the student will divide the run of the stairs into as many equal parts as treads are desired, bearing in mind that there is always one less tread than there are risers; thus if there are 18 risers in the stairs, there would be 17 treads. If the treads are to be 10 in. the run would be 10 times 17, or 170 in., which is 14 ft. 2 in. In the example shown on the full-page drawing the total run is broken by the landing, so that we get 13 risers up to the landing, or 12 treads for this run, which is 12 × 10 in. = 120 in., or 10 ft.

The hight of the risers should always be a certain proportion of the treads and we will give a few rules for obtaining this proportion: The less the rise the greater should be the run, and taking the width of the tread 10 in. as on the full-page drawing, the product of the tread and riser should be equal 70 to 75. The rule expressed in a formula would be: $T \times R = 70$ to 75, where $T =$ tread, $R =$ riser or $10 \times x = 70 = 10 \times 7 = 70$. Therefore the rise will be 7 in. or 7½ in.

Another safe rule for this proportion is to make the sum of the rise and run equal to 17 or 17½. The formula will be $T + R = 17$ to $17\frac{1}{2}$ in.

Still another rule is: Where 2 risers and one tread be 24 to 25, the formula would be $2R + T = 24$ to 25.

Fig. 1 shows clearly the difference between the closed string and open string. For country houses the open string is to be preferred, as this is easier to keep clean and dust swept out between the balusters.

We have now to call the students' attention to the newel, which is for wooden stairs, a piece of timber (very often built up of pieces) placed perpendicularly and receiving the strings, hand rails, etc.

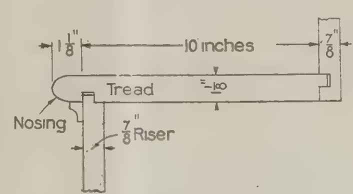


Fig. 2.—Details of Tread.

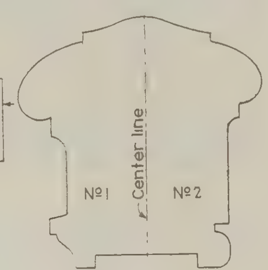


Fig. 3.—Sections of Hand Rail.

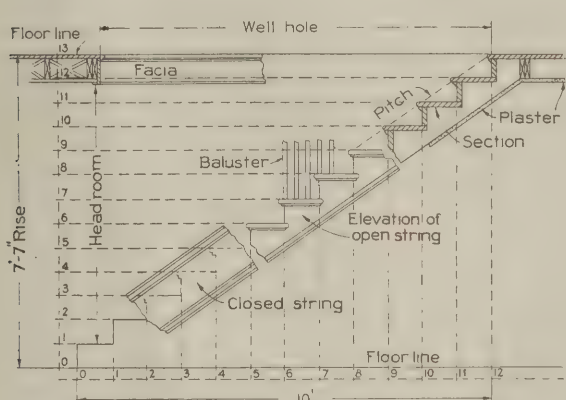


Fig. 1.—Laying Out a Flight of Stairs.

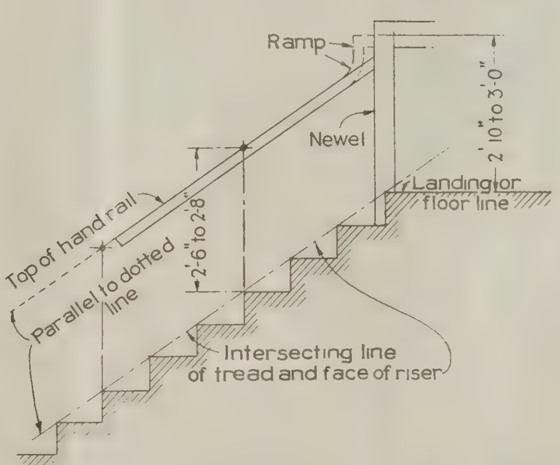


Fig. 4.—Hand-Rail, Showing "Ramp" at Landing Newel.

Lessons in Architectural Drawing for Beginners.

Baluster.—A small kind of a post belonging to a balustrade is called baluster. The balusters may be turned, square or of rectangle shape, as in the drawing, which is 7/8 x 1 3/8 in.

Hand Rail.—A rail raised upon slender posts (the balusters) intended to assist persons in ascending and descending and to protect them from falling down the well hole is called hand rail. The hand rail runs parallel to a line connecting the intersection lines of treads and risers and may butt into the newel, as shown by full lines in Fig. 4. If the rail is eased off by curved lines (see dotted lines in Fig. 4), it is known as a "ramp."

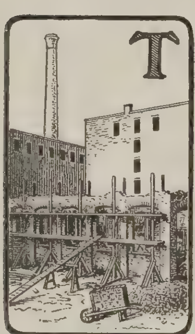
The hight of the hand rail should be 2 ft. 6 in. to 2 ft. 8 in., measured on a straight line with the face of the riser, from the top of the step to the top of the rail. Fig. 2 shows how the risers and treads are generally put together, while Fig. 3 shows two different sections of hand rails.

To lay out this drawing proceed as follows: Draw a rectangle measuring 10 x 14, as for the previous drawings. Place the paper vertical; measure off 2 1/4 in. to the face of first riser. Then measure off 10 ft. to a scale 1/2 in. = 1 ft. and divide this space in 12 equal parts for 13 risers to the landing. Draw width of landing as figured 3 ft. 4 in. Draw a horizontal line 5 in. from the bottom margin line for back of wall and measure off 3 ft. 4 in. for width of stairs to center of hand rail. Make well hole 10 in. wide to other center of hand rail. Place newels in center of hand rails and face of risers.

Draw a horizontal line 6 in. from the bottom margin line, indicating the finished first floor line, and measure off 10 ft. 6 in. for the second floor line. Draw a vertical line connecting the two floor lines, and divide this line into 18 equal spaces for the risers. Project all tread lines from the plan as explained by Fig. 1, the intersection lines will be the top of the treads. The finished plaster line of the partition under the landing and first run of stairs to be on the center line of the hand rail. Follow all other notes as shown and draw on another sheet the elevation of the stairs.

ERECTING A FACTORY BUILDING OF CONCRETE BLOCKS

By James F. Hobart, M. E.



THE erection of concrete buildings has become so important a portion of the business that carpenters and contractors find it necessary to absorb much of the information available upon that subject. The supply of workmen experienced in concrete construction is never plentiful at best, but with the present demand for concrete buildings, workmen cannot be educated in that line nearly as fast as they are wanted. It is to aid carpenters and other mechanics in obtaining a working knowledge of concrete construction that the following description of the actual erection of a factory has been prepared. While the methods described below may be different from those employed by some readers, yet they have proven economical and may be used as a whole or as described, or the methods may be changed to suit local conditions.

The operations described were those followed in the construction of a large cigar factory. It was decided to construct the foundation of the lower or basement story of monolithic concrete, the rest of the building to be of concrete blocks.

The foundation, which also forms the cellar wall, is about 10 ft. high and fitted with single sash windows about 3 ft. square. The excavating was done entirely by team and scraper, and, as a street ran close on two sides, enough material was left in the cellar to fill between the bank and the foundation up to the street level. Very little lumber was used in making the "forms" for this foundation. For the 10-ft. monolithic wall two matchboard shapes, 3 x 12 ft., were made as shown by Fig. 1. Each of these sections was 12 ft. long by 3 ft. high, made of North Carolina pine, tongued and grooved, and put together with the tongued edge down. This was done for the reason that the joint soon fills with cement and remains tight as long as the forms are used, and there is never any "juice" weeping out of the joints when the boards are so placed.

The section of "form," Fig. 1, is shown with a 2 x 4-in. piece every 3 ft., thus making the unsupported spaces 3 ft. square. The first scantling on each section, "A," is set back from the end of the section 1 in.

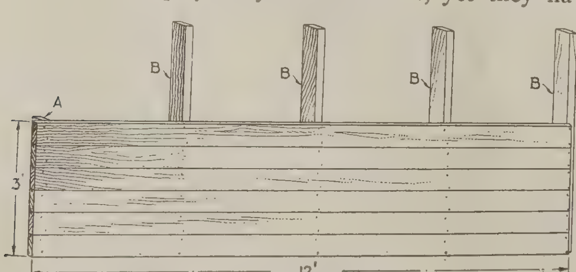


Fig. 1.—Detail of "Form" for Monolithic Wall.

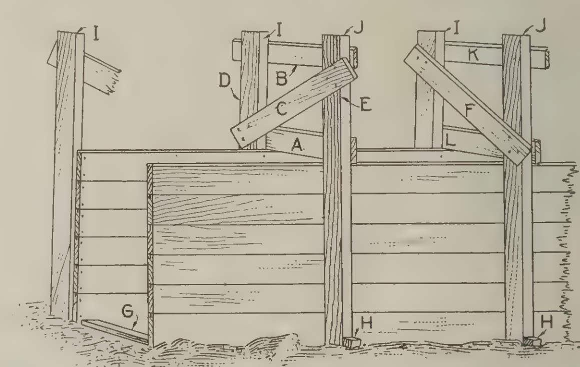


Fig. 2.—Method of Setting "Forms" for First Section of Foundation.

Erecting a Factory Building of Concrete Blocks.

and is cut off flush with the top edge of the boarding. The other four scantlings, "B B B B," are each 6 ft. long, and their purpose is revealed in Figs. 2 and 3. It will be noted that these form sections are exceedingly well nailed, and free from loose knots or cracks which could permit slush concrete to pass. The short scantling in Fig. 1, "A," is merely to support the boards at the end of the form while it is being transported and placed in position. When once in place, the last scantling of the next form section comes alongside of "A," and the form is nailed thereto during the pouring operation.

The setting of these forms is simplicity itself. Batter boards are first erected in the usual way, then a line is stretched which may be either above posts "I I I," or above posts "J J," as may be most convenient. After the form sections have been nailed together they are brought into line and made fast at the bottom, either by the stakes "H H," or by piling dirt against the lower edge of the forms. Usually the former method is followed upon the cellar side of the foundation, and the latter, or dirt-piling method, is employed on the side next to the embankment.

Distance pieces or struts are cut in as often as found necessary at the bottom, as shown at "G," and these pieces are removed as fast as the first layer of concrete comes up with them. The lower portion of the form being thus properly supported from both sides, the upper portion is fastened as shown in Fig. 2, and here the projection of the scantlings above the top edge of the forms shows its purpose.

The rectangle formed by scantlings "D" and "E," and ledgers "A" and "B," is braced by the strip "C," and becomes so rigid that it will stand almost any amount of hard usage without being forced out of place. It will be further noted that the braces are placed in alternate direction upon each pair of scantlings, thereby making the form still more rigid. The levels were all supplied by the contractor, who gave them from the drawings with a builder's level. The tops of the forms were kept at all times on a level, and the concrete was brought as closely as possible to the top of the forms before they were raised for another pouring.

As soon as the concrete had sufficiently set the forms were carefully removed by drawing the nails in the ledgers, "A B K L," and the braces, "C" and "F," also the nails in the ends of each cold section. This left the sections entirely free and they were lifted out of the way and deposited on the ground, or in the cellar, away from the section of wall already built. The concrete was composed of bank gravel, three wheelbarrows rounded full—about 300 lb. each—and two bags of cement. This made the mixture about 1:6 by volume. Water enough was used to make the mixture semi-fluid or "slush concrete," which was wheeled to the forms, dumped in and was not tamped except it was poled slightly with a scantling in the angles of the molds, to make sure that no holes were left in the corners. The weather being fine, and not freezing nights —March, 1910, in Northern Indiana—the molds were removed in 24 to 36 hours from the time of pouring the concrete therein. The resulting wall seemed smooth and solid. The gravel was apparently well graded, from about 1 in. or 1½ in. down to sand, though there seemed to be rather too much fine material in the gravel, and this is a fault of almost every batch of concrete made in the United States. There should be at least 50 per cent. of the two largest sizes of aggregate, and the remaining 50 per cent. should include all the finer sizes down to and including the cement. Hence, the quantity of fine material in scientifically graded concrete is much less than the usual proportions followed by concrete makers.

The forms were set for the second level pouring as shown by Fig. 3. Form "A" was raised until its upper edge just cut the line of sight in the builder's level, then two scantlings, one of which is shown at "B," were placed firmly against the ground and nailed to the form-scantlings as shown. This supported the cellar side of the form, and to support the other side forms dirt was shoveled in between concrete and the bank and tamped a little, until it would carry the outer form as shown. The pegs "H H" in Fig. 2 were omitted in this setting of the forms, and holes were bored for the introduction of No. 12 wire as shown at "E E." The free ends of this wire would be twisted around themselves after the other form had been put in place, and thus they formed a substantial support for the lateral strain against the forms.

The upper works, consisting of the described ledgers and braces, were put in place as shown at "F," and the forms were ready for pouring again, almost as quickly as it can be told. It may perhaps be noted, if the drawings be examined closely, that both sides of the foundation are no longer alike. The outer side has had its forms vertical, but the same batter of 1¼ in. to the foot is left on the inside forms.

Two shifts were made of these forms, after the original setting, or three pourings in all. The third or last pouring was just the hight of the square windows, which were spaced about 18 ft. on centers all around the building, thus leaving about 13 ft. of foundation wall between them. The half-window frames were so set that they came just flush at the top with the inside of the wall, then strips of board were gotten out on a taper from nothing to just width enough to fill between the vertical frames and the inside forms. Parallel strips were tacked or toe-nailed to the outside of the window frames to fill to the outer or vertical forms, then the third level was ready for pouring.

The forms were stayed a little different when set for the third level pouring. Instead of filling with dirt, as at "D D," the foreman, particularly as he found himself short of laborers, did not try to fill on the outside of the wall, but set up scantling as at "B." The third setting brought the bottom edge of the forms level with the top of the ground, and the foreman nailed a horizontal scantling, set up edgewise, to the vertical form supporting 2 x 4 in. and then drove a peg alongside its far end. A 1 x 4-in. brace was also nailed to each peg

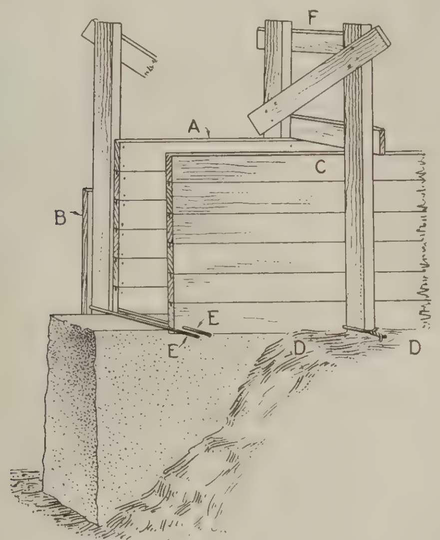


Fig. 3.—"Forms" Set for Second Level of Concrete Pouring.

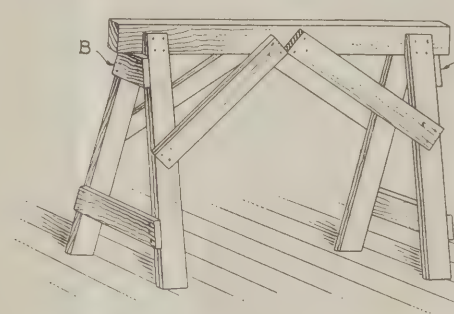


Fig. 4.—Style of Staging Trestle Used.

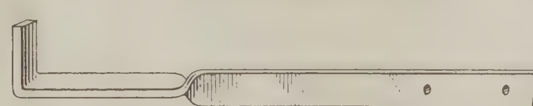


Fig. 5.—A Tie-Iron or Wall "Dell" for Fastening Floor Joist to the Concrete Block Wall.

Erecting a Factory Building of Concrete Blocks.

and to the scantling above the forms. This stiffened the whole form most amazingly, and made it very easy to bring the top edges of the forms into line with the line which had been suspended for that purpose.

The first and second levels were "poured" from the same staging or runway, which consisted of planks laid on top of horses or trestles. The third level was poured from a higher runway. A second set of horses or trestles were set on the first set, a single plank on the outside and another plank on the inside of the runway receiving the legs of the second "bent" of trestles. The rest of the runway was fleeted up to the second level of trestles, and more planks added as found necessary.

Some Details of Construction

One of the trestles is represented by Fig. 4. It is built entirely of 2 x 4-in. stuff for the back-bone, and 1 x 4-in. for the legs and bracing. The ledgers "A B" were not added when the trestles were first constructed, but they would have been much more lasting if this had been done, as they should be in all horses and trestles. This ledger is a little thing, but it may sometime make all the difference between perfect safety and the falling of a loaded staging when some of the trestles get old and rickety.

A single chimney was provided for, it being the intention to heat the factory by steam by means of two small boilers instead of one large one, and when the advance of the residential district in which the factory was located should make it profitable to turn the factory into a two-family cottage, then the double heating arrangement will be in place. For the use of the factory, a steam and return-drip connection was made between the two systems, so that in mild weather it was only necessary to run one of the boilers in order to heat the whole factory.

A fire wall was constructed from bottom of cellar to top of parapet, dividing the structure into two equal portions. This wall and the central piers were built of brick, simply because the parties chanced to have them on hand. The chimney, however, was built of concrete, integral with the building. A form was set around an enlargement of a portion of the foundation wall; a core in the shape of a box made of ⅞-in. boards was placed in the enlargement, and the chimney, or a section of it, was poured at the same time with the wall. The core was made to collapse and be drawn upward from the level of the top of the foundation which corresponds to the lower edge of the water table.

Placing the Floor Joists

The first wood was placed in position immediately upon removal of the first sections of the forms from the third and last level. A beam or stringer was run the entire length of the building upon the row of brick columns noted elsewhere. The stringer was built up of 12-in plank, 2 in. thick, well spiked together. As soon as this stringer was in place, the 2 x 10-in. yellow pine first floor joists, spaced 12 in. on centers, were put in position. Every 5 ft. a joist was doubled, over the entire floor space. The foundation was built in such a manner that the wall jogged back enough to permit the floor joists to bear 4 in. thereupon. Over the foundation-wall windows, lengths of angle iron 3 x 4 in., with the 4-in. leg vertical, were placed to receive the ends of the floor joists, which were cut short and square in all places where they bore upon and against the angle irons; the floor joists of normal length, with 4 in. bearing upon the foundation wall, were beveled for about two-thirds of their width from the top, in order to free themselves in case of fire.

The floor joists were spaced by means of short pieces of 2 x 4 in., which were cut off to length before the joists were placed in position. These pieces were cut for the normal joists, not for those which bore upon the steel over the window openings. The few pieces required there were scribed and cut after the joists were in place. The 2 x 4-in. blocks were all toe-nailed hard and fast to the joists, thereby preventing any possible tipping or swaying of the joists, either during their leveling or at any other time. This building was served by two lengths of joists, spanning the entire width of the structure in two spans, from walls to central beam or stringer. The joists were bridged every 7 ft. with 1½ x 2-in. stuff.

The lower layer of the first floor was 1 in. plump, in thickness, and square-edged as it came from the mill. The first floor was started at one corner of the building and the strips were run at an angle of 45 deg. until the other side and end of the building was reached. Thus the splicing of each strip was at 45 deg. also. The strips were run, random lengths, and the joints fell as they happened to come.

The floor joists had not been sized to a depth, and they laid slightly irregular upon the wall. They were left thus, nothing more being done to them except to nail the lower ends of the bridging after the first floor had been laid. This brought the top of the floor joists to a smooth surface, if not a level one, and some of the narrower floor joists were raised from the wall by the floor. When this happened, no attention whatever was paid to the joists which did not bear upon the wall, and they were finally blocked and supported in a very novel manner. Concrete blocks were placed between the floor joists, and the mortar with which these blocks were set spread out so it penetrated beneath the floor joists when there was any opening between any of them and the wall. In this manner the floor joists were given a good bearing without any expenditure of time or labor for that purpose. This is one of the most valuable cost-lessening "kinks" which the user of concrete blocks can utilize.

Construction of Water Table

Just as soon as the floor joists were in place, some loose boards were thrown on top of them, and the masons began with the water table, which was made up in several lengths. Reinforced sections of adequate length were placed over the windows, and shorter pieces, not reinforced, were placed between the pieces, which served as caps for the windows in the foundation wall. The laying of the water-table blocks was done to a line stretched between ledgers erected at either corner of the building and located by the builder's level. The corner sections were first set, then the adjacent sections and the sections forming the window caps were put in place as they came along.

To get the water-table sections exact to the line, they were lowered, after the mortar had been spread, upon wooden wedges which were backed out as required, to bring the blocks to the line. The wedges were left in the joints until after the initial set of the cement-mortar had taken place. After that the mortar is abundantly able to carry the load of any section of water table, or even of larger blocks. Necessarily the setting of the water table required considerable leveling up of the monolithic course, which was poured to the top of the level form, of course, but which always proves more or less uneven when the form is removed. There is a reason for this, which the concrete maker should find and take heed. It is this: When two batches of "poured" concrete are allowed to set, if there be any difference in the amount of water percentage in the mixing of the two batches there will surely be a difference in their volume after they have set. There is a certain quantity of water, depending upon the conditions of cement and aggregate, which will form the most dense concrete, and any departure from this proportion, either a greater or a less quantity of water, will cause a change in the volume of the resulting concrete. Here is the keynote to the proper amount of water to be used in mixing concrete, and it gives a very black eye to that maxim of some concrete makers, that: "the more water the better."

The leveling of the monolithic course, being within ¾ in. in this case, was done by varying the thickness of the mortar below the water-table sections. In spreading this mortar layer, the mason gaged its thickness by the block last laid and then measured with his eye the varying distance of the line from the monolithic work—if there was any variation at that particular place. With the mortar well spread, the block was lowered fair upon three or more wedges made of bits of board or any material at hand. It seems to the writer that it would be profitable to provide a supply of wedges from the shop, where they could be made in quantity on a circular saw; but, when the wedges are made by hand, it is possible to get along with a limited quantity of them, for the concrete will set in a couple of hours sufficiently that the wedges may be taken out and used over again. But it seems preferable to have an unlimited number of wedges, and let them remain under the blocks until more than the initial set has taken place; there is less danger of overloading soft concrete if the wedge supply be ample.

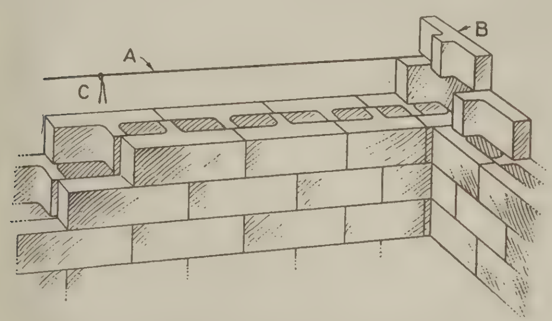


Fig. 6.—Arranging a Line for a New Course of Blocks.

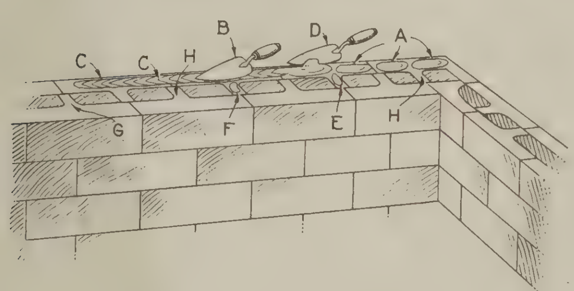


Fig. 7.—Showing Method of Spreading Mortar on the Blocks.

tween the floor joists, and were therefore made 9 in. long, which was just the right length to go nicely between the floor joists and leave a half an inch for mortar between the short blocks and the ends of the joists.

When these little blocks were set, they were mortared *only* on the *bottom*. After they were all set, and the mortar had hardened over night, the spaces beside of and between the backing blocks and the water-table course was grouted with thin mortar, which found its way into every hole and crack and filled completely any vacant spaces which there might be underneath any of the floor joists.

The window frames were put in place as soon as the walls reached the level on which the stone sills were to be located. These sills were set to measurements laid off on the wall and the ends of each sill plainly marked. This wall, being a two-piece affair, the inner or backing course was omitted immediately back of the sills, to be filled in later at the convenience of the masons. In setting the sill blocks, some mortar was placed under each end and the stone bedded down to the required level. No mortar was put under the middle of the stones, nor for more than 6 in. or 8 in. at either end. The joint under the remainder of the sill remained unfilled until after the side walls were completed. Then the backing to the window sills was put in place and the joint filled and pointed under the sill. This prevented any possible breaking of the sill through settling or other movement during the progress of the work.

The entire work of building, pointing and cleaning off the outer walls was done from the inside. Not a staging was used outside of the walls except for cleaning off and filling with blocks some small holes adjacent to the windows, which was done from light stagings thrust out from the windows.

The window frames were set to pencil marks made on the concrete window sills by the foreman, who marked for both ends and the front of each frame, making it entirely unnecessary for any mistake to be made.

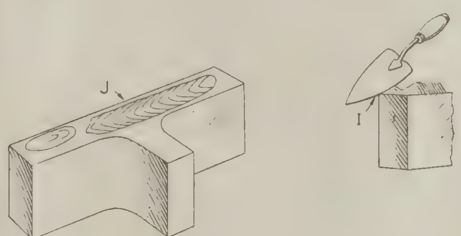


Fig. 8.—Showing How to Secure an Even Spread of Mortar.

Erecting a Factory Building of Concrete Blocks.

This structure was laid up with mortar made from hydrated lime without any cement being used in the mortar. The writer favors the use of cement-mortar for laying concrete blocks, and hydrated lime may be used with the cement if desired; but it is yet an open question, to the writer at least, if it be profitable to use hydrated lime—or any other lime—with cement-mortar. The manner in which each substance hardens—the lime-mortar and cement-mortar—is so different that it is very questionable whether it pays to use lime with the cement-mortar—more than enough, perhaps, to make the mortar work easily.

The wall which was being built for the structure here described was of the "two-piece" variety, the face or front blocks being of the finish known as the "Vertical Tooled Type," while the back blocks were made of coarse material without any facing whatever. Some special straight backing blocks were made for placing behind the water table, and on the ends of the structure, lengthwise with the floor joists, the water-table backing blocks were made 2 and 3 ft. long. On the sides of the building the blocks necessarily had to be placed between

In setting the frames the men worked in pairs. They would place a frame upright upon the floor, and leaning outward against the wall immediately opposite its position when set. Two boards, each 12 ft. by 6 in. wide, were fastened inside the jambs near the top of the window frame by a single nail in each board. The lower ends of these boards had been cut to an angle of about 45 deg., so they would fit pretty closely to the floor after the frame had been properly set. Enough of these boards were fitted by sawing one end to the required bevel to set the entire number of windows in any one story of the building and these boards were carefully kept until each story of the building has its window frames in place. Then the brace boards were used in the roof of the building.

After the brace boards had been attached by a single nail each, the window frame was lifted into place approximately upon the sill, and one man held the brace boards while the second man immediately placed two concrete blocks on the window stool to hold the frame in place, after which he adjusted the frame exactly to the pencil marks on the concrete sill. When the top of the frame was just right, the braces were nailed to the floor.

The frames were kept square by the usual two short braces in the top of each frame, as supplied by the maker. As the concrete sill had been set level, and as the frames were square, there was nothing more to be done except to test the jambs and stool of the frame to see that they were exactly vertical or level respectively. The entire weight of the window frame was carried upon the front edge of the stool and no pointing or slushing of cracks was done at the time the frames were set, the masons beginning at once to set the blocks between the windows.

A close watch was kept over the frames as the laying of the blocks proceeded, for the braces were nailed to a newly-laid floor, bridging of which had not yet been nailed on the under side of the joists. It was judged best to apply the level to the window jambs frequently and correct any disturbance of the frames which might be caused by the floor slightly changing while working into its own permanent position.

The Concrete Blocks

Quantities of blocks were piled on the floor near each of the six masons employed on the job, there being several kinds and shapes of blocks used. As the entire wall surface had been laid off in blocks and pencil drawings thereof furnished to the erecting foreman, he was able to have a supply of each required size and shape of block piled near the place where it was to be laid in the wall. Some blocks were to be cut to odd lengths. These were cut as required and piled handy—odd length blocks being marked as cut with the length, thus: 15 in., 11 in., etc., thus making it possible for a mason tender to very quickly bring to the mason a block of the length called for.

The setting of the second-story floor joists was done in the manner as the first floor joist. The ends were blocked with 10 in. blocks 2 x 4 in., nailed flush with the top of each joist. The bridging was left un-nailed at the bottom, but the upper ends of each strip had its nails driven home. The bridging was all cut in the shop and came with all the nails set and driven almost through the bridging.

The second-floor joists were single, none of them being doubled, as was the case with the first-floor joists. The only ones doubled in the second story were those beside the openings for stairs, elevator, etc.

Use of Tie Irons

Every fourth or fifth second-floor joist—they were spaced 12 in. on centers—had a tie-iron attached by means of two 3-in. wire nails, which were driven through the 1 x ¼-in. tie-iron into and through the 2-in. floor joist and then the nails were bent over and hammered flat on the side of the joist opposite to the tie-iron. These ties or "dells," as shown by Fig. 5, were made of 1 x ¼-in. soft steel, bent 2 in. from one end to hook into the cavity between the two-piece blocks. The piece of steel was originally 16 in. long, but shortened to 14 in. by the bend above mentioned. Then, 5 in. from the bend thus noted, a quarter twist was given the steel, also a bend of about 10 degrees, so the hook portion would lie flat in the joint between the blocks while the remainder of the steel extended along the floor joist and upward at 10 degrees to receive the nails which were placed in ½-in. holes, drilled or punched ½ in. from the end and 4 in. apart. The nails were bent over and hammered down on the opposite side of each joist, thereby adding to their holding power.

The manner of laying the blocks is illustrated in Figs. 6 to 8, inclusive. Fig. 6 shows the method of arranging a line for a new course of blocks. A block is set on each corner of the wall, then the line "A" is stretched and kept in place by an extra block "B," placed on top of it. The line is drawn tight and one or more loops, as shown at "C," is placed on it. With a line stretched 30 feet, one loop would be necessary; with the 70 feet length of this building, two loops were used. They were simply bits of string tied around the line and when a block was placed in the wall opposite the loop, another block was laid loosely upon the loop, thereby holding the line exactly in place.

Fig. 6 also shows the manner in which the blocks are arranged in a wall built of two-piece blocks, the joints of the inner wall coming opposite the tongues of the outer wall blocks and the same arrangement holds good in the joints of the outer wall. This point is more plainly shown by Fig. 7, which also illustrates the method used of spreading mortar on the blocks. The great thing in this mortar-spreading is the "knack." It cannot be learned or taught, it must simply be acquired. There is no other way of getting it, and without this "knack" a man will never do a good job at block-laying.

To begin with, the mortar must be exactly right, so it will slide cleanly off the trowel. Just the right quantity must be placed upon the wall or good work is simply impossible. If too much mortar is used, the work will be dauby, in spite of all the mason can do to remedy the trouble. If not enough mortar be put on, there will be open, partly filled joints, and there is simply no way of preventing it except to get enough mortar on the wall before the block is put in place.

The method of placing the mortar on the wall is shown at A in Fig. 7. A clean trowelful of "mud" is taken up, carried to the wall and deftly deposited by a slight downward and endwise of the wall motion of the hand. If too much mortar is taken on the trowel, it is hard to distribute it evenly as desired, but the larger the trowelful the longer will be the little mound of mortar and the quicker will the mason spread enough for a certain number of blocks.

Position of Mortar in Laying Blocks

It is necessary that the mounds of mortar be all placed at the same distance from the edge of the blocks. If this be done, the mortar can be spread easily and evenly by the next operation. If the mounds be placed some close and some far from the face edge of the blocks, it is almost impossible to spread the mortar evenly and it cannot be done nearly as quickly as when it is all laid evenly from the trowel as shown at "A."

The next operation is to hold the trowel as shown at B and spread the mortar along the edge of the cores of blocks already in place. Here, more skill is necessary, and even more skill is called for than in placing the mounds of mortar at A. The trick here is to so spread the mortar that it will lie in a most perfect layer, with only very slight variations in thickness and close to the edge of the block, and about 1¼ in. therefrom the thickest portions of the mortar should be located. A peculiar patting movement of the trowel "B," will leave the mortar spread in the "herring-bone" design, shown at "C C."

Sometimes—but this should not be the case—the trowel has to be run along the edge of the blocks, as shown at "D," more than once. The mason must keep a close watch on the mortar at the edge of the blocks, and whenever he sees the least sign of its curling over so as to daub the block below he must cut off the overhanging edge of mortar, as shown at "D." The greater the skill of the mason, the more sure will he be to so spread the mortar at A that but a single cut will be necessary as at "D." Care must be taken that too much mortar is not allowed to accumulate on the trowel at "D," or the blocks will be smeared by the mortar thus held on the trowel..

As soon as a pat of mortar the size of an egg has been caught on the trowel, as at "D," spat it off upon one of the tongues of the lower course of blocks, as shown at "E," and "F." It will be seen that while spreading mortar for the outer course of blocks the little dabs of mortar are placed on the tongues of the inside course, which come opposite to the joints in the outer course, and no mortar is spread upon the tongue of the outer course, which projects inward. This tongue will be taken care of when the inside course of blocks is laid.

In cutting off the projecting portion of mortar, as at "D," the trowel should be emptied upon one of the tongues as soon as enough mortar has accumulated thereupon to serve one of the inside tongues. It will be noted that tongues "E" and "F" have already been served, but tongue "G" has none. This tongue can be taken care of from the joint trimming of one of the blocks to be laid. When it is tapped into place the joint will have to be trimmed again and the mortar therefrom may be used for any tongue which has not yet been served.

