CARPENTRY AND BUILDING

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CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS
232-238 WILLIAM STREET, NEW YORK.

JANUARY, 1904.

Labor in the Building Trades.

One of the serious problems confronting business men just at the present time is the relation of organized labor to commercial affairs. Especially important is this matter to those engaged in the trades which are connected more or less directly with the building industry, which, perhaps more than any other, is the chosen field for the assertion of authority by the labor unions. The past few months have been marked by the curtailment of building enterprises in various parts of the country, caused partly by the many strikes and labor troubles which have hampered operations, partly by the high prices of building materials, and partly by the tightness of money, which has made it difficult to negotiate loans on a reasonable basis for large building schemes. Of these the first mentioned factor has been probably the most influential. The impediments placed by organized labor in the path of builders and contractors have seldom been so serious as they were this past summer. In New York City, especially, the entire building industry was paralyzed for months, when it should have been unusually active, in consequence of the exacting demands of the unions, which were met by the resistance of the associated employers. The influence of these disputes is far reaching. Where building strikes are on there is not only a stoppage of business in the many kinds of materials which would enter into the structures and a disuse of the tools of the mechanics, but factories, perhaps distant from the scene, feel the effect in a diminished call for their products. At the same time, an uneasy feeling is engendered, capital becomes timid, and in this way business suffers in many directions and a damper is put upon projected enterprise. This question has been with us for many years, and a satisfactory solution of the problem has yet to be found. It is generally recognized as idle to talk of doing away with organized labor, since it is proper for labor to do what it legitimately can for its own protection and advancement. In view, however, of the tendency of labor to go to unreasonable extremes in some cases, it is a fact full of promise that there is so general a disposition on the part of employers to come together in this matter. But further, and this is the most encouraging feature of the situation to-day, there is undoubtedly a growing inclination on the part of the more intelligent and broad minded representatives of both labor and capital to seek some common ground upon which they can agree to work, to the end of doing away with the disputes which have been detrimental to the interests of both in the past. A number of the more far seeing labor leaders have recently denounced in unqualified terms the unjustifiable and irresponsible strike and the sympathetic strike, the latter of which has done more harm in the building trades than in any other line of industry. It is, perhaps, too much to hope for a final solution of the complex labor problem in the near future, but it is gratifying to think that honest efforts are being made toward such a desirable consummation.

Temperature Regulation.

The effort to introduce apparatus for maintaining a given temperature in buildings, particularly school buildings, has received substantial encouragement only within the past few years. The benefits obtained by the use of such apparatus are becoming more widely known, and while considerable energy is still found necessary to secure the adoption of such systems in connection with large heating systems, it is clear that it is accomplished more easily than in the past. Sufficient business has been developed to support several establishments devoted entirely to the production of electrical, thermostatic and other devices required for automatic regulating systems. Through their use many manufacturing operations and mechanical apparatus are now governed automatically and much more satisfactorily than heretofore when the evenness of the temperature regulation depended upon the intelligence and close attention of some employee. For regulating the temperature and velocity of the air supplied by force blast heating systems in churches, schools and other large buildings, the superiority of the modern method has been clearly demonstrated. The manufacturers are entitled to no little credit for their enterprise in bringing devices designed for this purpose into more general use. Their efforts, however, have received less encouragement at the hands of the heating contractor and his customer than their appliances were entitled to. The march of progress will not be stayed, however, and whatever increases comfort and reduces labor must secure recognition. Moreover, temperature regulation, in many instances, accomplishes something more important than this. It is conducive to good health, and on this ground alone is worthy of careful consideration by all who have to do with the installation of apparatus for heating buildings. The use of such regulators in manufacturing plants is a simple question of dollars and cents, and will be settled on that basis; but where the health and comfort of school children and public audiences are affected, the heating engineer and contractor is responsible for any failure to utilize such advantages as are offered with this end in view.

Steam Regulation.

There can be no question that the study of economy in connection with the use of steam for heating apparatus by the Germans is largely responsible for the tendency toward the adoption in other countries of valves so constructed as to regulate the quantity of steam to the necessities and to reduce the waste. Many specially constructed valves and devices, more or less cumbersome and that still need perfecting, are in use abroad. There the demand for economy of fuel has induced investigation and study to secure the highest efficiency from the fuel used, and has also led the people to submit to the attachment to their heating systems of devices and apparatus for the economy of fuel that would not be tolerated here. While no effort to increase the efficiency and reduce the waste has been expended by the average steam heating contractor in this country, the practice and researches of the Germans have not escaped the attention of the live heating engineer. They have been an incentive to investigations along similar lines, and several concerns which devote themselves to exploiting special systems of heating have produced valves to be controlled automatically or by a thermostat, and also valves to be regulated in accordance with the requirements, so constructed as to facilitate the escape of air and the return of the condensed water from the heating surfaces without any waste of steam. At the present time there seems to be considerable activity on the part of the investigators in this field to perfect apparatus, particularly valves, that will make a satisfactory showing in efficiency, simplicity and cost. The engineers long since solved the problem of designing successfully operating two-pipe heating systems; they then devoted their attention to the one-pipe and circuit system, and fortunately they have not been satisfied with their achievements, but are now earnestly interested in the development of appliances that will reduce the cost of heating systems by enabling fewer valves and a smaller piping to be used, and at the same time reduce the coal bill, while affording acceptable service. Every confidence is entertained as to the success of their efforts, and an equal confidence is displayed that their perfected devices will find a good market and a growing demand.

Materials Used in Constructing Palace of Agriculture at St. Louis World's Fair.

Some rather interesting statistics are obtainable in connection with the construction of the Palace of Agriculture at the World's Fair at St. Louis and which afford one a faint conception, at least, of the magnitude of the structure. It is stated that in the roof are 1,062,400 square feet of surface, requiring 500,000 pounds of roofing felt, which was covered with 600,000 pounds of pitch and 3,375,000 pounds of gravel, thus making the combined weight of the paper, pitch and gravel 4,475,000 pounds. The bolts and rods used in joining the heavy timbers weigh 529,000 pounds. There were also used 2250 kegs of nails, weighing 112½ tons. There were 12,000 yards of plaster on the interior and 52,000 yards on the exterior, also 18,000 casts of staff 8 feet long, and in the construction of which was used 18,000 pounds of fiber. There were required 252,000 pounds of paint for the interior and an equal amount is said to have been used in painting the exterior.

For admitting light to the building there were provided 145,649 panes of translucent glass, each 18 x 23 inches, and requiring 10 tons of putty for the setting.

In erecting the building there were 796 posts, 60 to 67 feet in hight, each made by joining and bolting together four 10 x 12 inch timbers. There were 80 trusses, 106 feet long, each weighing 12 tons, and 536 smaller trusses weighing 7 tons each. The framework of the construction was completed by Caldwell & Drake, with a force of 750 men, in 46 working days, and the claim is made that if the occasion had demanded faster work it could have been done in 30 days.

Conventions of Brick and Tile Makers.

The Executive Committee of the National Brick Manufacturers' Association have decided to hold the eighteenth annual convention in Cincinnati, Ohio, February 1 to 13, inclusive. At the same time will be held the sixth yearly meeting of the American Ceramic Society. The headquarters during the convention will be at the Grand Hotel, where facilities will be offered for exhibition purposes. In this connection it is interesting to remark that the first convention of the Brick Manufacturers' Association was held in Cincinnati in September, 1886, when less than 50 of those who had signed the call gathered for the purpose of organizing the association. Since then the membership has steadily grown, until it now numbers over 500, and Secretary T. S. Randall expresses the belief that the coming meeting will be celebrated by a larger attendance than at any previous convention.

The Iowa Brick and Tile Association will hold its twenty-fourth convention on January 20 and 21 at Mason City, Iowa.

The Wisconsin Clay Workers' Association will hold its fourth annual meeting early in March at Portage, Wis.

The Illinois Clay Workers' Association will meet at Danville, Ill., on January 5 and 6, with headquarters at the Plaza Hotel.

Fire Proof Stairways.

It is interesting to note the views of our contemporaries regarding matters of a local nature, more especially if they contain suggestions of practical value. A case in point is the comment found in a recent issue of the *Brickbuilder* touching changes in the New York building laws regarding stairways in fire proof buildings, which is as follows:

However much question there may be as to the equitable manner in which New York building inspectors are permitted to exercise their discretion, the building law of that city is in many respects the best in the country, and it goes into scientific details to an extent that no other municipal ordinance has followed. The changes which from time to time have been made have been on the whole judicious ones and in accordance with scientific knowledge, and if the laws are not rightly enforced or do not always produce the best results, the trouble is seldom with the wording of the statutes. One of the latest changes is in regard to stairways in fire proof buildings. Heretofore, a construction including iron stringers, cast iron risers and slate or marble treads was considered sufficient; but it was found by fatal experience that the combined action of sudden heat and water would so shatter either marble or slate that a platform or tread might be totally inadequate to bear the weight of a single individual. The law consequently now provides that where slate or stone is used, such material shall rest upon a solid tread of wrought or cast iron. Unfortunately compositions of concrete, which in our judgment are quite as liable to disintegrate as either marble or slate, are still allowed to pass the law. Undoubtedly the most perfect construction which could be devised for this purpose would be hollow terra cotta blocks, which have been made to form the riser, tread and soffit of each step in a single piece, and which can be built up in place in same manner as some of the older constructions in stone so as to be self supporting and not requiring the use of steel.

THE hight of the New York Times Building is to be increased by the addition of two and one-half stories, thus making the total 16 stories. The plans for the alterations have been filed by Robert Maynicke, as architect for the company who own the structure. It is intended to take down the two upper stories of the present structure and rebuild them with a façade of brick and limestone. The new stories to be added will be of terra cotta with brick backing. A new passenger elevator will also be installed, the entire cost of the improvement being placed at $160,000. The present structure was built in 1887, and replaced the original Times Office, which was on the site of the Old Dutch Church. It is thought that the plan to add to the hight of the present Times Building is in anticipation of converting it to office purposes when the *Times* will occupy its new home, now under construction, at Broadway and Forty-second street.

THE convention of the National Association of House Painters and Decorators of the United States and Canada will be held in the Temple Building at Toronto, Canada, on February 9 to 12 inclusive of the coming year. The headquarters will be at the King Edward Hotel, and it is expected that the convention will mark the beginning of a new epoch in the history of the Master Painters' Associations.

COLONIAL RESIDENCE AT WEBSTER GROVES, MO.

WE take pleasure this month in bringing to the attention of our readers a Colonial residence erected a few years ago in what may be termed a suburb of the city of St. Louis. The half-tone plates which accompany this issue are direct reproductions from photographs taken especially for *Carpentry and Building.* One plate shows the appearance of the finished house, and the other a view in stair hall looking toward the rear of the building. A careful study of the floor plans will show the disposition of the interior space to be such as to provide a large reception hall on the first floor, which extends practically the entire depth of the building, the main stairs rising about midway and landing near the feet and of the second 9 feet 6 inches, all in the clear. The girders in the cellar are constructed of three 2 x 8 inch pieces, set 2 inches below the ceiling, with 2 x 4 inch pieces nailed on each side to receive the joists. The sills are of the boxed variety, and anchored with ⅝-inch bolts every 8 feet and 18 inches each way from the corners. The bolts are fastened to 2 x 4 inch pieces 2 feet long, built in the wall 3 feet below the sill. The first and second story joists are 2 x 10 inches, the collar beams and rafters 2 x 6 inches, placed 24 inches on centers, with hip rafters 2 x 8 inches and valley rafters 4 x 8 inches.

Front Elevation.—Scale, ⅛ Inch to the Foot.

Colonial Residence at Webster Groves, Mo.—A. Blair Ridington, Architect.

center on the second floor, from which all the principal rooms are readily accessible. At the right of the reception hall is the parlor, connecting with a library in the rear, these two occupying the depth of the house. To the left of the reception hall is the dining room, which connects with the kitchen beyond by means of a commodious pantry, provided with butler's sink, cupboards, store closet and other equipment in keeping with a modern up to date dwelling. From the kitchen a flight of stairs leads to the cellar, while from the back hall a flight leads to the rear of the second story, and lands near the store closet and servant's room. On the second floor are three sleeping rooms, a children's room, a sewing room and a bathroom, all provided with clothes closets of ample dimensions.

According to the specifications of the architect, the house rests upon a foundation of rubble masonry and covers an area 41 feet 10 inches by 38 feet 8 inches. The hight of the cellar is 7 feet 3 inches; of the first story 10

The studs are 2 x 4 inches, placed 16 inches on centers, and have a row of zigzag bridging throughout each story. The exterior wall studs are 2 x 6 inches, studs being doubled at the sides of openings and trussed over door and window openings. The porch joists are 2 x 8 inches, and are carried on double girders resting on cedar posts which extend to a rock footing 3 feet in the ground. The rafters and ceiling beams are 2 x 6 inches and 2 x 4 inches, respectively, placed 24 inches on centers.

The outside frame of the house is covered with 1-inch yellow pine sheathing, placed diagonally for a hight of 8 feet on each corner. On the sheathing are two layers of rosin sized sheathing paper well lapped, this in turn being covered with siding laid 4 inches to the weather. The roof is covered with Oregon cedar shingles.

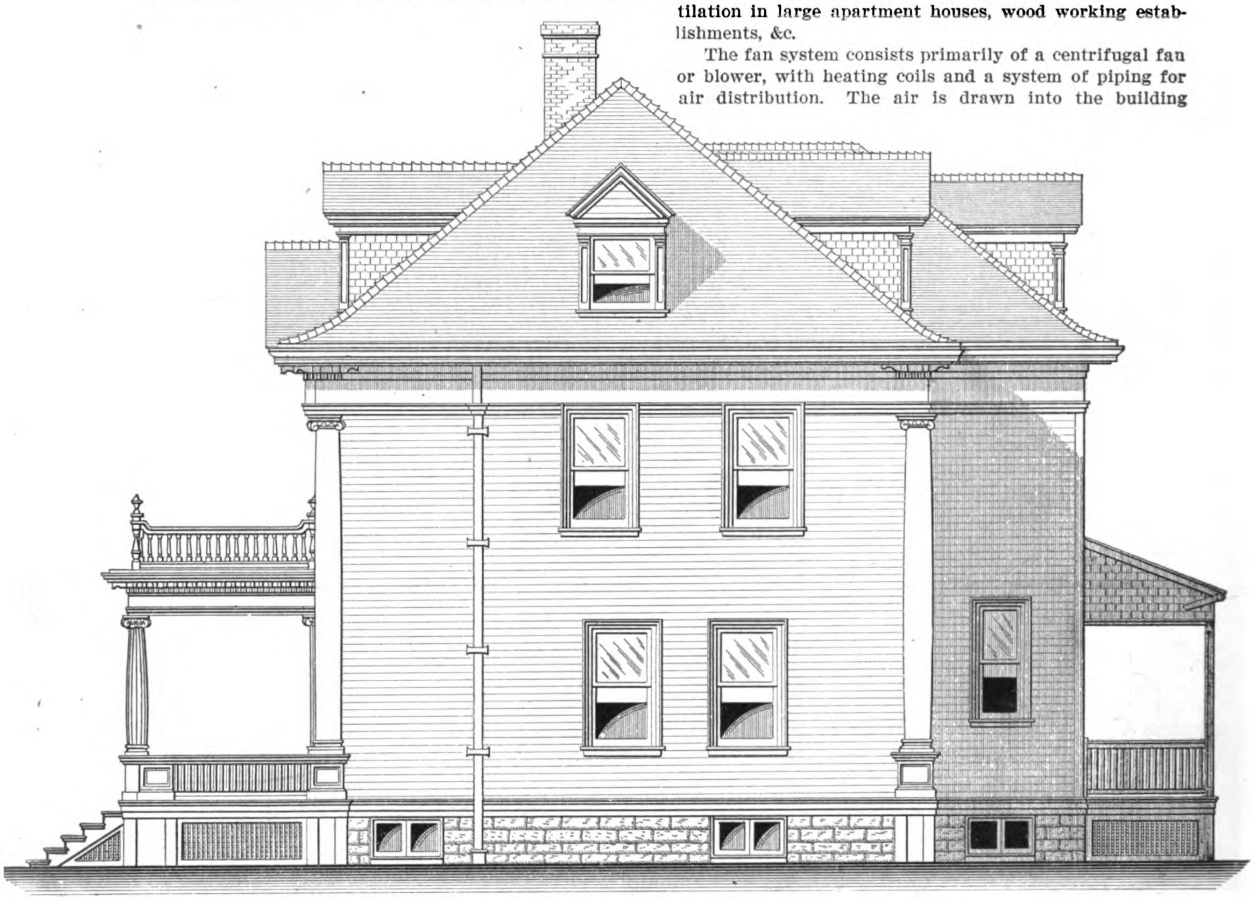
The first and second stories of the house have a double floor of 1 x 6 inch yellow pine, laid diagonally, while the attic is floored to the plate, with 3¼-inch face yellow pine flooring. The library, dining room and hall have a top floor of 2½-inch face yellow pine, while the second floor and the balance of the first have a 3½-inch face yellow pine top floor, laid after the plastering was finished. The porch floors are of 1⅛-inch pine, laid with white lead joints. The third story balcony has a tar roof under it so as to avoid any possibility of leaking.