Manipulation of the Mortar

But after the "D" operation has been attended to, still another manipulation should be given before the blocks are placed. This action is more clearly shown in Fig. 8, which represents a block with mortar thereupon in mounds. After it has been spread, as described, the operation illustrated at "J" is effected. The trowel is held in a peculiar manner with the back edge resting on the blocks, while the forward edge is raised ½ in. or ¾ in. and the trowel is drawn along the entire length of the mortared and "herring-boned" section while held in this position. The effect is shown at "J" in Fig. 8, also in the narrow bevel between "C" and "C" of Fig. 7.

It will be noted in Fig. 8 that the mortar has been divided into two sections separated by a low place between them. This corresponds to the point of the "herring-bone" pattern shown above. The last action of the trowel, as at "I," Fig. 8, renders the outer edge of the layer of mortar absolutely even and of the same thickness for a certain distance back from the face of the blocks. There is just enough mortar in this section to squash out and fill between the lower and upper blocks without a surplus of mortar to run down over the face of the block beneath.

Jointing was done after laying two courses of blocks, and it was done by the masons before stretching the line for the next course. They used plain rounded tools on this job and leaned over the top of the wall and jointed the two courses alternately in sections, passing along the wall only once for the two courses. The quick jointing was made possible by the fact that the concrete blocks were laid dry, not being wetted at all, and consequently they dried out the mortar very quickly—to that degree at least which permitted of the jointing of the mortar almost immediately after the last block in a long course had been laid.

Dry Laying of Concrete Blocks

The "dry laying" of concrete blocks calls for quick work on the part of the mason. The blocks must be placed in its permanent position by the same motion which lays it on the wall and no movement of the block is necessary or should be permitted, except a slight tapping into place with the hammer ordinarily used by brick masons.

Just a word here about the use of a hammer in tapping blocks into place. I frequently see masons laying blocks and using the hammer handle instead of the face of the hammer. They claim that the blocks are so soft that they will not stand hammering with the face of the tool, therefore they use the handle the same as when setting tile. This is not right. When a block is so soft that it will not stand tapping into place with the face of the hammer, that block is not fit to be laid in a wall and should be thrown out. The same is true with all blocks that will not stand the same treatment.

Any concrete so poorly made that a five-pound fragment will not stand up when used as a hammer for driving a 5-inch wire spike into a pine or cedar post, clear up to the head of the spike, such concrete should be rejected, for it is not what it should be, or what it can be easily and cheaply made if proper care and attention be given to the block-making process.

Arguments for a Public Comfort Station

The reasons set forth by the Board of Health of Columbus, Ohio, in its October Bulletin, why that city should have a central public comfort station may be used by advocates for similar stations in other cities. The article in question also relates some of the history of endeavors to obtain a public comfort station in Columbus and is as follows:

"The necessity for a public comfort station for the city is quite apparent to one who has given the subject careful thought. There is a local demand to accommodate a city of 181,511 people. And the demand becomes more urgent every day on account of a rapidly growing population. Then there is a demand from out of the city to accommodate the thousands of visitors and strangers coming here for pleasure or business. With a network of steam and traction roads entering Columbus and with many conventions, State fairs and other attractions, people coming to the city daily are numbered by the train load. Thousands of people come to Columbus every Sunday during the excursion season. Men, women and children pour into Columbus not only on Sundays, but on weekdays as well, to see the sights or to visit the public institutions. The large manufacturing and commercial interests of Columbus bring many business men to the Capital. While here many of the visitors do not stop at hotels, being here only for the day. They are not provided with the common conveniences of life. They have to enter houses of business or saloons to beg accommodations. This is embarrassing to the public and a shame to Columbus. The crowds that surge up and down our streets need the accommodations which the public comfort stations alone can afford.

"The public toilet is required, not as a matter of civic beauty or luxury, but as an absolute necessity. The State has recognized its duty in providing a comfort station on the State House grounds by passing a joint resolution some years ago, granting the city authority to erect such a building below the grade. This privilege is still open.

"The legislature later considered a bill to join with the city to build the comfort station. The bill passed both branches, but owing to a clerical error, in the closing days of the session, the measure failed to become a law. Two years ago the same bill passed the Senate, but was left on the House calendar at the close of the session.

"The State and the city alike are under obligations to furnish natural conveniences to the masses of Ohio citizens who crowd the streets of the capital city. Cleveland, Cincinnati, Indianapolis and many other cities are provided with public toilets. Columbus has the matter under advisement. Director of Public Service Holton favors the project and the city council has already made partial appropriation for this purpose.

"The State, it is believed, will construct a comfort station below the grade on the State House grounds. Whether the city and the State should join in the construction and maintenance of this building hinges upon the contingency of the legislature to make the necessary appropriation. Whether the city should proceed to construct a station in another part of the city and allow the State to build upon the State House grounds remains for city authorities to decide.

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DECEMBER, 1910

The Coming Cement Show

The features which have been provided by the management of the Cement Show, to be held in Madison Square Garden, New York City, Dec. 14 to 20, should render it of special interest to a large class, including the architect, the builder, the contractor, the manufacturer, the prospective home builder, as well as the farmer and the mechanic. It is probable that the average man at some time in his life builds a home, or at least thinks about building one. He has fairly well defined ideas perhaps as to just what it shall be and he gives his architect general instructions in regard to material and type, but it is just at this point that he needs additional knowledge, more especially if he is to use cement to advantage. He has grown up with construction in wood, brick and stone, but unless he has been especially fortunate he has seen little actual building in concrete, so that in his choice of architectural style of the type of construction and the materials to be used, each of which, of course, has its bearing on cost and utility as well as durability, he has not had the experience with cement construction that he probably has had with the older types. One object of the Cement Show is to offer facilities for placing him in touch with the newer concrete construction.

The Architect and Concrete Work

The architect of to-day, who has not specialized in concrete, oftentimes thinks in terms of the older construction materials. He may realize that with a new material come new possibilities in design or texture. The architect, too, must study the devices that are used by the contractor to carry out his designs in order that he may be able to plan economical and successful buildings. Certain practices common in the case of wood, brick or stone construction are impossible with concrete. The architect who uses a round arch in concrete work is designing in terms of stone, and he who plans intricate decoration in concrete should understand the contractor's difficulties. One seldom hears of wood or brick exhibitions, as people are supposed to be more or less familiar with such construction, but with the history of concrete the case is different, as its extensive use in building construction dates back only a comparatively few years. Men who are building to-day have not a life-long experience with concrete. It has been impossible for those who are not in close touch with building to plan or design in terms of concrete, so there is needed a common meeting ground for the architect, the contractor and the man who builds. Another object of the Cement Show in question is to afford a meeting ground for those interested along these lines.

The Place of Exhibit

Madison Square Garden, the old historical show building in New York City, will not appear like a noisy and dirty contractor's plant. On the contrary, it will be a neat and orderly department store of the cement industries, offering during the week's exhibition an opportunity which should be most acceptable to those desiring to make a study of any phase of the use and application of cement. Cement, aggregates, reinforcing systems, waterproofing methods, concrete mixers, concrete tile, block machines, coloring compounds, forms, ornamental concrete work and a complete representation of every article and appliance entering into the use of cement will be displayed. The show will be orderly and artistic in the best sense. Every possible effort will be made to render the exhibition as attractive as it is possible to make a show of this character. Two hundred and fifty exhibitors will have displays of vital interest to the trade. For the general public, the show will possess many points of educational value, and for their entertainment one feature of the show will be the music of Sousa and his band.

Licensing Architects in Minnesota

Every little while the question of enacting legislation looking to the licensing of architects crops up in various States of the country where such a law is not already in force, and a movement to this end has again been revived in the State of Minnesota, where it now seems probable that a bill providing for the licensing of architects will be introduced at the 1911 session of the legislature. It will be recalled that a measure looking to this end was brought before the legislature at its last two sessions, but met with such strenuous opposition from contractors and builders all over the State that it failed to become a law. It appears from investigation among architects in Minnesota and St. Paul especially, that there exists decidedly diverse views regarding the advisability of such a law. Some who are enthusiastically in favor of it believe that it would raise the standard of the profession by shutting out those who are incompetent and that it would result in the construction of more substantial and more artistic buildings, thus proving generally beneficial both to the general public and to the architects. Some of those who are either opposed to the passage of such a law as that indicated or regard the matter with more or less indifference hold that the law would be impractical and that incompetents would find a way to practice the profession of architecture despite the restrictions and safeguards which the law might throw about it. Unless the law was made very strict and enforced to the very letter and spirit by well-qualified officials, they believe that it would be detrimental rather than beneficial to the profession. They also point out that it might also place obstacles in the way of young men just starting in to practice architecture, and this, of course, is something that is not desired. The outcome of the movement will doubtless be watched with a great deal of interest, not only by builders and architects throughout the State of Minnesota, but also by those in adjacent sections.

Exhibition of Architectural League

The circular of information relating to the twenty-sixth annual exhibition of the Architectural League of New York shows an exceedingly interesting programme to have been prepared by those in charge of the affair. The annual dinner of the League, which will be held on the evening of Friday, January 27, is always a most enjoyable function and the League reception, which will occur from 3 to 6 o'clock on the afternoon of the following day, is ever replete with interest. The exhibition, which will be held in the building of the American Fine Arts Society in West Fifty-seventh street, will be open to the public from Sunday, January 29, to Saturday, February 18, 1911, inclusive. The exhibition will be illustrative of architecture and the allied fine arts; will consists of drawings and models of proposed or executed work in structural, decorative and landscape architecture; sketches and finished examples of decorative painting; sketches, models and finished examples of decorative and monumental sculpture; drawings and models of work in the decorative arts, together with photographs of exact work in the above branches. In this connection it is interesting to note that medals of honor will be awarded for successful competitors in architecture, in painting and in sculpture. It is also announced that competitions will be held for what is known as the Henry O. Avery prize and a special prize of $300. The subject is a Mural Fountain, to be designed with reference to its being placed on the wall of a building occupying a triangle, formed by two converging streets. The Avery prize will be awarded on the sculptural element and the premiated designs, as well as any other of sufficient merit submitted, will be displayed at the annual exhibition of the League.

Society for Promotion of Industrial Education

The fourth annual convention of the National Society for the Promotion of Industrial Education is being held in the city of Boston as we go to press. The programme covers a wide range of topics and the speakers announced are prominently identified with the question of industrial education. One of the important subjects for discussion is "Apprenticeship and Corporation Schools"; another is "The Beverly Industrial School"; still another, "The Public Schools and the Apprentices of Cincinnati," the latter being discussed by Frank B. Dyer, superintendent of schools in that city. "Evening Industrial Schools of Massachusetts" is the subject for discussion by C. A. Prosser, deputy commissioner of education for the State of Massachusetts. Various phases of industrial education will be discussed by J. P. Munroe, of the Munroe Felt & Paper Company, Boston, Mass.; by T. N. Carver, of Harvard University, and by Charles H. Winslow, of the Bureau of Commerce and Labor, Washington, D. C.

"The objects of the National Society for the Promotion of Industrial Education are to bring to public attention the importance of industrial education as a factor in the industrial and educational development of the United States; to provide opportunities for the study and discussion of the various phases of the problem; to make available the results of experiences in the field of industrial education, both in this country and abroad, and to promote the establishment of institutions for industrial training."

Prof. Charles R. Richards, director of Cooper Union, New York, is president of the society, and A. Lincoln Filene is chairman of the Boston committee.

Meeting of American Portland Cement Manufacturers

The next convention of the Association of the American Portland Cement Manufacturers will be held in the Hotel Astor, New York City, on December 12, 13 and 14.

The executive committee meeting will be held on Monday evening, December 12, and the business sessions of the association will be held on Tuesday and Wednesday following. These sessions will be in the nature of an open meeting, at which papers of interest to manufacturers and users of cement will be presented.

Iowa Association of Cement Users

The seventh annual convention and show of the Iowa Association of Cement Users will be held in Cedar Rapids, January 10-13, inclusive, 1911.

The convention will last four days this year instead of three, as has been the custom. This will afford exhibitors a better opportunity to display their appliances, as well as members of the association and visitors a better chance to educate themselves in the possibilities of cement and concrete.

BUILDING PERMITS issued in Toronto, Canada, in October were valued at $2,914,980, as compared with $1,540,355 for October, 1909. The totals for the ten months' periods of 1909 and 1910 are $14,605,232 and $17,734,488 respectively.

CORRESPONDENCE

Design for a Water Tank Tower

From Paul T. Lesher, Steelton, Pa.—I was very much pleased with the manner in which my article, published under the above title, was presented to the attention of the readers of *The Building Age* in the November number, but there occurred one error which, it seems to me, ought to be noted; that is, Fig. 5 throughout the article should have read Fig. 7, and Fig. 7 should have read Fig. 5. In making up the "form" the printer evidently reversed the frame diagrams.

Truss Design for Concrete Block Barn

From D. J. McLachlan, Calgary, Alta., Canada.—Answering the correspondent "S. M. F.," whose inquiry concerning truss for a concrete block barn appeared in the issue of the paper for September, I am sending a sketch of truss Fig. 1, showing the manner in which

The unbraced center panel is a condition to be avoided, but is perhaps justifiable for the reason given by the correspondent in question. However, care should be taken to keep the load divided between both sides, as a heavier load on one side than the other will in the absence of diagonals cause bending of the chords.

As these members, however, are otherwise unnecessarily heavy they will perhaps care for this.

The correspondent provides a double system of trussing, which is wrong as a principle, as it is impossible to tell which or whether either of them acts wholly or in part. I would here call attention to what Waddell says in his handbook on "Redundant Members," which is much to the point. I might have adopted the other system, which is known as the "Pratt," instead of the one which I have and which is known as the "Howe," but it is generally recognized that the Howe System is the proper one for construction in wood.

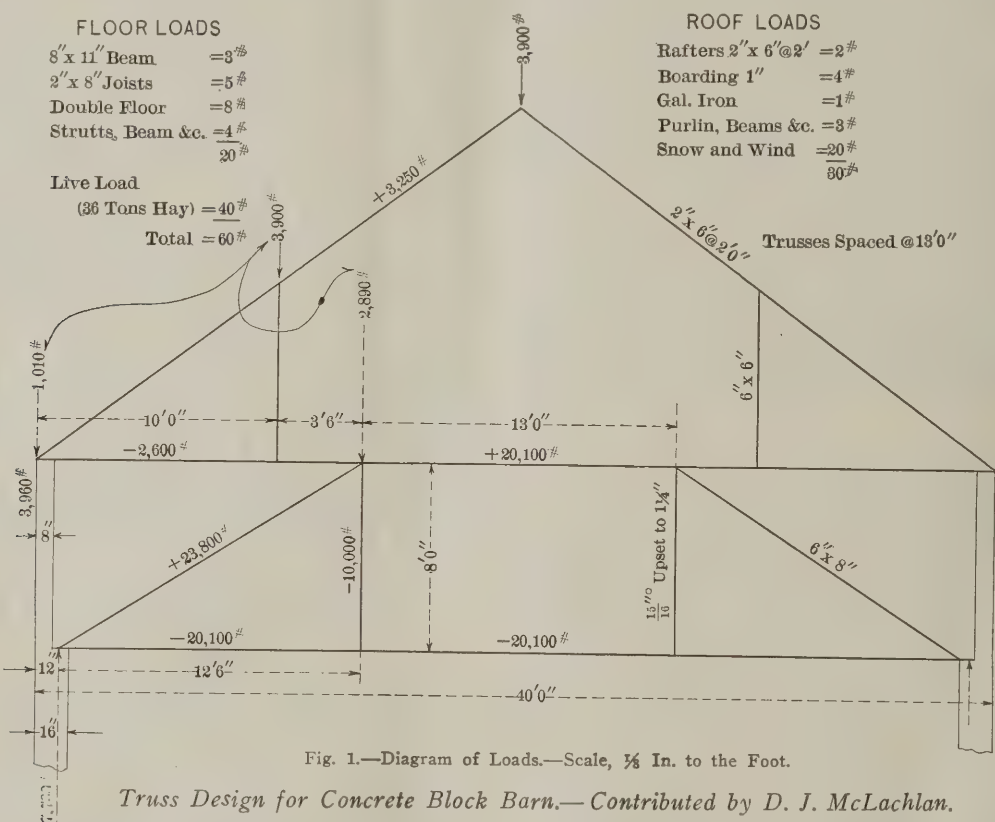


Fig. 1.—Diagram of Loads.—Scale, ⅛ In. to the Foot.

Truss Design for Concrete Block Barn.—Contributed by D. J. McLachlan.

I have figured its strength. The load on the purlin is carried mostly by the truss, a portion going to the wall, as shown. The half panel at the eaves is carried by the wall and the load at the peak is carried there also, causing 3250 lb. compression in the rafter and 2600 lb. tension in the tie at the eave, all as indicated in the diagram. There should be a ridge piece at the peak to accomplish this result directly and the rafters might be doubled at the trusses, spiking one to each side of the tie for a connection.

Flexure in the tie portion of the upper chord could be avoided by shifting the foot of the purlin post to the panel point toward the center, but if this member is of uniform section throughout it will be sufficient as placed.

The 4 x 4 in. strut to the purlin post, shown in the diagram of the correspondent in the September issue, is not needed if the rafters are connected as suggested.

There appears to be no necessity of carrying the pilaster (I understand there is to be one) inside the wall higher than the underside of the lower chord, as the weight carried above this point, 3960 lb., is not great and can be supported by the wall.

In building the lower chord no joint should occur in it at the point where it is carried by the vertical rod, except in the piece cut by the rod, as this is the point where it receives its maximum stress and failure would be expected by tension on its upper side. If it is built of four pieces it would be well to pack them apart enough to let the rod pass through without cutting.

Care must be taken to have the connections develop at least the stresses shown.

From A. C. Anderson, Sherman, S. D.—In the September number of *The Building Age*, S. M. F., of Fulton, Ind., submits a truss design for a concrete block barn, and asks if it is sufficiently strong in all its details to serve its purpose.

In order to make it convenient to refer to the different parts of the truss, I have drawn a general outline of it with letters to designate the various parts, as shown in Fig. 2. In the first place the probable load that will have to be carried by each truss will have to be calculated. It appears that each truss may have to support 13 tons of hay, or say 27,000 lb., and that will be 9000 pounds for each of the three divisions, *a*, *b* and *c*. Besides this live load, there will be a dead load of, say, 10 pounds to the sq. ft., and a wind load of some 20 pounds to the sq. ft. In order to make a calculation, we may assume the truss *h-b-k-f-e-d* to carry the live load of 27,000 and the inverted truss *a-g-e-l-c-b* to carry the dead and wind loads, which will amount to about 12,000 lbs.

By drawing the necessary stress diagrams, which would require more space than can here be given to them, and making the required calculations, the conclusions arrived at are as follows: Referring to Fig. 2 *a* is a compression member, which must resist a compression of 3900 lbs. and also support a load of 4000 lbs. at *p*, about three feet from one end. An 8 x 9 oak beam will be strong enough for this member and it will have a safety factor of 4.

At *b* is a compression member which has no transverse stress to resist. An 8 x 8 beam will be amply strong and it will have a safety factor of 7.

At *g* is a tension member with a stress of 7000 lbs. A ⅞-in. iron rod with upset ends will be amply strong, with a safety factor of 5.

At *h* is a compression member with a stress of 16,000 lbs. An 8 x 8 oak timber will here be strong enough to have a safety factor of 6.

At *i* is a tension member with a stress of 5000 lbs. and a ¾-in. iron rod with upset ends will be strong enough to afford a safety factor of 5. In order, however, to prevent the rod from being bent by the hay that may press against it, and to help to hold the truss in shape, it will be advisable to supplement the rod with a timber about 4 x 4.

At *d* it is subject to a compound stress and will in the first place have the transverse stress of about 8000 lbs. To take care of this stress the built-up 8 x 11 will be amply strong, strong enough to have a safety factor of 6, provided there are no splices between *m* and *n*. In the second place it will have a tensile stress of 13,000 lbs., to take care of which a 1⅛-in. iron rod with upset ends will be strong enough to have a safety factor of 5. This is the one place where "S. M. F.'s" truss is weak.

The member *e* is also subject to a compound stress. In the first place it will have a transverse stress of about 10,000 lbs., to take care of which the built-up 8 x 11 will be strong enough to afford a safety factor of 5, provided there are no splices between *n* and *o*. In the second place it will have a tensile stress of 19,000 lbs. To take care of this stress a 1¼-in. steel rod with upset ends will be strong enough to have a safety factor of 4.

It will thus be seen that the weakest part of the truss is at *e*. During a strong wind this member, as designed by "S. M. F.," will be liable to give, although the barn may not be more than one-third full of hay.

But even if built as I have suggested, the construction would not be safe. The beam *a-b-c* will be over 37 feet long and will be subjected to great compressive stress; that is altogether too great a length without any lateral support. In order to make plain what I mean, I will draw this plan, shown in diagram, Fig. 3, in which the lines A B, C D and E F each represents the line *a-b-c* of the truss. In order to make the construction safe, lateral struts, something as suggested by G H, H J, etc., should be used. These struts will probably interfere somewhat with the hay when the barn is to be filled; but some device must be used to prevent this beam from swaying sidewise. It might be possible to brace them some way from the roof. If that could be done it would interfere less with the hay.

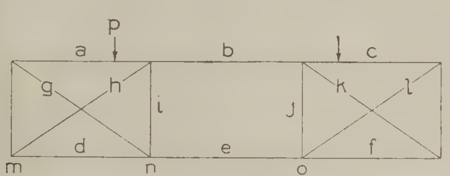


Fig. 2.—Diagram for Calculating the Sizes of Members Required for the Roof Truss.

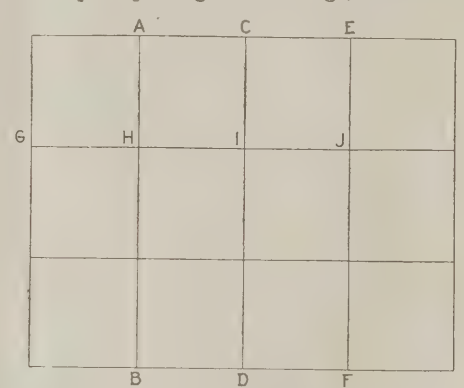


Fig. 3.—Diagram Showing Arrangement of Lateral Struts.

Truss Design for Concrete Block Barn.—Contributed by A. C. Anderson.

Weight per Barrel of Cement, of Sand and of Broken Stone

From A. B. M., Baldwin, Kan.—I note on page 429 of the October issue of *The Building Age* mention of the proportions of materials for making concrete. I desire to ask the weight per barrel at which these materials are figured—the weight per barrel of cement; per barrel of sand, and per barrel of shale or broken stone.

Answer.—In reply to the above, Ernest McCullough, C. E., furnishes the following data:

The barrel varies so much in size as to be unreliable to serve as a unit of measure. A fair average of all the barrels in common use gives a capacity of 3.8 cu. ft. On this basis, taking the average weight at 100 lb. per cubic foot, a barrel of ordinary sand, dry, will weigh practically 380 lb. The weight of such a barrel of cement, something we cannot buy to-day, is 376 lb. Cement is now put up altogether in bags, each containing 94 lb. net of cement. By common consent 4 bags constitute a barrel, and a bag is accepted as holding 1 cu. ft. (loose). The average weight per cubic foot of solid basalt is 178 lb.; granite, 168 lb.; sandstone, 137 lb. As usually quarried, stone contains 45 per cent. of voids, so a barrel of broken stone will weigh as follows: basalt, 372 lb.; granite 354 lb.; sandstone or limestone, 286 to 290 lb. These values are all averages, there being variations of as much as 20 per cent. in the weights of samples tested. The voids also depend upon the uniformity of sizes in crushing.

Chimney with Unsatisfactory Draft

From L. T., Lynchburg, Va.—In an old mansion near here there is a large chimney which in the past was used in connection with an open fireplace. This flue has been stopped off a short distance above the top of the fireplace, and the fireplace has been closed and a heating stove is connected near the ceiling with the chimney by a 5-in. pipe. The chimney is 14 in. square, inside measurement, and of heavy stone on one of the outside walls of the building. In consequence, if the fire is allowed to go out there is trouble from smoke when an attempt is made to rebuild it. The owner of the building is of the opinion that because the chimney operated the open fire it must have a very good draft. Nevertheless the fact remains that the heating stove, which is of the direct-draft type, does not always fire up properly or develop its full heating capacity when it is needed. I pointed out that it must be the draft of the chimney which is creating all the trouble, and would be glad to have the views of the readers as to what is the cause of the trouble and how it can be overcome.

Note.—A chimney of the size mentioned in an outside wall is apt to chill the hot gases before they can reach the top and pass away, and the chimney is of larger dimensions than required for a stove using a 5-in. pipe. Again, it seems that there is considerable distance between the bottom of the stove-pipe hole and the place where the chimney is stopped off. This has frequently been found to be the cause for conflicting currents in the chimney, which interfere with the operation of the stove. If the chimney is stopped off a few inches below the pipe hole it will have a beneficial effect. If this should not overcome the trouble the connection of a few joints of pipe will place a heating surface within the chimney which will serve to help the upward movement of the smoke and gases.

Carrying Lengths of Timber

From M. R., Sturgeon Bay, Wis.—A short time ago I was under the weather, having come in contact with the same specimen of poison that Adam accused Eve of substituting for a fig leaf when she changed her dress, which we call by its modern name "poison ivy." As sleep was out of the question for the time being at least, I happened to pick up the September copy of *The Building Age*, and among other items I read the article "Carrying Lengths of Timber," written by Mr. Hobart. Whilst following his reasoning my mind drifted back about a quarter of a century to the time I was employed as a wood-machine hand in a railroad car shop. Once in a while, when the laboring crew happened to be busy in some other part of the works, it fell to the lot of us machine hands to carry in quantities of oak timber to cut up for various parts of car construction. The bulk of this was carried just as Mr. Hobart has described—three men to a timber, two men on the carrying stick and one to look after the rear end.

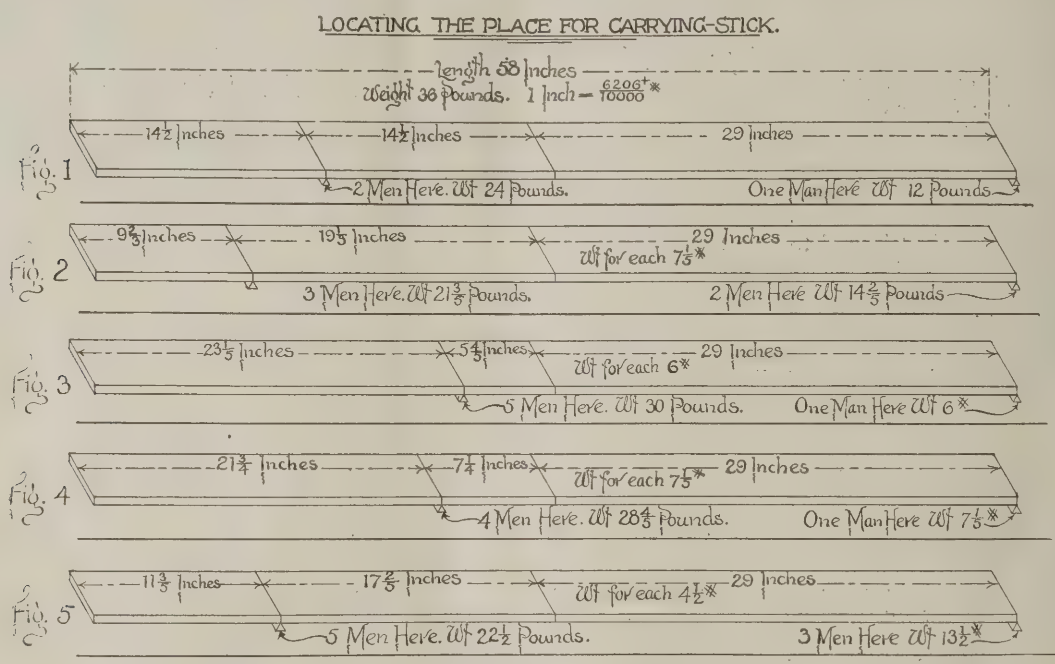
I usually carried at the ends and had one fellow on the stick, whom we will call Jim. He was a natural politician, but was never able to "land" an office, so was compelled to be a machine hand to keep his family all in the same house. To tell the truth Jim was lazy. I have known him to go so far as to pray for rain so that he could soak up the handle in an old hammer he used around the machine. He used to say it was less work to soak it than to wedge it and the head would stay on just as good for a while anyhow. Jim always had a partner named Harry on the carrying stick, and Harry would almost kill himself to make Jim take a good lift and many a time he would back up until he had Jim about the center of the stick, so sometimes all there was left for me to do was merely balance the timber.

Of course there were all kinds of discussions going on as to which was the proper place for the stick so as to equalize the load for all three. The majority claimed that it should be one-third the length, measuring from the front end. As I have never met with anything just on this order in any of the text books which I have looked over, and while Mr. Hobart's solution was still fresh in my mind an opportunity occurred to put it to the test. When I had some waiting to do around a hardware store, a steel bar ⅝ x 3½ x 58 in. and weighing just 36 lb. was found. This along with two platform scales was used. A three-cornered file was placed on one scale at the carrying stick location, as shown, and another three-cornered file was used at the end, all as clearly indicated in the sketches. To keep the file at the end in the proper position it was soldered just enough to keep the upper corner of the file exactly even with the lower corner edge of the steel bar. The five different positions of carrying-stick, as shown on the drawings, were weighed and found to be correct. Each scale was adjusted to balance the file placed on it. The scales were leveled one with the other, and when in the different positions, as shown, a ¾-in. iron washer was enough placed on most any part of the steel bar to move one beam up and the other down.

With this it may be said that to locate the place for the carrying stick, multiply half the length of the timber by the number of men at the end and divide by the number of men at the stick. The result will be the distance from the center the carrying stick is to occupy.

Computing Fig. 1 we have $1 \times 29 \div 2 = 14½$ in. from center.

Computing Fig. 2 we have $2 \times 29 \div 3 = 19\ 1/3$ in. from center.



Carrying Lengths of Timber.—Sketches Accompanying Letter of "M. R."

Computing Fig. 3 we have $1 \times 29 \div 5 = 5\ 4/5$ in. from center.

Computing Fig. 4 we have $1 \times 29 \div 4 = 7\frac{1}{4}$ in. from center.

Computing Fig. 5 we have $3 \times 29 \div 5 = 17\ 2/5$ in. from center.

From Arthur F. Davis, Newport, N. H.—In his article on Carrying Lengths of Timber in the September issue of the paper, Mr. Hobart has, to be sure, arrived at a correct conclusion, but by a rather roundabout way. The logic of the situation, as I see it, is as follows:

First, the weight of a body acts as if concentrated at its center of gravity.

Second, considering this stick as a lever, we must make lever arm times pressure equal to lever arm times pressure in order to obtain a balance.

Take Mr. Hobart's 30 in. uniform stick weighing 30 lb. We know we want 1/3 of this or 10 lb. resisted by upward pressure at D of the diagram Fig. 2, and the remainder by 20 lb. upward at some point B. Now, D being one end of the stick and 15 in. from C, the center, we have to balance

$$BC \times 20 = CD \times 10$$

$$BC = \frac{CD \times 10}{20} = \frac{CD \times 1}{2} = \frac{15}{2} = 7\tfrac{1}{2}$$

$AC = CD = 15$ in.

$AB = AC - BC = 15$ in. $- 7\frac{1}{2}$ in. $= 7\frac{1}{2}$ in.

$AB = 7\frac{1}{2} = \frac{1}{4}$ of AD.

This shows that the carrier rod should be quarter way from one end.

From S. D. D., Portsmouth, Va.—Replying to H. F. B., Alliance, Ohio. The question of carrying sticks of timber depends, as D. J. M. states, on the principle of moments, but as his explanation is somewhat obscure, I will see if I can state it more plainly.

The moment of a force about a point is its tendency to produce rotation about that point. If any body is supported at two points, the portion of the weight of the body supported at each of the points is called the reaction at that point and the sum of the two reactions is equal to the weight of the body. Notice that the reaction tends to turn the body the opposite direction from that due to the weight of the body when both tendencies are referred to the point of application of the other reaction. If the system of forces is balanced, that is, if there is no resulting motion, the sum of the moments of all the forces equals 0. For the purpose of computing moments the weight of any body may be considered as acting at its center of gravity. Take the simplest case, a uniformly loaded beam supported at each end, as shown in Fig. 3 of the diagram. The weight of the beam and load being uniform may be considered acting at its center. Let the length between points of reaction be $2\,l$ and the total weight be W. Then the sum of the moments about R_1 will be $W\,l - 2\,R_2\,l = 0$ or $R_2 = \frac{W\,l}{2\,l} = \frac{W}{2}$, that is, one-half the load is carried at each end.

Now, take the case discussed in the article of James F. Hobart in the September issue. Referring to Fig. 4 the weight of the stick being uniform may be considered as acting at its middle. We know that $R_2 = 2\,R_1$ from the conditions of the problem. We wish to know x. Let the weight of the stick $= 3$ W so that $R_1 = W$ and $R_2 = 2$ W and let the length be l. Then taking the sum of the moments about R_1

$$3\,W\,x\,\tfrac{1}{2}\,l - 2\,W\,x = 0, \text{ or } \frac{3\,W\,l}{2} = 2\,W\,x, \text{ then } x = \frac{3\,W\,l}{2} \div 2\,W = \tfrac{3}{4}\,l.$$

Supposing R_2 is to be four times as great as R_1. Let the total weight be 5 W and the sum of moments will be $5\,W\,x\,\frac{1}{2}\,l - 4\,W\,x = 0$, from which $x = \frac{5}{8}\,l$.

If H. F. B. will get the principle of this firmly in his head, he will find it will help to solve many other problems beside the carrying of a stick of timber.

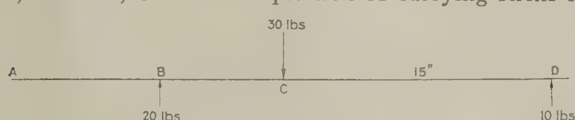


Fig. 2.—Diagram Submitted by Mr. Davis.

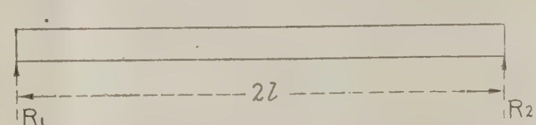


Fig. 3.—Uniformly Loaded Beam Supported at Each End.

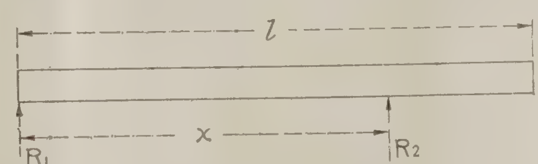


Fig. 4.—Diagram Illustrating the Example Discussed by Mr. Hobart.

Carrying Lengths of Timber.—Diagrams Accompanying Letters of Various Correspondents.

Some Questions in Barrel Measure

From Ernest McCullough, Chicago, Ill.—Replying to question of "P. D. M.," in the October issue of *The Building Age*, page 438, I would say that in the United States and Great Britain a barrel of wine or brandy equals $31\frac{1}{2}$ gal., the basis being the old British gallon containing 231 cu. in. weighing $8\frac{1}{3}$ lb. The present barrel is unchanged. Expressed in cubic feet, the legalized wine barrel contains 4.211 cu. ft. The dry flour barrel is supposed to contain 3.75 cu. ft. and by law must contain 196 lb. The dry barrel was never legalized, so far as size is concerned, and the size varies considerably.

A number of years ago the barrel was used as the measure for cement and cement was shipped in barrels. Each manufacturer had a size and finally engineers had to give up the attempt to use the barrel as a measure of capacity and declared that a net weight of cement of 376 lb. would be considered as equivalent to 1 bbl. The manufacturers then got together and decided to put cement up in bags, the net weight of a bag to be not less than 94 lb. and to consider each bag as equivalent to 1 cu. ft. Simply because old terms take a long time to die out and men hang to old expressions, it is a common matter to hear cement reckoned by barrels, but in practice 4 bags will be used instead of 1 bbl.

In measuring sand, etc., by the barrel, it is best to drop the use of the word "barrel," since it does not describe an invariable unit of measure, and express quantities in cubic feet or in pounds; considering then that a barrel of sand should contain 4 cu. ft., or 400 lb., the weight of common sand being practically 100 lb. per cubic foot. The writer once obtained 25 barrels from as many different places and measured them carefully, discovering 15 different sizes, ranging from 3.5 cu. ft. to 4.35 cu. ft., which proved to him that old-fashioned rules for mixing mortar and concrete with the barrel as a unit were untrustworthy.

Louvres for Church Towers

From J. E. R., Lawrenceville, Va.—Permit me to inquire of the practical readers of the paper, especially those of the architectural fraternity, if it is necessary for louvres to be placed in more than two sides of a church tower. If so, will they please explain the reasons therefor?

Methods of Determining the Swell of Diminished Columns

From C. J. M., St. Johns, Newfoundland.—In the sketches which I send herewith is shown a method of sweeping the entasis or swelling of diminished columns which may be of interest to readers of the paper, owing to the fact that it may not be generally known among them. The diminishing of columns is an interesting though somewhat difficult operation, as great care must be taken not to overdo the entasis or swelling. The swell must run very gradually from base to capital. The method here given shows one of the ways in which it may be done.

Before proceeding to describe the manner of laying out and constructing the trammel illustrated in Figs. 2 and 3 of the sketches, a few words as to the principle upon which it works may not be out of order. Referring to Fig. 1 of the diagrams, proceed as follows: From any point *b* in a horizontal line of indefinite length as G H, raise the perpendicular B A and upon this set out any length as *a b*. Now with *b* as center and *b a* as radius, describe the dotted arc *a* F. Then with F as a center and F *a* as radius, describe the arc *a* E. Set out F D equal to *b* E; draw the line D *a*, producing it indefinitely beyond *a*.

Now take any distance as *b* G to the right of *b* and divide it into three equal parts, as 1, 2, G. Set off *a* C equal to *b* G, and also G H equal to D C.

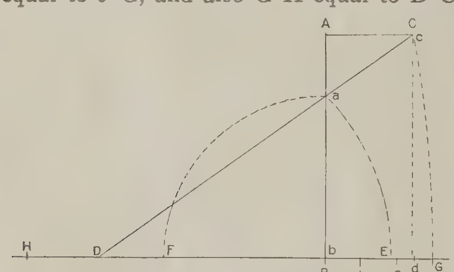


Fig. 1.—Showing Method of Laying Out a Trammel for Sweeping the Entasis of Diminished Columns, and the Principle Upon Which It Works.

Now draw the dotted lines *c d* parallel to *a b*. Set out *b* A equal to *d c* and draw the line A C.

It will be observed that the line *c d* falls very nearly in the center of the left-hand division of B G, thus making the line A C a little less than 5/6 of the line B G, which is the proportions of a diminished column. Now if we were able to move the point *a* along the line A B from *a* to *b* and at the same time move the point D along towards H, the result would be a graceful diminishing curve described by the dotted line from *c* to G. Upon this principle the trammel shown in Fig. 2 may be made.

To construct the trammel we draw upon a level floor or large drawing board, the line F *b* extending it indefinitely. In a convenient position upon it set out the diameter of the base of the column *a b* and divide it into six equal parts, as shown by 1, 2, 3, 4, 5, *b*. To find the point F set out the distance D *c* from the point *b*.

Through the center of the right-hand division 5 *b* of the diameter and perpendicular to F *b*, draw the line A B and upon it set out *c d*, the length of the shaft or portion of the column between the base and necking of the capital. Through the center division 3 draw the line C E parallel to A B. This line will be the axis or center line of the column.

Find the point D as described in Fig. 1 and draw the line D *c*, which will correspond with the center line of the trammel rod. Next procure a piece of stuff 1¼ by 5 in. in section and a foot or so longer than the shaft. Through its center make a groove about 2 in. wide and ¾ in. deep. Into this fit a sliding block with a pin fixed firmly in its center as shown in the details Fig. 3. Fasten the grooved piece to the floor, with the center of the groove exactly over the line C E. Procure a ⅞-in. rod about 3 in. wide and a foot or so longer than from D to *c*, and having drawn a line through its center lay it along the line F *b* and square it across at the points F, D, E, *b*.

In these marks where they cross the center line of the rod bore holes as shown at D, *f*, *e*, *c*, Through the rod from D to *f* cut a slot and through it pass the pin at D, which should be fixed in a block the same thickness as the grooved piece and fastened to the floor exactly over the point D. Through the hole *e* pass the pin in the sliding block and in the hole *c* insert a pen-

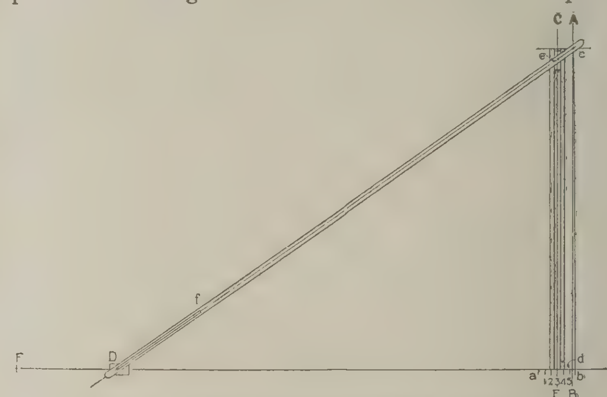


Fig. 2.—Trammel Set Up in Working Position.

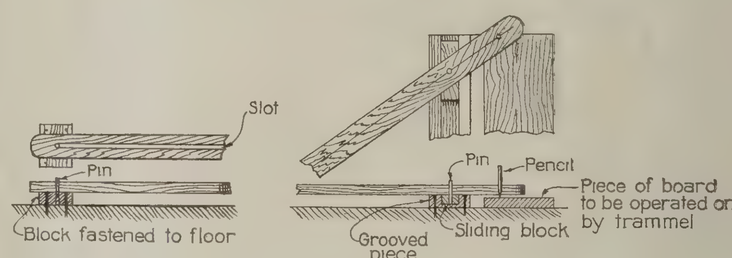


Fig. 3.—Details of Construction.—Scale, ¼ In. to the Foot.

Method of Determining the Swell of Diminished Columns.

cil. Now by sliding the block down the groove the pencil will describe a curve from *c* to *b*, which will be the true entasis of the column.

Where square posts are formed into classic columns by means of lath and plaster the carpenter requires a plumb rule to set up the furring. This may be easily made by the use of the trammel in the following manner: Straighten one edge of a board and lay it on the floor with its straight edge at right angles to be base line and the other edge where it will come under the pencil point. In this way also may be made floating rules for the plasterer and screed rods for running the flutes.

In Fig. 3 are shown the constructive details of the trammel drawn to a scale of ½ in. to the foot, which will be readily understood without extended description.

Storing Lumber in Limited Space

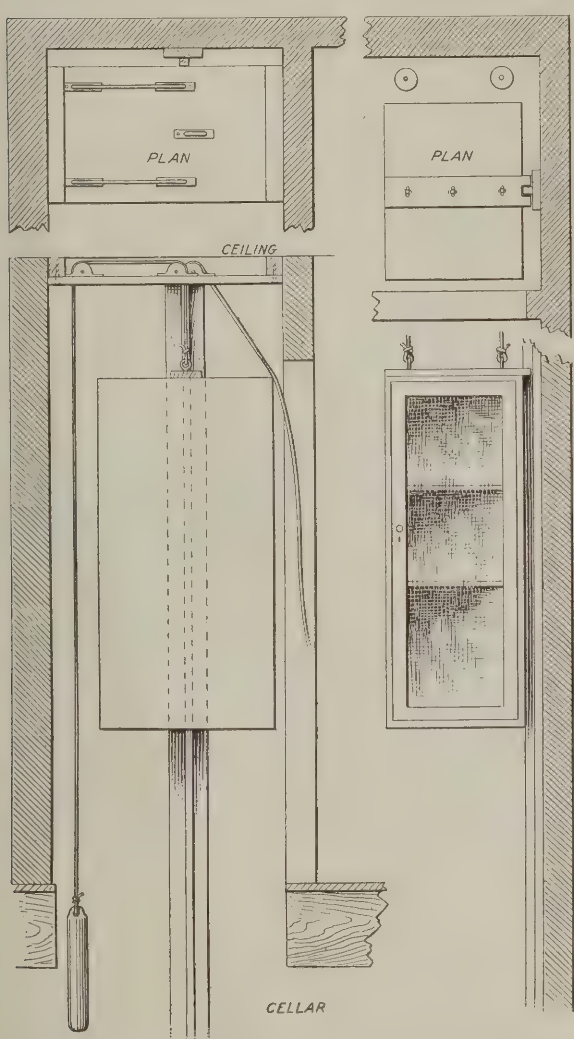
From R. W. McDowell, Uniontown, Pa.—It has been some time since I have taken up space in your paper, so I will do so now by asking the best way to keep lumber in a place where space is limited and where, on that account, it is impossible to pile it on the floor. I wish to put in racks of some sort which will hold a moderate quantity of lumber with as little liability of warping as possible.

I also desire to take this occasion to add that, while I have certainly been long enough in thanking "P. T. L." for his suggestions and drawings of a small shop in the July number, I wish he would consider "late better than never" and accept my thanks now. His communication was of material assistance to me.

A Homemade Dumbwaiter

From E. S. H., Danbury, Conn.—I am always interested in the Correspondence Department of the paper, and looking over a recent issue my attention was drawn to the inquiry of "E. H.," Springfield, Ill., who wants to know how to make a dumbwaiter. I am sending rough sketches of one which I installed and which has given entire satisfaction. It is a cheap arrangement, but it serves the purpose and my wife is much pleased with it.

In making the dumbwaiter I used a box of thin light boards and suspended it similar to a sash, making use



A Home-Made Dumbwaiter.—Contributed by "E. S. H.," Danbury, Conn.

of sash weights, pulleys and cord. It runs from the closet opening out of the kitchen into the cellar. In the top of the box I inserted five sash pulleys, as shown in the plan view, four being placed in such a way as to have one end of the cord fastened to the box and running directly over the middle of either side pulley to two pulleys in the back and then to the sash weights. The sash weights are somewhat heavier than the box, depending, of course, how much stuff is going to be placed in it.

The middle cord is fastened to the center of the box and runs over the center pulley, then back down in front and left loose. The drawing representing this is an end view of the box, showing the pulley arrangement overhead and one of the sash weights. The rope is used simply to pull the dumbwaiter up from the cellar; it can be pushed down without handling the cord.

I fastened the pulleys on the top of the board first, then put the sash cord over the pulleys, after which I took 2 in. No. 12 screws and fastened a board to cross pieces on the ceiling of the kitchen closet. This is also shown in the end elevation just referred to.

I cut a hole in the floor of the closet 2 in. wider than the box on the sides and 4 in. wider in the back so as to leave room for the sash weights. For runs I took a roof board long enough to reach from the cellar bottom to the ceiling of the closet and then screwed a ⅞-in. square piece to the center of that. I then put a cleat on the top and bottom of the box with a slot to correspond with the runs. This is indicated in the plan view in the upper right-hand drawing. The view immediately below it shows the screen door front of the box.

I think the practical readers will understand the sketches, so that further description on my part would seem to be unnecessary. Should, however, any of them desire further information I shall be glad to have them make inquiry through the columns and I will respond through the same medium.

Some Criticisms on Concrete Construction

From E. B. Noyes, Portsmouth, Va.—Referring to the papers on Concrete Construction by Mr. Paul T. Lesher, I note an obvious error in the May number under the heading Slab, viz., 120 + 51 = 195 lb., but as the subsequent work is carried out with this total figure, it is not likely it would mislead anyone.

Another point, however, should be explained, as it is likely to puzzle anyone new to the subject. On page 199 it is stated that "The horizontal shear is usually taken as equal per lineal inch of the beam to the vertical shear at that place divided by the effective depth of the beam at that place."

On page 237 of the June issue, in the practical calculation of the beam, it is stated that "The horizontal shear = 10,898 lb. × ⅔ rods = 7265 lb., divided by 11.46 = 634 lb., etc."

On page 238, in the computation for the girder, it is stated: "Horizontal shear=23,890 lbs. $\dfrac{\text{divided by}}{\text{(? multiplied by)}}$ 3/5 rods = 14,334 lb. divided by 16.64 equals 861 lb. per lineal inch, etc."

The reason for multiplying by ⅔ rods and by 3/5 rods is nowhere explained.

On page 237, it is stated that "Adhesion = horizontal shear = 634 lb. per lineal inch divided by 7.5 sq. in., which is the surface of *two* 15/16 inch square rods, etc." And on the following page, "Adhesion = horizontal shear = 861 lb. per lineal inch of girder ÷ 13.5 sq. in. (the surface of *three* 1⅛ in. square rods) = 64 lb. per square inch."

Why *two* when three rods are used and *three* when five rods are used? This should be made clear.

On page 238, it is stated that, "To provide for the roof covering, snow and wind pressure, and the weight of the concrete itself, a roof load of 40 lb. per square foot of roof area is ample for temperate climates."

The concrete slab itself would hardly be less than 3 in. thick or 36 lb. per square foot. A reinforced concrete roof is usually very flat and the snow load even here in Virginia may run as high as 10 or 12 lb. For so flat a roof the wind load may be neglected. A tar-and-gravel top weighs 4 to 5 lb. We have then 36 + 10 + 4 = 50 lb., without taking any account of rafters, purlins, etc. How would you figure to show 40 lb. ample?

Answer.—The above comments were submitted to

Mr. Lesher, author of the articles on "Plain and Reinforced Concrete Construction," who replies as follows: Referring to "obvious error" in the May issue, under the heading "Slab, viz.: 120 + 51 = 195 lb.," I would state that the article at this point reads "assuming that a square foot of cement 2 in. thick weighs 24 lb. and a 4¼-in. slab 51 lb., and adding the 120 lb. live load, the total load per square foot equals 195 lb."

This summation is correct, although it was an oversight on the part of the writer not to state more fully that the slab was to be covered with a 2-in. layer of cement for wearing purposes.

In regard to the question of the horizontal shear, wish to state that the horizontal shear at the support (where it is the greatest) of a beam is equal to the vertical shear, and the square inches of cross section of the beam divided into this shear gives the shear per square inch, but in the concrete beam, reinforced, the rods modify this somewhat. In the case of the beam with 5 rods, with two of the rods inclined, the horizontal shear to be taken care of between the end of the beam and the lower bend of the rods is lessened two-fifths, by reason of said inclination. That is to say, such a beam may be considered as two beams, one of which is similar to a trussed beam and the second of which is a beam with a lower flange running horizontally from end to end. Therefore the horizontal shear under such an assumption is that which is due to the second beam, as the inclined rods take care of the other two-fifths.

This method is used by one of the leading engineers in the concrete profession.

The above will also take care of the question about the adhesion. The roof load should have been 70 lb. per square foot instead of 40 lb. Am pleased that the correspondent has called my attention to these points, and am willing to answer any other questions.

What a Barrel of Cement Means

From Ernest McCullough, Chicago, Ill.—In looking over the November issue of the paper I note an error on page 477, in reference to the action taken by the American Society of Engineering Contractors as to what constitutes a barrel of cement. I am a member of that society and beg to state that it was a series of editorials by me last winter in engineering-contracting which led the society to take up the matter. In the article as presented in *The Building Age,* the weight of a bag of cement is given as 56 lb. This is an error, as the society resolution was a bag weighing gross "not less than 96 lb. and containing at least 94 lb. net of cement." A bag containing 94 lb. net is now, and has been for two or three years, counted as equivalent to 1 cu. ft., but a contractor is more apt to weigh the bag and contents, so the 96 lb. gross is mentioned.

Log Cabin Construction

From C. D., Ashland, Mass.—Although but an amateur in the building line, I enjoy reading *The Building Age* immensely and find it of great help to me. I am taking advantage of the editor's standing invitation to the readers by coming to the Correspondence columns for information.

Will some of the readers help me out on a log cabin which I wish to build? It is to be 36 x 38 ft. in size, have two windows on each side and contain four rooms. What lumber is best to use, how much of it will be required and how is it possible to line the house so as to make it warm? Are the logs treated with any preservative and are they cut in half?

I have planned for a chimney 6 ft. square in the middle of the house and to have a cellar 7½ ft. deep. The first floor is to be 9 ft. in the clear. How much brick will be required for the work? I want to build the log cabin myself, although I have never built anything but a fire in my life. Will the subscribers kindly help me out?

Construction of a Carpenter's Tool Shop

From W. M., Dassel, Minn.—I would take it as a great favor if some of the practical readers of *The Building Age* would describe, in the Correspondence columns, how to arrange the interior of a carpenter's tool chest. Naturally, it would add interest to the matter if the correspondent replying would accompany his comments with sketches showing horizontal and vertical sections through the box.

The Jobbing Carpenter and Some of His Work

From R. W. McD., Uniontown, Pa.—I am in perfect agreement with J. Bremner regarding the articles of the "Jobbing Carpenter and Some of His Work," by Edward H. Crussell. I suppose Mr. Crussell's articles could not very well be made a fixture—one every month—but it seems a pity that they cannot, for the way in which all the minor details were so clearly described renders these articles, in my opinion, of the greatest value, especially to the younger element. The little details are the hardest things to master in almost any line of work—a fact of which a big majority of the writers of books on carpentry appear to have lost sight. It is this same feature which makes the Correspondence Department of the paper especially valuable.

British Cement Specifications Revised

The British standard cement specification for Portland cement has just been revised a second time by the Engineering Standards Committee by the insertion of certain amendments that have been made as a result of investigations of the sectional committee on cement. The use of either the British standard and Vicat needles for determining initial set was specified heretofore, but in the revised form the Vicat needle alone is specified, since it was considered advisable to have only one method for determining both initial and final set.

Other amendments include the insertion of clauses regarding minimum lime content and total loss on ignition and provision for limiting the total amount of sulphur present, whether as sulphides or sulphates. The instructions for gauging have been modified so as to remove as far as practicable any ambiguity as to the actual consistency of the cement. The increase in tensile strength of cement and sand briquettes is now graded in a similar manner to that of neat cement briquettes.

Loss of Timber by Forest Fires

The extensive forest fires which have lately occurred throughout the Northwest have caused the United States Department of Agriculture—Forest Service—to issue an announcement giving a rough estimate of the loss upon the National forests in Montana and Northern Idaho. A rough estimate places the total amount of timber killed or destroyed in this one district at over six billion board feet, while the area burned over is placed at over 1¾ million acres.

The belief is expressed that last summer's fires either burned up or killed between 1 and 2 per cent. of the total stand of National forest timber. At the present rate of cutting from the National forests six billion feet is equal to 12 years' supply, but it is less than one-sixth of a single year's cut in the entire country, or enough to keep all the lumber mills busy for something under two months.

A CEMENT-CONCRETE RESIDENCE IN EASTERN MASSACHUSETTS

THE half-tone engraving presented herewith relates to a cement-concrete residence which, the architect points out, is planned very much upon the lines of a design for which he was awarded a prize in one of the competitions conducted under the auspices of this journal when known as *Carpentry and Building*, about three years ago. It is built with a concrete foundation and underpinning about 8 in. thick, with a footing at the bottom. The walls were built between a frame made with metal lath fastened to small steel studs 1 in. wide set in about 1 ft. 4 in. on centers. The concrete was then put in between these and when it was set each side was plastered with cement. The side walls were made with 2 x 4-in. studs placed 1 ft. 4 in. on centers, then there was a three-quarter V-shaped iron fastened to the outside of each stud and the metal lath fastened to the latter with hooks made on the V-irons.

and attic, is finished in hard pine. The bath room has a tile floor and the walls to a hight of 4 ft. are also of tile. The plumbing is first-class open work.

Referring to the floor plans, it will be seen that the approach to the front veranda is from the side, and the entrance to the house is through a vestibule into a commodious hall out of which opens the living room, den and the dining room. There is also direct communication between the kitchen and the front hall by means of a passageway out of which opens a toilet room and the stairs leading to the cellar. Communication between the kitchen and dining room is established through a well-equipped butler's pantry.

On the second floor are five sleeping rooms, bath room and ample closet rooms. The stair hall, it will be noticed, is lighted by a triple oriel window with leaded glass in the upper sash. The attic is finished with two

A Cement-Concrete Residence in Eastern Massachusetts.— John P. Kingston, Architect, 518 Main Street, Worcester, Mass.

The whole was plastered on the outside with two coats of cement plaster, and inside between the studs or irons, so that the whole of the metal work was entirely embedded in the cement.

The roof has wooden rafters on which are laid ⅞-in. boards covered with a layer of building paper. The finish is red colored cement tile about ½ in. thick, which gives a very pleasing appearance. The floors are double and rest upon wooden joist, those for the first floors being 2 x 9 in. placed 16 in. on centers. The second floor joist are 2 x 8 in., also placed 16 in. on centers.

The hall is finished in quartered oak, being paneled to a hight of 3 ft. 6 in. The dining room is also finished in the same way and has a beamed ceiling. The living room is finished in red birch, with beamed ceiling and pilaster opening into the hall. This opening is 8½ ft. wide and 7 ft. high and is finished with columns and pedestals. There is also a cased opening between the hall and den. The "den" is finished in birch and the remainder of the first floor, together with the second

sleeping rooms, a billiard room measuring 16 x 18 ft. in size, a trunk room and a water closet.

In the basement is the laundry, with three-part wash trays, a store room, the heating apparatus, with bins for range and heater coal and a water closet.

This very interesting example of cement construction, as applied to a modern residence, was built for Cornelius O'Connell on Pequossett street, Riverton, Watertown, Mass., from drawings prepared by John P. Kingston, architect, 518 Main street, Worcester, Mass.

Suggestions for Silvering Mirrors

We have in the past presented occasional inquiries from correspondents asking with regard to the process of resilvering old mirrors, and as the subject appears to be one of considerable interest we take pleasure in presenting herewith some extracts from a communication by George W. Mueller which were printed a short time ago in the *Furniture Journal*. What the writer has to say will afford the reader an excellent idea as to the latest methods employed in the silvering process.

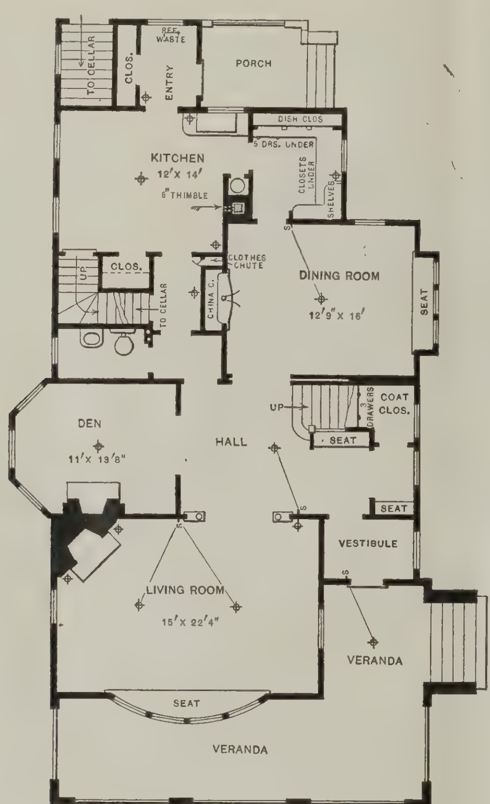
After describing and explaining old methods of silvering, the author takes up the preparation of the plate glass that is used for mirrors at the present day and for mirrors for the furniture manufacturers in particular. He tells how the glass is beveled and ground, as well as the processes employed for smoothing and polishing it. The author then states:

"When the plate reaches the silverers it is first placed on the washing tables, and carefully and thoroughly washed by hand with water and putty powder and felt hand blocks. It is then thoroughly rinsed with distilled water to remove all impurities, as ordinary water contains too much chemical matter that would injure the silvering. It is then ready for silvering, and while still wet it is placed on the silvering tables. The silvering tables are immense hollow tables with stone or concrete tops and a closed-in steam heating system underneath that thoroughly heats it. The stone top is covered first with a canvas cover and then with a woolen blanket to help retain the heat and keep it at an even temperature. Onto these tables, then, the glass is laid with the front or face side down, and onto the back or reverse side the silver solution is poured.

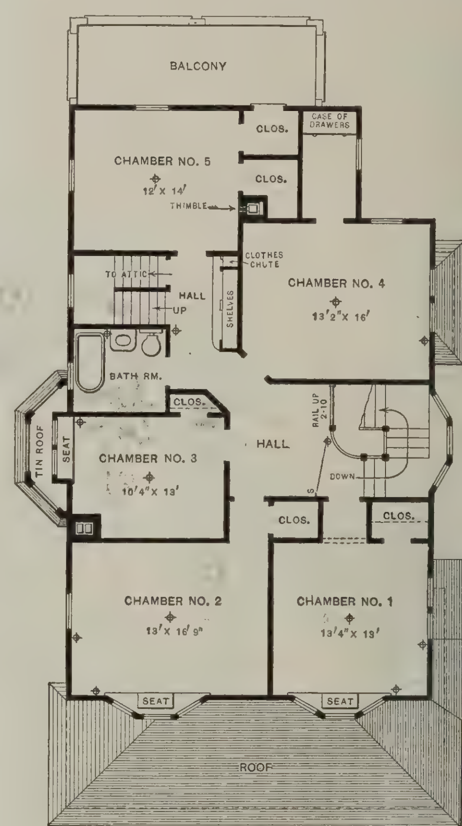
"The formulas for the silvering solution have always been more or less of a trade secret, but there are so many different formulas in use to-day that really there is no standard. The basic principle of all successful silvering formulas is the dissolving or cutting down of nitrate silver (which is chemically pure metal silver reduced to crystal form) with ammonia to reduce it to a liquid state and then adding an acid solution of Rochelle salts, or tartaric acid, to precipitate the silver in metal form out of the solution and onto the glass. The solution when ready for use looks very much like water, but the effects of the acid and the heat of the tables, after it has been poured onto the glass, gradually change its color until one can see the metal silver slowly begin to form and spread in the shape of a thin film of metal over the surface of the glass. The fine art in silvering mirrors is in the mixing of the various materials that go into the solution and the ability of the silverer to judge the chemical action after the silver is on the glass. The working of the solution must be watched with identically the same care that is observed in the developing of a photographic negative, and very many like difficulties have to be overcome in both. A successful silverer is born and not made, and there are but few really successful silverers to-day.

"After the solution has been poured onto the glass it requires from one-half to one hour's time for the silver to form in good shape. As soon as this occurs the plate is taken up and the superfluous solution allowed to run off. The coating of silver is then carefully wiped dry with chamois skin. The plate must be handled most carefully when in this shape, as the silver is so sensitive that a touch of the finger would leave a mark. The perspiration from the human body is most injurious to the silvering, as it contains so much salt and alkali. As the rooms in which the silvering is done naturally become overheated from the silvering tables the silverers are almost continually perspiring. The slightest drop of the moisture on an unfinished mirror would ruin it, and it naturally follows that the silverers must be most careful on this point.

"After the actual silvering is completed the plate must still be treated with a coat of shellac and a coat of paint as a protection for the silver. For the shellacing the finest grade of orange gum shellac, cut down with alcohol, is used, and this is applied directly over the silver with the finest of camel's hair brushes. When this is dry a coat of paint is applied over the shellac. The paint used is a special one for the purpose, and must be entirely free from oils and acids that would have a detrimental effect on the silver. When painted the mirror is placed in drying rooms until the paint is thoroughly dry. It is then thoroughly cleaned and polished with cloth and dry pumice stone by hand, and is then complete and ready to take its place and do its duty."



First Floor.



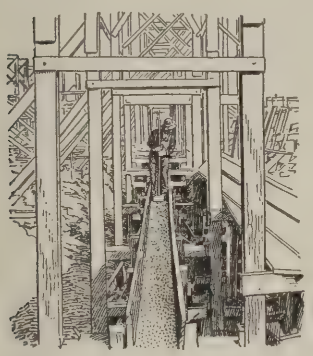
Second Floor.

A Cement-Concrete Residence in Eastern Massachusetts. Floor Plans.—Scale, One-Sixteenth Inch to the Foot.

THE COMMON SENSE OF CONCRETE

By M. C. Tuttle.*

FAILURE to understand the general principles of reinforced concrete comes from the idea that the subject is technical and complicated; also from the scarcity of non-technical articles on the subject. A statement of the simplest theories may be of interest. Concrete buildings are becoming common enough, so that the use of the concrete column, the concrete beam floor, stairs and wall excites little comment. It is generally known that steel rods are used to impart strength and that these are generally used in tension, but just how and why are not always clear.



Take the case of a simple beam supported at each end and loaded in the middle. It will be seen that the bottom of the beam is being pulled and the top compressed; that if the beam fails, it will probably do so by tearing apart at the bottom, or if the bottom is tough enough and the load is increased sufficiently, the top of the beam will crush or crumple. In the case of a concrete beam the material is hard but not tough, and a sufficiently-loaded beam of this material will supposedly fail by tearing open at the bottom.

Designing a Concrete Beam

In designing a concrete beam the engineer finds how much tension a given load will cause on a beam of given length. Knowing this he has but to select the amount of steel necessary to resist this pull. It will be seen that the deeper the beam the less pull will be exerted at the bottom, and accordingly the engineer can increase the depth and use less steel, or decrease it and use more steel, to get a given carrying capacity. He must at the same time assure himself that the compression in the top of the beam is not greater than the concrete can bear.

With regard to concrete columns the problem in the simplest case is to determine how much load comes on a given column; to reckon on the number of inches of cross-section necessary to safely carry this load and to so arrange the steel in the sides of the column that the column shall not bend or bow under the load. It is clear enough that a long shaft—for example, a knitting needle standing vertically on a table—will carry more load when it is straight than when it once begins to bend; and in the case of a bending column, the side opposite the bend is stretched and the side toward the bend compressed. To prevent this stretch steel bars are generally placed on the outside of any concrete column. In the simplest case this is the sole function of the bars.

With these general principles in mind, one will understand that once a bar is imbedded in concrete it should become a part of a composite structure, of which structure the concrete should be in compression, and the steel in tension, under load. If, however, a round bar was thickly coated with grease, so the concrete could get no hold on it when enough load was applied to a beam to tear the concrete at the bottom instead of taking up the pull, the bar would simply slip through the hole in which it was embedded.

Grip of Concrete on Steel

It has been found that the grip of concrete on steel is very strong. To satisfy yourself of this, embed the ends of wires in cement mortar at varying depths and at the end of three weeks try to pull them out. It is generally accepted that a plain steel rod with one end embedded in good concrete forty times as deep as the diameter of the rod will pull apart outside the concrete rather than slip from the concrete. It will be seen that a number of small rods will offer more surface hold to the concrete than does one large rod of equal cross section.

The average concrete building has more than one span of beams in its width, and it is to be noticed that the beams are in one solid piece across the width of the building—not separate beams between columns like the wooden beams in a mill building. If you consider the case of a concrete beam carrying load and supported by a column, you will see the beam will tend to break apart over the column by tearing at the top, just as a stick breaks across your knee; that is, the tension at this point has changed from the bottom of the beam, where it was in the middle of the span, to the top of the beam at the column. You will see that for some distance each side of the column the beam tends to project, like the arms of a cross, and that at some point beyond it tends to hang like a hammock from the point where the arm of the cross ends and the beam action begins. At this point the top of the beam changes from tension to compression. It is to take up this top pull over bearings that the beam bars are bent so as to bring the last two or three feet of bar into the top of the beam. It will be seen that if these ends stop at the center of the column it would have much the same effect as making the horizontal arms of the cross of two pieces instead of one; it would not be so strong, and if the steel were all at the bottom it might be compared to bringing the arm of the cross at the bottom when made of two pieces.