The trim throughout the house is of 5-inch molded plaster finish, with turned corner blocks and molded plinths, with 10-inch base and lip molding, except in the main portion of the first story, where they are mitered and have one member head mold. All interior finish is of cypress, with doors, panel backs, &c., to match. The kitchen, bathroom, rear hall and rear stairs have a 3½-inch molded wainscot cap and base. The entire first and second stories, as well as the finished portions of the attic are lathed and plastered, while the kitchen, rear halls and stairs and bathroom have Stone brand cement wainscot 5 feet high, troweled to a smooth finish and tooled into tiling. The library has a rough sand finish.

In the laundry is a 20 x 30 inch cast iron sink with Fuller bibbs. In the kitchen is a 20 x 30 inch enameled iron sink and a 40-gallon galvanized iron boiler. In the bathroom is a low, roll rim, enameled iron, French pattern bathtub, 5 feet long, with Fuller combination bibbs and nickel plated fixtures; a water closet with low down tank and a 15 x 17 inch oval stone china bowl, with 20 x 30 x 10 inch white Italian marble slab with brass nickel plated brackets.

The house is wired for incandescent lighting and electric call bells, and is heated by a Front Rank steel furnace, with registers as indicated on the plans, made by the Front Rank Steel Furnace Company of St. Louis.

The building here shown was built for Prof. Ernest R Kraeger in Webster Park, Webster Groves, Mo., in accordance with drawings prepared by A. Blair Ridington, architect, of 620 Chestnut street, St. Louis, Mo.



Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

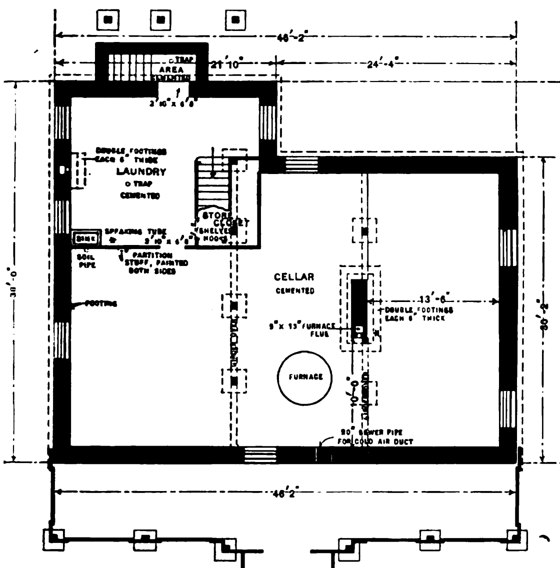
Colonial Residence at Webster Groves, Mo.

Heating and Ventilating a Factory Building.

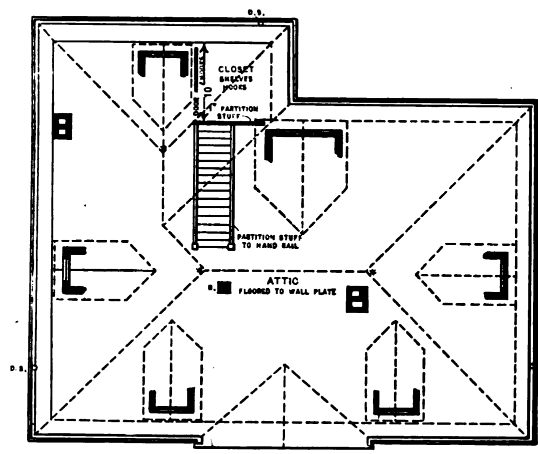
The heating and ventilating of modern shops and factories are important considerations, though in many of the older works they do not appear to have been considered at all. It is, of course, not only a question of comfort for the employees, but also one for the employers. Formerly the hands often had to work during the cold winter months with the temperature so low as to necessitate the wearing of extra heavy apparel during working hours, and benumbed fingers were quite common, while a stove in one end of the works tried to heat the entire area of the shop. The fan system of heating and ventilating has now so altered these conditions that it is no longer difficult to solve the problem of heating and ventilation in large apartment houses, wood working establishments, &c.

The fan system consists primarily of a centrifugal fan or blower, with heating coils and a system of piping for air distribution. The air is drawn into the building through the heaters, warmed either with exhaust or live steam, and distributed under a slight pressure through pipes or ducts having suitable outlets in the shops. The advantages of such a system are: The heater or heaters can be situated centrally in the basement of the building, thus saving in cost of attendance and preventing damage from freezing up steam pipes in exposed places; that the air supply and the temperature are under perfect control; that the temperature is capable of regulation for different rooms; that drafts are nearly eliminated and that any required volume of pure air can be supplied, and, in addition to this, the system has the great advantage of combining heating with ventilation.

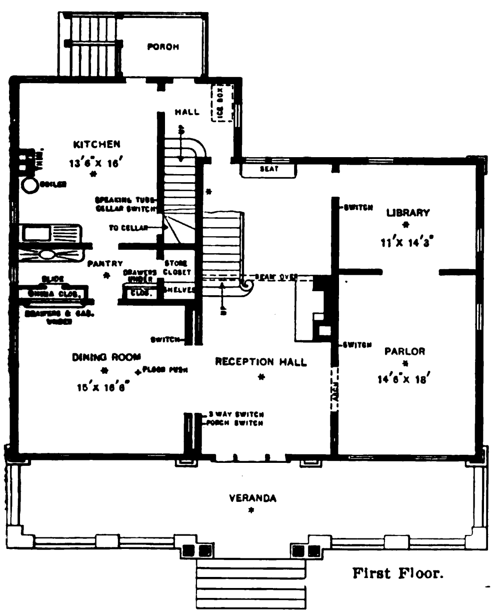
As a practical illustration of heating and ventilating a large wood working establishment, a brief description of a furniture factory, at Medina, N. Y., is here given, says a recent issue of the *Wood Worker*. This plant was installed in the fall of 1902, in three separate buildings, having a total capacity of 487,000 cubic feet. The buildings, although standing in an open space, are not greatly exposed to winds. The largest building, containing the apparatus, consists of basement with two stories above, each forming an entire room, with ceilings 13 feet high. At the northern end, and adjoining the main building, is the dynamo room. The second building consists of three stories, the lower story containing one room, the second floor three rooms and the third one. The third building has two stories. The first story is occupied by the wood shop, in the northern end of which is the carving department.



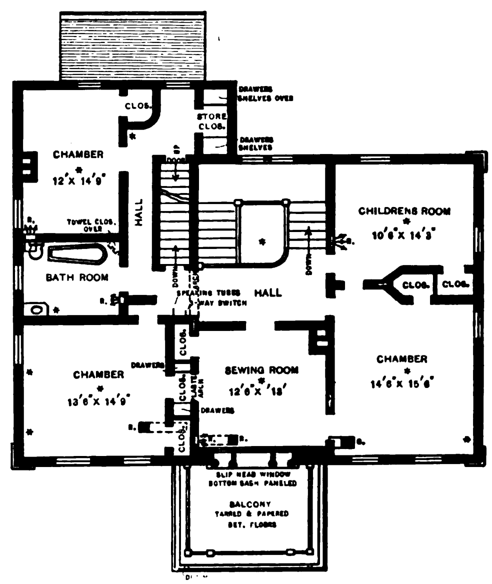
Foundation.



Attic and Roof Plans.



First Floor.



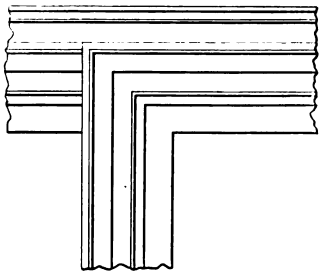
Second Floor.

Colonial Residence at Webster Groves, Mo.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

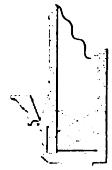
ment. That part of the second story directly over the wood shop is without ceiling and was not intended to be heated; however, the piping for the entire building was placed in this part, with drop pipes leading to the lower floor. All the buildings are of wooden frame construction, with one thickness of matched boards and tarred paper on the outside of the joists and one thickness of tarred paper and matched boards on the inside, making a very warm construction. With one exception, all the rooms are floored and ceiled with matched boards. There is, however, considerable glass surface, especially in the carving department at the front end of the wood shop, which has a northern and western exposure, with nearly one-half glass surface; this part having also an unceiled roof, which is 22 feet above the floor, allowing the warm air to rise and become rapidly cooled.

The apparatus, which is located in the basement of the first building, consists of a three-quarter housing double discharge fan, with a 92-inch blast wheel, directly connected to a 7 x 8 inch side crank engine and drawing through six sections of heater. The air is taken entirely from outside. The main discharge of the fan is horizontal, and supplies the first and second mentioned buildings, the small vertical discharge supplying the third building alone.

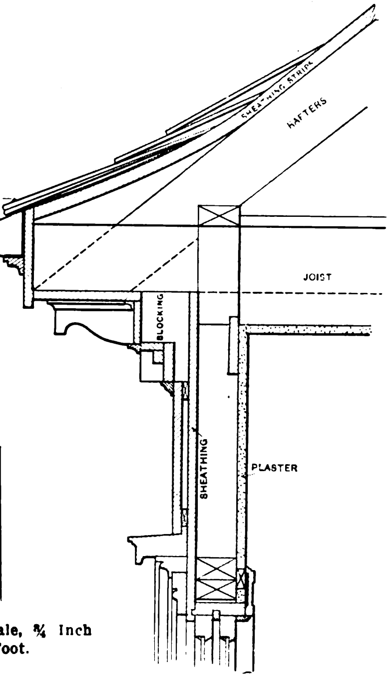
From the fan discharge two horizontal branches are taken through the basement. Four vertical risers from these horizontal branches supply the first and second floors of the first building, while a continuation of one of these branches supplies all three floors of the second building. The vertical discharge turns abruptly over and leads through a horizontal protected pipe to the second floor of the third building, whence it divides into two branches, from which three drop pipes lead to the first floor and horizontal discharges to each of the three rooms on the second floor. Thus each room, large and small, is supplied, summer and winter alike, with fresh, pure air. The workmen no longer complain of cold and drafts, but find it a pleasure to labor under such comfort-



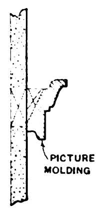
Detail of Window Finish.—Scale, 1 Inch to the Foot.



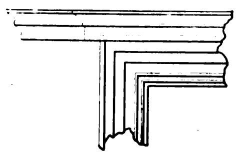
Section through Head Casing. — Scale, ¾ Inch to the Foot.



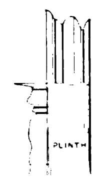
Details of Main Cornice.—Scale, ¾ Inch to the Foot.



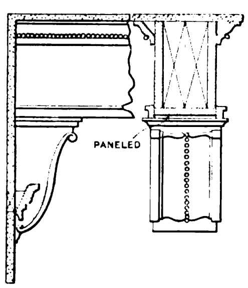
Section of Picture Molding.—Scale, 1½ Inches to the Foot.



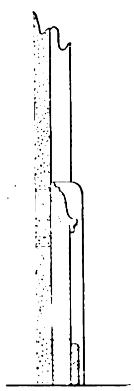
Detail of Trim.—Scale, ¾ Inch to the Foot.



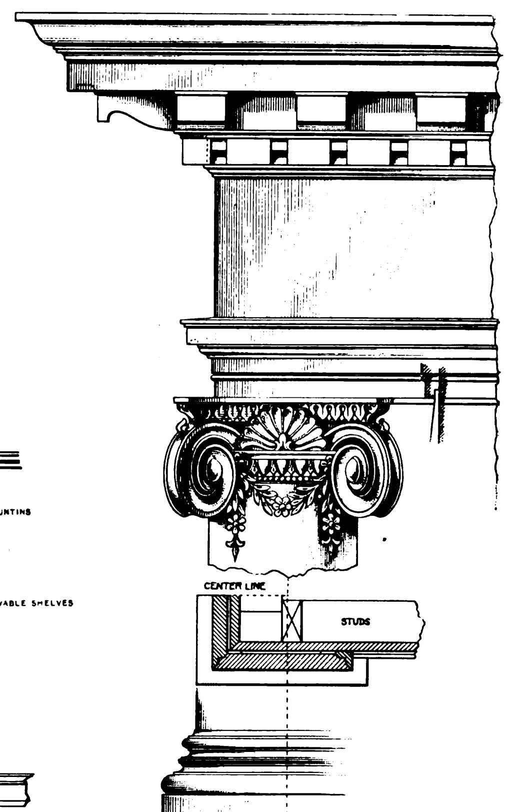
Plinth Block.—Scale, ¾ Inch to the Foot.

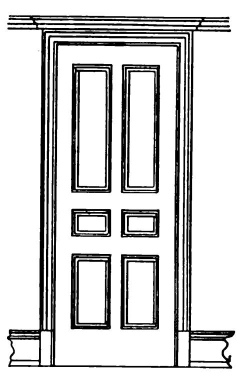


Section and Elevation of Beam in Reception Hall.—Scale, ¾ Inch to the Foot.

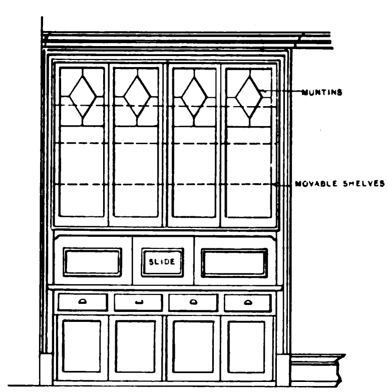


Base.—Scale, 1½ Inches to the Foot.





Elevation of Doors in Parlor, Dining Room, Library and Reception Hall.—Scale, ¾ Inch to the Foot.



Elevation of China Closet.—Scale, ¾ Inch to the Foot.

Elevation of Main Cornice, with Details of Pilaster.—Scale, ¾ Inch to the Foot.

Miscellaneous Constructive Details of Colonial Residence at Webster Groves, Mo.

able circumstances. It is safe to say that the fan system, as applied to heating and ventilation of large factories of this character, will soon obliterate entirely the old and antiquated methods which have so long been in use.

Concrete Column Foundations.

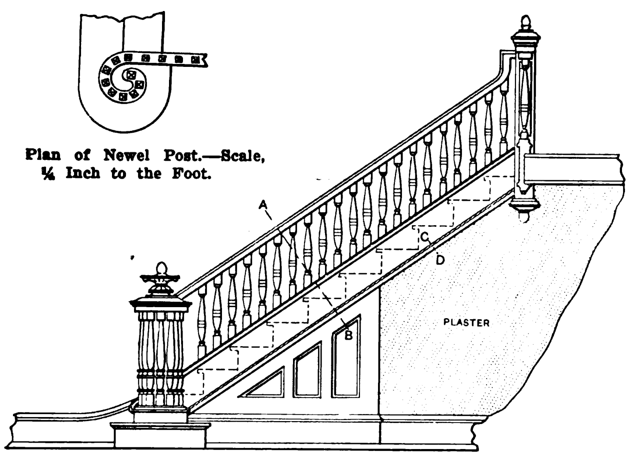
In the construction of the new building of the New York Historical Society on Central Park West, between Seventy-sixth and Seventy-seventh streets, this city, an interesting problem developed in connection with the foundations. The building is three stories in hight, with a basement floor only 12 feet below the level of the curb. although the foundations extend to an average depth of 75 feet. In referring to the difficulties encountered in the execution of the work, the senior member of York & Sawyer, the architects who planned the structure, describes the method of procedure as follows:

"When we had uncovered a few feet of the surface earth we saw that the whole lot was a mud hole, pure and simple. Although the building is to cover a very large area in proportion to its hight, and hence the weight per square foot of area is proportionately small, it was impossible to begin operations until we struck bed rock. Borings were made, and they developed unexpected difficulties. In some instances a depth of less than 20 feet was reached when apparently solid rock was struck. As it has turned out, however, we were working on 'made' ground. The rocks we found to be bould-

rooms, having accommodations for 4500 pupils. The offices of the principals will be on the first floor, and the main entrace will open directly on the stairways leading to the auditorium, the gallery of which is on the first floor level. This auditorium will seat 1600 persons, and will have its main floor in the basement proper.