Support for the Slab

In a concrete beam and slab floor the slab is supported by the beams and would tend to crack under the load either by crushing at the top or by pulling apart at the bottom about midway between the beams. It would act much as a slab of slate would if it were loaded to breaking. The steel, accordingly, is put at the bottom of the slab to take up the tension, exactly as it is in the case of a beam. The slab, in fact, is nothing but a thin, flat, continuous beam, and the steel bars or mesh is arranged as nearly as may be like that of a beam or girder. There is a point a little distance away from the beam where the top of the slab is in tension exactly as the top of the beam is in tension over a column. Some engineers bend the slab steel so as to get it into the top of the slab at this point and over the beam; others put in steel bars at right angles to the beam, extending beyond this point to take up the tension, and still others use small bars spaced a few inches apart, running both ways in the top of the slab for the purpose of taking up this tension, and also to tie the slab up to prevent cracking from internal strains in the material.

This leads to the consideration of the use of steel for preventing cracking. Concrete is cast wet and hardens into its place—in effect the same as cast iron hardens in its mold; and just as cast iron is full of internal strains caused by unequal cooling and unevenness in the metal, so the mass of the concrete is full of setting strains because of variation in time of setting, due to time of placing, the amount of moisture, the amount of heat and the rapidity with which it dries out, besides the unevenness which exists in the aggregate and in the cement. With cast iron it is possible to anneal this and so remove the internal strains. With concrete, however, it is only possible to tie the mass together

* Of the Aberthaw Construction Co.

with the tough steel so that under shock, under uneven loading, or in the racking of changes of temperature, the material will hold together and not show cracks.

Amount of Steel Necessary

The authorities disagree somewhat as to the amount of steel necessary to tie the mass of concrete together, some engineers claiming that with the use of enough steel a solid wall of concrete could be built of indefinite length without danger of cracking, others believing that the length of concrete sections, however much steel there may be in them, should not continue indefinitely, but should be broken with contraction joints. It has been found that concrete and steel increase and decrease in length under the action of heat and cold to almost the same amount. Hence the two materials will work together and the steel holds the concrete rigidly, even under temperature changes. It would seem that steel would hold concrete against cracking under temperature changes. For this purpose, steel bars are commonly embedded near the faces of concrete walls horizontally to prevent vertical cracking. The danger of horizontal cracking is less both because the vertical dimension of a wall is commonly much less than the horizontal dimension and also because the weight of the material bears down on all parts of the wall and tends to compress the various particles of the concrete rather than to tear them apart. It is, however, common to use more or less vertical steel in walls as a precautionary measure.

In building brick or stone foundations for a building it is common to start with a layer of wide stones or a wide footing and to step this in like the sides of a pyramid so that the load from the walls will be spread over the entire bottom course. If a slab of concrete is placed on the earth and the weight of a wall brought onto the middle of this, it would be seen that if the ground gave a little under the load the concrete would tend to tear apart immediately under the edge of the wall and to allow settlement. If, however, steel rods are embedded in the bottom of such a broad footing at right angles to the wall, any tendency to tear the concrete apart at the bottom will simply bring the rods into tension. This principle is commonly used in concrete foundations. Where the columns come onto a footing the footing may be made square with the steel running two ways, or octagonal with the steel running four ways across the bottom in the concrete. Again, it will be seen that the concrete acts wholly in compression and the steel in tension.

Size of Concrete Column

Objection is sometimes made to the size of the ordinary reinforced concrete column, and to overcome this objection vertical steel bars are sometimes used to carry part of the load. Builders are not altogether a unit on the advisability of using such vertical steel bars to carry part of the load, the argument against it carried to an extreme being something like the following: If you should support a weight on a long cork, the cork would undoubtedly compress under the load and at some point would allow the load to sink no further. If you ran two or three steel needles through the cork, cutting them off flush with the top and bottom and applied the weight again, the cork would take up very little of the load, the steel needles supporting it entirely, because the cork is more elastic than the steel.

Now, good concrete will carry 2000 lbs. to the sq. in. of cross section, while steel will carry 60,000 lbs. per sq. in. of cross section. Every material compresses somewhat under load, just as the cork used in the illustration does, the difference being that the compression in steel is very much less. Some experts claim that because the two materials under a given load do not share the compression equally, the concrete as a more elastic substance would have to be compressed beyond the point allowed by its physical structure before the steel would get anything like its full load. Others claim that as the concrete compresses much of the load is carried into the steel and that the two materials work evenly together. It can at least be said that practically all the tests on columns indicate that vertical steel bars do increase the carrying capacity of the columns. In considering column reinforcement, however, one must distinguish between the heavy vertical steel bars used to carry load and the smaller steel bars placed near the outside of columns to keep them from bending under their load, as explained in a former paragraph.

It will be seen that if the vertical steel bars used for carrying part of a load should be loaded heavily enough, they would tend to bow out, just as the knitting needles, previously used for illustration, under load tend to bow under their load. Accordingly, it is common to use bands of small steel just outside the bars to prevent this bowing under extreme load and also to hold the vertical steel bars in place during the pouring of the concrete.

Illustrating Effect of Reinforcement

If you stand an ordinary square-ended rubber eraser on end and press down hard on its top, you will see that the length of the eraser is shortened by the weight and also that the horizontal dimensions increase, that is, the eraser bulges in the middle. If the eraser were wound close with wire, this would hold all sizes of the eraser from bulging, and under the same amount of compression the length of the eraser would not decrease as much. Allowing for the difference in elasticity in the eraser and a concrete column, it is to be understood that the same general results occur in less degree in a concrete column that occur in a rubber eraser. Under sufficient load the particles which make up the concrete column would tend to slide by one another, so to speak, and to bulge the column, and as these particles are not as elastic as the particles of rubber, beyond a certain point they will not return to their relative positions, but will leave permanent cracks between the particles. The slipping of the different particles on one another can be seen readily in the case of a pile of sand, where under a load applied over a small area the particles of sand simply slip by one another out from under the load, and there is very little supporting capacity. Confine the same sand in a metal tube; compact it well and it will carry a tremendous load, because the particles cannot slip by one another, but are held firmly by the metal tube.

Reinforcement for Columns

This principle is commonly applied to the concrete column, some builders using horizontal hoops made of small bars placed just within the surface of the concrete, others using a spiral hooping that runs round the perimeter of the column inside the concrete. Experiments show that hooping increases the strength of a column tremendously. On practically any job today where concrete beams are being used, one may see small bars bent practically into U-shape standing up at right angles to the tension bars in the beams and girders. These bars are generally referred to as "stirrup bars." It has been found that when a concrete beam is loaded to the point of failure, cracks are likely to develop in the beams, starting at the bottom and running roughly at an angle of 30 deg. away from the point of support. These are referred to as shear cracks or diagonal tension cracks.

There is considerable disagreement among builders as to the exact function of the stirrup, and there is probably more uncertainty about their actual value than of any other feature of modern concrete design. In general terms they are put in to prevent this cracking, and by so doing to add strength to the beam. Some claim that these shear bars act with the concrete and with the tension bars of the beam, like the tension members of a truss, with the concrete between the bottom of one and the top of the next stirrup bar acting as the compression member.

Use of Stirrup

After careful investigation one is led to the belief that builders look favorably upon the stirrup; on the basis that it probably does some good and certainly cannot do much harm. It is probably safe to say that very satisfactory beams can be built without stirrups, and it will probably be necessary to wait further development of the theory of reinforced concrete design before the last word will be said regarding the necessity of the stirrup.

A new type of floor has come into prominence in the last few years, largely through the invention of C. A. P. Turner, of Minneapolis, Minn. This is the so-called "mushroom" or "girdless" type of flat slab floor. In this construction the caps of the supporting columns are usually increased in bell-shaped form below the ceiling line of a given floor. Over this cap the steel bars of the flat plate of the floor are carried at right angles from one column to the next column, and also diagonally across the slab from the columns at the opposite corners. These steel bars rise to the top of the slab at the columns, are near the bottom of the slab in the middle of the bays and are embedded in a fairly thin slab of concrete. It has been found that an absolutely flat slab of only 8 in. to 10 in. thick will carry a proper working load over a square bay with a column spacing of 20 or 25 feet. The advantage of the flat ceiling and thinner floor is obvious enough from the operating point of view.

New Floor Construction

Aside from the articles and book by Mr. Turner, of Minneapolis, the only technical treatment of this subject that we know of being yet published is the paper by A. B. MacMillan, of the Aberthaw Construction Company, Boston, Mass. The writer of the present article has no desire to attempt an explanation of the theory of this floor construction; about all that can be said is that experiment has shown it to be very strong and quite satisfactory.

It can be said in general that because the steel runs in the top of the slab over the column, and remains in this position for a considerable distance beyond the column, it is sure that a circle of concrete is supported by the column, much the same as the top of an umbrella is supported by the shaft; and that from the edge of this circle the piece of the slab is supported like a simple beam by the steel extending from the edges of this and the corresponding circle of concrete at the next column, and that if the whole concrete slab should fail, the steel bars clamped in position by the weights coming down the column above would hold like the strings of a hammock. It is also probable that the concrete between the different bands of steel acts like a flat arch, adding greatly to the theoretical strength of the construction.

New Houses Built of Old Material

It is perhaps not generally recognized by the average reader that new buildings constructed of old or second-hand materials are considered in many respects just as good, if not better, than those constructed wholly of new materials. In all cases the prices for second-hand building materials are considerably below the level of the new, thus permitting of a great saving in the building of a house, while, coupled with this, the owner has the satisfaction of knowing that his house is even more substantial than it would have been had he purchased new materials throughout. In discussing this particular feature of construction, a large dealer in second-hand building materials in Greater New York expressed himself as failing to understand why anyone intending to build a house ever purchased new material. "After a house is built," he said, "there is nothing to show that second-hand material has been used, except the bank account of the owner. The house itself will outlast the ordinary house of new material.

"The principal trouble in using new materials is caused by the lumber. In these days of airships and two-mile-a-minute autos we won't wait for lumber to become thoroughly seasoned. Take the ordinary beam that is used in a new house. It is still oozing sap. In the course of a few years it will shrink half an inch in length or it will become warped. As a result great cracks open in ceilings and in floors. Ceilings fall from this cause, doors stick and windows rattle, all because the wood was too fresh.

"Comparing prices, you will see how money may be saved. Second-hand brick is sold at, approximately, 25 per cent. lower than new brick. This in spite of the handling, for every second-hand brick must be cleansed of the mortar. A brownstone stoop which would cost you $200 to buy new I can sell for $100. It will be just as good as new, too, and none would be able to say from its appearance that it was not.

"On beams, the builder can save a third despite the fact that the second-hand are far better than the new."

The speaker went on to say that the demand for the big beams particularly far exceeded the supply. When the old Stock Exchange was torn down in Broad street some years ago the beams were used in the erection of a Fifth Avenue mansion.

"They say the only part of a pig the packer can't use is the squeal," he continued. "The same is true of an old building. The only part there is no demand for is the plaster. We leave that on the ground for the diggers to cart away. The sashes, doors, casings, stairs, banisters, fireplaces, mantels, even the laths, are all fish for our net, as are the piping, bath room fixtures, basins, tubs, chandeliers, etc.

"Second-hand sashes, that are as good as new, you can buy for less than it would cost to put glass in new ones. I'll sell you a bath room outfit for one-half what you'd pay for new material, while a door that would cost $10 new can be bought for $3.

"Of course it makes some difference how far the material has to be shipped. If you are building in Maine you can't build so cheaply as you can on Long Island, using the same material. A very well-known and very wealthy New Yorker has just built a bungalow in Maine from material shipped from here. Every stick used in it is old, but none would ever guess it. For $250 I'll sell you a complete bungalow. You can have it built for less than $100, and you'll have a place that would have cost you up to $1,000 to build of new material."

The removal of skyscrapers has already begun, and this has resulted in the appearance of second-hand steel. The prices on this class of material are 15 to 20 per cent. lower than the new, following the fluctuations of the new in the open market. Old steel and iron always have a price as junk, and the difference between the value as junk and as building material represents little more than the cost of manufacture.

Fireplaces from old farm houses also are in demand, and when a century-old house is torn down the open fireplace invariably is preserved to decorate some wealthy man's home. The supply of these is far less than the demand. Old oak for panels and old-fashioned Dutch doors in two pieces also are sure of a ready market at all times.

SUGGESTIONS FOR BUILDING A MODERN DWELLING*

BY WILLIAM ARTHUR.

FOR the most part ordinary houses have 2 x 4-in. studs, but the best ones have 2 x 6's. If the nailing is well done the 2 x 4's are strong enough and will last as long as the rest of the house. They are usually set 16 in. on centers, and thus provide a nailing for each joist. In some houses the distance is 12 in.

In this matter of wall studs we come to the possibility of what is known as "skinning." The studs should be doubled at corners and around all openings. The openings are sometimes made with single studs. The proper framing of a window opening is shown in Fig. 5. This doubling not only increases the strength, but gives the necessary nailing for both outside and inside casings. About 2½ in. should be left on each side for sash weights for an ordinary window.

The method of arranging the corners is shown in Fig. 6. It will be observed that after the plaster is on is shown in Fig. 9. The lintel should be shored up before the trussing is done to prevent sagging.

In high stories it is customary to put in a line of level bridging, such as shown in Fig. 9, but it is not really necessary in common houses.

For all partitions having hot-air flues in them, 2 x 6 studs should be used. There is no economy in using smaller ones for this work, as is so often done. The practice is bad in every way. Strips have to be nailed on to make room for the pipe, and the partitions should, in many cases, be a 2 x 6 to begin with for bearing purposes.

If there is to be plaster in the attic the rafters must not be set wider than 16 in. from center to center, for lath does not suit wider spans. Indeed, this distance is standard in all houses. If a house pitches to the center the corner rafters should be 2 in. wider than the ordinary ones, and well braced up before the short pieces are nailed to them.

Sometimes when metal lath is to be put on the distance is reduced to 12 in., but this is not really necessary except on ceilings. This lath sags so much that 12 in. is the widest distance that should be specified for

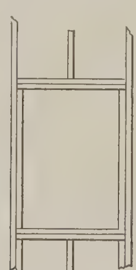


Fig. 5.—Proper Framing for Window Opening.

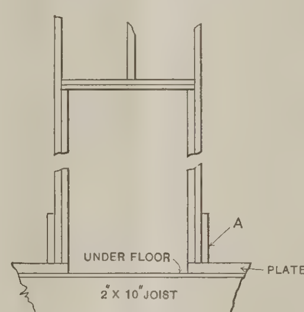
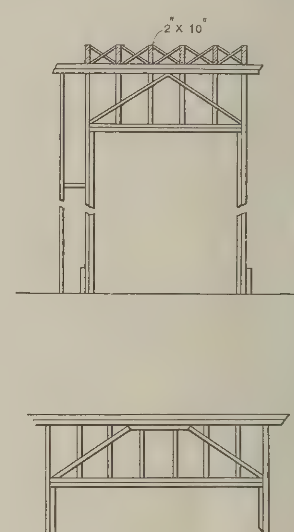


Fig. 7.—Method of Framing Door Openings.



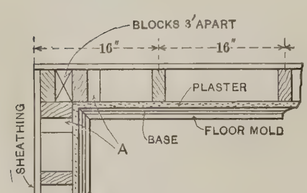


Fig. 6.—Method of Framing at Corners.

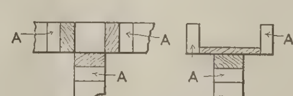


Fig. 8.—Two Methods of Making Corners Solid.

Fig. 9.—Showing Two Methods of Trussing the Partitions for Wide Openings.

Suggestions for Building a Modern Dwelling.—Various Methods of Framing.

there is no room to nail the inside base-board to the corner studs, and it is for this purpose that the blocks "A," about a foot long, are nailed in.

The studs are so arranged that the lath may be nailed from each direction in a solid corner.

All door openings should also be doubled as shown in Fig. 7. The blocks "A" are required for base nailing.

Where partitions meet, the lath must not be allowed to run through, or else the plaster will crack. There must be solid, nailed corners everywhere, including all ceiling work. This point is essential to good building. In Fig. 8 we see two methods of making corners solid. Blocks "A" must go in wherever required for base.

This doubling of studs, making solid corners at all overhead joists and at junctions of partitions, putting in blocks like "A" and fire-steps cost quite a little, but it should be done in all houses.

At the wide openings on the main floor it is necessary to truss the partitions. This is more particularly the case between the hall and parlor, because the weight of the cross joists goes there. The method of trussing

ceilings. The joists are often set at 16 in., and strips nailed on crossways to hold the lath.

If the attic is not to be plastered the rafters are often set at 20 in., which is the extreme width advisable for 2 x 4's. They are strong enough if so placed, and well braced. Of course even at 20-in. centers the attic may be plastered, for furring can be put on, but it is better to set them at 16 in. if this is to be done, for the roof is stronger to hold the extra weight of the plaster.

It is really astonishing to see how many houses are spoiled, both for looks and strength, by the neglect of this simple precaution. In Fig. 10 the proper way of bracing a roof is shown. It is so simple that a schoolgirl could understand it, and yet we see mechanics botch one roof after another.

If there is to be no attic the dotted line shows the best bracing; the solid lines give the attic space. When only 2 x 4 ceiling joists are put in a light tie should be run down to keep them from sagging above the rooms, half way from each bearing. This is shown on only one side. A 2 x 4 plate is spiked along the top of the

* Continued from page 450, October issue.

joists in some cases, to bring them to a common level; they are then braced up from below, and when the roof is shored up a little above the straight the whole bracing is nailed on and everything made firm.

The least pitch for a shingle roof should be one-third of the span from wall to wall. If an attic is wanted, not less than half the span should be used. This means that a house 24 ft. wide would have an attic 12 ft. high in the center.

The house of our day is being designed with wide projections of eaves and gables. They look well and are priced accordingly. It is a question of personal taste as to whether the kind that are altogether boxed in or the ones where the fine molded rafter ends show is chosen. Both are good, but the artists might find more pleasure in the one with the exposed rafter ends.

It has been remarked that fashion controls in house building as in other spheres, and it is now the fashion to make roofs with curves at the eaves. It is cheaper to make two distinct slopes as shown in Fig. 11, but it is not nearly so good as to make a regular curve. When the slope is abruptly broken the water has a tendency to settle at the joint and rot the shingles. A continuous roof is best. The two styles are shown in Fig. 11.

One advantage of the curve, apart from its artistic merits, is that it gives a chance to keep the second story windows a little nearer to the ceiling than is possible with a straight slope. With the level box cornice thus if 8-in. joists are considered a gain of about 9 in. is obtained. The dotted lines show this method.

For an ordinary house a cornice of 24 in. wide to the outside of the molded gutter is used, and this can be worked to get the hight without curving, although it would not please the health experts. But the wider cornice looks better if the window hights are attended to.

To save money the edges of the window frames are quite often used for grounds to guide the plasterer. It is better to put strips around all openings. Even the inside frames are used for this purpose, but if the finish is to be in the natural wood this is a serious mistake. The plaster discolors the jambs.

For lathed walls grounds should be 13/16 in. thick and surfaced on one side; on masonry walls, where there is no lath, ⅝ in. is the standard thickness.

These are not usually put on for base and picture-mold in the ordinary house, unless on masonry walls where they are required for nailing. For picture-mold they are put on about an inch from the ceiling.

Another new and commendable fashion is to protect all exposed plaster angles, such as on a projecting chim-

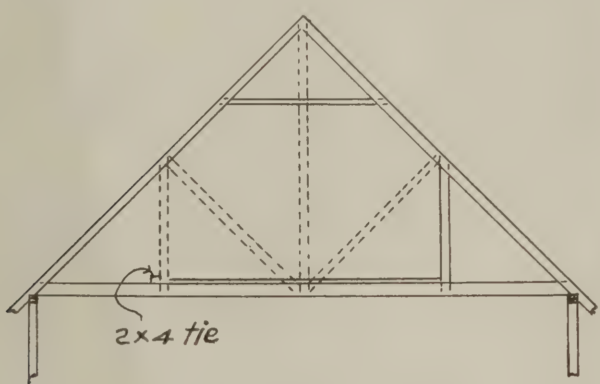


Fig. 10.—Method of Bracing a Roof.

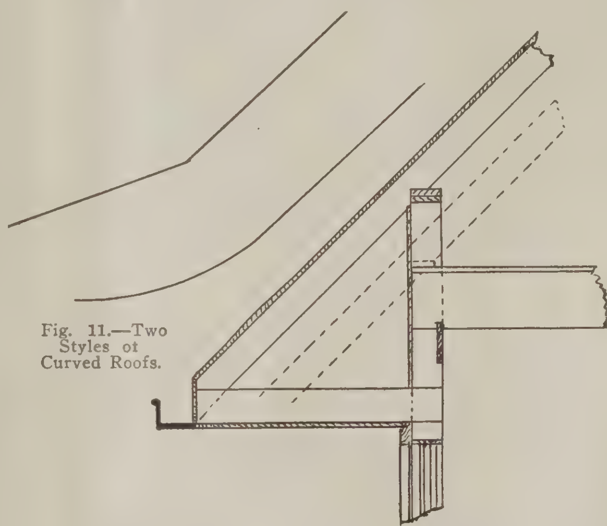


Fig. 11.—Two Styles of Curved Roofs.

Fig. 12.—Roof Construction for Head-Room in Attic.

Suggestions for Building a Modern Dwelling.—Roof Construction.

on a high-pitched roof with a straight slope, the eave comes so low that, even when the head of the window is set close under the frieze board, the distance between it and the ceiling on the inside is too great.

Now, sanitarians tell us that the top of the window should be within 6 in. of the ceiling for ventilation, but most are well enough satisfied with a foot down. With a box cornice, however, running straight down and projecting 30 in., the window head for a high-pitched roof would be nearly that distance from the ceiling, and it is too much. By curving the roof, and by using a galvanized iron, moulded gutter with a flat bottom as a part of the cornice, to give about 5 in. of extra width without raising the level, the window can be put up higher.

If an open rafter cornice is used the window can be raised, but the level of the top will be above the level of the eave. When sitting this will not be noticed, but when standing one is apt to ask what kind of architecture it is which blocks the view—unless we look upon the overhang as a good sun-shade.

But there is a way to get the required hight and at the same time make a better attic. The wall can be run up above the ceiling joists for, say, about a foot, as shown in Fig. 12, and difficulty is solved even for a straight-sloped roof.

Or, without raising the walls, the rafters may be set on a plate nailed to the top of the ceiling joists instead of, as ordinarily, to the plate upon which they rest, and ney and angles of partitions with metal corners. The old way was to use a wood bead that broke off after a time and left the plaster exposed. The new metal style is strong enough to withstand the blow of a hammer. The wall paper goes clear around it, and it is thus unseen when the papering is done.

These corners should run from floor to ceiling. They are sometimes cut off half way up.

In general the framing of a house is a matter of conscience, leveling, plumbing of angles and plenty of spikes. There is nothing so very complicated with it, except the roof, when that is cut up into many angles, which is oftener a mistake than not. The modern tendency, approved by all good architects, is to keep to plain designs. Towers, flying buttresses, Corinthian capitals, gargoyles and poppyheads do not belong to cottages.

(*To be continued.*)

The mere fact that a person is employed as architect does not constitute him a general agent of his employer, his powers as agent being limited by the contract entered into between them. Thus, unless specially authorized, he is not entitled to modify the contract entered into by the builder and his employer, nor has he any authority to bind the owner by contracts for any work done or materials furnished for the structures concerning which he is employed.

WHAT BUILDERS ARE DOING

WHILE the amount of capital involved in the building operations projected during the month of October in leading cities of the country shows slight falling off as compared with the corresponding period a year ago the figures, all things considered, are of a nature to indicate fairly satisfactory conditions. Many important cities show a heavy shrinkage in the total of operations, while others indicate a marked increase, and these cities are so widely scattered that no one section of the country would appear to be favored either way. Prominent among the cities showing increases may be mentioned Atlanta, Chicago, Rochester, Columbus, Ohio, and Los Angeles, Cal.; while among those showing a shrinkage in operations as compared with October last year are Buffalo, Cincinnati, Cleveland, Denver, Kansas City, Memphis, Newark, N. J., New Orleans, Greater New York, Omaha, Philadelphia, Pittsburg, Portland, Ore., and St. Paul. Housing accommodations for the steadily growing population represent a large percentage of the operations under way and the outlook seems to favor a continuance of this tendency, although important business structures are not without evidence in the general summary of operations.

Here and there is to be noted a feeling of unrest among labor in various branches of the building and allied industries, but with the practical close of the season nothing of significance is expected to develop before spring.

Atlanta, Ga.

There was a decided increase in new building work planned last month as compared with the same month a year ago, there having been issued 472 permits for operations representing buildings valued at $473,379. In October last year permits were issued to the number of 423 calling for an estimated outlay of $384,554.

Birmingham, Ala.

The Building Material Men's Exchange of Jefferson County, Alabama, recently gave its second annual banquet at the Country Club in Birmingham, the General Building Contractors' Association, an affiliated organization, being invited to unite with the Exchange in the rôle of host. The president of the Exchange, W. A. Currie, of Moore & Handley Hardware Co., was master of ceremonies. The attractions of the Alabama State Fair were too strong for many to resist, and consequently there were not as many present as would otherwise have been the case. In spite of this the gathering was a complete success. It enabled business men to become better acquainted, as there are not many forces which accomplish more in the transaction of business than does personal acquaintance. It is the chief asset of the traveling man. It often turns the scale one way or the other when it comes to closing a transaction. Therefore it is well to have these gatherings in order that we may meet the men we have to do business with either as buyers or as competitors. The entertainment could not have been the success it was without the spicy introductions given the speakers by toastmaster John W. Sibley, of the Sibley-Menge Press Brick Co., for in this capacity Mr. Sibley has few equals and no superior.

The first address of the evening was in response to the toast, "The Exchange," and was by H. H. Snell, the first president of the organization. He referred to the objects of the Exchange and the work accomplished by it during the past two years. He said that wherever a member had given not only his *monthly dues* but also his interest and his efforts he had been rewarded many times over. He spoke of the hold the Exchange had on its members. While its growth had been slow the members had held together and there were few who had resigned. He said that "organization" was necessary to obtain the best results in any line. Of the "credit bureau," which is a branch of the Exchange, he spoke in the strongest approval. He said that those who had used it were loudest in its praise and did not hesitate to acknowledge that it had been the means of saving time and money, that the Exchange could not flourish without the support of its members and that if all its members would realize its benefits and would give their active support, the Exchange would, within three months, have upon its membership roll 90 per cent. of the dealers of the county.

"Sand, Lime and Cement" was handled by Carl F. Wittichen, of Kirkpatrick Sand & Cement Co. Mr. Wittichen spoke with only a few minutes' preparation, as the gentleman to whom this subject had been assigned was not present. He spoke at some length on the lack of confidence between dealers and the loss to the business as a consequence; of the great mistake for any merchant to cut prices below the profit line; gave instances of sales made solely through fairness in competition.

L. L. Stephenson, of the Brick Selling Co., spoke on "Brick." He, too, filled the place of another who was slated for a speech but was absent. He said that most lines of business were dependent on one bank and often that dependence was exceedingly troublesome, but that the brickmaker was obliged to rely on two banks, a clay bank and a National bank, and it was hard to say which was the most necessary to his success. He told his hearers a good deal about bricks and their history.

F. J. Sheppard, of the Peerless Lumber & Manufacturing Co., spoke on "Mill Work." He compared the man engaged in his business to the bumper between the cars of the railroad train; he has to take all the knocks which pass betwen the architect and the contractor. He urged the contractors to insist upon better and clearer specifications and details. He advocated the adoption among mill men of a "Universal Mold Book."

J. D. Moore, of Moore & Handley Hardware Co., had as his subject "The Hardware Man." His address was splendidly thought out and it would be impossible to do it justice in a sketch of this character.

The very important subject of "Builders' Lien Laws" was handled by J. D. Kirkpatrick, who is at the head of one of the largest sand and cement houses in the South. He advocated the adoption of an amendment to the present lien law of Alabama, in effect requiring a bond of all contractors where the contract involves more than a stipulated sum, and that the bond shall be recorded and stand for the protection of the labor and material used in the construction. He emphasized the importance of encouraging confidence among dealers so that that element which makes a lien law necessary may be eliminated from the business.

H. A. Lockhart spoke for the "Contractor." His speech was full of good humor and good sense, though he was filling the place of another gentleman who was unavoidably out of the city.

Buffalo, N. Y.

Statistics compiled by the Bureau of Building for the month of October exhibit a slight increase as compared with the preceding month; but a falling off of 42 per cent. as compared with October, 1909, which was an unusually heavy month in building operations. The number of permits issued for October of this year was 310 and the estimated value $613,000. The indications are that this total will be largely exceeded by the month of November, permits for the first half of the month having reached a high aggregate and cover a large number of commercial and industrial buildings, four church edifices and many dwellings, on which work will be started this fall.

In the list of new buildings upon which construction has begun or will soon be commenced are the following: Extensive additions to the plant of the Augustine Automatic Rotary Engine Co., Elmwood avenue and Erie R.R., which with powerhouse will cost $100,000; factory for the Geo. A. Otis Co., Florida street; car repair shop for the Atlas Works of the Standard Oil Co.; addition to machine shop New York Central R.R., Broadway, East Buffalo; foundry building, 75 x 120 ft., for plant of the Crosby Co., Pratt street; shoe factory, 60 x 160 ft., three stories and basement for the Jno. Strootman Shoe Co., Monroe street; stock house cold storage building and bottling works for the Iroquois Brewing Co., $200,000; dairy building for the Peoples Milk Co., $30,000; seed warehouse and grain elevator for Geo. Carvers' Sons, Ganson street and Buffalo River; warehouse for Bingham Trunk Co., Mechanic street; four-story and basement store and office building for Berrick and Meyer, Main and Northampton streets, $50,000; O'Brian store and office building, Main and Ferry streets, $40,000; stone church and rectory for St. Lucas German Evangelical Society, Richmond avenue and Utica street, $60,000; Pilgrim Congregational Church, Richmond avenue and Breckenridge street, $50,000; edifice for Church of Christ, Independent Scientist, West Ferry street and Norwood avenue, $50,000, and church, school and convent buildings for the St. Hyacinth Polish R. C. Church Society, Lackawanna.

Plans have also been completed and bids will soon be received for a cathedral of white marble with twin towers 250 ft. high to be erected by the Roman Catholic diocese of Buffalo on Delaware avenue, corner of West Utica street, to cost $500,000, a more detailed account of which is given in another column.

Plans are also in preparation for a group of asylum buildings, 208 x 368 ft., to be erected by the Buffalo Orphan Asylum on Elmwood avenue just north of Delaware Park.

Chicago, Ill.

The month of October established a new record of activity in Chicago in the number of permits for new buildings, the frontage and the estimated cost. The figures show for last month 1140 buildings, with 32,400 ft. of frontage and $10,077,200 cost. For the ten months this year there were permits issued for 9962 buildings, fronting 286,485 ft. and costing $76,362,100, against 9880 buildings, fronting 270,202 ft. and costing $77,008,980 for the same period a year ago. The figures indicate the trend of building operations this year.

There have been fewer large office buildings in the loop district and more apartment buildings than in former years. A new feature in building is the increasing number of apartment buildings that are fireproof, usually with steel and hollow-tile floors. One building of this character which has just been let will require 250 tons of steel. In factory construction there has been a marked increase in the use of concrete.

A notable building on which work will begin soon is a new department store for Mandel Brothers, to be 15 stories high, of fireproof construction. This will make the sixth one of the eight large department stores in the loop district to have fireproof buildings, leaving only two of the large stores in old-fashioned buildings. It is understood plans are under consideration for similar buildings for these two remaining stores.

Another notable step in building development here is the increasing number of what in Eastern cities are called "loft" buildings, a term that has not come into use in Chicago. The Marshall Field Estate is taking bids on the largest building of this kind that has been heard of thus far, a 16-story fireproof building at Fifth avenue and Polk street, to be rented to light manufacturing and wholesale business. Many large projects are under discussion for office buildings, hotels and other commercial buildings.

Cincinnati, Ohio.

During October 847 building permits were issued, with an estimated value for improvements of $386,236. In September 818 permits were issued, valued at $560,297. In October, 1909, only 682 permits were taken out, with building costs estimated at $484,965. The inference is that during October of this year smaller and cheaper buildings were constructed.

Very little bad weather has been experienced lately, giving contractors a fine chance to push work on buildings now in the course of construction. Common labor is in better supply, but skilled carpenters are still scarce. Experienced tile setters are also hard to get.

Local heating contractors are very busy, but the plumbing business appears to be easing off some. This is seasonable, however, and plumbers look for cold weather to bring in enough repair work to keep them busy.

The Attlesey-Dyer Co., heating contractor for the Ohio Mechanics' Institute, has commenced installing its apparatus. The Kramig Tile Co., another Cincinnati firm, has started work on its tile contract for this same building.

Among new residences just completed, which are attracting much favorable comment, is the $50,000 home designed by Architects Rapp, Zettel & Rapp, for R. K. LeBlond.

W. G. Franz, Union Trust Building, Cincinnati, is preparing plans for a heating and ventilating system for the Good Samaritan Hospital.

Cleveland, Ohio.

Building operations continue very active in this city and from present indications all previous records will be surpassed this year. During October there were 814 permits issued by the City Building Inspector's office, or a larger number than during August and September. The total estimated cost of the buildings is $1,439,462, which is but slightly less than each of the two previous months. This record is considered highly satisfactory when the fact is taken into consideration that October permits usually show a falling off.

New building work is pretty well distributed between mercantile buildings of from two to four stories, factory buildings and residences. Considerable important construction work is already in prospect for early next season, including a large new hotel and a six-story building, both to be located in the upper Euclid avenue district. The erection of the new City Hall building will probably be gotten well under way next year, as preliminary contracts for foundation work are about to be placed.

The N. J. Rich Knitting Co. has commenced the erection of what is claimed will be the largest knitting factory in the world. The building will be 360 x 100 ft. and four stories high. The mushroom type of concrete construction will be used. Plans have been prepared by Wilbur J. Watson, engineer, and the contract has been let to the National Concrete Fireproofing Co. F. E. Druary has commenced the erection of a brick and stone residence that will cost about $100,000, plans for which have been prepared by F. B. Meade, architect.

The city building inspector on November 10, under direction of the city council, went back to the former system of charging fees for building permits. The fee will be charged according to the number of square feet in the building. It is expected that the revenue obtained will defray the expense of inspection.

The annual meeting and banquet of the Cleveland Builders' Exchange was held at the Chamber of Commerce Friday evening, November 11, with about 200 members present. During the business session, after listening to the annual address of President Teare, new directors were elected as follows: Charles H. Brandt, Ira S. Gifford, James R. Gloyd, J. C. Norton, Frank M. Potter, Jacob Schade, J. C. Skeel, E. E. Teare, Henry Waterson and R. R. Wills. On behalf of the old board of directors Mr. Gifford presented the exchange with a life-sized portrait of President Teare.

The directors met on Monday evening, November 14, and re-elected the old officers as follows: E. E. Teare, president; J. C. Skeel, vice-president; Henry Waterson, treasurer; E. A. Roberts, secretary.

The Builders' Exchange has just issued through its enterprising secretary, Edward A. Roberts, a "brief review of the year's record" in the shape of an attractively printed pamphlet measuring 9 in. in length by 6¼ in. in width. The frontispiece is a group picture of the officers and directors of the organization. This is followed by a table showing the attendance at directors' meetings, an enumeration of the large assemblies of the year, the noonday and other meetings addressed by prominent speakers on topics of special interest. Several pages are given up to to "gleanings from the minutes of the Board of Directors and committees illustrating the scope of exchange activities."

Detroit, Mich.

The Builders and Traders' Exchange of the city has recently sent out an exceedingly neat and attractive pamphlet setting forth the purposes of the organization and referring to some of the work that it is doing. It is profusely illustrated with half-tone engravings showing various interior views of the exchange, as well as of the Penobscot Building, in which are located its headquarters. The present officers of the Exchange are: President, George F. Stokes; vice-president, John L. Austin; treasurer, Charles L. Batchelder; secretary, Charles A. Bowen, and assistant secretary, George T. Wallace.

Los Angeles, Cal.

The building revival in this city continues unabated, the month of October showing a total larger than for several preceding months and considerably larger than the same month last year. For the first ten months of the year, 1910 shows a gain of more than three-fourths over the year preceding, the respective figures being $17,982,000 for the present year and $10,685,000 for 1909.

During October the total number of permits was 957, authorizing construction to the amount of $1,890,753, as compared with 913 permits for work valued at $1,171,966 for October, 1909. During September and August of this year the value of the work authorized was $652,790 and $1,875,909 respectively.

The permits issued in the month just closed included: Two for Class A reinforced concrete buildings, to cost $104,000; 30 for Class C buildings, to cost $332,000; 363 for one-story frame buildings, to cost $527,000; 40 for one and one-half story frame buildings, to cost $101,000; 48 for two-story frame buildings, to cost $243,000, and one for a three-story frame building, to cost $35,000. There were also permits for six State buildings, to cost $182,000, and for one county building, to cost $226,000, and for a large amount of alteration and smaller work.

Builders report that the outlook is good for a large amount of work during the remainder of the year. The unusual amount now authorized or under way and the large number of large-sized buildings that are planned for construction in the near future indicate that the fall and winter will be more active than any year since that of 1906 and 1907.

Minneapolis, Minn.

Building operations in the city continue to show an increase both in the number of permits filed and the amount expended, 608 permits having been taken out in October estimated to cost $1,177,275, as compared with 565 permits in October a year ago for buildings valued at $1,035,815.

The records for the ten months of this year also show an increase in operations over the same period last year. From January 1 to October 31 there were 5629 permits issued by the Building Department for building operations to cost $13,003,595, as against 5397 permits for the same period in 1909, involving an outlay of $11,180,835.

New York City.

There is very little of special importance to note in the local building situation. Operations are being conducted upon a conservative scale, and while a fair average of new work is projected from month to month there is nothing to indicate any great amount of activity before spring. In the Borough of Manhattan the amount of vested capital involved in the new undertakings for October is a trifle greater than it was in the same month last year, yet in most of the other boroughs constituting Greater New York the shrinkage has been very marked. It is possible that the difficulty in readily obtaining mortgage money except at rather high rates of interest has tended to restrict operations in some measure, although the general business situation has doubtless been a factor in producing a more conservative attitude on the part of builders. In the Borough of Manhattan plans were filed for 61 buildings in October to cost $6,837,000, while in the same month a year ago 40 buildings were planned to cost $5,369,000.

Changing conditions in Brooklyn preliminary to a re-improvement of many private residence sections with multi-family houses are indicated in the permits which were filed with the Building Department in October. The total cost of the 371 buildings for which plans were filed was $2,194,000, while in October last year 715 buildings were planned to cost $4,028,000.

In the Borough of the Bronx the Building Department issued permits for 149 buildings in October estimated to cost $2,896,000, this being a decrease over the corresponding month of last year of 32 structures and $455,000 in cost. Since the first of November an unusually large number of plans for tenement houses have been filed with the Bureau, due not altogether to the demand for accommodations but more to the desire of owners to prepare operations for the spring season before the new ordinance introduced by President Miller goes into effect. This ordinance, which becomes operative November 15, will prohibit the approval of plans by the Bureau of Buildings which show projections beyond the building line. The order applies to stoops, areas, fences, awnings, store fronts, porticoes and pilasters, but does not include projections 10 ft. or over above the sidewalk. It seems to be the general impression in building circles that it will take at least six months to thrash out the ordinance and during that time building will practically stop pending an adjustment of the new rules.

Queens was the only residential borough of the city showing an increase in the home-seeking movement, nearly 80 per cent. of the operations representing dwelling construction. There were 345 permits issued in October carrying an estimated outlay of $1,205,000, while in the corresponding month of 1909 plans were filed for 314 buildings valued at $1,030,000.

In the Borough of Richmond building operations as compared with October, 1909, showed a loss of four buildings but a gain of $97,000 in estimated cost.

Philadelphia, Pa.

Expectations that the volume of business transacted in the building trades the current year would equal that for 1909 do not appear likely to be realized. Up to November 1 the estimated value of the work undertaken in 1910 aggregated $31,453,875, as compared with $37,758,250 during the same period in the previous year. In making this comparison, however, it must be remembered that 1909 was the record-building year, so that the volume of new work undertaken this year will probably be quite a normal one and particularly good when the quiet condition of general business is taken into consideration.

Statistics of the Bureau of Building Inspection show that 790 permits for 1382 operations were granted in October, at an estimated value of $2,643,025, which is a decrease of $640,890 as compared to September, and is $249,465 less than the aggregate expenditure during October, 1909. An analysis of the statistics for the month shows that permits for 645 two-story and 50 three-story dwellings were taken out, the former valued at $1,406,250, the latter at $266,265. In two-story dwellings 709 houses, valued at $1,524,075 were begun. The number of operations in three-story dwellings was the same in both September and October, although the gross expenditure for this class of work was larger in the former month. Five flat-house buildings were planned, at a cost of $117,000.

Judging from the amount of work on architects' boards and plans under way by operative builders, it is believed that the new work begun during the remainder of the year will be quite up to the average, unless unfavorable weather conditions should interfere. Builders are very busy on work under way, a good share of which is being advanced as rapidly as possible, so as to get well ahead before the winter season.

Recent operations in dwellings include 26 two-story houses and two two-story stores, costing about $44,000, in the vicinity of Clearfield and Tulip streets, by George Moehole. Estimates have been taken by Wm. E. Howes for the building of 60 two-story houses, 14 x 39 ft. each, to be erected on Womrath, Adams avenues and Franklin street, Frankford. G. W. and J. M. Zane have begun work on 46 two-story houses in the vicinity of Sergeant and Twenty-second streets. Henry P. Schneider has started the work of erecting 32 two-story houses and a two-story store and dwelling at Sixth and Hunting Park avenue. The operation will cost about $56,000. Plans are being prepared for Louis Weber for 80 three-story dwellings, each 16 x 49 ft., which it is proposed to erect at Tulpehocken street and Wayne avenue, Germantown, at an estimated cost of $360,000.

The contract for erecting an addition to the Union League Club, from plans by Horace Trumbower, has been awarded to Cramp & Co., builders. The addition will be eight stories in hight, 100 x 115 ft. on the ground plan and conform in general with the design of an extension recently completed. The estimated cost of the addition is $475,000. Cramp & Co. will begin work on the contract at an early date.

Richmond, Va.

The Builders' Exchange of this city has recently been elected to membership in the Inter-State Builders' Association, which includes Baltimore, Md.; Washington, D. C., and Norfolk, Va. The occasion was celebrated on the evening of October 11, when addresses by prominent officers of the association were made, in the course of which they called to mind their own early difficulties and sounded warnings against the many pitfalls that beset the paths of youthful organizations. While they believed in organized labor the speakers favored "open shops," and offered many examples of the dangers arising from "closed shop" policies, which they pointed out as detrimental to builders and laborers alike when the strict rules of the various labor unions are adhered to. The speakers included John T. Trainor, Baltimore, president of the Inter-State Association, who asserted that the builders' exchange of a city should be the clearing house of all work that rightly comes within its scope; that a well-organized exchange such as exists in Richmond should bear the same relation to non-members as the New York Stock Exchange bears to the curb brokers. "No contracts," he said, "should be awarded to any but members of the Exchange and the benefits will show for themselves."

I. H. Scates, secretary of the Inter-State Association, and also secretary of the Builders' Exchange of Baltimore, spoke against the curbstone contractors. He believed in making the exchanges so influential that no reputable builder could afford to remain outside of the membership. Mr. Scates pointed out that the open-shop plan was the only one under which American labor could work to the best advantage and cited examples as to why this plan in his opinion was the best.

President F. S. Chavannes, of the Baltimore Builders' Exchange, made a plea for bringing the best men into the membership of the exchanges and placing the business on the highest plane.

He was followed by A. Christi, secretary of the Norfolk Builders' Exchange, who spoke mainly on the duties of the members toward the secretary. E. C. Graham, vice-president of the Inter-State Association, spoke on the subject of co-operation, showing how other exchanges had been of benefit to one another before Richmond came into the field.

Secretary B. T. Pillow, of the Builders and Manufacturers' Exchange of the city of Washington, stated that men who reaped the benefits of an exchange without becoming members were like the man who when in a crowd accepted drinks from the others but when it came his turn he suddenly remembered he had an important engagement. He favored the open shop, but was not opposed to organized labor. He believed that the best men should be employed and should be paid the best wages irrespective of affiliation.

St. Louis, Mo.

There was a slight falling off in building operations in October as compared with the same month last year, although the shrinkage was not particularly significant but no more than what might naturally be expected at this season of the year, especially when winter weather has developed long before generally expected. Building Commissioner Smith's report shows the value of the improvements for which permits were issued last month to have been $1,147,429, as compared with $1,206,694 in October last year. Going back to October, 1908, the showing is much worse, for in that year October had building operations aggregating $2,280,050.

The most important new building authorized last month in the city was the passenger station at Eads Bridge to cost $50,000. There were 128 brick dwellings, flats and tenement houses authorized to cost about $525,000.

The Master Builders' Association, which is an off-shoot of the Building Industries Association, has just been organized with a membership consisting of the largest general building contractors in the city. The principal object is to prevent future strikes in the various branches of the building trades in the city by forcing the unions to arbitrate instead of allowing them to go out on strike. This is to be accomplished by placing each building contractor under bond to obey a labor committee of the organization to whom all controversies are to be referred. If union men in one branch refuse to arbitrate every contractor in the city will be under bond to stop work on the job and discharge all men, pending a settlement of the controversy. It is understood that the plan carries with it the sanction of the bonding companies who agree to refuse to give bond to any contractor who forfeits on the association's bond.

St. Paul, Minn.

The record of building operations for October was slightly better than that for September but considerably below the figures for August and nearly one-half a million dollars under the showing for October last year. According to figures compiled in the office of the Building Inspector of the city there were 381 permits issued last month for new construction work estimated to cost $877,003, while in October last year 345 permits were issued for buildings valued at $1,324,400.

For the 10 months of the curent year the showing when compared with the same period last year is much more favorable than might be inferred from the figures mentioned above. From January 1 to October 31 inclusive there were 3368 permits issued from the building inspector's office calling for an estimated outlay of $8,922,599. In the corresponding 10 months of last year 3615 permits were taken out for building construction involving vested capital to the extent of $9,958,362.

Sacramento, Cal.

The amount of building now under way and projected in this city is much greater than has ever before been known in this city. All local contractors are busy and the outlook is that there will be but little slackening in the building line during the fall and winter. It is claimed that the buildings now under way in the city aggregate in value upwards of one and one-half million dollars, or more than twice the amount under way a year ago. Of the buildings in plan to be started in the immediate future the following are the most important: The Sacramento County Court House, to cost $510,000, for which bids are to be opened on December 5; the Cox Estate building on K street, to cost $75,000; the new D. O. Mills Bank building on Seventh and J streets, to cost $250,000; the Schadt Estate building on K street, to cost $75,000; the Guarantee Title & Trust Co. building on Eighth street, to cost $175,000; and the Ruhstaller, Matthews & Herold building, for which the contract for the foundation has just been let for $25,000. Aside from these, more or less tentative plans are under way for the construction of the Masonic Temple, to cost $250,000, and the Southern Pacific Railway depot, to cost $400,000.

San Francisco, Cal.

Building seems to have dropped into a reaction as far as new work is concerned, and, though in most lines of business the city seems to be well up with the smaller cities on the Coast, all of these are in the lead in a building way. The records for October show that the total valuation of the building permits issued here were $1,425,116 as compared with $1,693,173 for the month preceding and with $1,969,008 for October, 1909. Notwithstanding this adverse showing, the building trades seem to be quite busy, though the absence of new work indicates a slack later on. Some builders explain that the drop shown is more in the value of new construction than in the actual volume of work. It is claimed that there has been little or no falling off in recent months in the smaller work, but that the present poor showing is due to the absolute lack of expensive buildings so far as the permits issued indicate. A few business blocks are going up on lower Market street and in one or two other sections, but these are, in the main, cheap brick or concrete structures ranging about four stories in hight. Apartment house building continues to be the most important feature of the construction work now under way, though more and more attention is being given to residences. The fact that smaller work is keeping up, and more particularly frame construction, is shown by the increase in the lumber movement from northern Coast points to this city. It is reported that practically all of the steam tonnage on the Coast is now chartered to bring lumber from Oregon and Washingon to California ports, chiefly to San Francisco. Of course a great deal of this goes to interior towns, but much of it is also consumed in San Francisco and other cities on San Francisco Bay.

Common brick is still selling at the old figures, though the situation is rather easier than earlier in the fall and a drop in prices may come before long. It now looks as though there would be a considerable carry-over into the next year notwithstanding the fact that only a few of the plants are running. Pressed brick and architectural terra cotta are in good demand, a number of considerable contracts having been recently let. A good deal of building stone is also being used in a few large jobs, though the outlook is not for any very important additional stone contracts in the near future. The chief feature in cement is the movement of California cement to the cities on the northern Coast, though a good deal is also going into use in and about San Francisco. Crushed rock is in oversupply at the quarries about San Francisco, as the concrete construction for fall seems to have been over-estimated by the quarrymen.

The new Masonic Temple to be erected on the corner of Van Ness avenue and Oak streets at a cost of between $600,000 and $700,000 will have a hight of 10 stories and will be one of the finest lodge buildings in the West. It will have a main front of 120 ft. on Van Ness avenue, and side frontages of 150 ft. each on Oak and Hickory streets. On the ground floor will be a marble vestibule in the front and an auditorium in the rear. The second floor will be used as lodge rooms and the third for commandery quarters. In the attic will be a social hall, library and offices. The basement will contain the drill hall and the kitchen. The building will be in the Italian Renaissance style with Florentine details and emblematic sculpture. A large amount of Alaska marble will be used in the building. Bliss & Faville are the architects, Mr. Faville being now in Europe inspecting European Masonic and other Lodge architecture.

Seattle, Wash.

While there were less permits for building operations filed in October than was the case a year ago yet the amount of vested capital involved was something more than half a million in excess of the value of the operations in October last year. One reason for this is found in the fireproof steel frame building to cost $1,350,000 for which plans were filed last month. According to the report of Francis W. Grant, Superintendent of the Department of Buildings, there were 1114 permits issued last month for new building construction to cost $2,093,100, while in October last year 1347 permits were issued involving an estimated outlay of $1,439,125. Of the permits issued last month 181 were for frame residences to cost $265,750 and 219 permits were for frame business buildings to cost $168,230. There were three reinforced concrete buildings projected, only one of which, however, was conspicuous, involving, as stated, an outlay of $50,000. Of the other two one will cost $17,000 and the other $4,300. There were only two flat houses planned, these being estimated to cost respectively $35,000 and $20,000.

For the 10 months of the current year 11,367 permits were issued for building construction involving an outlay of $15,396,730, these figures contrasting with 12,785 permits and an estimated expenditure of $16,749,118 in the corresponding 10 months of last year.

An application has been filed by L. C. Smith, the typewriter manufacturer of Syracuse, N. Y., for a permit for a 41-story building to be erected at Second avenue and Yesler way, at a cost of approximately $2,000,000. David Simon, representing an Eastern theatrical syndicate, has taken an option on a location on Pike street, on which it is proposed to erect a 12-story building at a cost of $250,000.

The Builders' Exchange and the Master Builders' Association of the city formally opened their exhibit rooms at No. 1311 Fifth avenue, and we understand that there were upwards of 500 people in attendance. The exhibit is intended to provide a central point where prospective builders may select building materials without the difficulties often experienced. It is a place where architects may take their clients, and the material men keep appointments with builders, contractors, etc.

Washington, D. C.

While the reports from the various architects' offices of the city are to the effect that much building is being planned for the winter months, the report of the building inspector for the District shows that there was a material decrease in October in the amount of new undertakings. Last month there were 454 permits issued calling for an estimated outlay of $627,374, while in September 516 permits were issued calling for an outlay of $656,702.

Last month building operations were conducted upon a scale something like 30 per cent. less than in October a year ago.

Lectures During the New York Cement Show

Arrangements have been completed for an interesting series of addresses or lectures, as perhaps they might properly be termed, which will be delivered in the concert hall of Madison Square Garden during the period of the Cement Show in New York City. The series of talks will be made afternoons and evenings, and while a large number of people likely to be interested will receive special invitations to attend, the meetings will be open to all who may wish to hear what the speakers have to say regarding cement construction.

Up to the time of going to press arrangements have been completed with the following, who will speak upon the subjects mentioned: Rudolph Miller, superintendent of the Bureau of Buildings for the Borough of Manhattan, will discuss "Fireproof Materials"; C. P. Goodrich, consulting engineer of the City of New York, will take for his topic "Important Reinforced Concrete Structures"; Hon. Logan W. Page, director of the Office of Public Roads, United States Department of Agriculture, will speak on "Rural Highways"; Calvin Tompkins, Commissioner of Docks and Terminals, will discourse on the subject of "Transportation Terminals."

Albert Moyer, of the publicity committee of the Association of American Portland Cement Manufacturers, is conducting negotiations with a number of other men of national reputation who, it is expected, will discuss some phase of cement construction.

Preventing Accidents to Workmen

There has just been opened a permanent exposition of safety devices in the Engineering Societies' Building, New York City, to show how the dangerous parts of machines and processes may be protected so as to save the lives and limbs of the workmen, for it is the claim of the American Museum of Safety that 50 per cent. of the accidents in American industry are preventable.

The exposition consists of machines in actual operation, models and photographs of safety devices for circular saws and planers; presses and grinding machines; safety exit doors and fire escapes; respirators and helmets for supplying pure air; elevators, safety lamps, and containers for gasoline and other volatile liquids. Textiles, the building trades, transportation, quarrying, the chemical industries and wood-working contain their appropriate safeguards.

"Tabique" Walls in Chile

Down in Valparaiso and Santiago, Chile, they are doing quite a lot of building these days, according to consular reports. These towns are being reconstructed on new plans, necessitating a practical rebuilding of a whole lot of the territory, and there are some peculiar forms of construction reported. It is said that there is some concrete work, but not much of it. Many of the better buildings are built of brick and plastered over on the outside with cement, while many of the larger dwellings have what is called "tabique" walls. These walls are made by using studding like a frame wall, only it seems like they use 4 x 4 for studding, which is placed 16 in. apart. Then the spaces between the studding are filled in with sun-dried brick. After filling in this space, wires, evidently of the type we call bale wire, size 14 to 16, are run around this wall inside and out about 6 in. apart from top to bottom. The wall is then plastered over with mud or cement. The report does not give any specific information as to the kind of clay used for making these "tabique" walls; that is, the exact nature of it or the climatic conditions that make it practical to use merely sun-dried brick. It surely doesn't rain much down there, or else they have a mighty good clay—clay that would make the average brick man in this country dance a jig and get busy at erecting an enormous plant.

Metal Siding for Windmill Tower

The uses to which sheet metal may be adapted in connection with building construction multiply as the years go by and its application seems to be apparently limitless, for every now and then some one puts it to novel use. Out in Idaho a farmer decided to erect a tower for a windmill, and the question arose as to the kind of siding which would give the best results, both from a structural point of view and also that of appearance. The builder who had the matter in hand suggested the use of rock-faced metal siding, to be applied over the sheathing boards covering the frame of the tower, and the result was the construction illustrated herewith.

Metal Siding for a Windmill Tower.

The tower is 35 ft. high and encloses a tank and pumping apparatus for the purpose of protecting it from freezing. The metal siding used was made by the St. Paul Roofing, Cornice & Ornament Company, St. Paul, Minn.

THE AMERICAN INSTITUTE OF ARCHITECTS will hold its next convention in San Francisco, Cal., on January 17, 18 and 19. The board of directors will hold its meeting prior to the convention on Monday the 16th of January.

ACCORDING to the best figures obtainable, the annual fire loss in the United States is nearly $750,000 per day. This is burning up property at a frightful rate, and, unfortunately, quite a lot of this property is woodworking institutions. There is strong argument in this in favor of taking every step practical toward fireproof construction and fire prevention in the arrangement and maintenance of factory buildings.

New Publications.

Dustman's Book of Plans and Building Construction. By U. M. Dustman (Licensed Architect). Size 13½ x 9⅜ in. Profusely illustrated. Bound in board covers. Published by the Charles C. Thompson Company. Price, $2.00.

This work by a well-known Western architect has been designed especially for the use of general contractors and builders, and also for prospective home builders. The author has been associated with building work for over 30 years and what is presented within the covers of the book under review represents the best selections from his varied experience. The work is very much more than a book of designs, for, in addition to the plans for 150 modern houses, bungalows, barns, etc., there is much useful information for those to whom the work is specially addressed.

Attention is given to simple geometrical problems and roof trusses, suggestions for finding the lengths of rafters, a chapter on building construction, rules for determining treads and risers, some comments on window frames, store fronts, brick work, columns and splices, plastering, with rules for measuring, a chapter on painting, another on estimating, tables of rafters, a glossary of terms used in carpentry, figuring the labor and material for a building, and a form of specification which cannot fail to appeal to the practical builder.

There is valuable chapter on cement concrete work, giving a description how to properly carry it to a successful conclusion, some suggestions on watering troughs, foundation walls and footings, concrete sidewalks, and how to build a concrete silo, with numerous illustrations.

The designs, as intimated above, are of a varied character and adapted to meet many requirements. In many cases half-tone engravings of the completed buildings are shown and all are accompanied by floor plans and brief descriptive text. One of the most striking designs is that of the brick-veneer residence of the author, which was illustrated in considerable detail in the columns of this journal not long since. The closing chapter of the work is given up to plans of barns, garages, and farm and miscellaneous buildings, all of which will strongly appeal to the contractor and builder.

Artistic Homes. By Mabel Tuke Priestman. 148 pages. Size 6 x 9 in. Profusely illustrated with half-tone engravings. Bound in board covers with gilt side and back titles. Published by A. C. McClurg & Co. Price, $2.00.

This is a work in which the prospective home builder is likely to be deeply interested, as it illustrates and describes in popular style a large number of homes which the author has visited in New Jersey, Pennsylvania and other States of the country, as well as in England. In the 16 chapters of which the work consists no floor plans are given, but the illustrations include many interior views showing the style of finish, decoration and furnishings, thus affording the reader valuable suggestions as to decorative effects. The author tells how the houses were built, how much they actually cost, and offers a variety of suggestions which cannot fail to be appreciated by those at all interested in home building.

The aim of the author has been to render service to those who are about to build and who are trying to decide what style of house is best suited to their mode of living and the furniture that they may already possess. Suggestions have also been given for those wishing to remodel or make slight improvements, as well as hints for the decoration of the interior. The majority of the houses to which reference is made have been built for something less than $10,000, while some have been constructed at as small an expense as $5,000. A comprehensive index, alphabetically arranged, greatly facilitates reference.

The Late Philip Corbin

The builders' hardware trade of the country will learn with deep regret of the death of Philip Corbin, founder of P. & F. Corbin, and president of the American Hardware Corporation, which occurred at his home in New Britain, Conn., on Thursday, November 3, at the age of 86 years and 8 days.

Mr. Corbin was born at Willington, Conn., October 26, 1824, but early in life his parents moved to West Hartford and from there to Ellington, and still later to the homestead in West Hartford, now known as Corbin's Corners, where his father died in 1881. His early education was acquired in the district school and at the West Hartford Academy. In March, 1844, he followed the example of other young men of his acquaintance, who had found employment in the factories of New Britain, and entered the shop of Matteson, Russell & Co., afterwards the Russell & Erwin Manufacturing Company. It was customary for the manufacturers to have their goods made upon yearly contracts by men who engaged their own labor and Philip Corbin worked for such a contractor, receiving $14 per month in wages. In the fall of that year he engaged with North & Stanley, where he learned to make locks. The following spring he secured a contract to make plate locks and before he was 21 years old he had 19 men in his employ.

Mr. Corbin took into partnership his brother Frank, and the two were associated in business for several years, when Frank Corbin withdrew to go into business elsewhere. Five of Mr. Corbin's six brothers were given a place in his business at different periods in his career.

In the summer of 1848 Mr. Corbin, with his brother Frank and a brass founder named Edward Doen, formed a co-partnership to manufacture hardware under the name Doen, Corbin & Co. On the first of September, 1849, Henry W. Whiting, the father-in-law of Mr. Corbin, bought Mr. Doen's interest, but in the fall of 1851 Mr. Whiting sold his share to the two brothers and the firm became P. & F. Corbin, the name under which the business is done to-day.

In 1852 the business had outgrown its original quarters and Mr. Corbin secured a room in the factory of North & Stanley, on the site of the present plant of P. & F. Corbin. Additional room was soon engaged and the old factory abandoned. Mr. Corbin was quick to appreciate any opportunity for the expansion of his business and in the first five years of its life added to its line many new articles.

In 1854, it being apparent that the limited capital of the firm closed to it many avenues of extension, Mr. Corbin decided to form a corporation, this being done on February 14 of that year. In 1858 Andrew Corbin joined his brother, and in 1860 he assumed charge of the New York office, but returned to New Britain in 1872 to become general manager of the factory and its first vice-president.

In 1882 Mr. Corbin decided that the manufacture of cabinet locks could be better conducted as a separate industry than as one of the lines of P. & F. Corbin's goods, and the Corbin Cabinet Lock Company was formed. This company's welfare was always a matter of special concern to Mr. Corbin, and its rapid growth and prosperity were a source of much satisfaction to him.

On March 13, 1902, the American Hardware Corporation was formed, with Philip Corbin as president—a striking indication of the popular appreciation of his business ability and judgment and as a tribute to his genius and high personal worth.

On May 2, 1903, the Corbin Screw Corporation was formed to manufacture screws and screw-machine products. On June 11, 1903, the manufacture of automobiles having been favorably considered, the Corbin Motor Vehicle Corporation was formed.

Mr. Corbin's business career is unique in that it covered a period of 66 years of active life, 61 of which were spent in the management and development of a single enterprise engaged in the manufacture of hardware. The capital invested has grown from $900 to $10,000,000, and the number of persons employed from 3 only, to 10,000.

Mr. Corbin was president of the New Britain Club, and also of the Maple Hill Golf Club; and took an active interest in the Young Men's Christian Association, the Children's Home, hospitals and other local institutions. In 1884 he was elected a member of the Connecticut State Legislature and in 1888 a member of the State Senate. He was at one time a director of the Hartford National Bank of Hartford, the Hartford Steam Boiler and Insurance Company, and the Mechanics National Bank of New Britain. He was also president of the Savings Bank of New Britain. At the time of his death he was president of the New Britain Machine Company, the Porter & Dyson Company, the Calumet Building Company, the D. C. Judd Company, the H. R. Walker Company and the Whiting Land Company.

The funeral services were held at his late residence, 64 Maple street, New Britain, on the afternoon of Monday, November 7, the burial being in the family lot in Fairview Cemetery.

Toncan Metal as a Fireproofing Material

It is generally conceded by those who have given the matter even casual consideration, that millions of dollars have been lost by fire because of defective or wooden roofs. While metal roofs are all fireproof, those who have investigated have found that fireproofing alone is not enough—that durability in the metal is essential for perfect protection at all times. But the acme in metal roof construction, which is thoroughly appreciated and always taken into consideration in writing insurance, is the metal roof that is not only fireproof and durable but also invulnerable to destructive lightning shafts.

Many metal roofs are constructed of material which is subject to early rust and corrosion, and it is a matter of history that more than one conflagration has been communicated from one building to the roof of another by means of the fire finding the rusted spots and eating its way through the supposedly fireproof metal. Insurance men are said to be more disposed to accept risks on buildings roofed with Toncan metal because it protects the building against fire and lightning and is anti-corrosive.

Cost of Building Construction

In the last issue of the *Handshake,* issued by the Genuine Bangor Slate Company, Easton, Pa., there are, among other very interesting reading, a few paragraphs entitled "Assisting the Home Builder." In the course of the remarks under this heading the statement is made that one of the questions frequently raised is: "What is the Building Apt to Cost?" The reply is that until the plans are at least partly under way this is pretty difficult to determine, but the following data will enable one to form an approximate idea:

Workshops, asylums, etc., 9 to 15 cents per cubic foot; large workshops and factories, 7 cents; stabling, 9 to 15 cents; workmen's cottages, 10 cents; small houses, 15 to 25 cents; large town houses, 19 to 30 cents; churches and chapels, 16 to 65 cents; halls and public libraries, 12 to 55 cents; large hotels, 35 to 60 cents; municipal buildings, 22 to 65 cents.

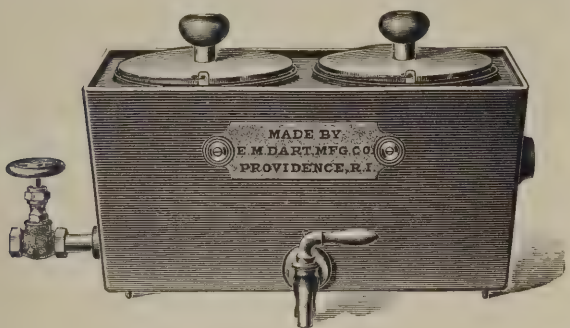
IN THE RECENT DEATH of William Criswell, Pittsburg lost one of its noted architects and builders. He was born in Finleyville, Washington County, Pa., February 13, 1829. He passed his boyhood days on his father's farm, and when 18 years old entered as an apprentice the firm of Bungy & Smith, carpenters in old Allegheny. With the exception of three years spent in what was then the territory of Minnesota, his home was on the north side in the city of Pittsburg. During the 60's some of the biggest buildings of those days were constructed by Mr. Criswell. The Union Depot and Grain Elevator in Pittsburg, the Allegheny Conservatory, the Union Bridge across the Allegheny River at the Point, the Allegheny Observatory and the Masonic Temple in Allegheny City were some of the buildings of which he was the architect and the construction of which he superintended.

CONTENTS

NOVELTIES.

A Steam Glue Heater

In the shop of the carpenter, the builder, the cabinet maker and the woodworking mechanic generally there is always more or less work in connection with which glue must be used and used hot. An apparatus for keeping the glue at a proper degree of temperature and which embodies features by reason of which the cooking and heating of the glue is rapidly performed is illustrated in Fig. 1 of the engravings. In the arrangement of parts a perforated seamless brass tube extends the entire length of the interior of the steam box admitting water that has condensed in the connecting steam pipe which flows into the



Novelties.—Fig. 1.—A Steam Glue Heater.

steam box when the valve is open. From this source emanates a supply of water that always remains fully half the depth of the steam box, all surplus running off through an opening provided in the right-hand end and which is connected to the waste pipe. The faucet or draw cock as it is called shown in the front is a convenient arrangement for obtaining hot water which it is pointed out is an important aid in accomplishing the object sought. The range of service concentrated within this hot box can be regulated to furnish any quantity of cooked glue, ranging from 30 gal. to a teaspoonful in 10 hours at a minimum expense. The covers shown on the two kettles may be used when the kettles are removed for the purpose of preventing steam escaping into the room. In case larger kettles should be required they can be furnished with extended tops of sufficient size to hold 1 gal. The raised edge around the steam box prevents the water which might accumulate by excessive boiling from flowing over the sides, while a pipe within the box connecting with the top furnishes an opening for the water to return again. The apparatus as shown is made by the E. M. Dart Mfg. Company, Providence, R. I.