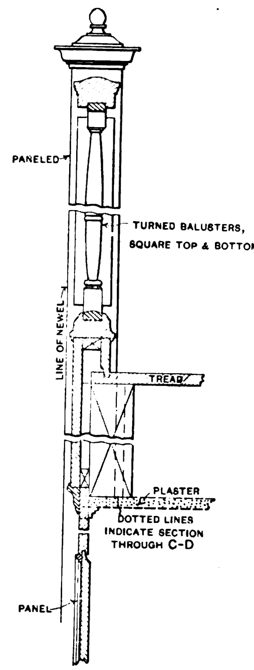
A House of Beer Bottles.

Aside from its being famed on account of its vast mineral resources, Tonopah, Nev., also occupies the unique distinction of numbering among its inhabitants a man who is able to live in a glass house, and throw unlimited quantities of stones at the same time without suffering any of the serious inconveniences popularly supposed to surround such an association. Not a tree grows within 60 miles of the great mining camp, and very naturally building material and fuel bring all sorts of



Plan of Newel Post.—Scale, ¾ Inch to the Foot.

Elevation of Main Stairs.—Scale, ¼ Inch to the Foot.



Section of Main Stairs on Line A B.—Scale, ¾ Inch to the Foot.

Details of Stair Construction in Colonial Residence at Webster Groves, Mo.

ers, which had been used in filling in the lot. To sink a caisson in such soil was out of the question, as the blasting necessary would have destroyed any caisson ever built. Accordingly concrete columns were decided upon. The mud was cleared away, the boulders blasted out, and the excavations continued down to solid rock. Once the concrete columns were finished the bridging them over with structural steel was a comparatively easy matter, and the completion of the basement and retaining walls took little time."

The relation of the amount of actual construction below ground to that above is approximately as two to one, the hight of the building being about 36 feet. Under the present style of construction the average proportion of the depth of foundations to the hight of the buildings themselves is about as one is to six.

A Large Public School Building.

What is said to be the largest public school building in the United States is about to be erected on the north side of Hester street, between Essex and Norfolk streets, New York City. It will be six stories in hight, with basement and sub-basement, and will be in the French Renaissance style of architecture. The cost is placed at $518,000. The interior will be divided into 100 class

fancy prices, the commonest kind of lumber selling for $66 per 1000 feet, while inferior grades of scrub cedar command $22 a cord. Consequent upon this condition, various subterfuges are resorted to in the architectural make up of Tonopah. There are houses made of straw, of burlap sacks trimmed with blue jean overalls; of tin from 5-gallon oil cans; of dry goods and cracker box lumber; of mud, stone, tents, cloth—in fact, almost every sort of contrivance is resorted to as a makeshift for a place of habitation; but it has remained for William F. Peck, a miner, to devise a house in a class by itself. He has constructed of empty beer bottles a house 16 x 20 feet in the clear, with ceilings 8 feet high, and containing two rooms. It was built in October of last year by Mr. Peck entirely unaided, at such odd moments as he could spare from his regular duties at the mine. Ten thousand empty beer bottles were incorporated in the structure. The inside walls are plastered with mortar, which is spread to a depth sufficient to cover the protruding bottle necks, thus making a smooth surface. Mr. Peck, says the Kansas City *Star*, lived all last winter in his peculiar abode with his wife and two children, a girl of seven and a boy of three years, and says, while the temperature in many residences of Tonopah reached the freezing point quite often, his family found their glass house exceedingly comfortable at all times.

NATIONAL BUILDING TRADES EMPLOYERS' ASSOCIATION.

AFTER a session lasting three days a convention of building contractors from all over the country perfected the preliminary organization of a national association, to be known as the National Building Trades Employers' Association. On the floor of the convention were seated 168 accredited delegates, representing 123 associations in 71 cities, embracing 18 States of the Union. The call for this association was issued by the Chicago Building Contractors' Council, of which W. B. O'Brien is president and E. M. Craig secretary, the object in general of the association being to secure freedom to the building contractor from the long series of oppressions and injustices to which he has been subjected by labor organizations and their walking delegates.

When the convention met Thursday morning, December 10, it soon became evident that there were two widely differing sentiments among the members. The New York Building Trades Employers' Association, represented by Benjamin D. Traitel and James R. Strong, was soon recognized as the leading exponent of the closed shop idea. As is well known, building contractors in New York City have an arrangement with the labor unions, on the one hand, and the supply men, on the other, by which it is difficult for out of town contractors to successfully bid on work in the city. These gentlemen made a valiant fight for the adoption of the same plan in other cities. On the other hand, the overwhelming sentiment of the delegates from every point, except possibly Washington, D. C., and Buffalo, N. Y., seemed to be in favor of an organization that should stand for the open shop. The sessions of Thursday and Friday and the morning session of Saturday were devoted to an effort to find some ground on which these two widely differing elements could unite, but without avail; and Saturday afternoon and evening a platform was adopted and resolutions passed which practically pledge the association to the open shop idea in the following preamble:

Objects Stated.

The objects of this association shall be to promote and protect the interest of its members; to maintain just and equitable treatment in their relations with each other and with their employees; to promote and protect the business interest of the members of this association, to the end that the confidence of the building public may be sustained, and that continued and uninterrupted prosperity in the building industry may be assured; to encourage the formation of associations of contractors in every community in the country, all in strict conformity with the Constitution and laws of the United States; but there is no intention, nor shall there be any action, on the part of this association to control or in any way deal with prices or restrict competition.

A resolution was formed, with the following eight cardinal principles as a basis of the dealings of the employers of the association with their employees:

1. No limit to amount of work a man can do in a day.
2. No restriction to use of machinery and tools.
3. No restriction to use of manufactured materials, except prison made.
4. No person to have the right to interfere with workmen during working hours.
5. The use of apprentices shall not be prohibited.
6. The foreman shall be the agent of the employer.
7. All workmen shall be at liberty to work for whomsoever they see fit.
8. All employers are at liberty to employ and discharge whomsoever they see fit.

Resolutions were also passed, heartily indorsing President Roosevelt's decision in maintaining in Government service the principles of the open shop.

The adoption of the open shop principles made it impossible for the New York City delegation to ally itself with the National Association, and the delegates from Buffalo, New York and Washington, D. C., also refrained from pledging their alliance until they should return and receive instructions from their associations.

During the last session of Saturday, the following general officers were elected to hold office until the next annual meting, which is to be held on the third Tuesday of January, 1905, at a place to be selected by the Executive Committee:

President, Wm. D. O'Brien of Chicago, Ill.
First Vice-President, H. C. Gillick of St. Louis, Mo.
Second Vice-President, Thomas H. Doane of Providence, R. I.
Third Vice-President, C. J. George of Detroit, Mich.
Secretary, E. M. Craig of Chicago, Ill.
Treasurer, S. Keigley of Pittsburgh, Pa.

Executive Committee to Carry on Active Work.

The work accomplished during the six sessions held in the three days' life of the convention was indefinite and general, but an Executive Committee was appointed on which should sit one member from each State represented, this committee to have wide discretionary powers in perfecting the organization and inaugurating its work. The Executive Committee consists of the following members:

Geo. H. Asire of Logansport, Ind.
John M. Hartwig of Peoria, Ill.
H. R. Edwards of Racine, Wis.
A. E. Pearson of Orange, N. J.
A. C. Swayze of Kansas City, Mo.
C. J. George of Detroit, Mich.
J. C. Loomis of Cedar Rapids, Iowa.
Albert Neukom of Toledo, Ohio.
J. C. Wilson of Pittsburgh, Pa.
J. Henry Miller of Baltimore, Md.
H. C. Wood of North Adams, Mass.
L. D. Campbell of Duluth, Minn.
Milton Council of Topeka, Kan.
John H. Harte of Omaha, Neb.
A. Mungiven of Providence, R. I.

The president, first vice-president, secretary and treasurer of the association itself are *ex-officio* members of the Executive Committee.

This committee will meet in Chicago in about 30 days, at which time it will pass upon the constitution and by-laws drafted by the Special Committee for that purpose as described below, decide upon what shall be the dues and assessments, discuss and decide upon means for widening the scope of the association and inaugurate a propaganda on behalf of the association which shall have for its ultimate object the enrollment of every employing association connected with the building trades in the United States.

Committee on Constitution and By-Laws.

A Special Committee of ten members was appointed to draft constitution and by-laws. It is understood that this committee will begin its labors immediately in this direction, reporting to the Executive Committee for final approval. The *personnel* of the committee is as follows:

R. A. Edgar of Columbus, Ohio.
Chas. F. Buente of Pittsburgh, Pa.
John Bonnett of Milwaukee, Wis.
P. C. Campbell of Grand Rapids, Mich.
Adam Bauer of St. Louis, Mo.
H. C. Wood of North Adams, Mass.
F. T. Houx of Sioux City, Iowa.
C. F. Byrne of Chicago, Ill.
J. H. Miller of Baltimore, Md.
R. M. Abercrombie of St. Joseph, Mich.

Speculation and Misinformation Rife.

Inasmuch as all the sessions of the association were secret, much of the material published in the Chicago dailies and thus disseminated widely throughout the country is entirely erroneous, representing the imaginative powers of the representatives of Chicago papers who hung about the outskirts of the meeting hall. The fact is, as is outlined above, the real work and the definition of the powers and methods of the association have been left largely to the Executive Committee, and will not be defined until that committee shall have met and completed its work.

A spirit of intense earnestness actuated the delegates who attended this convention. They all spoke in the tone of men who had reached their last ditch and were determined to adopt some basis of concerted effort that would restore to them at least some of their inherent and constitutional rights.

The Banquet.

Members of the association, with their guests and supply men to the number of 300 or more, sat down to a banquet in the Auditorium banquet room at 8 o'clock Friday night, December 11, as guests of the Building Contractors' Council of Chicago. W. D. O'Brien, Chicago, was toastmaster, and his opening toast to the President of the United States, "The Man Who Dared to Say 'No,'" was received with uproarious cheers and applause.

F. P. Bagley, a Chicago marble dealer, answered to the toast of "Organization." He stated that a year ago marble manufacturers of the leading cities of this country were conducting their business with difficulty, and that this condition was particularly distressing in the city of Philadelphia. The dealers did not stand together and the unions did. It reached the point where unions forced the marble men to pay ten and eleven hours' pay for eight hours' work, reducing the Philadelphia marble interest to a point where the work in that city was done by outsiders, and the local men could only take the small jobs which no outsider wanted. The same condition existed in Chicago, but in a little less aggravated form. Finally the manufacturers, in February, 1903, from 12 cities outside of New York and New England, met at Pittsburgh and formed an association, at which they decided to handle their business on a national basis. The Executive Committee of the new association met the grand officers of the national marble workers' union at Buffalo, and after a three days' session passed what is known as the Buffalo resolution founded on the rules that had worked so successfully between the stove manufacturers and the iron molders. Among the cardinal principles of this agreement was that conciliation, not arbitration, should prevail, equal numbers of both employing and employed classes meeting and coming to a decision without a referee. The hours of labor were reduced to nine hours at the same wages the men had been getting in some cities for ten to eleven hours' work, and the labor officials specifically agreed that competing firms not members of the association were to be compelled to come to the same basis. A little later members of the association discovered that the national labor organization had openely violated its agreement and furnished men to set work made by outsiders who were compelling the marble workers to labor 11 hours in their shops, and subsequently the same labor officials coolly informed the association that the Buffalo resolutions would no longer be respected. Disgusted at this treatment, the association met and decided to fight for their rights thereafter on the open shop basis, and notices were posted in all factories, stating specifically the reasons for this move. The result of this disregard of agreement on the part of labor leaders is that to-day 40 factories in 12 leading cities, except Chicago, are running on the open shop basis and union men are working in these shops where places were left for them. The same thing would have been accomplished in Chicago had it not been for the steam power council, who pulled their engineers out of the factories, leading to a quick massing of the employing interests for protection in a secret organization. Seeing that the employers had formed an undivided line of defense, the unions weakened and asked the privilege of going back to work, the non-union men employed in the meantime to be discharged. This the employers refused to do. The next move on the part of the unions was to try to fight local dealers and to allow contractors from Baltimore, Cincinnati and other cities to enter this market and compete with the local interests. In two prominent cases—the New Granada Hotel and the Hartford Building—the owners have stood by the marble contractors and refused to consider bids from outside sources. To-day as a result of the oppressive measures inaugurated by the labor leaders 40 or 50 manufacturers of marble in 12 cities have firmly organized and are working in harmony.

Another feature of Mr. Bagley's address was a statement that 30 days after they had made their Buffalo agreement to employ none but union men the quality and quantity of work dropped to the basis of ruinous inefficiency; that the whole time and effort of their foremen had to be devoted to endeavoring to encourage and urge the men to do the work for which they were paid, and that notwithstanding this falling off in quality and quantity of product members of the union were actually fined repeatedly for doing more than they should. The *esprit du corps* of the shop was gone, and good men, willing to work honestly in the interest of their employers, were afraid to do so. Mr. Bagley insisted that the only means by which the open shop policy could be maintained by the members of the Building Contractors' National Association was by absolute loyalty to the organization on the part of every member. "We can be free," said he, "if we are brave enough to use freedom. The advantages of a free country are dependent upon the realization of the responsibilities that come with freedom."

H. C. Gillick of St. Louis, whose address was on the "World's Fair Builders," paid a tribute to the soldiers at Valley Forge, suffering in defense of their rights denied by foreign oppressors, as being the real builders of the Centennial at Philadelphia in '76, of the World's Columbian Exposition in Chicago in 1893, and of the World's Fair next year. He stated that had it not been for tyranny in another form—the unjust demands of labor, both in the shop and on the ground—the St. Louis Fair would have been ready in 1903, the centennial anniversary of the Louisiana Purchase. His tribute to President Roosevelt as a man who had the courage to uphold the Constitution in the face of the storm of threats on the part of labor was received with great and prolonged applause.

Wm. Powell of Pittsburgh delivered the most eloquent and finished address of the evening. He said that employers were now in the position of "Faithful" in "Pilgrim's Progress." They were beset by lions not only in front but on every hand, but that if they but had the courage to stand together they would discover before long as did Faithful that the lions were chained. "We have rights," said he, "and we will obtain them if we stand on the platform which we shall form in this convention regardless of individual loss of money and time." He outlined this bill of rights:

1. The right to employ or discharge whom we please.
2. The right to pay what wage the work is worth, the employer to be the judge and supply and demand the jury.
3. The right to demand a full day's work for a day's pay.
4. The right to demand that no superintendent be a member of any organization while acting as superintendent.

"With these rights well in mind," said he, "standing shoulder to shoulder, we may entertain the hope some day of having the power to run our own business. The contractor in the last few years has had to be as gentle as a dove and as meek as a lamb; he has had to have the skill and patience of the spider, and he has had to work 16 hours himself to his workmen's eight."

The following figures were given by the speaker as an example of the influence of labor unions on the building operations in the city of Pittsburgh: In 1901 the value of work done in Pittsburgh was $23,867,160; in Allegheny, $2,748,125; balance of county, $6,318,300; total for city and county in 1901, $32,933,585. In 1902 this fell to $30,547,000, and in 1903 it will be $2,300,000 less; this in the face of unprecedented prosperity in the city of Pittsburgh up to a few months ago, and the insistent demand for more buildings with capital ready to put them up. "Owners," said he, "have plans for buildings worth hundreds of thousands of dollars that are laid on the shelf, not so much because of the excessive cost of labor and materials, but because of the very great uncertainty and the knowledge that the construction of the buildings would require double the time it should. Hundreds of thousands of dollars' worth of work is unfinished to-day which should have been done months ago but for repeated strikes. Let us stand together," urged the speaker, "marching shoulder to shoulder, until we perform this God given mission—God given because, while it is better for ourselves, it is also infinitely better for our men and the general country."

Victor Falkenau of Chicago, contractor, gave a witty address on "Agreement," and told at some length of the struggles which the building trades went through in 1900.

An indication of the spirit of the evening was the cheering and applause that greeted a topical song rendered by the Glee Club, the refrain of which ran:

"Contractors, you shall be free,
When shops are open wide."

James R. Strong of New York spoke on "Benefits of National Organization," and showed how the formation of such an organization is in regular process from the local organization. At first local organizations in individual trades find that it is necessary for them to band together for mutual protection because of interruption from the unions of allied trades, making a central local employers' organization necessary. Then it is discovered interference by contractors and labor interests in other cities make a national organization necessary to cope with the great power of the labor organizations. The aims of the national organization are necessarily broader than those of the local organization. The interchange of ideas, for instance, of 200 men, such as had been gathered in convention hall that day, has been of inestimable benefit to each individual. United action is necessary, and with this united action it will doubtless be possible to accomplish justice without a national lockout; but should it be necessary to declare a national lockout, every member of the association should sink his personal interest in the good of the cause. This association will be a power acting on conservative and broad lines, and any conclusion that is arrived at by so great a body of men is sure to be pretty nearly right. The organization should have the power to stop building operations in any city if necessary. "We are here for fair dealing," said he, "but if, after giving the laboring men every opportunity to earn good wages in exchange for honest work, they make unjust demands, then comes the time for action."

W. C. Gindele, a Chicago contractor, delivered an address on "Organized Effort," quoting liberally from an address delivered by W. H. Hunt of Cleveland before the Builders' Exchange in December, 1902. Mr. Gindele stated that it was not an impulse but a natural law that led to the organization of labor and the organization of the employers. Organized effort is the secret of development in commerce and industrial law. The spirit of fraternity and of mutual protection and advancement is the key note of our civilization. The contractors have a righteous cause. Trade, commerce and business organization mean more to the man who believes in organization as an institution than any other factor of our civilization. The vocation of the builder is pre-eminently significant of creation and advancement. The builder occupies the middle ground between producer and consumer. His prosperity is the nation's prosperity; his adversity is the nation's loss. In following out the plans of the association success can be reached by studiously avoiding criticism and fault finding, by a spirit of broad conservatism and by determination to stick together.

Hon. John Griffiths of Chicago said that confidence is all there is to life and that by the exercise of mutual confidence the members of the association could accomplish much.

E. M. Craig, secretary of the association, who is also secretary of the Chicago Building Trades Council, was cheered to the echo and given much credit for the successful organization of this present association.

A New Flooring Material.

A new form of concrete flooring, which consists essentially of hollow tubes of mortar and iron, and which is claimed to be fire proof, has just been brought out by an architect named Siegwart, in Lucerne, Switzerland. Our consul at that place, Henry H. Morgan, writing under recent date to the State Department concerning this new flooring material, says:

"It is claimed that this system is an improvement on the inventions of Monnier, Hennebique, Koener and others. It consists in manufacturing, in a factory, the mortar into hollow beams for forming a floor or roof ready for delivery to the builder—one which can be laid together on the supporting walls without planking. By this means one floor after another can be laid in a very short time, and the floor so laid can be used to work upon at once without scaffolding.

"This appears to me as a great advantage compared to the usual devices of stone, plaster, &c., which are dependent largely upon temperature and weather, and in all cases must be left for some days to dry before they can be walked upon.

"One advantage claimed for the Siegwart system is that no workmen are required other than the ordinary laborers. Another fact which should be considered is that armored beams which are made in the building can only be depended upon for uniformity when the mortar is mixed in exactly the same proportions and when it is not influenced by shocks, frost, or rain during the time of setting. When this work is done in the factory it is far easier to secure uniformity and protect the beams against weather conditions.

"The beams manufactured at Lucerne have a uniform breadth of 25 centimeters (9.84 inches), and are manufactured in five sizes—viz.: 9, 12, 15, 18 and 21 centimeters (3.5, 4.7, 5.9, 7.08 and 8.36 inches) high, according to the length of span and load. The size of the iron rods in the beams is between 5 and 10 millimeters (1.96 and 3.9 inches), and generally six such rods are used in each beam. Two of these rods are laid parallel with the under border of the beam, and the other four are bent upward into the form of a knot at the ends in order to strengthen their holding power. The proportion of cement with coarse sand is 1 to 4. Though the beams are made hollow, they have the same supporting power as though they were solid, with a great reduction of weight. This is an important factor where freight charges are to be considered. The beams, being hollow, offer also more favorable conditions for heating. The sides are ridged, so that the cement for joining them together can enter into the vacant spaces and thus form a solid mass. The laying together of the beams is done exactly as with wooden beams.

"The beams are supplied in different lengths. In Lucerne they are made up to 5.5 meters (18 feet) long; in Italy and Germany, up to 6.5 meters (21.3 feet) long, and in Russia, up to 7.5 meters (24.6 feet) long. They can be used, in addition to floors, for terraces, roofs, staircase supports, and for walls where there is a side pressure, as, for instance, in coal bunkers, warehouses, &c. It has been demonstrated that with a load from four to five times as great as the normal the beams have only bent to the extent of 1 or 2 millimeters (0.0394 and 0.0788 inch).

"The chief advantages claimed for these beams are: Great supporting power and security from fire; they come dry and hard from the factory, and can, therefore, be used at once as floors for working on; greater facility and speed in building are secured by their use; freedom from excess of heat and cold by reason of their being hollow; thickness of completed floors is reduced by their use; the beams can be used as a heating floor by sending warm air through them.

"The manufacture of the beams as practiced in the Siegwart Beam Factory in Lucerne, Switzerland, and in other European countries is very simple. They are made in layers of 2.5 meters (8 feet) breadth and not singly. The hollow spaces are formed by means of iron molds, around which the cement is laid and the iron rods placed in position. These iron molds are constructed so that they can be reduced in size by the turning of a screw and withdrawn when the cement has become hard. The beams are cut, before the cement has set, by means of a patent cutting machine.

"Six to eight hours after laying the beams the iron molds can be withdrawn, but they are generally left to harden for four to six days before they are separated. After two to three weeks they are ready for delivery.

"There are already a large number of buildings, both public and private, in Switzerland in which the Siegwart beams have been employed, and in all the buildings now in course of construction in Lucerne they are being used.

"At present there are three factories in Germany, three in Russia, and one in Italy occupied in manufacturing beams under the Siegwart patent."

The Egg and Dart Molding.

The egg has been from time immemorial among the ancients the symbol of the being who createth all things and hath all things within himself. It is to be found placed on all the statues of Mithras, upon his altars, and in many ancient votive hands of bronze. Montfaucon has given the representation of a statue of Isis, between the horns of which is placed an egg. The Egyptians also regarded it in profound veneration, says *The Builder*, and in conjunction with the serpent, held it as representing the mystery of creation, or the mundane globe, or time and the serpent of eternity. On several of the engraved gems published by Stosch are sculptured two crested serpents, raised upon their tails, with the mystical egg between them. From the Egyptians the egg and serpent's tongue crept into the architectural sculpture of Greece, and forms one of the most elegant ornaments. It is still much used, and called the egg-and-tongue ornament. It is introduced between the volutes of the Ionic order, and may be traced back, as is done by Quartremere de Quincy, to the head of Isis, to represent a mystical collar or necklace of the mundane egg and the tongue of the serpent of immortality. It is also used in the entablature of the same order with great effect, as in the Erechtheum.

THE ELEMENTS OF CONCRETE WORK.*—I.

By F. W. Taylor and S. E. Thompson.

THIS article is not written for experienced civil engineers and contractors, nor for those who desire to make a scientific study of methods and principles. On the contrary, it is merely an elementary outline, indicating to the inexperienced the various steps which must be taken with this class of masonry. The writers have adapted it for *Carpentry and Building* from one of the chapters of their complete work on "Concrete," about to be published.

The question as to whether concrete is preferable to some other form of masonry may often resolve itself into a question of cost. The cost, in turn, is dependent upon the character of the structure, the rate of labor and the price of the various materials entering into the work. Portland cement concrete has been laid in large masses at as low a price as $3 per cubic yard, while for thin walls built under disadvantageous conditions the cost of constructing molds may cause it to run as high as $30 per cubic yard, and in the case of ornamental work even above this. Before estimating the cost in any case, the materials must be chosen and the relative proportions of the ingredients determined from a consideration of the design of the structure.

By far the largest proportion of Portland cement concrete is laid in heavy foundation work and in other structures, such as tunnels and subways, below the surface of the ground. It is peculiarly adapted for foundations of engines or machinery, heavy walls, piers, &c. In the former the concrete is often carried all the way up to the base of the engine or machine, instead of being topped with brick or stone. It is widely used for sidewalks or floors upon the ground level, and for suspended floors, when suitably reinforced with steel, it furnishes one of the most economical and effective materials for fire proof construction. Its use for walls of buildings is largely increasing, but on account of the very indefinite time required in the building and moving of forms the cost may largely exceed the original estimate unless the builder is experienced in this class of work. Under favorable conditions, however, a 6-inch wall of concrete will cost no more, and usually less, than a 12-inch wall of brick work, and will be stronger, more durable and fire proof. The strength of concrete columns and beams is readily calculated by means of formulas.

Concrete is destined to be used to a large extent in the construction of tanks and vats for holding various liquids which attack wood and iron. Their construction is comparatively simple, but the work must be carefully performed if the result is to be permanent and satisfactory. Concrete is especially suitable for all kinds of arches, because the stresses therein are chiefly compressive. Other classes of work for which concrete is largely employed are dams, retaining walls, penstocks, bridges, abutments, sewer and water conduits and reservoirs. For ornamental work developments are constantly being made, and it is noteworthy that concrete or mortar can be cast in molds in a somewhat similar manner to that in which plaster of Paris is run for interior decoration.

Concrete is ordinarily composed of cement, sand, gravel or crushed stone, or both, and water. The selection of each of these materials is largely dependent upon local conditions, and no unalterable rule can be laid down in regard to it, but certain general conditions may serve as a guide to the inexperienced.

Cement.—It is a wise rule to use Portland cement for nearly all classes of concrete, and the remarks in this article are based entirely upon this material. Portland cement is more uniform and therefore more reliable, while its strength is so much higher than natural cement that by mixing it with larger proportions of sand and stone, properly graded, it will usually yield better results at less cost than natural cement.

If the job is small and unimportant, it is generally safe to select in the market a brand of Portland cement of American manufacture which has a first-class reputation and to use it without testing. As a precaution, however, it is usually advisable that samples from a few of the packages of every shipment should be tested for soundness. This can be done after a little practice with scarcely any apparatus.* For very important concrete construction complete specifications should be prepared before purchasing the cement, and a laboratory should be established for conducting tests to determine whether it is fulfilling the requirements.

Aggregate.—The sand and broken stone or gravel are termed the aggregate. The sand should be clean. One may obtain some idea of its cleanness by placing it in the palm of one hand and rubbing it with the fingers of the other. If the sand is dirty, it will badly discolor the palm. If the use of dirty sand is unavoidable, its effect upon the strength of the mortar should be investigated. Preference should be given to sand containing a mixture of coarse and fine grains. Extremely fine sand can be used alone, but it makes a weaker mortar than either coarse sand alone or a mixture of coarse and fine sand.

Either crushed stone or clean gravel, or both, is suitable for the coarse material of the aggregate. It is chiefly a question of which can be delivered upon the work at the least cost. If the gravel is chosen greater uniformity is attained by screening it over, say, a ⅜-inch mesh screen and then remixing the sand which falls through the screen with the coarser gravel in definite proportions, than by taking the run of the bank. If the gravel is dirty or clayey it should be washed with a hose, a little at a time, before it is shoveled onto the mixing platform.

Broken stone, if selected, may be used unscreened as it comes from the crusher. The maximum size is usually limited to 2½ inches. A smaller size than this, say 1 inch, will give, with less care, a finer surface. In a thick wall large sound stones may be placed by hand or derrick with-

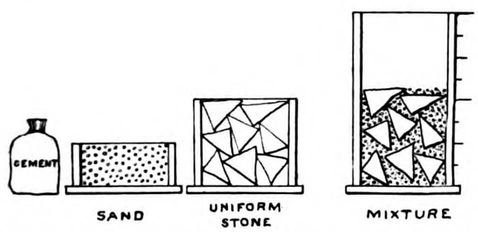


Fig. 1.—Diagrams Illustrating Measurement of Dry Materials and the Mixture When the Broken Stone Is of Uniform Size.

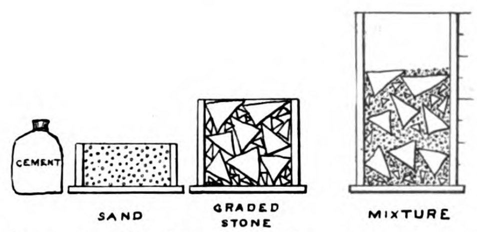


Fig. 2.—Dry Materials and the Mixture When the Stone Is of Varying Sizes.

The Elements of Concrete Work.

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* See article by the same authors on "Testing the Soundness of Cement," in *American Architect*, July 18, 1903, p. 19.

out detriment to the work, providing the consistency of tne concrete is thin enough to properly imbed them.

Proportions.

If a large or very important mass is under consideration, or if the work must be water tight, the correct proportioning of the cement and aggregate requires more careful investigation than can be awarded it in this article. The method often adopted of pouring water into the coarser material to determine the percentage of voids, and thus finding the quantity of sand to use for filling them, is apt to be misleading, because so much depends upon the compactness of the stone, due to the method of handling it—that is, whether placed quietly, dropped, thrown or shaken down—and because in the majority of cases the sand contains many particles so large that they will not enter the smaller voids of the coarser material. In a small job it is sufficiently accurate to select the proportion of cement to sand which will give the required strength to the concrete, and then use twice as much gravel or broken stone as sand. In figuring the capacities of the measures for the sand and stone it must be remembered that a barrel of Portland cement weighs 380 pounds, not including the barrel, and a bag of Portland cement 95 pounds, and we may assume for convenience that a cement barrel holds 3.8 cubic feet. This is a fair average measurement of a heaped barrel, or a barrel with both heads removed—a convenient measure for sand.

As a rough guide to the selection of materials for various classes of work, we may take four proportions which differ from each other simply in the relative quantity of cement:

A rich mixture, for important work, such as engine or machine foundations subject to vibrations, floors, beams and columns, suitably reinforced, for heavy loading, tanks and other water tight work, is made up of the proportions 1 : 2 : 4—that is, 1 barrel, or 4 bags, packed Portland cement (as it comes from the manufacturer) to 2 barrels, or 7.6 cubic feet, loose sand, to 4 barrels, or 15.2 cubic feet, loose gravel or broken stone.

A medium mixture, for ordinary machine foundations, thin foundation walls, building walls, arches, ordinary floors, sidewalks and sewers, the proportions are 1 : 2½ : 5—that is, 1 barrel, or 4 bags, packed Portland cement to 2½ barrels, or 9.5 cubic feet, loose sand, to 5 barrels, or 19 cubic feet loose gravel or broken stone;

An ordinary mixture, for heavy walls, retaining walls, piers and abutments, which are to be subjected to considerable strain, the proportions are 1 : 3 : 6—that is, 1 barrel, or 4 bags, packed Portland cement, to 3 barrels, or 11.4 cubic feet, loose sand, to 6 barrels, or 22.8 cubic feet, loose gravel or broken stone;

A lean mixture, for unimportant work in masses where the concrete is subjected to plain compressive strain, as in large foundations supporting a stationery load or backing for stone masonry, the proportions are 1 : 4 : 8—that is, 1 barrel, or 4 bags, packed Portland cement, to 4 barrels, or 15.2 cubic feet, loose sand, to 8 barrels, or 30.4 cubic feet, loose gravel or broken stone.

The above specifications are based upon fair average practice. If the aggregate is carefully graded and the proportions scientifically fixed, smaller proportions of cement may be used for each class of work.

Quantities of Material.

Inexperienced contractors have often lost money by assuming that the quantity of gravel plus the quantity of sand required will be equivalent to the volume of the finished concrete—that is, that 7½ cubic yards of concrete in the proportions of 1 : 2½ : 5 will require 2½ cubic yards of sand and 5 cubic yards of gravel. This is absolutely wrong, since the grains of sand fill, to a certain extent, the spaces between the larger pebbles. It is incorrect, on the other hand, to figure a quantity of gravel equal to the total volume of the concrete, because the introduction of the sand, which is always in excess of the actual voids, swells the bulk.