Various Uses of Flexol

We have just received from the Flexol Company, 27 East Twenty-second street, New York City, a copy of an interesting pamphlet which it has issued setting forth the various uses of Flexol paint and varnish which it offers for both exterior and interior use. Flexol, it may be stated, is a combination of flexible products in the form of a light fluid oil. It represents the result of over 20 years of investigation and experiment, and emphasis is laid upon the great saving which is effected when Flexol is used in all protective coatings, such as paint, varnish and enamel, by increasing the spreading capacity, elasticity and durability. The point is made that a coating of Flexol on iron, steel or other metal will protect it from rust and corrosion. The skin or film of a paint containing Flexol is claimed to be elastic, flexible, impervious to moisture and to withstand gas, acids and oils. A paint made up of half Flexol and half raw linseed oil with the proper amount of lead, zinc or other pigment, will easily spread over much more surface per gallon, last much longer and go on so easily that a painter can do 20 per cent. more work per day than is the case where linseed oil paint is used. The claim is made that Flexol will work on wet wood and will dry smooth and glossy, that it will stand heat and cold admirably, that it is excellent as a finish for natural wood floors and can be used to great advantage in waterproofing any concrete without previous treatment. It can also be used for waterproofing of fabrics except woolens, and is of value in many other ways, all of which are set forth in detail in the pamphlet in question.

Catalogue of Fine Mechanics' Tools

We have received from the L. S. Starrett Company, Athol, Mass., a copy of a catalogue of fine mechanics' tools which has just been issued from the press. It is known as "Catalogue No. 19," and contains 274 pages, which are 42 more than were contained in the previous edition of the company's catalogue. There are 350 illustrations within the covers of the work, presenting the Starrett line up-to-date. Among the new tools contained in this edition of the catalogue may be mentioned a double square, a combination builder's tool, micrometers, and protractors of various sizes, shrink rules, a new size of scriber, extension plyers, a scraper, ratchet wrench, screw slotting saws, hack-saw frame, a micrometer depth gauge, and a fillet or radius gauge. There have also been made a number of changes in design as well as changes in prices. The company states that it has endeavored to make the character and appearance of the catalogue in keeping with the excellence of the goods described within its covers and by the arrangement, marginal numbers, indexing, etc., to render the book as convenient as possible for the use of mechanics and dealers.

The Dutro Sash and Door Holder

A sash and door holder, so made as to possess an instantaneous adjustment, simple in construction, represents the results of much careful thought and study on the part of the inventor, and is regarded as an exceedingly handy device for hanging storm sash, storm doors, screen windows and screen doors, as well as for various other purposes, is the device made by the Dutro Mfg. Company, Mason City, Iowa. It is in fact an automatic device for holding sash and doors, etc., while the edges are being planed off, or the ends planed or sawed, and for setting locks, hinges, etc. The holder is provided with two steel clutches which are placed on the feet of the device to protect the rubber when the holder is being used on a rough floor or where there might be sand, lime, cement or dirt. The jaws are lined with rubber so that the device can be used on a highly polished door without marring the finish, while the feet are lined with rubber so that it can be placed on a highly polished floor. There is no complicated mechanism to wear out or get out of order. The feet are adjustable and can be turned parallel with the jaws so that it will not take up much room in a tool chest. When the holder is not in use it is suggested that the spring be unhooked. A little pamphlet which the company has issued gives full directions for using the holder and the method of adjusting it.

The Crescent Saw Guard

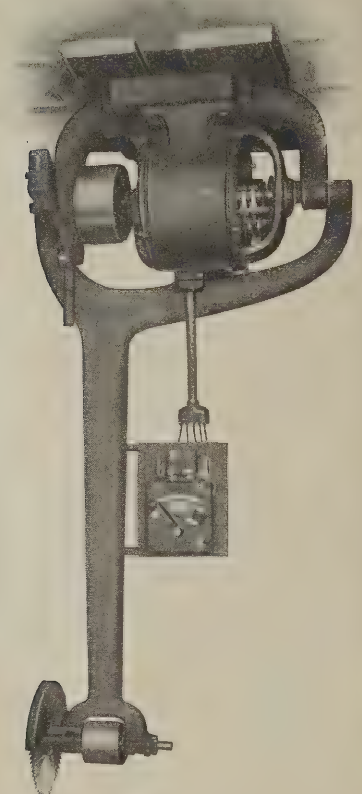
A new saw guard which is so constructed as to be readily attachable to any of the saw tables made by the Crescent Machine Company, Leetonia, Ohio, is illustrated in Fig. 2 of the accompanying engravings. The arrangement of parts is such that when in position the guard will completely cover the saw, thus affording ample protection against the possibility of injury to the hands of the oper-

Fig. 2.—The Crescent Saw Guard.

ator or of strips of wood being thrown about by getting on top of the saw. The heavy steel arm shown in the engraving as overhanging the table is fastened to the rear part of the machine, where it does not interfere with the work in cutting off long pieces. The guard is also of such a nature that it does not interfere in the least with the operating of the tilting saw tables. The protecting shoe is made of wood so as to avoid possible injury to the saw. It is fastened to a sliding steel bar that can be readily adjusted as far forward or backward on the table as desired; hence it is admirably suited for two-mandrel saw tables, such as the Crescent No. 3 or No. 5 machine. A very important feature is the ease of getting the guard out of the way when it is not desired to make use of it, the operation consisting of simply swinging it back into an upright position as indicated in the engraving and which leaves the entire table clear. The company points out that the guard can be used on saw tables of other makes and that a diagram blank for marking on the necessary measurements will be furnished on application.

The Reliance Swing Saw

The adaptability of electric motors for driving individual tools or machines is strikingly exemplified in the swing saw which we illustrate in Fig. 3 of the cuts. The motor is mounted directly in the base of the saw frame, thus making the outfit self-contained and allowing it to be



Novelties.—Fig. 3.—The Reliance Swing Saw.

mounted upon the ceiling, wall or upon a standard located out in the yard, the latter meaning simply a question of running a few wires to the motor. It does away with unsightly countershafting and belting in the woodworking shop and means a saving of power because the motor is running only while the saw is doing actual work. The machine is known as the Reliance swing saw and is manufactured by the Reno-Kaetker Electric Company, 610 to 616 Baymiller street, Cincinnati, Ohio. The saw is referred to as being well adapted for the building contractor who can install it on the job, is also convenient for the lumber mill where the outfit can be placed in some far off corner of the yard; also to the large manufacturer who can install the saw in any convenient location in his shipping department, and in fact it is readily adapted for the use of any one requiring cross-cut work. A neat little folder which the company has issued sets forth at some length the merits of the Reliance Swing Saw, and a copy of it can readily be obtained on application to the company.

An Improved Temperature-Regulating Apparatus

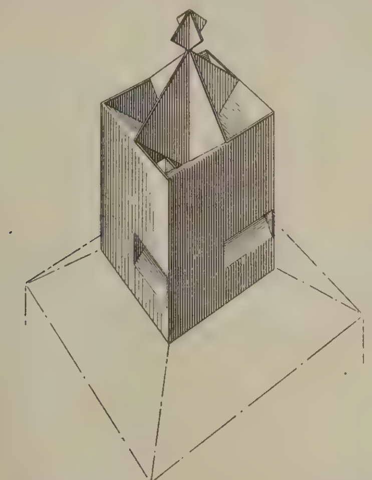
An unusually interesting temperature regulator, to which some improvements have lately been made, is the subject of the following descriptive account. It is the Crandon combined damper regulator and thermostat made by the Crandon Manufacturing Co., Bellows Falls, Vt. It is of that general class of devices in which a thermostat is fixed in the room, the temperature of which is to be controlled, and a simple device is provided in the cellar controlled by the thermostat and arranged to actuate the draft dampers of the heater. Inasmuch as it is designed to open and shut the dampers in accordance with the temperature of the apartment served, the regulator is adapted to steam and hot-water heating, as well as to warm-air furnace heating. The accompanying illustration, Fig. 4, will serve to indicate the general scheme of operation. The motor, as the mechanism is termed, includes in substance a rotating crank arm, made to turn, when it is released, by the weight shown. The principle is that with a chain or wire fixed to each end of this crank arm, and to one going to the check damper and the other to the ashpit door, the half revolution of the crank arm will open the door to the ashpit and close the check damper, while with the succeeding half revolution the ashpit door will be closed and the check damper opened. At the left are shown the two solenoids through which the electric current is allowed to pass when the thermostat in the room closes the electric circuit, according to whether the room has grown too cold or too hot. The magnetism set up attracts the armature, releases the horizontal lever shown in the picture and trips the rotating arm, which, owing to the influence of the weight, begins its half revolution, which revolution is stopped by the opposite end of the lever catching the tripping lug. On the rear side of the motor are what may be termed two metal clips or brushes, by means of which the current is broken as soon as the rotating arm begins its travel and which remains broken until the temperature condition in the room reaches the other extreme, when the thermostat will connect up the opposite brush or side of the circuit and again cause half revolution of the crank arm. Space prevents a great elaboration of the scheme of operation, but mention may be made of such details as the use of dash-pots. One of the dash-pots is shown and has the apearance of an air pump and tends to prevent the too sudden turn of the apparatus with the sudden application of the weight. The dry battery which supplies the current necessary is fixed to the back side of the apparatus. In brief, the temperature regulating system involves the use of the thermostat in the room, electric wires from thermostat to the binding

Fig. 4.—An Improved Temperature-Regulating Apparatus.

posts on the motor and wires or chains from the motor to the dampers of the heater. The weight for driving the motor is drawn up once a day or as needed. The motor is built of aluminum, bronze and brass and is therefore regarded as being proof against rusting. Emphasis is placed on the use of levers in place of a greater or less complication of gearing.

Mowen's Improved Ventilator Chimney Top

A device which is adopted for use where ventilation or an upward or outward current of air through the chimney flue is desired and which is so constructed as to render back drafts impossible, has just been placed upon the market by G. Emerson Mowen, 39 Mariner's place, Plainfield, N. J., to whom has been assigned the patent taken out by D. H. Mowen, Hagerstown, Md. It is intended to be made of terra cotta, concrete or sheet metal, the first and second materials being used in placing the device as a substitute for chimneys on new buildings, as either terra cotta or concrete is regarded as more durable than brick. Sheet metal, however, will quite naturally be extensively used, as it is more readily adjusted to stacks, chimneys, etc., already standing. As will be seen from an inspection of Fig. 5 the new chimney top or ventilator is rectangular in form and has an opening on each of its four sides near the bottom. From each of these openings running to the top on the opposite side is a partition or baffle plate, the four plates meeting at a common point in the center. A flange or shield is provided at each of the air inlets, the flange rising to the hight of the inlet opening, but not so high as to interfere with the free passage of heat, smoke or air through the ventilator itself. In the upper part and connected to each of the baffle plates is a shield or flange, converging from the outer edge to the common point of contact of the baffle plates. These flanges extending beyond the top of the body aid in preventing back drafts or downward currents in a flue. It is further pointed out that whether the wind should blow down on the top of the chimney or strike it on any one of the four sides where there is a chimney top of this construction placed, the air will blow through the passageway provided for the purpose and in either direction will have the effect of



Novelties.—Fig. 5.—Mowen's Improved Ventilator Chimney Top.

drawing upon the chimney flue, so that the smoke and gases, instead of forming a back draft and causing trouble, will be drawn off and produce satisfactory operation of the apparatus which may be connected with the chimney. The ventilator has no movable parts and may be used in forming an ornamental top to a chimney. One of its chief uses, however, is to serve as a remedy for defective flues or flues which are at the mercy of freakish air currents, due to the peculiarity of location, proximity to higher buildings, varied roof angles, etc.

A New Style of Steel Fence

The Barcalo Manufacturing Co., Buffalo, N. Y., is placing on the market a steel fence which is new in style of construction and which embodies the essentials of strength and durability—a trim and dignified appearance and low cost. As illustrated in Fig. 6 of the accompanying cuts it is built entirely on straight lines with an absence of all ornamentation, and is very attractive in appearance. The manufacturers designate it as the "Sensible" steel fence, and advertise it as "a steel fence for the price of a wooden fence." The sectional rails and pickets are made of high carbon stiff steel angles, having sides of equal width, the thickness and width of the rails and pickets varying according to the hight of the fence. The line posts are made of brazed square steel tube 2 in. square, and the corner and gate posts are built up with angle steel and gray iron castings. They are 5 in. square, having a heavy angle on each corner riveted to heavy cast caps and one-piece braces. The pickets are inserted in V-shaped holes punched in the horizontal rails. In each V-shaped hole a wedge-shaped button is riveted on the under side. The button is turned into a small notch in the picket and riveted. The V-shaped hole in the section rails takes out much less than the round or square hole necessary in the construction of the ordinary make of iron fence and preserves the greatest amount of strength. The fence is made in 6-ft. sections; brackets being provided on the posts to engage with the section rails or panels, and are slotted to allow for expansion and contraction, making the whole construction absolutely rigid. All parts of the

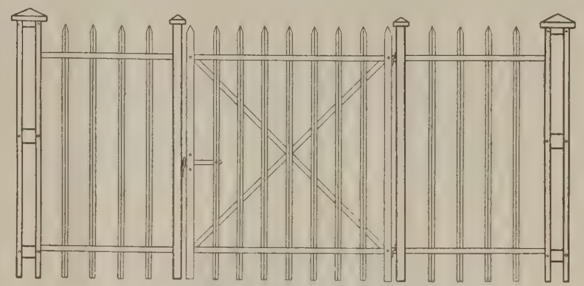


Fig. 6.—A New Style of Steel Fence.

fence are painted before shipment with two coats of black, each coat baked to 450 deg., insuring the fence against weather conditions for two or three years. The fence is especially adapted for use around large institutional properties, hospitals, asylums, schools, churches and for parks, cemeteries, railroad properties and manufacturing plants, as well as for residence properties. The Barcalo Company is meeting with marked success in placing this fence upon the market.

Oshkosh Portable Saw Rig with Electric Motor

Among the latest candidates for popular favor in the way of a portable rip and crosscut saw is the machine which we illustrate in Fig. 7, and which is being manufactured by the Oshkosh Logging Tool Company, Oshkosh, Wis. The machine is of a nature to render it of special interest to builders and contractors by reason of its convenience in connection with the construction of concrete "forms" and frame buildings. It is referred to as a labor saver and as embodying features which cannot fail to be appreciated by the practical man. While the illustration presented herewith shows the machine operated by means of an electric motor the company states that it manufactures the machine also with gasoline engine, which is a very popular form of power for portable outfits of this character. The claim is made that a carpenter and a helper operating this outfit can readily do the work of six carpenters, so that the machine will soon pay for itself on a job of liberal proportions. It will be seen from an inspection of the engraving that the machine is mounted on heavy hardwood skids 8 ft. long by 4 ft. wide, thus giving a very rigid and durable foundation. The mandrel on the machine is not built stationary but can be made to swing for cross-cutting and can be instantly changed to a rigid position for rip sawing. The iron saw table

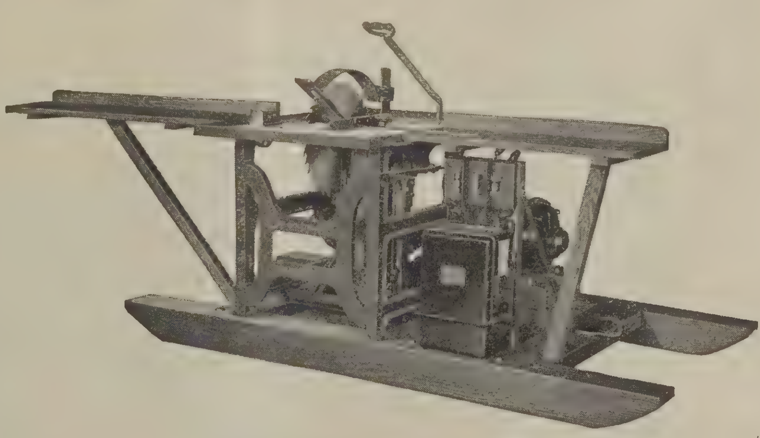


Fig. 7.—The Oshkosh Portable Saw Rig, with Electric Motor.

is of sufficient size for all ordinary work and is provided with a gauge for sawing various sizes, also a mitering device, and extension side tables for cross-cutting. On each end of the skids is a heavy steel hook to facilitate moving the rig to any place desired.

A. S. Boyle & Co., Cincinnati, Ohio, have made arrangements to erect a two-story brick factory, 80 by 170 ft. in plan, at Evanston suburb, which will be used for the manufacture of hardwood finishes.

New Method of Selling Edwards Metal Spanish Roofing Tile

The Edwards Manufacturing Co., 423 to 443 Eggleston avenue, Cincinnati, Ohio, has just adopted a new method of selling its goods, especially its metal Spanish tile for roofing. Hereafter all its business will be handled through local agents which it is now appointing with a view to covering the entire country. The company is presenting the opportunity for one carpenter, contractor, builder or architect in each town, city, village or community to become an agent by making prompt application so as to put himself in line to be selected as the district representative to handle the business of the company in his locality. The company states that the man selected will be given every dollar's worth of business that the company is now doing in his territory and that it will be turned over to the local agent as fast as it is received. The reasons for turning this rapidly increasing business into new channels, as explained by the general manager of the Edwards Manufacturing Co., is that the volume has assumed such proportions that it is no longer possible to properly handle it direct—from factory to home—with fullest satisfaction. The output is now so large that even at the wholesale prices at which the goods are offered—which make a big inducement to individual buyers—it is now possible to allow a good margin of profit to the local representative. Every reader of the *Building Age* is at least acquainted with the Edwards metal roofing, but in Fig. 9 of the illustrations is presented the application of one style of its product—the Metal Spanish Tile—which produces a most striking and pleasing effect when applied as the roof covering of a building. The company, however, has many other styles—something to suit every practical requirement. Those of our readers who are interested in the above proposition of the company can obtain fuller details upon direct applications.

Novelties.—Fig. 8.—Showing Application of Edwards Metal Spanish Tile for Roofing Purposes.

Duplex Window Ventilator

Fresh air for ventilation without drafts is the object aimed at in the Duplex Window Ventilator manufactured by the Virginia Metal Mfg. Company, Portsmouth, Va. It is designed to serve a purpose where the heating system provides for no change of air in the building by permitting an inflow of fresh air at the bottom of the window, the opening being controlled by the distance the window is raised. The use of the Duplex Window Ventilator includes the application of weatherstrips to prevent a blast of air entering over the top of the lower sash, and an air baffling device at the vent at the top of the window to regulate the outflow. The ventilator is furnished in whatever character of metal the purchaser may desire and includes the top vent and the weatherstrip, as well as the inlet section with its deflector, which throws the entering air upward, so that it may mingle with the warm air in the room and not give the annoyance of a cold draft. Full particulars with illustrations are contained in the literature which the company can supply upon application.

Pryibil's New Swing Saw

A swing saw which embodies features of construction rendering it a decided departure in machines of this kind has just been brought out by P. Pryibil, 512 to 524 West Forty-first street, New York City, and a general view of which is presented in Fig. 9 of the illustrations. A point to be strongly emphasized in this machine is that the saw travels in a straight line parallel with the table, while the arrangement of parts is such that a saw 3 in. smaller in diameter than is required for a swing saw as usually made can be used. The machine is self-contained on one post, thus insuring absolute and permanent alignment, the manufacturer furnishing it completely assembled together with a template for drilling the necessary bolt holes into the post so that it can be erected in a few hours. The main supporting frame is cast in one piece and all other parts are mounted on this frame. The swing frame is also cast in one piece and carries in its upper yoke a driving shaft in self-oiling babbitted bearings. The arbor is made of high grade steel and the belt shifter is attached to the swing frame within easy reach of the operator. The swing frame is counterbalanced by a combination of links, levers and steel springs so that it swings very easily. The guard is made of iron and is adjustable to different sizes of saw. One side is open so that the saw may be removed from the arbor without disturbing the guard. The entire swing frame can be raised and lowered by means of a hand wheel and screw so as to adjust it to size of saw or cutter head or for depth of cut when gaining, tenoning or molding. The mechanism employed to produce the straight line motion of the saw arbor consists in its main part of a link fulcrumed on an adjustable knee which is gibbed to the lower end of the main supporting frame. This knee can be raised or lowered by a hand wheel and screw. The length of this link is exactly equal to one-half of the distance between centers of saw arbor and upper driving shaft. The boxes of the upper driving shaft slide in straight guides which are planed parallel with the rear face of the main frame. When the swing frame is in a vertical position the centers of the upper driving shaft, link, stud and lower pin are in a straight line and the centers of the lower link pin and saw arbor coincide. As soon as the arbor center is moved from this position either to the front or rear the stud connecting link and swing frame will move in an arc about the center of the link fulcrum and the upper driving shaft will slide vertically up or down in its straight guide, thus compelling the saw arbor to travel in a straight line parallel to the table. A folding link hinged on both swing frame and main frame limits the outward stroke of the saw. With the machine here shown dado heads, grooving heads and wabble saws can be used for grooving, gaining, rabbeting, tenoning or molding. The machine is of special advantage in gaining, rabbeting or tenoning, as the remaining margin is of the same thickness in all cases irrespective of the thickness of the lumber that is being used. Another advantage to which attention may be directed is that a finish cut 34 in. long on stock 1 in. in thickness or less can be made on this machine. On material thicker than 1 in. the length of the cut would be correspondingly shorter. Dado heads or grooving saws 9 in. in diameter will just clear the table when the machine is in its lowest position and will produce a cut ½ in. deep in 10 in. lumber when the machine is raised to its extreme hight, thus leaving a margin of 9½ in. between the table and the grooving saw. If a greater margin is required a smaller dado head or grooving saw must be used. The distance between the center of the saw arbor and the center of the upper driving shaft is 4 ft. 10 in. The diameter of the saw arbor where the saw is applied is 1⅛ in., and the length of the saw arbor over all where the saw is applied is 4⅞ in. The arbor pulley is 5 in. in diameter with a 5½ in. face, and the diameter of the driving pulley is 20 in., with the same face. The tight and loose pulleys are 10 x 4¾ in., and should have a speed of 640 r.p.m The hight from the floor to the highest point of the machine is 9 ft. 5 in., and the extreme width of machine is 36 in.

Fig. 9.—Pryibil's New Swing Saw.

Building Age

FORMERLY
CARPENTRY and BUILDING

A PROGRESSIVE MONTHLY DEVOTED TO MODERN PRACTICAL BUILDING CONSTRUCTION

Vol. XXXII. No. 8. New York, August, 1910. TEN CENTS A COPY ONE DOLLAR A YEAR

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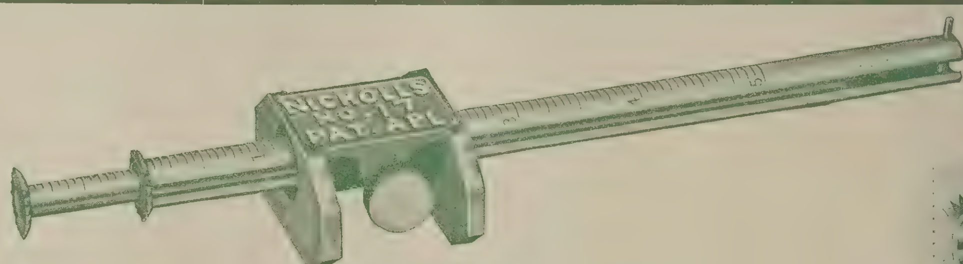

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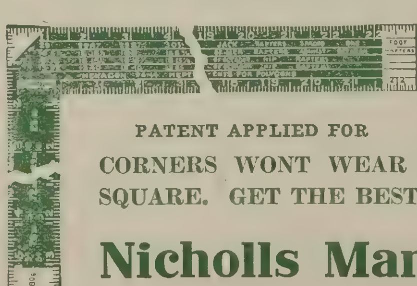

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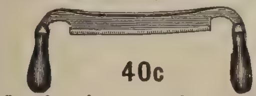

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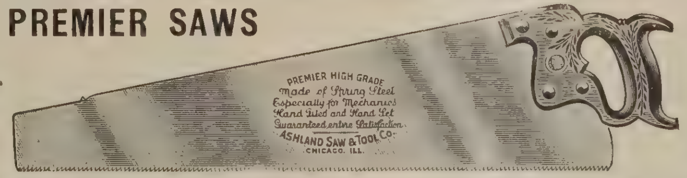

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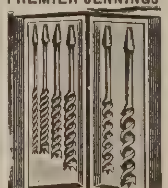

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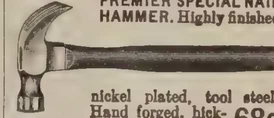

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CHICAGO HOUSE WRECKING CO. 35th and Iron Streets CHICAGO

What Machines are you going to Buy?

Tell us—We can help you. Use the Coupon.

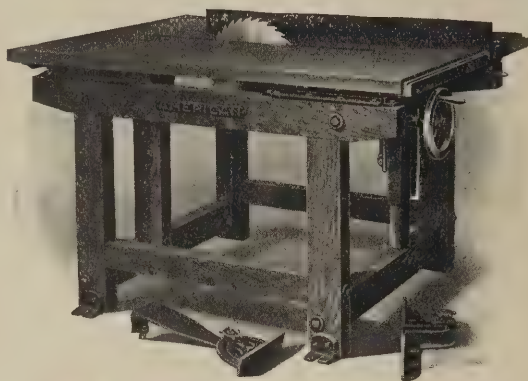

Fig. 629. American No. 5 Combination Saw Bench

Fig. 9721. American No. 1 Vertical Borer

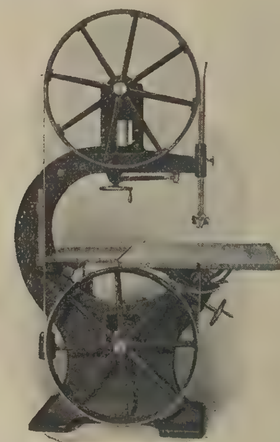

Fig. 510. American 38-in. Band Saw

Fig. 5221. American Scroll Saw

Fig. 1052. American No. 10 Wood Lathes

Fig. 1120. American No. 14 Post Sander

Fig. 800. Jointers and Buzz Plane

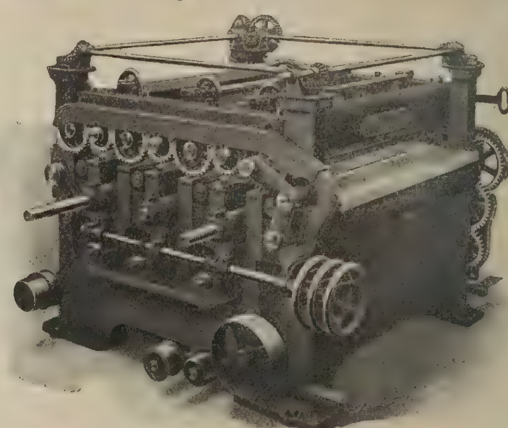

Fig. 1070. American "Columbia" 30-in. to 84-in. Three Drum Sander

American Wood-Working Machinery Company,

....

Fill in address of nearest office.

Gentlemen—Please send prices and particulars regarding..............................

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Name ....

Street ....

City ....

State ....

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Give The Building Age credit

American Wood-Working Machinery Co.,

Executive Offices - - - Rochester, N. Y.

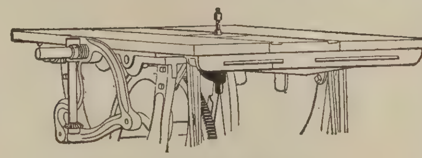
Sales Offices:

New York: 90 West St.
Chicago: Fisher Bldg.
Rochester: 591 Lyall Ave.
Spokane: Paulsen Bldg.
Portland: First and Pine Sts.
San Francisco: 58 Fremont St.
New Orleans: Canal-La. Bank Bldg.

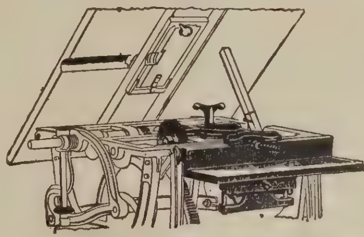
No. 5 "Union" Combination Self-Feed Rip and Cross-Cut Saw

(Almost a Complete Workshop in one Machine.)

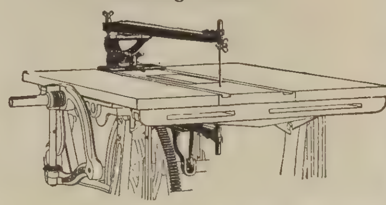
THIS Machine is suitable for various kinds of work—ripping (up to 3½" thick), cross-cutting, mitering, rabbetting, grooving, dadoing, etc., and with the additions of extra attachments, boring, scroll sawing, edge moulding, beading, etc. The heaviest, most substantial, accurate and easiest running machine of its kind on the market.



"Union" Moulding Attachment



"Union" Boring Attachment



"Union" Scroll Saw Attachment

ADVANTAGES: Large adjustable combination wood and iron table, 28 x 36"; folding extension rolls for long work; two hand powers, one for self-feed ripping, and the other for cross-cutting, etc., arranged at rear of machine, leaving table free and allowing operator a natural, upright and easy position; our patent foot-power with walking motion; three changes of speed, three changes of feed, no lost motion, power being transmitted entirely by chain belt and accurate machine cut gears, steel shafts and babbitt metal lined boxes, adjustable for wear; easy and quick to change machine from one operation to another.

WE BUILD a complete line of Foot, Hand and Light Power Wood Working Machinery, and guarantee each machine to be thoroughly practical and accurate.

Machines sent on trial and if not found entirely satisfactory may be returned at our expense.

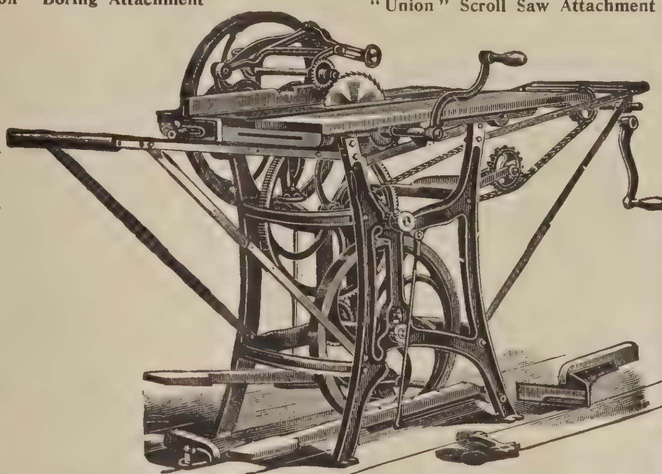
Send for Catalogue A

The Seneca Falls Mfg. Co.

204 Water St.

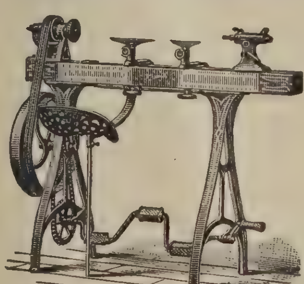
SENECA FALLS, N. Y., U. S. A.

91-H.



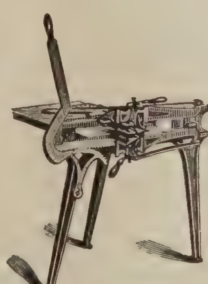
No. 5 "Union" Combination Self-Feed Rip and Cross-Cut Saw

Hand-Power-Foot WOOD-WORKING MACHINERY



No. 3 LATHE

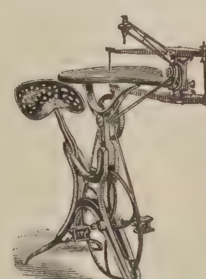
A Complete Line for a Carpenter and Builder



TENONER

Our Machines are so constructed that you can take them to the house you are building.

Saves Time

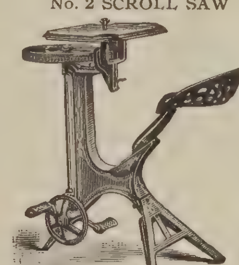


No. 2 SCROLL SAW

Why buy these Machines? BECAUSE

You can save a millman's profit.
You can make more money with less capital invested.
You can manufacture in as good style and finish, and at lower cost than the mill.
You can work up stuff ahead in winter for the spring rush in building.
10,000 builders are using from one to eight of our different machines.

No. 7 SCROLL SAW



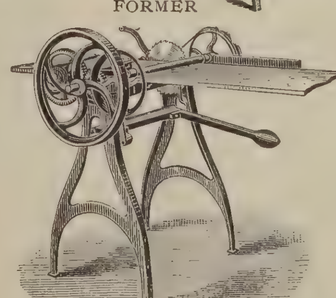
FORMER

Any of our machines will pay for themselves in a year and often in a single job.

MORTISER

Our machines are not complicated, but simple, strong, practical and built for good hard work.

No. 4 SAW



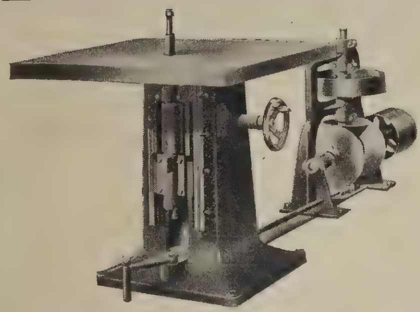
HAND RIP SAW

Send for Catalogue and Prices

W. F. & JOHN BARNES CO.

71 RUBY STREET, ROCKFORD, ILL.

CRESCENT SHAPERS EITHER SINGLE OR DOUBLE SPINDLE are



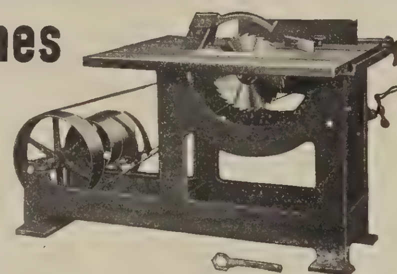
Strong, Durable, Accurate, Steady Running

These machines are built to meet the requirements of those who demand a maximum of accurate work at the least cost for repairs.

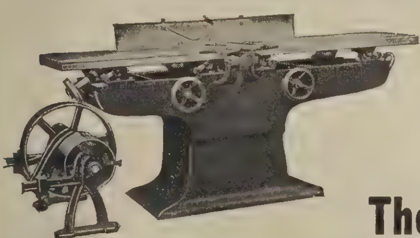
Send today for 1910 CRESCENT Catalog. It tells all about these splendid machines and our fine line of Band Saws, Jointers, Saw Tables, Planers, Planer and Matcher, Swing-Saw, Variety Wood Worker.

THE CRESCENT MACHINE CO. No. 206 Main Street Leetonia, Ohio

Silver's New Woodworking Machines



are improved right up to present-day requirements. They include SAW TABLES, JOINTERS, SWING SAWS, BAND SAWS, etc. They are constructed so as to make every operation as easy as can be, and save so much time and labor over other methods, that modern Carpenters and Builders are glad to install them and profit thereby.



Silver's Machines are high-pressure machines, built extra strong and rigid to withstand the severest service. They are made in a wide range of sizes and patterns: Jointers, 8, 12, 16, 20, 24-in. Band Saws, 20, 26, 32, 36-in. Swing Saws, 6½, 7, 7½, 8-ft. lengths. Saw Tables, two styles.

Note cuts shown and send for our Printed Matter, which gives full details.

The Silver Mfg. Co., 350 Broadway, Salem, Ohio

Famous Junior Universal Wood Worker

25% to 50% Reduction!

Here's a Woodworker for small Contractors. Sold at a Low price for Ninety Days. No Competitive Machine can compare with it for High Quality and Low Prices.

SEE WHAT IT IS!

This machine comprises:
- 20″ band saw.
- 8″ jointer.
- Vertical shaper.
- Pole and Felloe rounder.
- Emery grinder.
- Saw table with raising and lowering saw arbor.
- Boring machine.
- Dadoing machine.

A Complete Machine Shop

No Machine is like the FAMOUS

No machine can do so much or can be bought or operated so economically. You get a complete machine shop for the price of one machine. And it's so compactly built that anybody can understand it and nothing can get out of order. There are no complicated parts; everything is as plain as daylight. Remember you get a reduced price if you order within ninety days. This machine has no equal, but we are offering it as a special proposition in order to meet the competition of inferior machines. Don't delay, because time is money —send today.

The Sidney Tool Co.
Sidney, Ohio

Marston's Hand and Foot Power Circular SAW

Iron frame, 36 inches high. Center part of top is made of iron, accurately planed, with grooves on each side of saw for gauges to slide in. Steel shafts and best babbitt metal boxes. Gears are all machine-cut from solid iron. Boring table and side treadle. Two 7-inch saws and two crank handles with each machine. Weight complete 350 pounds. Send for catalogue.

J. M. MARSTON & CO.
201 Ruggles Street, Boston, Mass.

WILLIS SKYLIGHTS

are made in every conceivable style and size. We've studied skylight construction over 25 years and are able to offer you the most perfect skylight on the market.

The bars are so constructed and reinforced as to give the largest possible glass area without danger of sagging. Our ridge and gutter bars will not sag, buckle or spread.

Our "knocked-down" method of shipment saves freight rates and insures safe delivery. An ordinary person can erect our skylight—water-tight—without other tools than hammer and screw-driver. No putty or solder is nccessary.

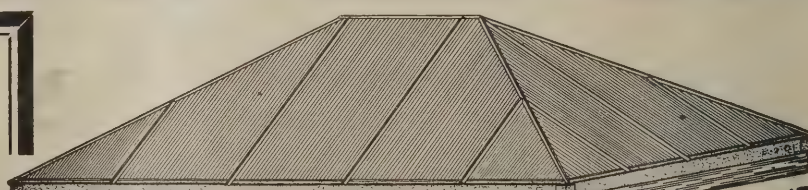
Write us for Catalogue "B" on perfect light and perfect ventilation.

WILLIS MANUFACTURING COMPANY

GALESBURG, ILL.

M. W.

20 MINUTES



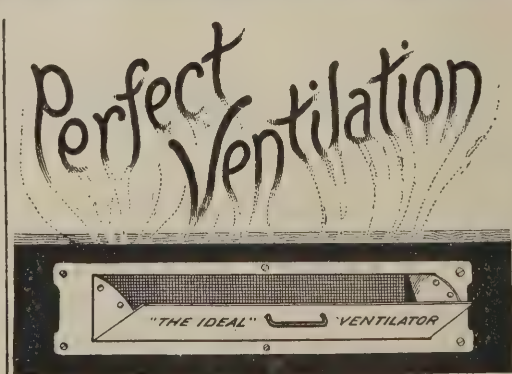
Our **KNOCK-DOWN SKYLIGHTS** can be put up by anybody in *twenty minutes.*

No cutting to do—no soldering—no puttying—all the tools required are hammer and screw-driver.

Everything is made just right and fits in its proper place. Our skylights have good, strong metal frames and glazing bars; they admit plenty of light, but never a drop of rain or a flake of snow.

Many sizes and styles. Send for Catalogue.

GALESBURG CORNICE WORKS, Galesburg, Illinois



Secured Through the
IDEAL SASH VENTILATOR.

The "Ideal"—Just the

Handiest, Neatest and Best Sash Ventilator you ever saw, and at about 1/6 the price of the next best. Takes up no room, doesn't disfigure a window, insures fresh air without dust or draughts, and can be installed in a few minutes.

Send today for full details, and **special discount** we are quoting Building Age Subscribers to sort of celebrate this our first appearance before them.

THE IDEAL MANUFACTURING CO.

ERIE, PA.

THE "GLOBE" VENTILATOR

is made on scientific principles. As soon as the air strikes the upper and lower dome it is deflected by the **turned edges**; this creates an exhaust in the Ventilator and makes the air in the pipe rush toward the head to fill the vacuum.

The "Globe" is specified by leading architects and builders everywhere because it operates perfectly and without noise. Is made in many sizes in galvanized iron and copper, and is adapted for residences, stores, schools, theatres, churches, hospitals and factories. You can make good money installing them. Send for booklet.

The Globe Ventilator Co.

203 River St., Troy, N. Y.

CORTRIGHT

HERE'S THAT SIDELOCK!

We've been saying a whole lot about our sidelock, but we're not quite sure you know what a good feature it is.

Look at the illustration above. See how the shingle on the right locks perfectly into the one on the left? See how impossible it is for snow or rain to beat through there?

In laying Cortright Metal Shingles it's impossible to get an imperfect lock; they're "fool-proof"—for they **can't be laid** till they are locked.

What's more, after they **are** laid they can't come **unlocked—you can't** pull them apart.

Another important point is, that no nails are left exposed to the weather on a Cortright Roof. Notice how this method of sidelocking protects them.

Now we want to send you our two free books, if you haven't already received copies of them. They show pictures from all over, of buildings roofed with Cortright's.

Better send us your name and address now before you forget about it.

THIS is one of a series of Selling Talks published to help you make more profit through Cortright Metal Shingles.
Next month's talk will tell about their adaptability for siding, as well as roofing.

Cortright Metal Roofing Co.
Philadelphia and Chicago

NEW CENTURY METAL SHINGLES

Are fireproof, light, unbreakable, artistic, handsomely embossed, lock perfectly and are patented. And then figure on this—that they are cheaper than wood, cheaper than anything when you figure all the savings involved, cost of insurance, etc. Write for illustrated Shingle Book No. 25. Copy mailed free.

ORNAMENTAL METAL CEILINGS, LOUIS XIV AND COLONIAL DESIGNS
Send for Finely Illustrated Ceiling Catalogue No. 26

ASK YOUR DEALER FOR CAHILL GRATES

You will never enjoy the full measure of grate satisfaction until you install our Cahill Grates in your home. One advantage in the Cahill Grates is their superior plating. Another is the fact that they give more heat for less money than any other grate on the market. The time to install these grates is when you are building or repairing. If your dealer doesn't carry them, send us his name.

Chattanooga Roofing and Foundry Co., Chattanooga, Tenn.

The Canton Art Metal Co.

CANTON - OHIO

...MAKERS OF...

Black and Galvanized Sheets
Eaves Trough and Conductor Pipe
Metal Shingles and Siding
Cornice and Skylights
Roofing and Tin Plate
Metal Ceilings and Side Walls

Send for Catalogue

EASTERN BRANCH:
525 West 23d Street, New York City

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Metal Ceilings and Side Walls

Are shown in such an endless variety of patterns in our big Catalog B, that you are sure to find just what you want and you can get it when you want it.

Our patterns are new and original and are made in the highest degree of accuracy and perfection.

Send for Catalog B

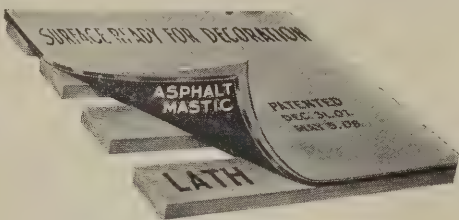
Wm. Foster & Sons Co.
Sheet Metal Works

Box 31 SPRINGFIELD, ILL.

BISHOPRIC WALL BOARD AND SHEATHING

YOU don't have to wait for "good building weather" when you use Bishopric Wall Board as a substitute for lath and plaster. It is delivered to you dry, is applied dry and keeps dry for all time. Being proof against moisture, it will not swell, shrink, warp, crack, flake or blister. It is applied equally well in cold or hot, wet or dry

Applied Dry, Winter or Summer



weather; therefore it does away with all bad-weather delays in building.

Bishopric Wall Board is made of kiln-dried, dressed laths, imbedded in hot Asphalt Mastic, under pressure of 500 pounds to the square inch, and surfaced with sized card-board. It is cut at the factory into sheets of uniform size (4 x 4 ft.) and uniform thickness (⅜ inch). These sheets, which insure a perfectly smooth wall surface, are easily and quickly nailed to studding ready for immediate application of wall paper, paint, burlap or other decoration.

Bishopric Wall Board is clean, sanitary and odorless. Under natural conditions it is guaranteed not to shrink, warp, crack, flake or blister. It is proof against moisture, vermin, heat or cold. Being a non-conductor, it saves fuel in winter and keeps out summer heat. It is a guaranteed sound deadener.

Bishopric Wall Board is extensively used for dwellings, pleasure and health resort, office and factory buildings, ranch houses, new partitions in old buildings, finishing attics, porches, laundries, cellar ceilings, garages, etc.

Importance of Lath

The laths form a perfect binder—a guarantee against warping or twisting out of shape. Furthermore, insures perfect adhesion when nailed to studding. Beware of cheap imitations. Bishopric Wall Board is protected by U. S. patents. Prosecution will follow infringement.

PRICE AND SHIPMENT OF WALL BOARD: Crate of 16 sheets, covering 256 square feet of surface, $6.40 or $2.50 per 100 square feet, f. o. b. New Orleans, La., Cincinnati, O., or Alma, Mich. We ship from nearest point.

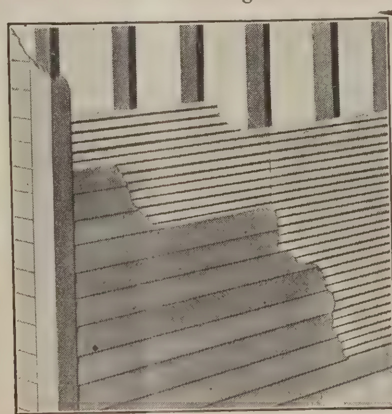
Bishopric Sheathing —and— Cement or Stucco Exteriors

Illustration to right is from an actual photograph of a New Orleans factory with Bishopric Sheathing and cement exterior. Bishopric Sheathing has been nailed to outside of studding and the exposed lath and Asphalt Mastic have been coated with cement. The artist has indicated with an arrow the exposed lath. This form of cement construction is most durable as well as economical; is fire-proof, moisture-proof, wind-proof as well as proof against heat and cold. The cement firmly adheres to the laths, making a solid, smooth exterior. Spaces between parts of laths not fully imbedded in Asphalt Mastic form an excellent key for firmly holding the cement. For factory or residence this form of cement or stucco construction is the cheapest and best known.

BISHOPRIC SHEATHING is made of same materials as Wall Board, but finish is not necessarily so fine; therefore costs 20% less. It is of uniform thickness, insuring a perfectly even surface when applied. It is nailed to the weather side of studs, with lath and asphalt side exposed. Over the laths, weather boards are nailed or cement is applied.

Bishopric Sheathing makes a more solid and substantial wall than lumber. There are no gaping joints; no widening cracks due to shrinkage; no knot holes. The Asphalt Mastic in it is a non-conductor. Moisture cannot penetrate it; therefore proof against dampness. Also proof against vermin; pests cannot bore through the tough, gummy Asphalt Mastic. In applying weather boards over the laths, dead air space is left between the laths, forming splendid insulation.

One wagon load of Bishopric Sheathing covers an area from six to ten times as great as one load of lumber—10,000 feet can be hauled in an ordinary wagon. Cost of applying ordinary wood sheathing is from $5 to $10 per 1,000 feet, whereas cost of applying Bishopric Sheathing is but $2.50 per 1,000 feet—a saving of about 75%. Furthermore, 1,000 square feet of wood sheathing covers but 750 feet of surface, 20% less being due to tongue and groove. In Bishopric Sheathing 1,000 square feet covers 1,000 feet of space.

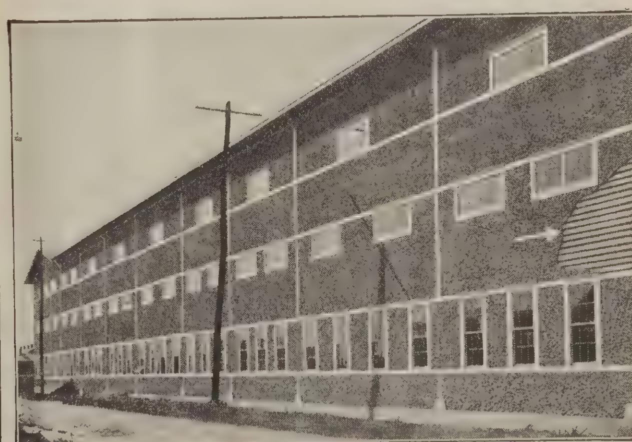


Bishopric Sheathing does away with the expense of building paper. In applying lumber, heavier scaffolding, more tools and greater scaffold floor-space are required. In applying Bishopric Sheathing one man drives a few nails in each sheet; a common laborer or boy can finish nailing.

Bishopric Sheathing insures comfort during construction. As soon as building is closed in with it, the men may work in comfort on inside during bad weather, finishing outside on suitable days. This insures continuous work.

Bishopric Sheathing is used under flooring and roofing boards. Under floors, it serves as a sound deadener and keeps out dampness; under shingles, it keeps out summer heat. It also is used with excellent results as a lining for dairy barns, ranch houses, poultry houses, driving stables or any out-door building where protection from the elements, summer or winter, is desired.

PRICE AND SHIPMENT OF SHEATHING: Crate of 16 sheets, covering 256 square feet of surface, $5.12, or $2 per 100 square feet, f. o. b. New Orleans, La., Cincinnati, O., or Alma, Mich. We ship from nearest point.



Write for descriptive booklet and samples of Bishopric Wall Board, Sheathing and Roofing—ALL SENT FREE

The Mastic Wall Board & Roofing Mfg. Co., 78 E. Third St., Cincinnati, O.

The Peyton Building, Spokane Wash Equipped with Mullins Metal Fire Proof Windows.

"An Ounce of Prevention"

It is easier to prevent a disastrous fire than it is to stop one.
The weak point in all buildings is through the windows.
These openings can be made as fire proof as the walls themselves by installing **Mullins Fire Proof Windows.**

MULLINS

FIRE PROOF——STORM PROOF——DUST PROOF

WINDOWS

have successfully withstood the severest trials not only in factory experiments but in actual conflagrations.

Mullins Windows are perfect windows in every way. Entire lock-seamed meta with no soldered joints in frame, sill or sash. They cannot warp or buckle and are not affected by heat, expansion or contraction.

The Peyton Building of Spokane, Washington, shown herewith, is one of the many undred of modern fire proof buildings equipped with Mullins Windows.

Mullins Fire Proof Windows are manufactured under the supervision of **Underwriters' Laboratories, Inc.**, according to the latest specifications of the **National Board of Fire Underwriters, and every window is inspected, approved and labeled with their official label.**

We have catalogues showing our various lines of product. Please specify the particular class of sheet metal work you are interested in and we will send you the proper catalogue for the same.

W. H. MULLINS COMPANY, 208 Franklin Street, Salem, Ohio

ART GLASS

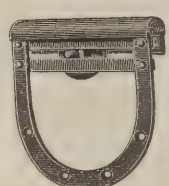
Leaded, Window, Plate (plain and bevel) Mirrors, and a complete line of glass for building purposes.

THIRTY YEARS' practical and business experience has enabled us to perfect most artistic and pleasing designs at FACTORY prices.

Sketches and estimates furnished promptly on application.

The Suess Glass Co., Chicago, Illinois

Lane Barn Door Hangers



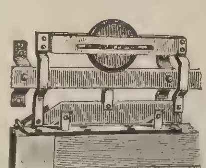
Give best satisfaction. We are the originators and largest makers of U-shape hangers.

"LANE'S STANDARD" is the original steel single rail **PARLOR DOOR HANGER.** The most popular hanger to-day—because it is ALL steel and substantially and well built on correct mechanical principles.

—IT GIVES SATISFACTION—

Sold by Hardware Trade

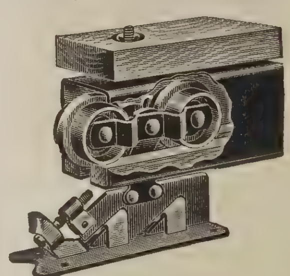
Send for circulars to



LANE BROTHERS CO.

423-455 PROSPECT ST.
POUGHKEEPSIE, N. Y.

It's the man on the job



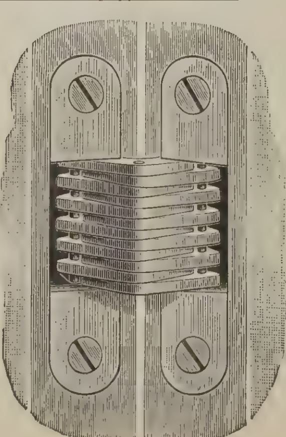
who recommends **Richards Royal House Door Hangers.** With ball bearing hanger running freely, noiselessly on a full trolley, covered maple track, you have the best—the Royal. You can adjust both hanger and track. Hang any door quickly, and do it alone.

Architects specify Richards Royal for the peace of mind it brings.

Good things are imitated. Get original package by insisting on Richards Royal.

RICHARDS MANUFACTURING CO.
Aurora, Ill.

RICHARDS RMC AURORA TRADE MARK



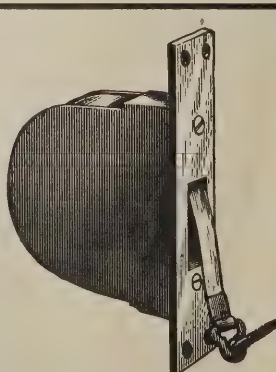
Invisible Hinge as it appears when door is open.

SOSS INVISIBLE HINGES

give to the doors the artistic effect obtained by perfectly smooth joints and the absence of projecting butts.

Send for booklet or see Sweet's pages 598, 599.

SOSS MFG. CO.
434 ATLANTIC AVENUE
BROOKLYN, N. Y.

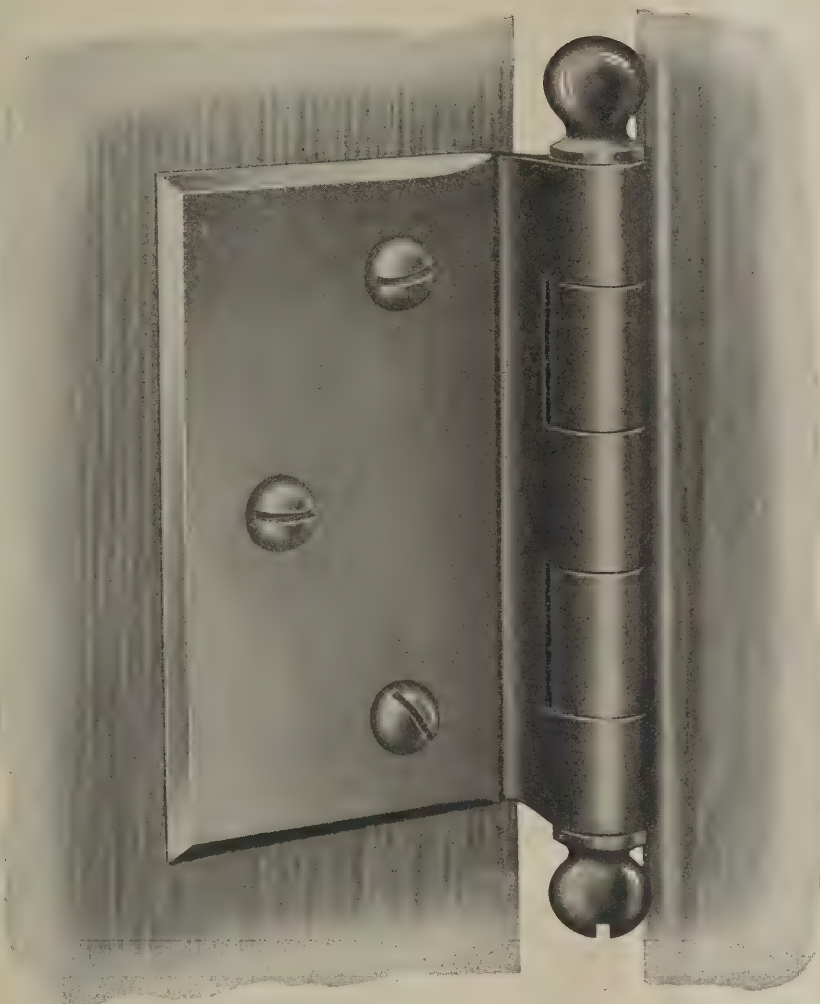


Caldwell Sash Balance

Caldwell Manufacturing Co.
5 Jones St., ROCHESTER, N. Y.

WE INITIATE -- NEVER IMITATE

"National" Tips



"National" Butts can now be supplied with ball tips in all the usual sizes on both Common and Ornamental Butts.

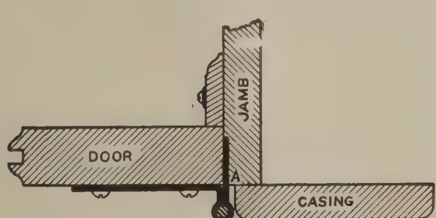
The new false tip is threaded and screws into the butt. The SLOT for a screw driver is also an exclusive feature. It makes it easy to remove the pin and shows also which is the bottom of the butt.

Style No. 450B

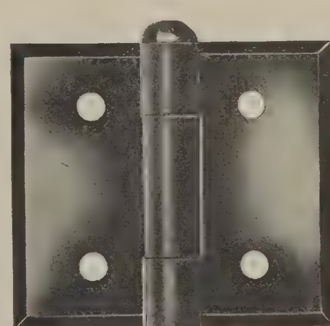
here illustrated, is the latest design, and a beauty. It has beveled edges, is highly polished and double plated. All sizes from 1½-inch to 4-inch, inclusive. Any finish desired.

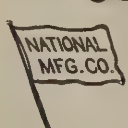
No. 450B

Ask for "Catalog B," and give us your dealer's name.



Directions—Attach butt part "A" to jamb first, then set and wedge door into position and attach Ornamental Leaf to surface of the door. Simple, isn't it?





Trade-Mark

Be sure to look for the flag—it's stamped on all "National" Butts.—It stands for quality.

National Manufacturing Co.

STERLING, ILL.

Trade Notes.

E. H. Sheldon & Co., 323 North May street, Chicago, Ill., point out that the clamp fixtures which they are offering possess, among other qualities, strength, durability and speedy adjustment. The company are directing special attention to several clamps which are of interest to carpenters and woodworkers, these consisting of patent malleable clamp fixtures which are mounted on oil-finished maple bars; the parlor frame and cabinet makers' clamp, especially adapted for carved, cabinet and other light clamp work; a tempered steel bar clamp constructed for the application of excessive pressure, and a perfection horse clamp, which is intended for heavy work. In a catalogue which the manufacturers have issued, and a copy of which can be obtained on application, the merits of these goods are set forth at length.

The fifth dish of "Roofing Salad" sent out by the Genuine Bangor Slate Company, Easton, Pa., contains the usual amount of interesting matter relative to the slate which the company is prepared to furnish. There is also more or less of what may be termed light reading, in which is interwoven incidental reference to roofs and roofing. As showing the popularity of slate for roofing purposes, the company recently sent a letter to a list of Philadelphia churches asking each what kind of a roof it had. Of the seventy-eight replies received 70 per cent. showed slate roofs.

Parks & Parks, Troy, N. Y., are directing the attention of carpenters, cabinet makers, painters, door and blind makers and others having occasion to use sandpaper, emery paper or emery cloth to Reissmann's Perfection Sandpaper Holder, an illustration of which was presented in these columns at the time it was first placed upon the market. The tool, as it may be termed, measures 4½ by 2¾ by 1 in., and its use results in a great saving of time, labor and material. After a piece of paper has become worn out from use a new sheet can be easily placed over the block and clamped in position, and all in a few seconds of time.

A folder sent out by the Pearl Clay Products Company, Bradford, Pa., carries a list of buildings, together with names of architects, and in some cases the builders in connection with which the company's product has been used during the past year. The folder also gives the names of the officials of the company.

The E. L. Watrous Manufacturing Company, makers of stamped steel hardware, 516 to 528 South Ninth street, Des Moines, Iowa, is distributing a number of folders and leaflets calling attention to the leading specialties which it manufactures. These include among others storm sash fasteners, automatic door catches, cupboard catches, screen door catches, storm sash hangers, etc., etc.

S. Keighley Metal Ceiling and Manufacturing Company, 819 Locust street, Pittsburgh, Pa., sets forth in a circular just issued the merits of a line of steel lockers built on the unit system in sections or groups in a single row, double rows with a single back, and in single or double tiers. The material employed is heavy cold-rolled steel, reinforced at the edges and center with angles and bars. The doors are equipped with a simple three-way locking device which securely fastens the door at the top, center and bottom and is operated by a Yale & Towne or other lock or a keyless or time combination lock. Flat tops are regularly furnished, but, if desired, a sloping one can be made to order.

At a Recent Special Meeting of the directors of the Reading Hardware Company, held at Reading, Pa., Henry J. Davis, of New York, was elected a member of the board of directors and president of the company. The selection of Mr. Davis marks the final step in perfecting the company's working organization, and the action of the directors carries with it a project for the introduction of additional working capital, which places the company on a firmer financial basis and provides for an immediate extension of its rapidly growing business. Mr. Davis assumed the duties of president of the company on the first of August. Closely associated with Mr. Davis in the administration of the company's affairs is Edward W. Riker, recently appointed general manager, and for upward of 20 years previous connected with the Yale & Towne Manufacturing Company.

American Metal Door Company, Bradford, Pa., is directing the attention of architects and builders to its fireproof metal doors and interior trim which it manufactures in great variety and adapted to meet many requirements. The American patented fireproof doors are made with the members hollow, the stiles and panels being lined with asbestos paper. The stiles are made of one piece, and all of the door between the stiles consists of one panel subdivided by rails included between the stiles. This construction tends to render the doors sound proof. All doors and windows are fitted with panel glass molding, the glass being inserted without the use of screws, putty or filler, and when the molding is in position the profile of the molding is the same whether the door is sash or panel. The claim is made that the adoption of American doors, windows and trim reduces the fire hazard and the cost of fire insurance on the building in connection with which they are used. The method of holding the glass in sash doors by detachable molding sprung into place is referred to as a novel idea, and has been referred to in very flattering terms by architects and contractors who have made careful investigation of its merits. A special cement is used to secure the asbestos filling to the steel plates, the claim being made that the cement contains no properties that will rust or corrode, but that after being applied will resist severe heat.

Voss Mantel Company, Louisville, Ky., has just issued from the press an exceedingly attractive pamphlet relating to its specialties and bearing the suggestive title "Mantels for the Home." It is illustrated throughout with half-tone engravings of interiors, showing mantels of various designs, with proper setting. Some views represent dining rooms, others libraries, parlors, living rooms, reception halls, etc. The text accompanying the engravings relates especially to the advantages of properly designed mantels in the home, emphasizing the fact that the style and finish should harmonize with the architecture or other furnishings. The merits of the Voss mantels are emphasized, and the point is made that an important feature of the establishment is the making to order of specially designed mantels from architects' drawings. The little work has been prepared with a great deal of care, and architects and builders cannot fail to be interested in it. Those who desire a copy can readily obtain one by making application to the company.

The Business, Good-Will and Patents of the Ritter Folding Door Company, Cincinnati, it is understood, have been purchased by the Kinnear Manufacturing Company of Columbus, Ohio, manufacturer of the Kinnear rolling steel shutter, and that the Ritter plant and office will probably be moved to Columbus.

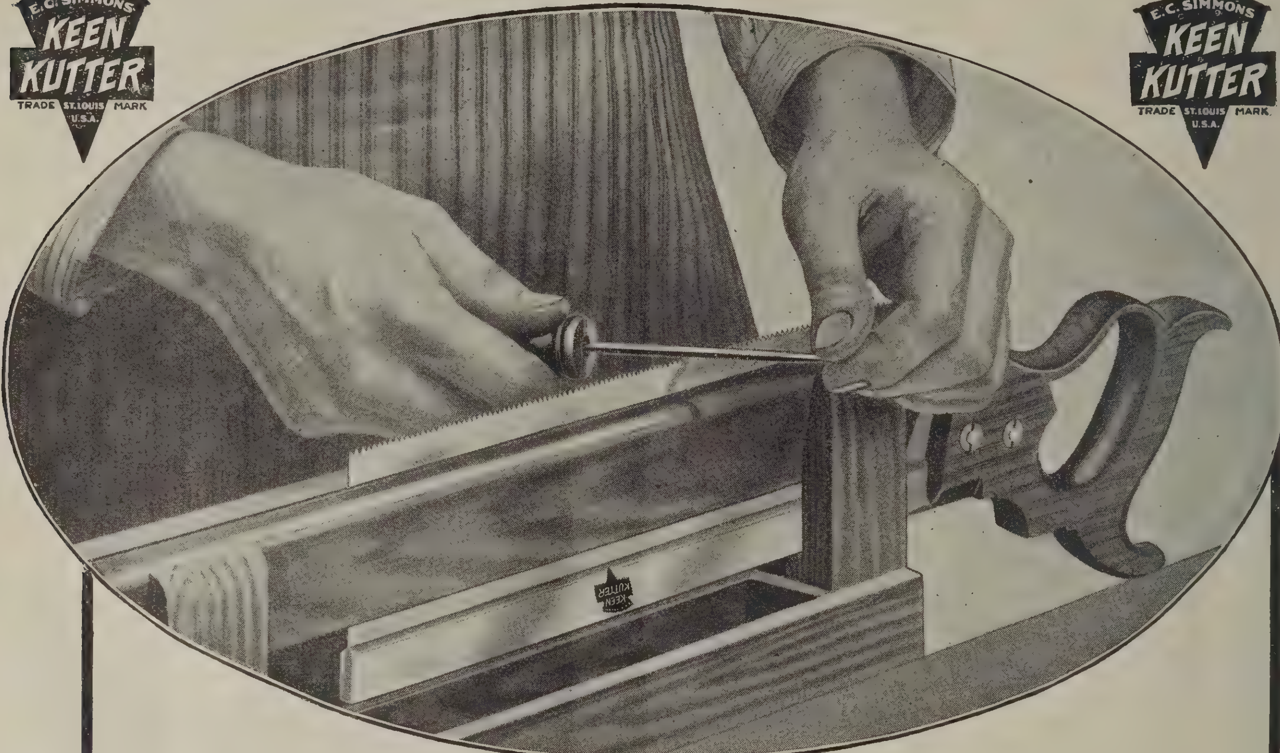
A New Trussed Hard Steel Wire Lathing, for which strong claims are made, has just been placed upon the market by the Greening Wire Company, Ltd., Hamilton, Ont. Among the many special points of interest to architects and builders it may be mentioned that the selvages are stapled or nailed along the studs or joists, consequently there is no lacing, and owing to the truss formation of the lath it may be used without the necessity of furring, being applied direct. The claim is made that the truss principle renders the lath so stiff as to give it a sustaining power of 3½ times that of a square mesh cloth of equal weight per square foot. It is supplied in continuous length up to 100 yards, with a selvage on each side, and in widths to suit the spacing of the studs or joists. Owing to the alternate transverse or short wires being offset from each other or in different places the cloth has no "face" and the claim is made that it cannot be scraped free of plaster.

The H. W. Johns-Manville Company, 100 William street, New York City, is offering in place of sand in stucco a ground asbestos rock containing a large percentage of asbestos fibre, which has a tendency, when mixed with proper binding materials, to form a durable and elastic product. These people have had excellent success with this product, and have issued full directions for the application, which, if properly followed, should minimize the troubles experienced in the past, providing, of course, that the mechanics applying the material are willing to do their share.