If gravel or stone having particles of uniform size is used it must be recognized that the work will cost from 5 to 10 per cent. more, on account of the additional quantity of material required to make a given volume of concrete. In measuring the gravel or stone before mixing there will be less solid matter in a measure, and consequently more sand and cement will also be necessary to fill the spaces between the stones. This fact, which is often overlooked even by experienced men, is illustrated in a somewhat exaggerated fashion in Figs. 1 and 2. Here Fig. 1 illustrates the measurement of the dry materials and the mixture produced therefrom when the stone has been screened to one uniform size, while Fig. 2 shows the dry materials and the mixture when the stone is what is termer "crusher run"—that is, of varying sizes as it comes from the crusher.

It is obvious at a glance that the uniform stone measured in Fig. 1 contains less solid stone than the graded stone measured in Fig. 2. The spaces between the stones in the first case are very nearly equal to the volume of the solid particles, and as the measure of the sand is one-half that of the stone and the particles of cement fill the voids in the sand, this sand and cement mixes in between the stones, filling the spaces or voids, and resulting in a mixture but very slightly greater in volume than the stone alone. In the second case, Fig. 2, the spaces between the large stones in the stone measure are filled with graded smaller stones, so that there is a much smaller volume of spaces or voids. Hence, when the sand and cement, which are identical with that in Fig. 1, are mixed with it the volume of mixture becomes considerably larger than the original bulk of the stone. Consequently, if we start with definite proportions of materials, more concrete will be made with graded stone—such as "crusher run" broken stone, or gravel containing various sizes, ranging, say, from ¼ inch np to 2 inches—than if the stone has been screened to uniform size. If, on the other hand, the proportions of the materials are changed on account of the fewer voids in the mixed stone and less sand and cement are used, a saving in these materials results.

The simplest rule for determining the quantities of materials for a cubic yard of concrete is one devised by

Fig. 3.—Square Pointed Shovel.

Fig. 4.—Style of Wheelbarrow.

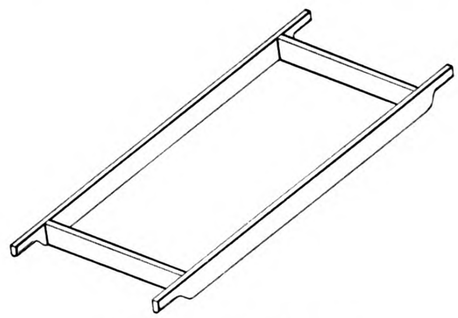


Fig. 5.—Measuring Box for Gravel.

The Elements of Concrete Work.

William B. Fuller, a concrete expert, of New York City. Expressed in words, it is as follows:

Divide 11 by the sum of the parts of all the ingredients, and the quotient will be the number of barrels of Portland cement required for 1 cubic yard of concrete. The number of barrels of cement thus found, multiplied respectively by the "parts" of sand and stone, will give the number of barrels of each required for 1 cubic yard of concrete, and multiplying these values by 3.8 (the number of cubic feet in a barrel), and dividing by 27 (the number of cubic feet in a cubic yard) will give the quantities of sand and stone, in fractions of a cubic yard, needed for 1 cubic yard of concrete.

To express this rule in the shape of formulas.

Let

c = number of parts cement;
s = number of parts sand;
g = number of parts gravel or broken stone.

Then

$\frac{11}{c+s+g} = P$ = number of barrels Portland cement required for 1 cubic yard of concrete.

$P \times s \times \frac{3.8}{27}$ = number of cubic yards of sand required for 1 cubic yard of concrete.

$P \times g \times \frac{3.8}{27}$ = number of cubic yards of stone or gravel required for 1 cubic yard of concrete.

The following table is made up from Fuller's rule and represents fair averages of all classes of material. The first figure in each proportion represents the unit, or 1 barrel (4 bags), of packed Portland cement (weighing 380 pounds), the second figure the number of barrels loose sand (3.8 cubic feet each) per barrel of cement, and the third figure the number of barrels loose gravel or stone (of 3.8 cubic feet each) per barrel of cement:

Materials for One Cubic Yard of Concrete.

Proportions.	Cement. Barrels.	Sand. Cubic yards.	Gravel or stone. Cubic yards.
1 : 2 : 4	1.57	0.44	0.88
1 : 2½ : 5	1.29	0.45	0.91
1 : 3 : 6	1.10	0.46	0.93
1 : 4 : 8	0.85	0.48	0.96

If the coarse material is broken stone screened to uniform size it will, as is stated above, contain less solid matter in a given volume than an average stone, and about 5 per cent. must be added to the quantities of *all* the materials. If the coarse material contains a large variety of sizes so as to be quite dense, about 5 per cent. may be deducted from all of the quantities.

Example.—What materials will be required for six machine foundations, each 5 feet square at the bottom, 4 feet square at the top and 8 feet high?

Answer.—Each pier contains 163 cubic feet, and the six piers therefore contain $\frac{6 \times 163}{27} = 36.2$ cubic yards.

If we select proportions 1 : 2½ : 5, we find, multiplying the total volume by the quantities given in the table, that there will be required, in round numbers 4 barrels packed cement, 13 cubic yards loose sand, 25 cubic yards loose gravel.

Tools and Apparatus Required for Concrete Work.

The quantity of tools will, of course, vary with the size of the gang. The following schedule is based upon a small gang of eight to ten men, making concrete by hand:

8 square pointed shovels, size No. 3, and such as illustrated in Fig. 3. (If a very wet mixture is used substitute small coal scoops.)
3 iron wheelbarrows, such as shown in Fig. 4.
2 rammers, which for wet concrete may be about 1¾ x 5 inches at the bottom, and weigh 8 pounds.
One mixing platform, about 15 feet square, built so substantially that it can be moved without coming to pieces, and having a strip around the edge to prevent waste of materials and water. On a small job this may be of 1-inch stuff, resting on joints about 3 feet apart, provided it is stiffened by being tongued and grooved.
One measuring box or barrel for sand of a capacity for one batch of concrete. A convenient measure is a cement barrel, either whole or sawed in two, with both heads removed. It is filled and then lifted in such a manner as to spread the sand.
One measuring box for gravel (see Fig. 5) of a capacity for one batch of concrete.
Lumber for making and bracing forms.
Nails and, for some kinds of work, bolts for forms.

CABINET WORK FOR THE CARPENTER—CHAIRS.

BY PAUL D. OTTER.

"WELL, sir, I am ready to sit down in my easy chair when supper is over," is the thought so frequently expressed and quite uppermost in one's mind as the transactions of the day are closed. With the older people a certain chair is often appropriated and in time becomes closely identified with their life, the much used chair becoming more and more cherished and guarded as it is passed on from generation to generation. Of such chairs there are not a few examples which are to-day considered models in the directness of their construction. It is an exception that an antique chair is comfortable in which to tarry long, this important feature being noted more in frames which were almost wholly covered with upholstery material. In this there was greater latitude to secure comfort than in a plain chair, the lines of which were formed in the most direct way permissable with low cost and a meager equipment of tools and machinery. To-day wood may be converted into many varied shapes; curved, serpentine and twisted forms being as easily produced from a minimum amount of stock, as a piece of tin is in one's fingers readily made to assume any shape desired. Steam, as the means of softening wood, with modern metal forms and presses make it possible to produce in a chair of general utility a graceful line and proper balance, particularly to the back post. An illustration of this is shown in Fig. 1, which represents a very old and common type of rush bottom rocker, many of these being made by the farmers in winter time for their own use or local sale.

Note the relative position of the straight back post to the rocker. To give the proper balance and appearance of a substantial base, the posts should curve back immediately under the seat and have connection with the rocker some distance back. The straight back post required that the back be more at right angles with the seat, which robbed the chair of the comfort and easy balance which the modern bent or curved post rocker possesses. However, this type of rocker was the original of that class of chair which is distinctly American, and little attempt was made to alter nature's material form.

As these rare examples are less seen we cherish them the more, as we think that before the early men of the country in building their homes were able to take their stiff backed ease they were forced to lay aside, for seasoning, stock of simple form to construct their chairs and other furniture, and also, at a certain time of the year, to gather from the fields and low marshes the rush or flag for the chair seats. In the meantime the bench, or form, did service, as well as other smaller and less unwieldly forms, such as the hassock and stool.

The ordinary factory chair is built according to a certain standard of size and adherence to bevels. In the construction of a chair for individual use it should be very much like the suit made by the tailor—made to fit the individual. The regulation hight of a dining room chair, or side chair, is 18 inches from the floor to the top of the seat, plain or upholstered, with a ¾-inch drop back of the seat. The angle of the back to the seat is usually 1½ inches, or 2 inches, in 12 inches.

The top of the seat in the rocking chair is in hight from top of rocker, about 11 inches in front and 10½ inches at the back leg or post. The front edge of the seat, when the chair is not occupied, should not point up more than 17 inches from the floor. This is assuming that the rocker has a sweep which can be secured with about 5 inches in width of stock. A greater throwback, or angle, is given the back than in the stationary chair.

The rocking chair, unlike other chairs, must be made to balance properly and, when occupied, give a well poised adjustment to the occupant, as an even weight is to the contents on a scale. This must be determined by the maker by trying the chair on a level floor. Many have probably experienced the discomfort of sitting in a rocker which compelled them to dig their heels into the carpet to avoid going out in front, or to have the embarrassment of almost flying heels up over the back. Such an article of furniture among the young people is often considered in the light of a prize "trick mule," to be tried by the unwary as a part of the evening's amusement. The rocker, or "sweep," however, on many rocking chairs is often too flat, particularly on the very early chair of that type. The segment of a circle found within a plank of 5 inches width and about 31 inches in length, will produce a rocker giving a comfortable swing when properly secured to the legs. Most any outline may be given to the top or concave edge. It is generally made to conform to the underline until it rounds off at both ends.

The construction illustrated in Fig. 2 represents a class of chair which the reader may construct without so finished curved panel. To mark this out make a paper pattern within the limit of the gross size of the stock. After drawing in at the proper position the shape of the top and bottom slat, proceed to detail the shape of the slat or small banister.

It must be borne in mind that in most all chairs the spread of the back part at the top is greater than at the seat. In the case of a long chair, 2 to 2½ inches greater will offset a contracted appearance. For the same reason the slats should be correspondingly parted at the top more than at the bottom.

It is expected that the band or jig saw will be brought into use in cutting these irregular shapes, although simple modifications may be made thereby. In the absence of these most convenient machines outlines may be produced by the slower means of a draw knife on the outside and with hole borings and filing to effect some kind of opening within, as a feature. To construct more intelligently, a side view detail should also be drawn, and from this mark out patterns, which may be transferred to the proper pattern paper. In doing this one will have

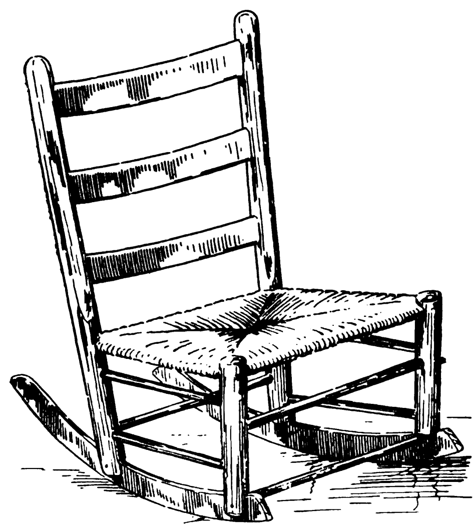
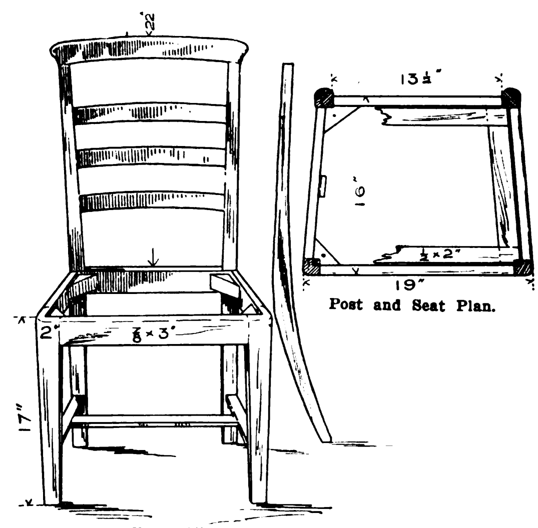


Fig. 1.—Early Settlement Rocker.



Front View.

Post and Seat Plan.

Fig. 3.—Showing Construction of Frame Work of a Dining Room Chair.

Cabinet Work for the Carpenter.—Chairs.

many of the peculiar features met with in regular chair construction, particularly that of the old turned class of chair, which requires much practice in dealing with the angles and the boring of round parts in order to have the work come out satisfactorily. Such a chair appears simple to make, but some amusing first productions have resulted when the carpenter or cabinet maker has completed a chair of turned parts. This is traceable to the fact that being accustomed to almost continuously working with square or bevel against flat surfaces, a new proposition is presented when he attempts to hold the tool and bore at the proper angle a part that is round and also bent. These points will not be considered, as it means an equipment to be found nowhere but in a chair factory.

The idea of the illustrations is to show patterns which may easily be constructed, or modifications of them made by the carpenter, to have and to hold, making his home characteristic and representative of his handicraft. It is well in all work to at first draw the subject to full working detail, laying out on separate paper the plan of the seat taken from the figures given in the illustration. From this proceed to draw in the elevation of the back part, one-half only being necessary, to the left of the center vertical line. In order to create a chair which will be comfortable a certain amount of curvature should be given to the two slats. This can be done very readily, when the slats are not too wide faced, by sawing on the band saw, or by adzing, that curvature which can be secured within, say, 3 inches on stock. In this case 5 x 25 inches for the top slat, allowing a thickness of ¾ inch to the absolute correctness of measurement and true relation of back to front part and position of rocker. As previously mentioned, the rocker shape is to be drawn in its relation to the posts, within stock of 5¼ x 31½ inches. This position of rocker to seat hight, as before noted, will not be perfectly correct, but approximately, until after the chair has been finally set up, and if upholstered that weight and the weight of the back will indicate an after adjustment of the back or front post hight to a comfortable balance when the chair is occupied.

A shaped out saddle seat is a very desirable form and may be set within the seat framing of the chair shown. The stock is thoroughly dry before jointing, and if oak is used the careful matching of the quarter in a favorable manner before gluing will add much to the appearance. After removing from the clamps, surface to a thickness of 1⅜ inches, then band saw to the outline of the marking out pattern, made for the purpose out of heavy drawing paper. This pattern should also have cut in it a fine slotted line, which will mark the turn out of the interior shaping in the front, and the curved shapes, as shown in the back of the seat. Under the bottom of this plank temporarily secure with short screws a 1 x 5 or 6-inch block, which is intended to set in the jaws of a vise while carrying on evenly the work of scooping out the upper surface of the seat.

As the greatest depth of the saddle will be ¾ inch in the back part, be careful not to use screws entering the wood too far. The roughing out work is done with a mallet and a 2-inch gouge, reducing the surface in a dish like manner, along the sides and back to within 1/8 inch of the marked line, and to a depth thought to be more effective. The middle and front edge of the seat is left uncut, and from the straight line previously centering the seat the wood is cut away in a sloping manner on each side, leaving a crown or "pommel," suggestive of a horse saddle. Now strike off the front edge, sloping away into an easy undefined round, which when finally shaved off will be smooth and congenial to the touch.

No tool in the regulation carpenter's outfit will be found practical in finishing this roughened out undulating surface, and for this purpose the chair builder has a tool peculiarly his own, the construction of which has been fully described in a previous article under the head o. Stock Dresser's Scraper, in the issue of *Carpentry and Building* for October, 1902, and Details of Spoke Shave in the issue for November of the same year. The tool there described is the straight scraper; a tool having a convex cutting blade and holder may be made in the same manner, and the tool will be found very useful for more purposes than seat finishing. The convex shave, made with a similar curve, is first used to remove the ridges of the gouge work, and may be used to reduce the surface to a fair condition. Then the convex scraper is taken up for final smoothing and working to a perfect clear edge along the marked outline. A little after nursing with a steel blade, the edge of which is convex, may be used in places where the handled scraper cannot be used advantageously. In sandpapering use No. 1 and No. 0 paper under the palm of the hand, or under a soft rubber block. Avoid destroying the well defined line along the edge, but smooth off well the front edge. Carefulness in creating such conforming work will be well rewarded in after polishing.