The Pullman Ventilating Cowls made by the Pullman Automatic Ventilator Manufacturing Co., York, Pa., are described on a mailing card which is being sent out by the company. The cowl referred to is made in both round and rectangular styles of galvanized iron or copper, with or without fire-retarding dampers. The round model is made in sizes ranging from 3 to 120 in. in diameter, while any desired size of rectangular cowl can be made to order. Three illustrations are presented on the card to show the cowl installed on a skylight, the square-base type installed on the ridge of the roof and the Pullman cowl standard ejector, which works on a principle practically the same as that of the ejector.

One of the features of a late issue of "Graphite," published by the Joseph Dixon Crucible Company, Jersey City, N. J., is a short, illustrated article relating to the construction of the new building of the Prudential Life Insurance Company at Newark. In the construction of this building 8000 tons of steel were used, all of which was painted at the shop with Dixon's Silica-Graphite paint. Another feature is an illustration of the coaling plant at Rochelle Park, N. J., of the New York, Susquehanna & Western Railroad, the steel work of which is preserved against the elements by silica-graphite paint. The company calls attention to the fact that it has been publishing "Graphite" for 12 years, and it has grown from hardly more than a circular of four pages to a definite publication of 12 pages. In view of the expense, time and effort put on "Graphite," the company feels that all those sufficiently interested in the publication who desire to continue to receive it should make request to that effect.

ALPHABETICAL LIST OF ADVERTISERS



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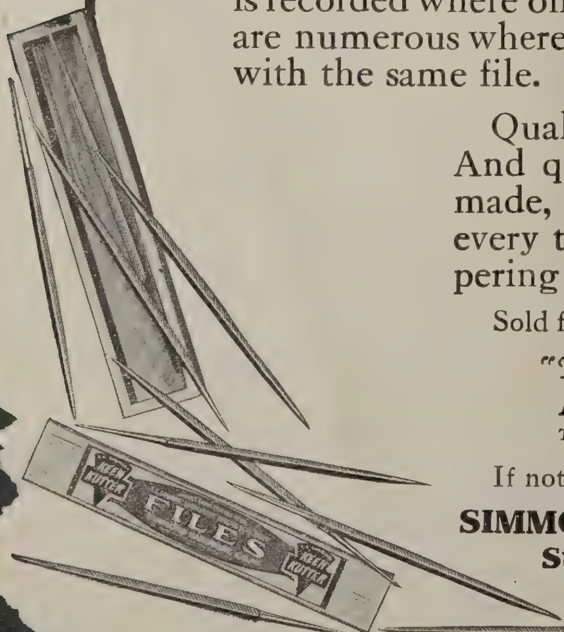
KEEN KUTTER
Special Slim Taper Files

The slimmest taper files made. Best for fine tooth saws, and the longest-lived files you can buy. A case is recorded where one file sharpened 35 saws. Instances are numerous where 15 to 20 saws have been sharpened with the same file. How is that for service?

Quality makes such service possible. And quality here means finest tool steel made, improved machinery that cuts every tooth the same depth, and a tempering process that's wonderful in results.

Sold for over 40 years under this well known motto.

"The Recollection of Quality Remains Long After the Price is Forgotten"
Trademark Registered —E. C. SIMMONS



If not at your dealer's, write us.

SIMMONS HARDWARE COMPANY, Inc.
St. Louis and New York, U. S. A.

Suggestion for Builders.

Without doubt many readers have in the past wished to be first-class Draftsmen and Designers, and probably often looked for a long time at plans, trying very hard to figure out certain lines, or desired to be able to do the best work in most up-to-date manner; and many men, especially in Architectural lines, have often felt greatly embarrassed because unable to read a sketch or unable to make any kind of business-like drawing.

No Mechanic is first-class and competent unless he is an A-1 Draftsman in addition. Without this knowledge he can never rise any higher and will remain only a Mechanic, paid by the hour or day.

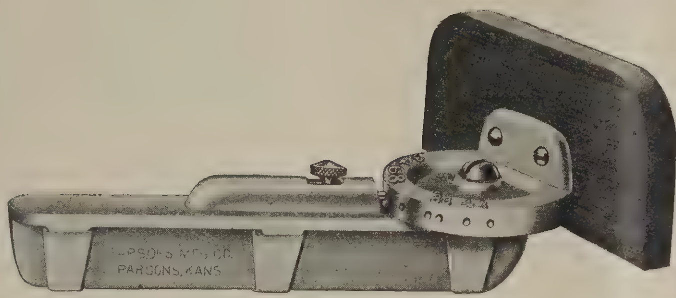
To become a successful Draftsman it is necessary to receive the most practical and personal training. Not school or book knowledge, but practical Drafting room work.

Mr. B. A. Dobe, M.E., and Chief Draftsman of the Engineer's Equip't Company (Inc.), Chicago, has for many years given personal and individual Drafting instruction in complete Architectural drawing and Building design; and is prepared to accept a few more personal students, young or old.

His instruction is given by mail, but must not be compared with ordinary "for all alike" correspondence school lessons, as all work is laid out personally by himself and prepared especially for your individual requirements and advancement. He treats each student according to the student's ability; and with his individual practical method, which consists of actual Drafting room work, giving the student the required practical experience, he is able to qualify any intelligent man.

He does not give or sell diplomas, but insists on your work being the evidence of your ability to talk for you. He guarantees by contract to qualify you with his practical instruction for a first-class Draftsman's position. Instructions given until competent in every respect. Mr. Dobe furnishes to his students the finest complete Drawing Outfits, including a full set of German Silver Instruments, worth $13.85, free this month.

The Milks Pocket Miter Box



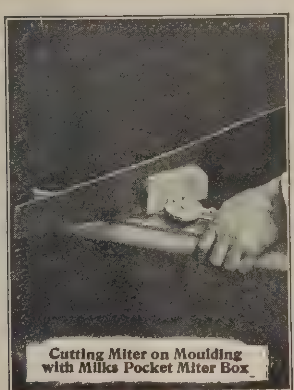
only

ONE DOLLAR

DO AWAY with the old-fashioned, clumsy affair, and use this up-to-date and convenient miter box instead. Can be carried in the pocket—weighs only 8 ounces. Can be applied to the work in any position and in any place where a saw can be used Will cut the principle angles on any moulding or strips. Can be used on a ladder or scaffold, and is never in the way.

Three Tools In One

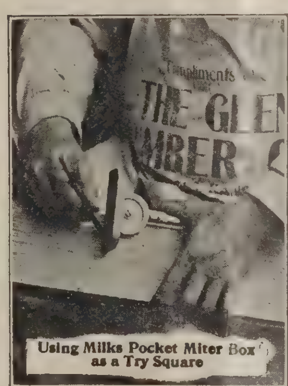
A MITER BOX



Cutting Miter on Moulding with Milks Pocket Miter Box

3 in One

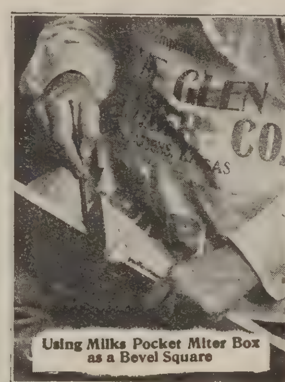
A TRY SQUARE



Using Milks Pocket Miter Box as a Try Square

3 in One

A BEVEL SQUARE



Using Milks Pocket Miter Box as a Bevel Square

This wonderful little tool is made of aluminum, strong, durable and perfect mechanically. Absolutely guaranteed as to accuracy. It is placed on the moulding instead of having to turn a long piece to get it in position to cut. It's a big time and labor saver—pays for itself on one job. Ask your dealer—if he hasn't it, **send us one dollar, and we'll send you one prepaid.** If you don't like it, send it back in good condition, and you'll get your money back. Ask us for Catalog.

Using Milks Pocket Miter Box on a Ladder

All Our Tools are Union Made.

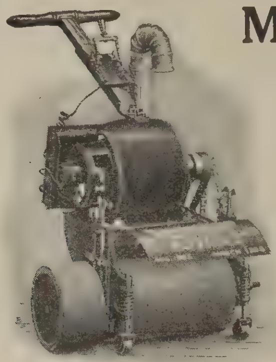
Parsons Mfg. Co.

1810 Washington Ave.

Parsons, Kan.

Cutting Miter on Top of Base

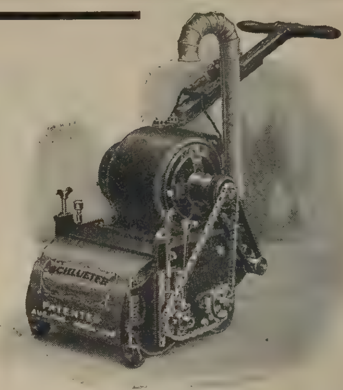
The Schlueter Floor Surfacer Makes The Most Money For Contractors



Edge Roller easily adjusted to either side

because it covers more square feet of floor space at less cost of power and labor in a given number of hours, than any other machine. It will easily earn you a net profit of not less than $10 to $25 a day. It is very easily operated as when the handle is raised it is inclined to move forward of its own accord. And as each Surfacer is equipped with an Automatic Dust Collector owners of the finest residences gladly welcome this machine. It produces the smoothest kind of surface on any kind of wood floor.

Send for Prices and FREE TRIAL PROPOSITION.



Made in three sizes: 8 x 18, 8 x 15 and 8 x 12 in. Roller

M. L. Schlueter, 103 N. Canal Street, Chicago, Ill.
NEW YORK OFFICE: 1001 Flatiron Building.

No matter where you live, whether New York, San Francisco or Timbuctoo, or whether your estimate is made now or ten years hence, you can estimate easily and accurately, if you use the

STANDARD HANDBOOK OF ESTIMATING DATA

because all the items are based on the amount of material required and the average work done per man per day on every branch of every trade in building. Full of facts, not formulas. No useless padding. Understood at a glance. Every page worth the price of the book

PRICE ONE DOLLAR

The Builders' Auxiliary Co., Room 325 Old South Bldg. Boston, Mass.

Ask for particulars of the BUILDERS' AUXILIARY, the latest and most efficient system of Estimating and Cost Accounting for Building Contractors.

Little Giant FLOOR SCRAPERS

Made to Stand Hard and Continuous Use

OUR FREE TRIAL PROPOSITION
will interest you as it has others. We do not ask you to deposit any money. Write us

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We also Manufacture the Thor Electric Washer and Wringer

A Handy Steam Glue Heater

Heats quickly and economically. Each kettle holds two quarts of glue. Draw cock is convenient for obtaining hot water. Shipped to responsible parties on approval.

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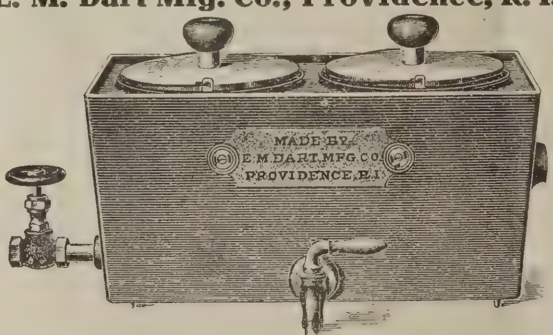
E. M. Dart Mfg. Co., Providence, R. I.



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Liquid & Colors Separate Mixed as Needed

THE WOODLIFE CO. NEW YORK, U.S.A. WL TRADE MARK REG. U.S. PAT. OFF.

The WOODLIFE Shingle Stane GUARANTEED

WOODLIFE Shingle Stane will beautify and preserve the exterior of bungalows, shingled houses, barns, roofs, fences and rough woods generally—it **lasts longest** and is **the most economical.** Guaranteed for five years.

Contains genuine creosote, "Nature's own preservative." Liquid and colors are separate and **mixed as needed,** hence **will not settle.** Any desired shade can be matched. No odor.

Formerly known as "PRESERVO Shingle Stane."

Made also for interior use—INTERIOR WOODLIFE.

Write for color cards.

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SAVE 50 PER CENT ON PAINT AND VARNISH BILLS

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WATERPROOFS Paint, Varnish, Steel, Iron, Concrete, Plaster, Wood, Silk, Linen, Cotton and Paper.

Stops the Cracking of Paint and Varnish.

Used and re-ordered on some of the best known buildings in New York. Send for information and booklet.

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By using **Axtell "ALL STEEL"** Weather Strips. Simple, durable and cheap, sell at sight; $ $ $ $ in it. No experiment. Over a million satisfied customers in 5 years. Write for booklet, "Storm Insurance."
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Used on steel work of many of New York's most prominent structures. Also has durability records on exposed surfaces.

Write for information concerning **your** class of work.

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The WEBER DOUBLE ACTING Floor Scraper

Out-class and Under-bid All With This Scraper

You can do both with the Weber Double Acting Floor Scraper, Mr. Contractor, because you can do any floor scraping job better, quicker, and at less cost.

"PUSH OR PULL"

Free Trial Offer

To prove to you by the Weber Scraper's actual work that it is the very best one on the market—that it will do all we claim and **more**—I want you to try it for five or ten days absolutely free. Just write me now and ask about the plan—it won't obligate you in any way.

1 in Your Town Sells 25 More

It eliminates half the motions and work necessary with ordinary scrapers, for this one will push or pull and run with or against the grain.

It will scrape square up to the very angle of the floor and baseboard without a side draft or phazing the wall—it covers every single inch of floor surface and makes the whole as smooth as a table top. This important feature to be found only in the Weber Double Acting Floor Scraper is alone worth a lot to you **—it means perfect work, more business and less trouble.**

The Weber Scraper is equipped with our patent Sanding Device, Shearing Cut Attachment, Bowling Alley Scraper and Sharpening Device. The handle can be moved to either side for working close to the wall, and the blades can be set at any angle suited for scraping any kind of floor.

There are a dozen other invaluable things you ought to know about this scraper for the sake of your own purse and business.

Write me now and I will tell you all.

These Orders Show What Contractors Think of It

St. Joseph, Mo., June 10, 1910.
WEBER MFG. CO, West Allis, Wis.,
Will you please send me one of your Number Two Floor Scrapers the same as Mr. M. Thirifay, General Contractor, of this city, has? Send at once.
Yours truly.
EMIL STOCK.
Contractor and Builder.

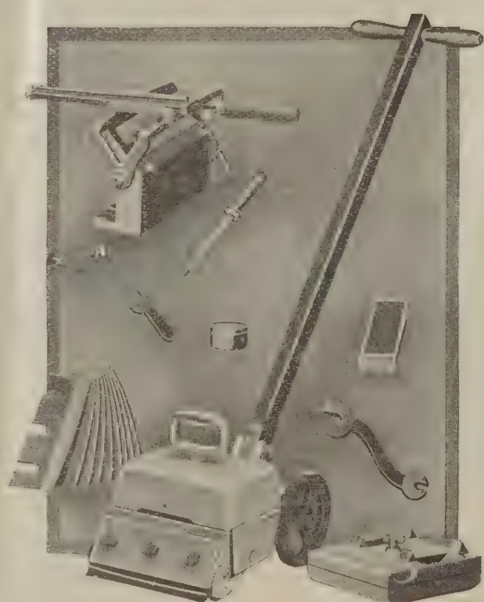
Loup City, Neb., Aug. 26, 1910.
WEBER MFG. CO., West Allis, Wis.
Gentlemen: Please send us one of your Number Four Double Acting Floor Scrapers complete, as listed in your price list.
We saw your scraper used in Grand Island, Neb., by Sothman, Voss & Goehring, General Contractors. They told us what they paid for it, and if you cannot send us this for the same price please wire us, as we need it at once, and for this reason we are ordering it this way.
Yours truly,
OHLSEN BROTHERS, Contractors and Builders.

JOHN F. WEBER
President

WEBER MFG. CO., 672 71st Ave., West Allis, Wis.

YOU CANNOT AFFORD

to be without the **Acme Floor Scraping Outfit.** It is the best labor saving equipment for scraping and finishing floors on the market to-day. It is complete in every detail and has given perfect satisfaction to thousands of users during the past four years.



Let the **Acme Floor Scraping Outfit** demonstrate its worth to you. Let me send the machines on a WEEK'S FREE TRIAL. I want every contractor to know my outfit and the best way for you to get acquainted with it is to have it in your possession and work with it.

It will cost you nothing to accept my **Free Trial Offer** and if you do not want to buy the machines, just send them back to me.

Further information and booklet will be gladly mailed on request.

JOS. MIOTKE, 251 Lake Street, Milwaukee, Wis.

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WE MANUFACTURE ALL KINDS.—MOULDINGS, WINDOWS; DOORS, BLINDS, MIXED CARS, INCLUDING EVERYTHING FOR A BUILDING, STRAIGHT CAR-LOADS, SHINGLES, SIDING, FLOORING, WHITE PINE, AT WHOLESALE PRICE.

"Your enquiries will receive prompt and careful attention and our catalogue may be of use to you."

LESTERSHIRE LUMBER & BOX CO., LESTERSHIRE & BINGHAMTON N Y

STAY-LOCKED COLUMNS DO STAY LOCKED

GUARANTEED 5 YEARS

JOINTS CANNOT OPEN.
THAT'S WHY WE GUARANTEE
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GET OUR
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WE PAY THE FREIGHT

AMERICAN COLUMN COMPANY
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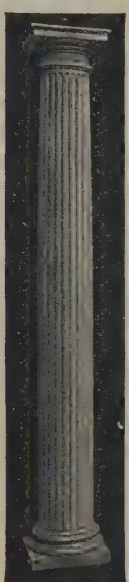


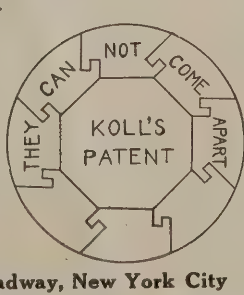
Koll's Patent Lock Joint COLUMNS

are noted not only for their superior *architectural beauty*, but for their *unequalled strength*. The joints on these columns are so *locked* that they positively *cannot come apart*. There's 14 years of *specialized experience* back of them—each man is trained to do his part of the work and to do it *right*

We make nothing but columns—have the largest factory of its kind in the world—occupy 40,000 sq. ft. of floor space—have a modern dry kiln with 600,000 feet capacity—turn out over 60,000 columns per year—have unequalled location and facilities for *labor, material* and *shipping*.

Much doing of *one* thing *lessens the cost* of doing it.

Write to-day for Catalog D-40.



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Elston and Webster Ave.
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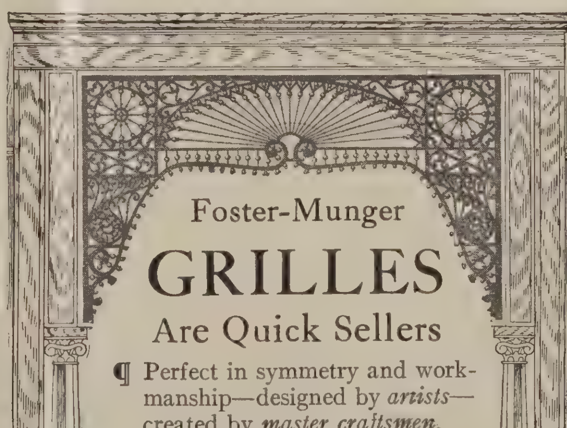

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GRILLES
Are Quick Sellers

¶ Perfect in symmetry and workmanship—designed by *artists*—created by *master craftsmen*.

¶ All woods selected with special care as to color and grain.

¶ Each and every detail is turned and finished with the same skill and attention required on the highest grade furniture.

¶ Superior mechanical equipment enables us to produce a greater quantity and still uphold quality.

¶ More than a hundred beautiful designs from which to make a selection. Special order designs quickly executed.

¶ Our prices are as surprisingly low as the quality is high.

Every dealer should have Book 108 K which shows the finest and most complete line of grilles in America; also colonnades, stairs, mantels, wood carpet and parquetry flooring. Mailed postpaid upon request. Write for book 108 K and price list today.

The Foster-Munger Co. Chicago U.S.A.
AMERICA'S GREATEST SASH & DOOR HOUSE

Another book of interest to dealers—107 K—showing 68 choice new patterns in wide stile cottage front doors. Prices about the same as you pay for common doors. Get the book.

Townsend's Carpentry.—160 pages. Size, 6½ x 9¾ ins. 224 illustrations. Cloth. Price, $1.00.

A working manual for carpenters and woodworkers in general.

Light and Heavy Timber Framing Made Easy.—By F. T. Hodgson. 395 pages; 420 figures. Substantially bound in cloth. Price, $2.00.

Heavy framing is the principal subject of this work. It gives an easy system of balloon framing, and explains the methods for taking hewn timber out of "wind," hewing, counter-hewing, sizing, boxing, draw-boring, gaining, mortising, tenoning, kerfing, splicing and all other details in connection with timber framing in barns, bridges, centers, shoring, needling, groins, timber houses, churches, spires, towers, factories, warehouses, etc.

Framing.—Edited by W. A. Radford. 338 pages; 182 figures. Size, 6 x 9 ins. Cloth. Price, $1.00.

Describes methods of house framing and construction, together with tested methods of heavy timber and plank framing, as used in the construction of barns, factories, stores and public buildings; strength of timbers, and principles of roof and bridge trusses.

Richey's The Building Mechanics' Ready Reference—Carpenters' and Woodworkers' Edition.—A fine, leather-bound book for the pocket. 226 pages; gilt edges. Price, $1.50.

A new and first-rate book of short cuts for men who "travel the shortest road and win the race," accompanied with a handy book of forms of time cards and memoranda.

A Practical Treatise on the Uses of the Steel Square.—By F. T. Hodgson. In two volumes. Sold separately. Volume I.: 242 pages; 177 illustrations. Size, 5½ x 8 ins. Cloth. Price, $1.00.

Volume II.: 230 pages; 160 illustrations. Size, 5½ x 8 ins. Cloth. Price, $1.00.

The Steel Square and Its Uses.—By W. A. Radford, A. W. Woods and W. Reuther. In two volumes. Sold separately. Volume I.: 264 pages; 144 illustrations. Size, 6 x 9 ins. Cloth. Price, $1.00.

Volume II.: 264 pages; 118 illustrations. Size, 6 x 9 ins. Price, $1.00.

These books plainly describe the correct methods of using the square in laying out all forms of timber construction, showing the practical application of the instrument in all phases of carpentry and joinery, also masonry, cabinet-making, etc.

Each work is original in style and treatment, having many interesting examples of work peculiar to itself.

The Steel Square Pocket Book.—By D. L. Stoddard. A handy pocket guide to the best methods of using the carpenter's steel square. 109 pages; 112 illustrations. Cloth bound. 50 cents.

This little book is a good idea, well and concisely carried out.

A feature is the absence of reference letters on the illustrations. To insure the greatest simplicity the cuts show the square laid on the work so as to give at once the points, lengths and quantities sought.

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ESTIMATING.

The New Building Estimator.—By William Arthur. 437 pages with a 13-page cross-reference index; handbook size. Cloth. Price, $2.50.

This is an exhaustive book of building cost data, designed to meet the wide and varied requirements of architects, builders, contractors, appraisers, engineers, superintendents and draftsmen. All types of structures are covered in full detail with helpful analysis, and with material, labor and time figured chiefly in hours and quantities.

Features.

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Detailed methods for finding the cost of buildings from excavation to finish.

Examples of work are presented in a systematic way and so as to be easily understood.

Covers a field ranging from $500 cottages to $200,000 structures.

Two chapters tell home builders how to build.

The cost of building is also given by the square and cubic foot.

The Estimator's Price Book and Pocket Companion.—By I. P. Hicks. 172 pages. Pocket size. Cloth bound. Price, $1.00.

It gives full information concerning materials used in ordinary buildings, the quantities required, etc. It presents the average market prices of such material, together with blank spaces throughout for putting in memoranda of local or special prices. In this way it may be made the handiest kind of a reference.

With the foregoing matter, which is conveniently arranged and indexed, is given a useful collection of tables, always of value for reference. These include tables of lumber measure, complete rafter tables for any width and pitch of roof, sizes and weights of iron columns and I-beams required to carry certain loads, safe-bearing loads of timber, and of structural iron, etc.

Estimating the Cost of Building.—By Arthur W. Joslin. 192 pages. Illustrated. Size, 5 x 6¾ ins. Cloth. Price, $1.00.

This book presents in compact and handy form the author's serial articles which were recently published in the columns of *Carpentry and Building*, where they attracted wide interest and approval.

The work is practical, analytical and thorough in style. It will be an excellent prompter and guide to every one who has to do with building costs and superintendence, constituting as it does a systematic treatise on the subject.

There are important chapters on "Estimating the Cost of Building Alterations" and on "Systems in the Execution of Building Contracts."

Modern Estimators' and Contractors' Guide for Pricing Builders' Work.—By F. T. Hodgson. 300 pages. Illustrated. Cloth. Price, $1.50.

A serviceable hand-book containing explanations of various ways of estimating and pricing builders' work, showing in concise form some of the methods employed by successful contractors. Full information is given on the details of estimating cost by the square, by the cubic foot, by rough quantities, by accurate quantities and by other methods of calculation.

Hicks' Builders' Guide.—By I. P. Hicks. Revised 1910; twentieth thousand. 168 pages. Size, 5 x 6¾ ins. 114 illustrations. Cloth. Price, $1.00.

Presents a system of simple and practical application for estimating materials and labor chiefly as applied to suburban residential work. One of the most serviceable books for contractors and builders, as well as for carpenters, who will find it to contain also a very complete treatment on framing roofs of all descriptions.

The GUIDE was designed by a man who understood the needs of the young carpenter and builder, and the knotty problems of the daily work are solved in the simplest and best ways.

Estimating Frame and Brick Houses, Barns, Stables, Factories and Outbuildings—New Edition, 1910.—By Fred T. Hodgson, architect. 240 pages. Illustrated. Size, 5 x 6¾ ins. Cloth. Price, $1.00.

The book aims to give a careful consideration to all the items and elements of cost in construction, beginning at the foundation of the building and progressing to the finished structure. Young contractors and builders especially will find it to cover the subject in a plain, practical way, with detailed consideration of cost factors, items and quantities.

There is a detailed estimate of a $5000 house and additions; detailed estimates of kitchen, dining room, parlor, den, halls, bedrooms, conservatory, basement, bath room, closets, etc., all figured out and measured by the quickest and simplest methods. The author also tells how to estimate by cubing, by the square of floors or walls, and by the process of comparison, and gives hints and practical suggestions for taking measurements and making tenders for work.

Estimating.—By Edward Nichols. 140 pages. 14 full-page plates. Cloth. Price, $1.00.

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Bungalow Craft.—By Henry Menken. 120 pages. Size, 7½ x 11 ins. Oblong. Bound in heavy paper. Price, $1.00.

This book contains 87 different floor plans of bungalows and cottages, suitable for any climate; with photographic views of exteriors, interiors, cozy corners, mantels, fireplaces, buffets, furniture, etc. They have all been built at prices ranging from $1000 to $4500. Working plans and specifications are obtainable at a nominal price.

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The material of this book was obtained directly from practical work during the process of construction. Treats the Tools; Laying Out the Work; Mixing Concretes and Mortars; Bonding; Building Brick Angles, Corners and Intersecting Walls; Brick Arches, Lintels and Piers; Chimney Flues and Breasts; Anchoring, Bracing and Furring Brick Walls; together with general details of Brick Work. The latter part of the volume relates to Shoring and Needling, and includes a chapter on Underpinning and Sheet Piling.

Building Mechanics' Ready Reference—Cement Workers' and Plasterers' Edition.—By H. G. Richey. 458 pages; 193 figures. Pocket size. Morocco. Price, $1.50.

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Greenhouse Construction.—By L. R. Taft. 219 pages. Illustrated. Cloth. Price, $1.50.

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Another useful book of boiled-down information and tables designed for constant reference. Describes and illustrates the most practical methods in vogue.

Cement Workers' Hand-Book.—By W. H. Baker. 98 pages. Cloth. Price, 50 cents.

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A description of cement materials and processes of manufacture.

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Contains representative data on costs of concrete and concrete steel structures.

Concrete and Reinforced Concrete Construction.—By Homer A. Reid. 906 pages; 715 illustrations; 70 tables. Cloth. Price, $5.00.

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Treats all divisions of modern constructive practice, including extended sections on stone masonry, brickwork, concrete and fireproofing construction, terra cotta, lathing, plastering, lime, cement, sand, mortar, etc.

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Reinforced Concrete.—By A. W. Buel and C. S. Hill. 499 pages; 340 illustrations. Cloth. Price, $5.00.

A mathematical discussion and practical consideration of constructions of reinforced concrete.

Reinforced Concrete; a Manual of Practice.—By E. McCullough. 136 pages. Illustrated. Substantially bound in cloth. Price, $1.50.

Treats the theory of the design of reinforced concrete structures in a simple and popular manner; that is, the subject is divested of complications. Very condensed, with much original matter. Well worth the price to contractors.

Reinforced Concrete.—A Treatise on Cement, Concrete and Concrete Steel and their Application to Modern Structural Work. By Walter L. Webb, C. E., and W. H. Gibson. 129 pages; 57 illustrations. Cloth. Price, $1.00.

This book is designed for the architect, builder, contractor and engineer, who will find it to contain a concise treatment on the manipulation and uses of reinforced concrete, based on recent construction work, with descriptions and illustrations of typical practice. The contents are arranged in five divisions, as follows: Cement and Cement Testing; Mixing and Measuring Concrete; Depositing and Finishing Concrete; General Theory of Flexure in Reinforced Concrete; Structural Applications.

Treatise on Concrete, Plain and Reinforced, Materials, Construction and Design of Concrete and Reinforced Concrete.—New Edition. By F. W. Taylor and S. E. Thompson. 807 pages; 237 figures. Cloth bound. Price, $5.00.

Designed for the use of architects and engineers. Treats the manipulation and uses of concrete for constructive and engineering purposes. Special chapter on concrete building construction, pages 608 to 636.

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Building Plans and How to Draw Them.—By I. P. Hicks. 75 pages. Illustrated. Price, 50 cents.

A series of practical lessons covering the steps necessary in drawing working plans of buildings.

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Perspective for Beginners.—By George Pyne. 168 pages; 86 illustrations. Limp cloth. Price, 80 cents.

Commences with the consideration of the instruments which the student of perspective drawing requires, and advances by easy steps until the most complex subjects are reached.

Practical Lessons in Architectural Drawing.—By Wm. B. Tuthill. 44 pages; 33 full-page plates (one in colors) and 33 woodcuts; showing methods of construction and representation. Cloth (oblong). Price, $2.50.

Shows how to make the working drawings for buildings. The work embraces scale drawings of plans, elevations, sections and details of frame, brick and stone building, with full descriptions and a form of specifications adapted to the same.

Architectural Perspective.—By I. P. Hicks. 36 pages. Illustrated. Cloth bound. Price, 50 cents.

A simple treatise for the use of beginners.

Blue-Print Making.—28 pages. Paper. Price, 25 cents.

Embracing directions for constructing the printing frame, preparing the paper, and making prints of various kinds.

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Stair Building in its Various Forms, and the New One-Plane Method of Hand-Railing.—As applied to Drawing Face Moulds, Unfolding the Center Line of Wreaths, thereby obtaining exact lengths of Balusters and also Unfolding Side Moulds; with Numerous Designs and Plans of Stairs, Newels and Balusters. By James H. Monckton. Contains 100 full-page plates with descriptive text on opposite pages. Bound in cloth. Size, 9 x 12 ins. Price, $4.00.

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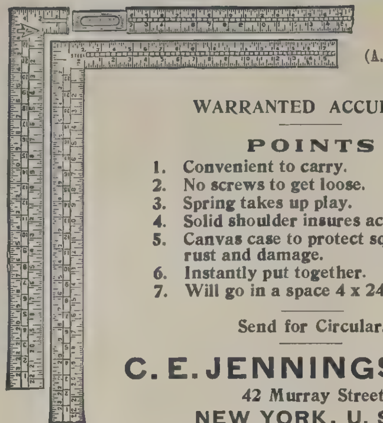

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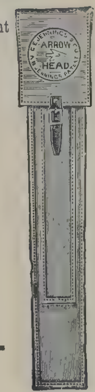

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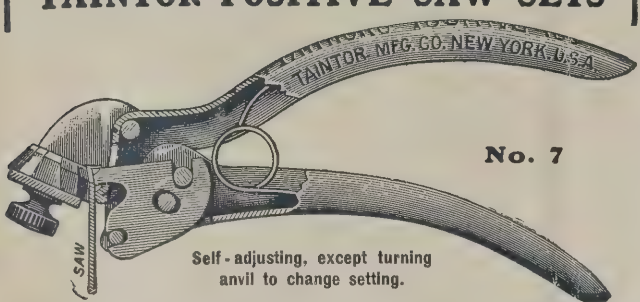

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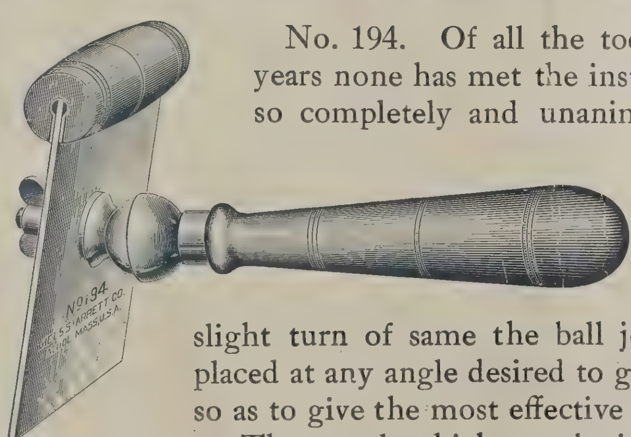

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