As the work proceeds it will be noted that in adjusting the rocker immediately under the side rails their extreme spread at the back, regulated by the side plan, is less than in the front. This fact will cause the out-turn of the back post to set over the rocker, with rear outside and front inside corner hanging over. This is to be chamfered off to the thickness of the rocker sweeps. The joints in this chair are all mortise and tenon, with the exception of the arm and stump, where dowels should be used.

After the chair has been knocked down for final gluing up, go over all the edges, taking off all sharp corners. The top edge of the arms, front edge of the arm stumps, side rails, legs and back posts above the arms are to be shaped a low round. The proper time to do this is after the chair is glued up, in order that a continuous smooth surface may be worked over the glue joints at the arm stump and where the arm enters onto the line of the back post. The edges between these joints may, of course, be molded or shaped more readily in the vise, as loose parts, leaving enough stock at the ends to trim after gluing.

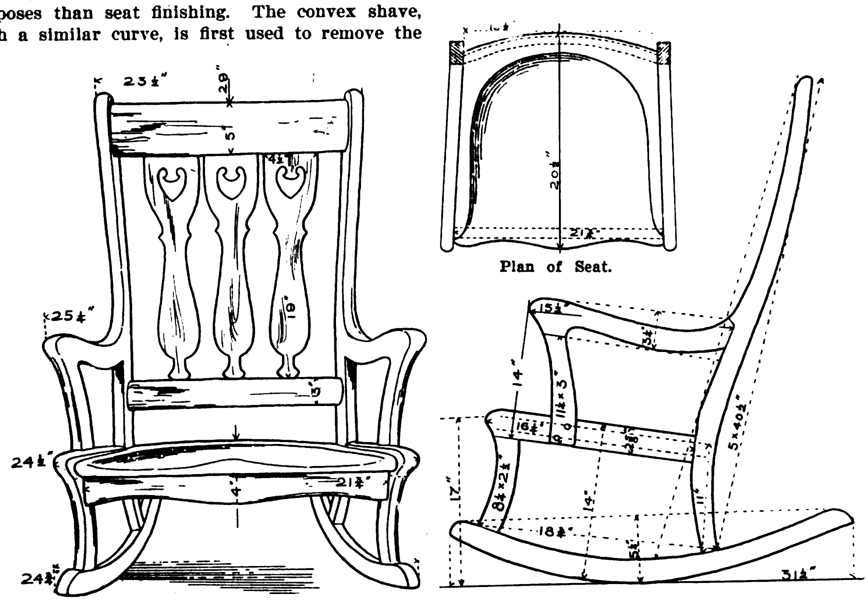


Fig. 2.—Front and Side Views of Chair.

Cabinet Work for the Carpenter.—Chairs.

The Dining Chair.

So much attaches to the moments spent about the dining table that the chairs used for the family should be of the same pattern and of a dignified, plain character, the outline free from unnecessary angles and the surface smooth and plain. If carving is desired it should be of a detail clear and smooth, and low relief. With these particular features observed the dusting and polishing from time to time is greatly reduced. The chair made by the famous cabinet maker, Chippendale, had these desirable points about them, even on the open worked backs. The carving and rounding of edges, front and back, were smoothly done and easily kept clean. These chairs afford models for many present day reproductions.

The pattern in vogue in the early Dutch colonies of New York gives us excellent types for dining room purposes. The construction of the earlier patterns are even more severe and to the point than any period before, and later the style shown with more elaborate treatment preserved the honest square lined construction.

For purposes of simple construction, Fig. 3 is given as a composite of the Dutch and the English style which prevailed at the same time in the New England settlements. The "ladder back" is probably more easily constructed and more comfortable to sit in, although the lower slats may be left out and a 7-inch banister inserted between the under part of the top slat and the projected base on the back rail. With the seat plan given and shape of back post, as shown, a drawing of the entire chair may be made. In doing this one may be guided in some particulars, as in securing the back angle, spread of legs, &c., by a well constructed chair about the house. The front legs have a slight taper. As to how much this and other matters of finish shall be carried along must be decided when the chair is set up loosely for a trial inspection. The rounding of the back posts on the back, as shown in section on the seat plan, Fig. 3, is recommended as giving a smooth finished appearance; also a similar rounding to the back edges of the slats, which are 7/8 inch thick, rounding off the front face with a low round.

A padded slip seat cover with leather is most desirable, as it wears well a long time and can be easily renewed. The frame to this consists of 1/2 x 2 inch material, lap jointed, glued and nailed into a frame, giving a 3-16 inch allowance all around when set upon the corner and side block shown in the engraving.

The upholstering of this is very simple, consisting of burlap webbing stretched tightly over the face of the frame, upon which is laid cotton batting, with several extra squares built up in a tapering manner toward the center. This mass of cotton may be held and molded into an arching shape by stitching with thread and needle, making long stitches in so doing, sufficient to keep the cotton from shifting. Over this is stretched the leather, cut sufficiently large to pull down along the edges of the frame, or what is now over the burlap webbing. Starting the tacking from the frant, pull it back, meanwhile rounding or conforming the surface, and secure to the back edge. Then tack down the sides and trim off the surplus leather on the bottom edge of the lower framing. By the allowance made on the frame, with added thickness of burlap and leather, the framing should slip in snugly against the chair frame, where it is held by screws driven from the under side of the corner blocks. Note that the inner corners of the legs are to be cut out ½ inch deep and on an angle with the inside of the front and side rails. The straining rails under the seat are ⅝ x 1⅛ inches, set in with tennons to the front legs and back posts.

Rush Seats.

It is rare to find an old time workman who is able to make a "rush" or "flag" seat. Where such work can be secured this form of seat will be found very durable and artistic to embody in the frames of chairs. The removable frame, or the manner of constructing it for the chair desired, will be furnished by the worker in that material.

While chair designs are endless, the main purpose of utility and comfort should be the first thought. With a carpenter's ability, many odd pieces and side chairs may be constructed, embodying some rare wood or treasured piece of stock having eccentric grain, or mayhap some rare old large piece of furniture which has so sunk into decrepitude that a chair or two may be constructed, thus continuing its service and history.

Cleaning Stone Work and Pressed Brick Fronts.

In replying to the inquiry of one of its readers as to whether there is any other way of cleaning stone work and pressed brick fronts than by the use of the steel stone brush, a recent issue of the *Painters' Magazine* offers the following suggestions:

Stone work is best cleaned of smoke as well as mold by applying with a long handled fibre brush a strong solution of caustic soda or pearl ash, which is permitted to remain about 15 minutes and is then thoroughly removed with one or more washes of clear water, for which purpose a hose and a stiff broom will do good service.

To clean finished marble, mix with enough water to make a creamy paste 5 pounds sal soda, 2½ pounds bolted whiting and 2½ parts powdered pumice. Apply this to the surface and rub with any suitable brush, then wash off with soap and water, and finally rinse.

Builders' acid, a mixture of muriatic acid and water in equal parts, is used to remove the spots of mortar on brick work, and is also recommended for removing efflorescence on brick, but it is scarcely the proper means of renovating or removing discoloration from smoke or age. At any rate, the acid solution must be followed up by rinsing with clear water, or the bricks will darken to a great extent. A thorough scrubbing with soft soap and water, to which a little ammonia has been added, is the best cleanser for pressed brick. Final rinsing with clear water, of course, is necessary.

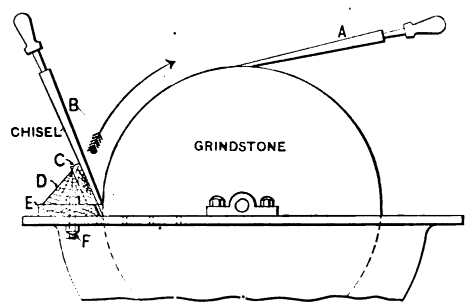
To make tne brick look fresh and new, however, a wash of the following composition will be of service: One-half pound of good animal glue, soaked in water and then melted in water, say 8 gallons in all, to which add 1 ounce of bichromate of potash in solution and 10 pounds dark Venetian red and enough yellow ocher to give the desired effect. This is applied as thin as possible with a large wall brush.

Tool Rest for Grindstone.

Every reader should take it upon himself to send to the editor a short description, with sketch, of any "kink" or "wrinkle" in the way of doing work in his particular line which may come under his notice. However trivial the matter, there may be in it a suggestion to some reader which will more than justify the trouble of describing it, and the contributor will have the satisfaction of feeling that he is helping to promote the material interests of his fellow craftsmen, while at the same time he will be working in the direction of making the paper more valuable and instructive.

A good example of the kind of suggestion our readers are doubtless in a position to offer is contained in the following extract from a letter of a correspondent of an exchange bearing upon a method of grinding a chisel:

Wood workers and pattern makers who grind chisels, plane irons, &c., in the old way, by holding them on the stone as shown at A in the sketch, will find the little jig



Tool Rest for Grindstone.

for holding them, as at B, to be a great convenience. The two pieces, C and D, are screwed or nailed together and braced by the bracket E. Then the piece C is beveled to give the proper angle to the edge of the tool. The fixture is fastened to each side of the grindstone trough by the bolts F, and a series of bolt holes is drilled through each flange of the trough so that the jig may be moved in as the wheel is worn down.

Workmen Buying Better Tools.

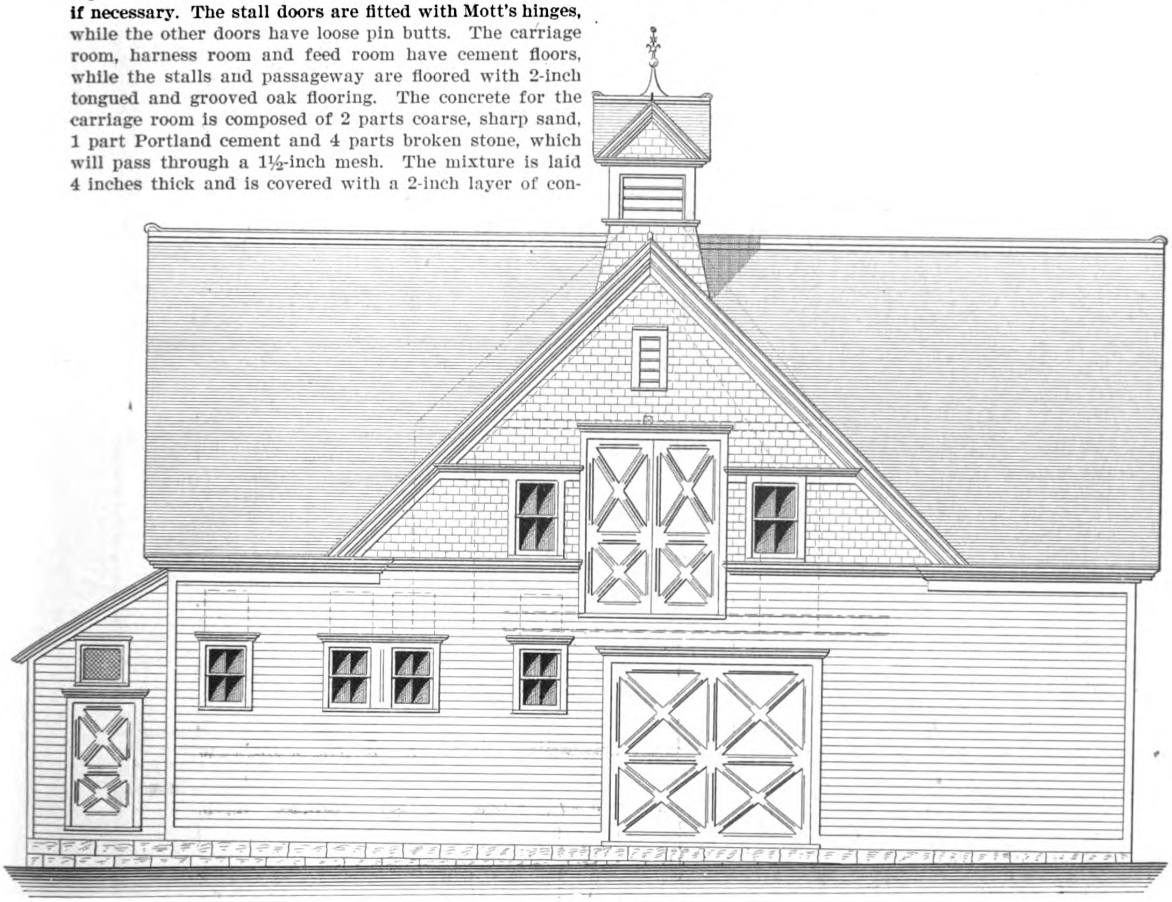
While the workingman is spending a great deal of time these days inventing new troubles and magnifying old ones, it is worthy of note, says the New York *Evening Post*, that he is giving eloquent token of possessing more money than ever before. This is discernible in the prices he is paying for the tools of his craft. Upon the authority of a member of one of the largest wholesale hardware houses in this city, it may be stated that the workingman is now paying practically twice as much for his tools as he did a year ago. This does not mean that the prices of tools have risen, but that the artisan is buying better tools. The cheap grades of tools are a drug on the market, and the factories are far behind, many of them from six to eight months, in filling orders for implements of high grade. Carpenters are paying $2 for saws, whereas they formerly bought those of $1 grade, and in so small a matter as a 2-foot rule, the workingman now purchases a full bound brass one for 50 cents instead of a half bound one for 25 or 30 cents. The same is true also of hammers, braces, bits and planes. The day of the wooden plane has passed; the carpenter now buys steel planes, paying for them nearly double the amount he used to pay for wooden ones. When the hardware expert was asked to account for this condition, he said: "Workingmen have more money to spend; that accounts for it."

THE fire loss of the United States and Canada for the month of November, compiled from the carefully kept records of the New York *Journal of Commerce*, shows a total of $13,589,550, or over $3,000,000 more than in the same month of last year or in the preceding month of this year. The total fire loss for the 11 months ending with November, 1903, is close to $139,000,000, or $5,000,000 above that of the corresponding period of last year.

DESIGN FOR STABLE AND CARRIAGE HOUSE.

THE drawings which we present herewith represent a stable and carriage house, embodying a number of interesting features of construction, which was erected not long since in Hazleton, Pa., in accordance with plans prepared by Charles O. Beck, architect, of 572 North Church street, Hazleton, Pa. It will be observed from an examination of the end elevations that the ground slopes away to such an extent that the foundation walls rise to a considerable extent above ground. The floor plans show accommodations for four horses, two of the partitions being removable so that two large box stalls can be provided, if necessary. The stall doors are fitted with Mott's hinges, while the other doors have loose pin butts. The carriage room, harness room and feed room have cement floors, while the stalls and passageway are floored with 2-inch tongued and grooved oak flooring. The concrete for the carriage room is composed of 2 parts coarse, sharp sand, 1 part Portland cement and 4 parts broken stone, which will pass through a 1½-inch mesh. The mixture is laid 4 inches thick and is covered with a 2-inch layer of concrete, composed of 1 part Portland cement and 1 part sand. On the second floor are located a room for sleighs, the hay loft, man's room, feed box, bins, &c. The man's room is plastered and the sleigh room lined with matched boards. There are two air shafts, one leading from above the horse stable and the other from above the carriage room to the ventilator. The door to the carriage room and the door between the carriage rooms and the stable are hung with Lane's patent barn door rollers. The hay racks are of cast iron and the feed box of oak plank. The windows of the barn are hung on weights and provided with sash locks.

The sills, girders and posts of the building are 6 x 8 inches, the corner posts are 6 x 6 inches, the studs 3 x 4 inches, the first floor joist in the horse stable and passage 3 x 10 inches, the second floor joist 2 x 10 inches, the ceiling joist, ties and collar beams 2 x 8 inches, the rafters 2 x 8 inches and the valleys 4 x 8 inches. The joist run over and are spiked to the girders, all joist, studding, &c., being placed 16 inches on centers, with rafters 24 inches on centers. The 8 x 8 inch turned posts in the stable between stalls are yellow pine. The sills under the outside doors are 3 x 8 inch dry oak spliced to other sills. The exterior of the frame is covered with 1-inch surfaced hemlock flooring, put on diagonally, over which is placed two thicknesses of rosin building paper, well lapped, this in turn being covered from base to cornice with white pine beveled siding, showing a face of 3¾ inches. The rafters are covered with 1 x 3 inch roof lath spaced 5½ inches on centers, this in turn being covered with red cedar shingles laid 5½ inches to the weather. The gables are also shingled, all of which were dipped two-thirds of their length in Cabot's creosote stain before being laid.



Front, or West, Elevation.—Scale, ⅛ Inch to the Foot.

Design for Stable and Carriage House.—Charles O. Beck, Architect, Hazleton, Pa.

The stall posts are of turned yellow pine, and are 8 inches in diameter. The center stall partition is of 2-inch surfaced tongued and grooved Georgia pine plank, 12 inches wide, rabbeted into the posts. The two side partitions are of 2-inch spruce plank 8 inches wide and also rabbeted into the posts, but made so that they can be taken out and two stalls thrown into one, if necessary. The stall partitions are 7 feet high to the top of the iron guards. The stall floors are of two thicknesses of 2-inch oak plank, while the floor in the passageway is of one thickness.

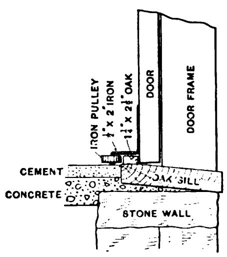
All exterior wood and galvanized iron work has three coats of best linseed oil and white lead paint in two colors, and all interior finish wood work has one coat of filler and two coats of varnish. All tin work is painted with brown grounds mineral paint, two coats only before it is put on and the other after the roof is shingled.

The carriage house and stable shown was built for Phillip V. Weaver, and is located on the east side of

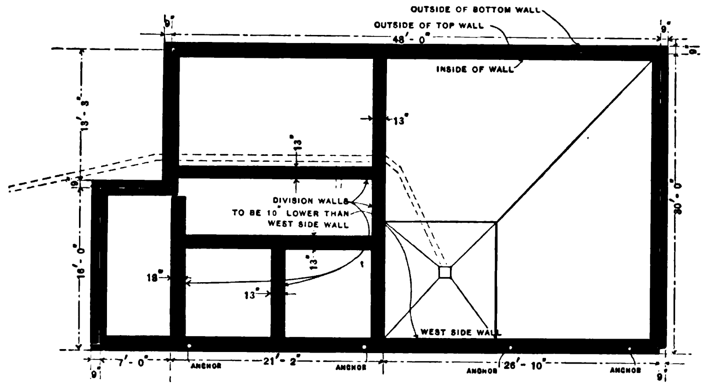
Sherman Court, between Eighth and Ninth streets, in Hazleton, Luzerne County, Pa. The structure cost a trifle more than $2000 at the time it was built, but it is probable this figure would be exceeded if duplicated at the present time, owing to the increased cost of labor and materials.

Sheet Zinc for Roofing.

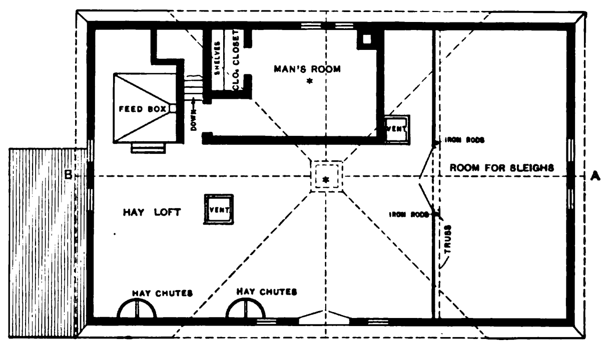
We have recently received inquiries from several sources in regard to the use of sheet zinc as a roofing material in the United States. These communications are evidence that the subject is receiving considerable attention among the roofing trade, and we have endeavored to secure information as to the extent to which this material has been used as a roof covering up to the present time. The information elicited



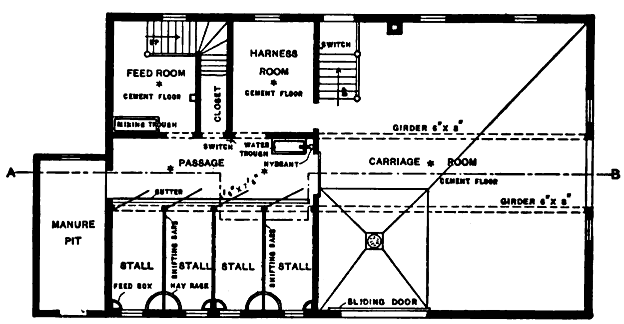
Detail of Sliding Door.—Scale, ½ Inch to the Foot.



Foundation.



Second Floor.



First Floor.

Design for Stable and Carriage House.—Plans.—Scale, 1-16 *Inch to the Foot.*

shows that the use of sheet zinc is inconsiderable in the Eastern part of the country, but that in the Central West and the South some work of this kind has been done. As is well known, sheet zinc is very largely employed for roofing in Central Europe, especially in Germany, and the results, from all accounts, have been excellent. Zinc roofs are known to be in existence in Germany which were put on 40 or 50 years ago, and are still in good condition.

The objection to the use of this material in the United States is that the vicissitudes of our climate make it difficult to put on a roof of sheet zinc which will provide for expansion and contraction, due to the frequent and severe changes in temperature. This is a difficulty which should not be impossible to overcome, and, without doubt, a way will be found to do so, provided the utility of the sheet zinc for roofing is demonstrated to the satisfaction of builders, roofers and house owners.

We have referred the matter to certain manufacturers of sheet zinc and others who have experimented with it, and we give below extracts from some of the replies with which we have been favored. The general manager of a prominent concern at La Salle, Ill., writes as follows:

"Zinc is extensively used for roofing purposes in several European countries, and there is no reason why it should not be used advantageously for the same purpose here, provided sufficient allowance is made for expansion and contraction of the metal by reason of the changes in temperature, which are more severe here, the South excepted, than in Central Europe. In Europe zinc roofing is considered a special trade, which is carried on by mechanics skilled in the art of working sheet zinc into all kinds of ornaments as well as roofing. At the time the writer was living in Europe zinc roofs were guaranteed to last for 40 years without repairs. When zinc is used in the shape of tiles it is more easily applied than in larger sheets, and it can be laid on in the same way as other metallic tiles. Two zinc tile roofs in this vicinity are giving complete satisfaction."

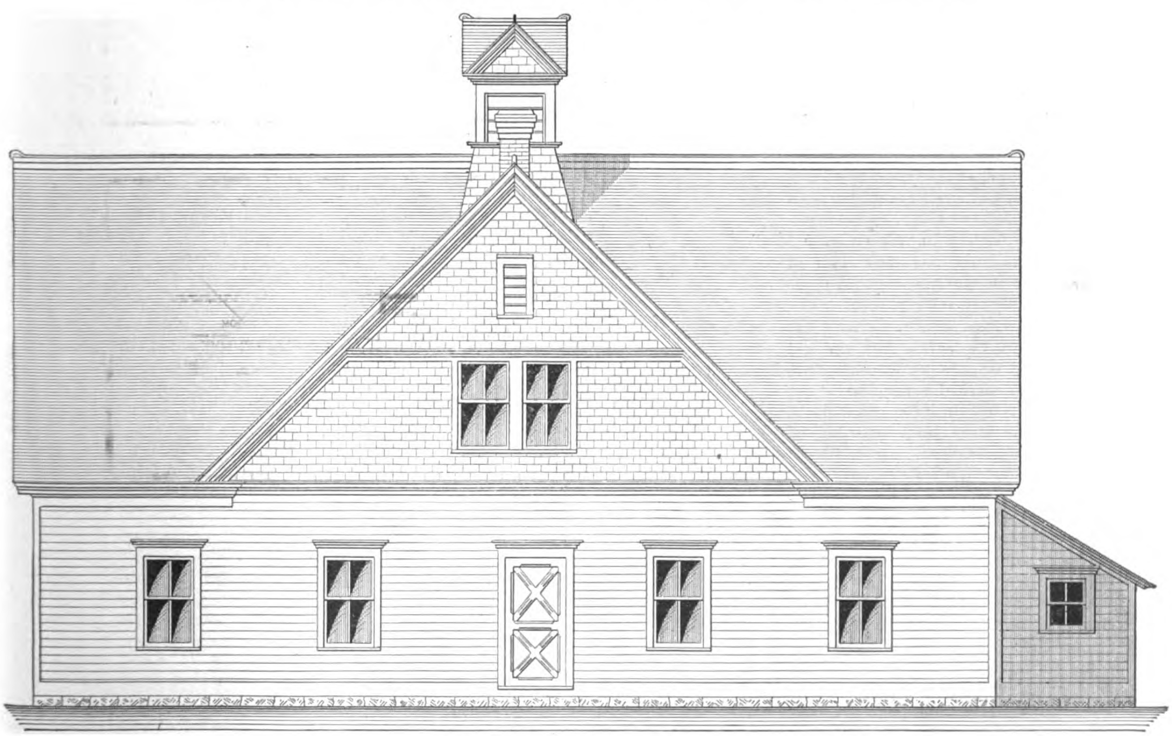
A St. Louis concern says:

"We are glad that you have brought up the subject of zinc for roofing purposes, because it is one that is really entitled to consideration. The interest now being evinced by architects and builders in sheet zinc for roofing purposes shows that the experience of the European people during the past 25 or 30 years is sufficient to insure good results if the subject is taken up thoughtfully by our people. So far as we can learn, the climatic differences here are such as require more technical attention to the method of attaching the various sections of the roof or ornaments, but as soon as these points are carefully worked out there is no doubt about the ultimate use of zinc for these purposes. We have been surprised to note the increase in the inquiries and purchase of sheet zinc for roofing. This demand has been growing steadily and has reached a substantial quantity. However, it is still but a fraction of the amount used yearly in Europe."

A well-known manufacturer of architectural sheet metal work in Salem, Ohio, writes:

"I am sorry that I connot give you any practical or accurate information in regard to sheet zinc roofing in this country. We have sold quite an amount of our stamped zinc tile roofing, but not enough of it to justify

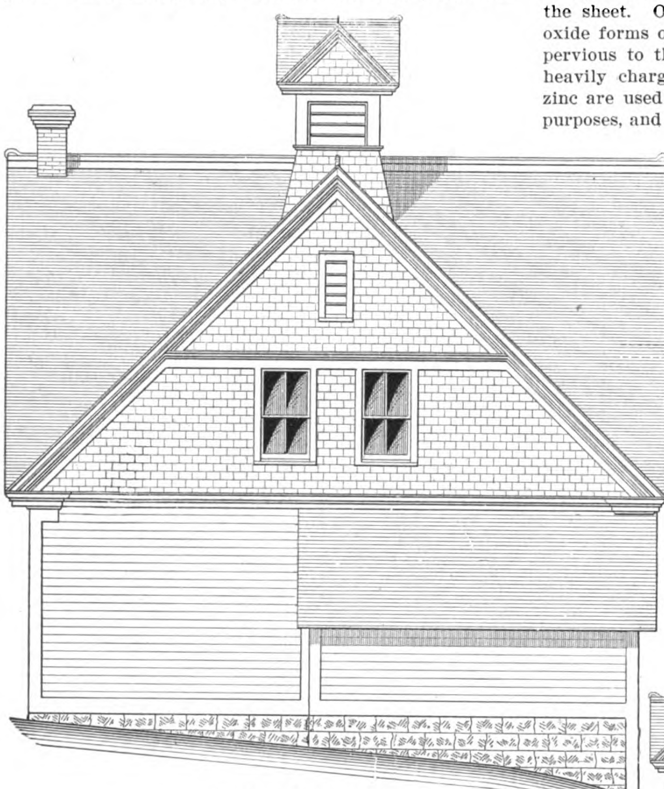
Vertical Longitudinal Section Looking to the Front of the Building from the Line A B of the Plans.



Rear, or East, Elevation.

Design for Stable and Carriage House.—Elevations.—Scale, 1/8 Inch to the Foot.

the claim that it is in general use. Zinc, as you are probably aware, is largely used in Europe for roofing purposes. In Germany 40 per cent. of the total product of

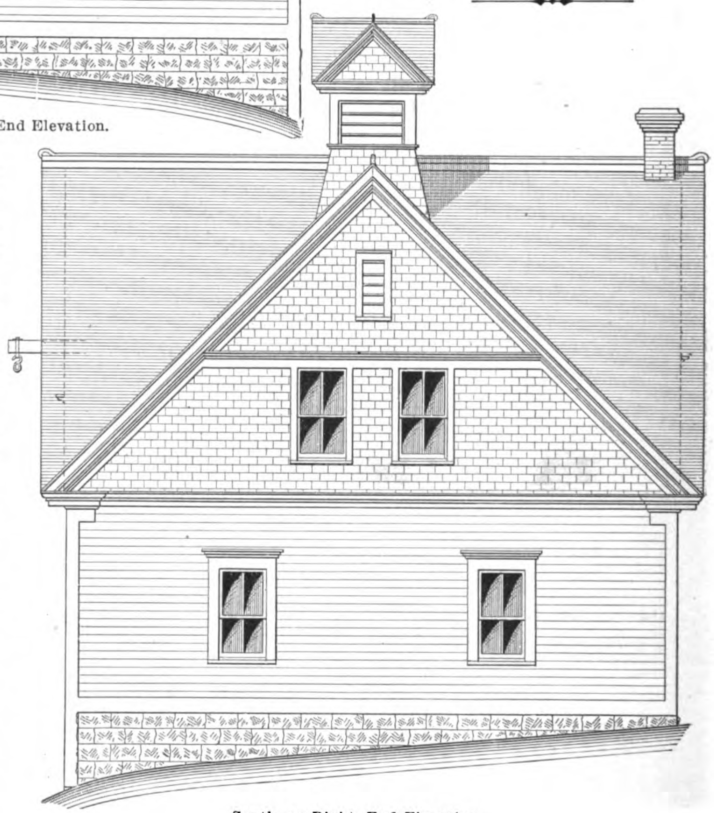


North, or Left, End Elevation.

sheet zinc is so used. There a roof is made of heavy zinc, sheets never lighter than No. 12 gauge being used and Nos. 14 and 16 gauge being preferred. Where this heavy gauge of zinc is used the zinc, in oxidizing, forms its own coating and is protected from the action of the weather. It is claimed that a roof made of No. 14 gauge zinc will last for 40 or 50 years. Where zinc has been employed for roofing in this country I think the mistake has been made of using zinc of gauges that are too light for the purpose, so that when oxidation takes place it has not enough body of metal work on and the sheet is very soon eaten through. We have furnished a number of ornamental roofs in zinc, notably a roof for the large office building of the Illinois Zinc Company at Peru, Ill., and for the residence of Mr. Matthiessen of the firm of Matthiessen & Hegeler at La Salle, Ill. I have often thought that if the matter was properly exploited in this country a much larger quantity of zinc would be used for roofing purposes."

Another concern who have had some experience in zinc roofing state that considerable zinc has been used for roofing in various parts of this country with success. In order to meet the exigencies of the climate, however, they claim that it must be made with lap joints so that the sheets may expand and contract freely. For this reason solder cannot be used. A common practice is to lay on parallel strips of wood and bend the sheet into the wood so that the expansion and contraction can take place freely, and at the same time moisture cannot get beneath the sheet. Owing to the fact that a slight coating of oxide forms on the surface of sheet zinc, it becomes impervious to the weather, unless the atmosphere is very heavily charged with acid fumes. Large quantities of zinc are used both in Europe and in Canada for roofing purposes, and our correspondents believe that by adopting proper methods of placing the roofing, the metal could certainly be used to advantage in this country.

An instance is cited which seems to bear out this contention of our correspondents. A zinc roof in Southern Wisconsin, which was put on in 1854, has been subjected to all the climatic changes which have occurred in that portion of the Mississippi Valley for 50 years, and is said to have never cost the owner of the building a single dollar for repairs. It is claimed that a careful examination of the sheets which compose the roof has proved that the exposure of half a century has wrought no injury to it, and there is every reason to believe that the roof will serve equally well for another 50 years. If these claims can be substantiated they certainly offer a very strong and valuable argument in favor of the use of zinc roofing in the United States.



South, or Right, End Elevation.

Design for Stable and Carriage House.—End Elevations.—Scale, ⅛ Inch to the Foot.

SOME tests on the strength of paper, made at the Watertown Arsenal, showed that strong blue print paper had a strength of 9700 pounds per square inch and linen paper 9000 pounds per square inch.

CORRESPONDENCE.

Rule for Setting Windows.

From D. P. B., *Redford, N. Y.*—In my comments in the December issue on "Rules for Setting Windows," I notice a slight error crept in regarding the distance from the top of the window stool, as mentioned at the top of page 326. The distance should have read "two diameters and 45 minutes," instead of "two diameters and 25 minutes."

From C. G. C., *Fort Morgan, Col.*—In answer to the question of "A. A. C.," in regard to setting windows, my idea is that the hight of the ceiling and the size of the window should govern to a certain extent. In this section of the country I believe that the bottom of the windows are put from 20 to 26 inches from the floor, the average ceiling here being 9 or 9½ feet. If there is any fixed rule I have failed to find it so far.

Novel Water Tower Framing.

From JAMES F. HOBART, *New York.*—I send for the benefit of those readers who may be interested illustrations of a rather novel water tower frame, which is used to support the water tank of a sprinkler system at the mill of the International Paper Company, at Piercefield, N. Y. The tank is about 20 feet in diameter, and a little more than that number of feet in depth. The half-tone shown in Fig. 1 is a reproduction from a photograph, and shows the general appearance of the tower. It may be stated that the structure presents far from an obtrusive effect, as it harmonizes well with the wild scenery of the surrounding country and is rather pleasing to the eye. In Fig. 2 is shown the principle embodied in the frame to withstand the wind pressure, as well as the dead weight of the tank, which is constantly kept full of water. Standing upon the summit of a hill and exposed to winds, which, in that part of the country, are sure to blow at one time or another from every quarter, the framing must withstand the strain from all directions. The octagon form evidently answers for the horizontal cross section of the framing, but it is not convenient to tie the timbers together, as in Fig. 1, for if this were done costly posts and framing would be necessary for the corners—something which is avoided by the framing actually employed. In Fig. 3 is presented a ground plan of the timbering. The top of the tower is similarly put together, while girts of corresponding description are framed in at every horizontal bent. The timbering is 8 x 8 inches, and tie bolts are put through at every girt, as the picture in Fig. 1 clearly shows. In order to dispense with diagonals and to secure square framing, while still having all the angles of the frame nearly of the same strength, the cross sills were set out, as shown in Fig. 3. The centers of the cross timbers were extended 1 foot, and there placed upon the apexes of the angles formed by the sides of the figure. This brought the inside corner of each post to the center line, and it also caused the framing to be much shorter outside than inside the posts. So much so, in fact, that with the stiff diagonal bracing inside the outer posts, there has been found no necessity for any outside oblique bracing or framing whatever.

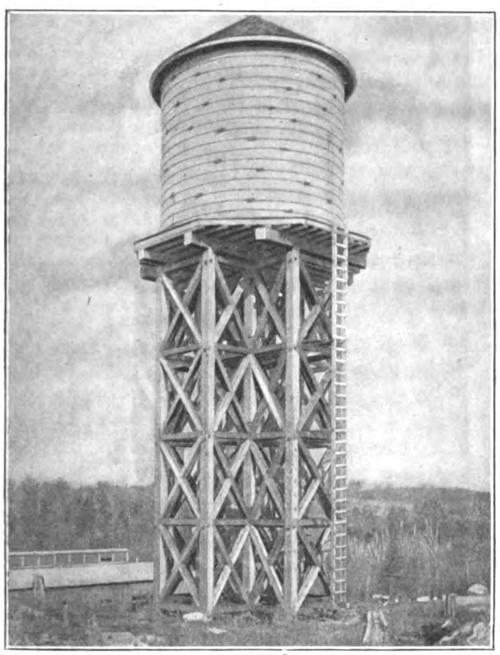


Fig. 1.—General View of Water Tank and Supporting Frame Work.

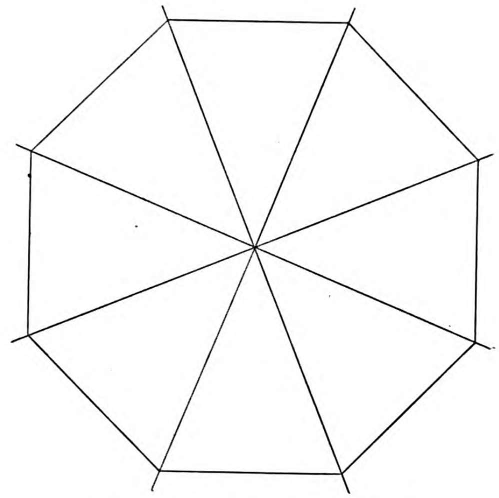


Fig. 2.—Principle of Water Tower Framing.

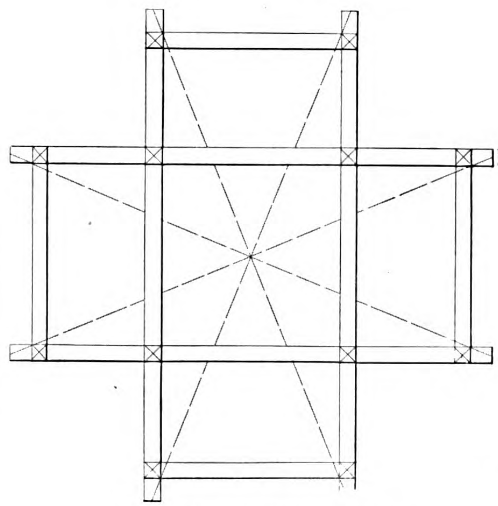


Fig. 3.—General Plan of Framing.

Novel Water Tower Framing.

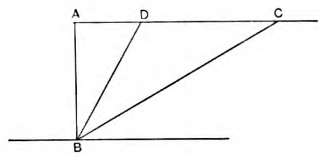
Design Wanted for Four-Room Flat Building.

From C. L., *San Francisco, Cal.*—I would like to ask of the readers of *Carpentry and Building* to suggest a plan for a four-room flat building, with bath and all modern conveniences. The house is to be two stories and basement in hight and erected on a 25-foot lot, the depth of the structure being 45 feet. Houses are built on both sides of the lot so that there can be no windows in the side walls of the flat building, except in the light wells or shafts.

Calculating Pressure on Coal and Grain Bins.

From S. D. S., *Portsmouth, Va.*—Referring to the question of "C. E. M." of Findlay, Ohio, as to pressure on the sides of a coal bin, I would say that there is no exact method of computing it. By making several assumptions a theoretical pressure has been determined, as follows, reference being made to the accompanying diagram.

If A B of the surface pressed = h, and B C = the natural slope of the pressing material, then B D is a line bisecting the angle A B C, and w is the weight of a cubic



Calculating Pressure on Coal and Grain Bins.

foot of the pressing material. The pressure on each foot of length horizontally of the surface pressed for the hight is

$P = \frac{1}{2} w \times A D^2$, A D being measured in feet.

This pressure is assumed to be concentrated at the point 1-3 A B $= \frac{h}{3}$ from the bottom point B.

It has been found by experiment that this formula gives a pressure greater than the actual pressure, so that it errs on the side of safety.

The same formula may be used for small grain, but it is a fact that elevators are frequently constructed of which the walls are weaker than would be demanded by its pressure and used successfully.

Criticism of Plank Frame Barn Construction.

From JOHN L. SHAWVER, *Bellefontaine, Ohio.*—In response to the wish of "S. H.," Minneapolis, Minn., as expressed in the December issue of *Carpentry and Building*, I offer a few suggestions in connection with his proposed plank frame basement barn. It is well, indeed, that he should insist on knowing what he is doing, for many have made blunders because they attempted to build plank frames without having first investigated the proper method of construction. Too many guess at it. As pioneers in this work we started, 25 years ago, on small structures, and month by month studied and contrived until a system was evolved that is adapted to barn structures of any reasonable size. Each point has been carefully tested as we proceeded, and if not fully satisfactory, was discarded for something better. We now have over 7000 structures in some 44 States and provinces, some of them quite large, and have received many gratifying testimonials as to their strength, durability and cheapness.

The floor plans submitted by "S. H." are very good in design and arrangement, save that the hay chutes are made to appear directly over one of the main girders. Of course, this he would discover and rectify. Should it be difficult to obtain 8 x 8 stuff for posts and 8 x 10 for girders, the former may very easily be constructed of two 2 x 8's and two 2 x 4's, box pattern, thus saving something in materials and risk from dry rot. The girders might be made of two 4 x 10's, or four 2 x 10's, leaving an air space of 2 inches in the middle and saving the necessity of making mortises.

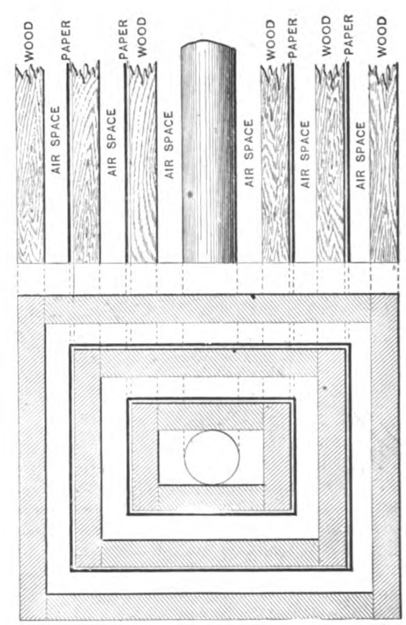
The drawings indicate the use of two 2 x 12's and one 2 x 8 for cross sills, the 2 x 8 being flat. In my opinion, the 2 x 8 is needless. The plates are all flatwise, while they must sustain much weight. We prefer purlin plates set on edge at right angles with the combined pressure of both sets of rafters. The main plates we make of three 2 x 6 inch, or 2 x 8 inch, according to the size of the structure when on edge to sustain the weight and two to sustain the outward pressure of the roof and the contents of the building. In this case, the purlins should incline 45 degrees.

The drawings of the correspondent indicate that the nailers are cut to fit between the posts, in which case they must be mortised, gained or toe nailed. The first two require unnecessary work, while the latter is not strong enough. If the bents are constructed in three sections, they will be tedious to raise in position. If completed before raising, they will be weak at the purlin plate. The drawings indicate also that staging would be required in setting the upper frame, and that quite a large amount of the work is done as the frame is being raised. In our experience we never use any staging, and we do most of the work from the ground before beginning to set for the frame. Most men can work more rapidly on the ground, with all materials handy, than they can aloft, where materials must be drawn up with ropes. I believe "S. H." can save enough on labor alone to pay his expenses to go to some point and see one of our plank frame constructions. Besides, he will find wherein he can greatly improve upon his method of construction. Those who are within convenient reach to do so can visit the barn of Dr. W. I. Chamberlain, near Cleveland, Ohio, which is easily accessible by railroad, while the doctor, who is one of the editors of the *Ohio Farmer*, takes great delight in showing his barn to visitors. This barn, which is 40 x 82 feet in size, required four carpenters two and a half days to frame and two hours and fifteen minutes to raise.

We do not usually give name and address of our patrons, because it leads to much inconvenience to them. Should any of the readers write to Dr. Chamberlain, I would suggest that they inclose a stamped envelope, properly addressed, for reply.

Protecting Tank Pipe from Freezing.

From W. T. M., *Ridgewood, N. J.*—It may not be without interest to some of the readers to describe my method of protecting the supply pipe to a tank from freezing, I have tried all the best loose and sectional non-



Protecting Tank Pipe from Freezing.

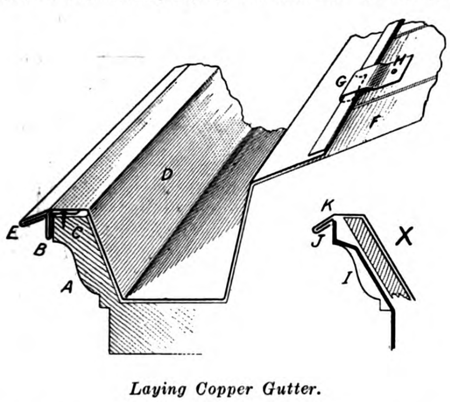
conducting materials that have been recommended and placed on the market, but I have always found, after the covering has been on for one year, that it would help freezing in the pipe, owing to dampness brought on by the atmosphere. I have experimented with the different methods of wrapping, covering, boxing, &c., and the method that I suggest will absolutely prevent the water in the pipe from freezing if the temperature be 20 degrees below zero. Place around the supply pipe what may be termed a three-ply box, a cross section and an elevation of which are shown herewith. This box must be attached to the bottom of the tank with an air tight connection and must extend at least 3 feet into the pit below the ground. Each section of the box should be made of ⅞-inch finished pine boards or something equal. The first box, in order to cover a 2-inch pipe, should be 4 inches wide to allow for laps, and 2¼ inches deep from front to back. This leaves an air space all around the pipe. When this has been connected to the bottom of the tank, so as to be air tight, it should be wrapped with sheathing or manila paper from top to bottom carefully, so as to be as near air tight as possible. When this has been completed 1 inch square cleats should be nailed on the box about 5 feet apart, to which the outer boxing or next ply of the box is to be fastened, equalizing the air space all round. When this has been completed, taking the same care to make an air tight connection at the bottom of the tank, it should be wrapped with the paper the same as the first ply. On the outside nail more cleats of the same size to provide an air space, and put on a third box, to be made of 12-inch wide finished boards, which can be painted to preserve them. Having met with the best success in using this method for the last eight years I can say from experience that it is better than anything else I have tried. I have experimented with it and given it the severest kind of test, and I have never had a frozen pipe which has been protected in this manner.

Laying Copper Roofing.

From J. C. D., *Indiana.*—I would like information as to the best size sheet copper to use in laying a flat seam roof, also do you consider it necessary to tin the seams? How would an expansion joint be made in an inlaid copper gutter?

Answer.—To make a good job the sheets should be 16 x 20 inches. If a large quantity of sheets are required they can be ordered direct from the mill, or can be cut from 20 x 96 inch copper, giving six sheets of the best size. The sheets should be tinned 1½ inches all around the edges. This can be done with a soldering copper, or a pan can be filled with molten half and half solder and the sheets dipped, using rosin or boiled acid as flux.

In laying the gutter as well as the roofing not a single nail should be used in fastening the lining or roofing to the sheathing. Nothing but cleats should be used, so as to allow for the expansion and contraction of the metal. Base and counter flashings should be used at the side walls and chimneys. The method of laying the gutter is shown in the accompanying illustration. Let A be the

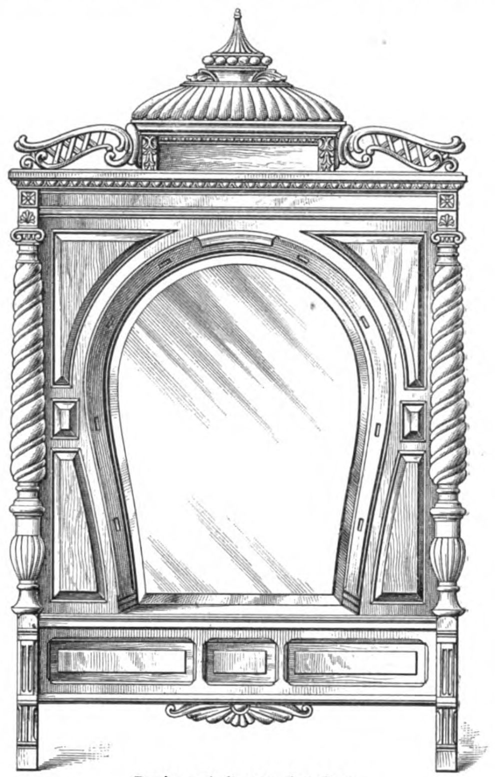


Laying Copper Gutter.

wooden cornice with gutter. Form a T-flange, as shown at B, along the entire edge of the cornice, which nail at intervals, as at C; then form the gutter D, so that it will lock into B at E, allowing it to run up on the roof, as at F. Into the lock F the cleat G is locked and nailed at H, placing the cleats about 18 inches apart. The cross seams in the gutter are tinned, locked and thoroughly soldered, using heavy coppers so as to retain the heat, laying the sheets in 8 feet lengths. Thus it will be seen that not a single nail is driven through the gutter, which is fastened in position by the cleats and lock E. When laying the flat seam roofing cleats are also employed, as at G, using four cleats to a 16 x 20 inch sheet. Should the molding A be of metal, as shown in diagram X at I, then a projecting edge is formed to the top, as at J, and the lining K locked into the same, as shown.

Design of Screen for Bar.

From C. A. W., *Port Jervis, N. Y.*—I inclose herewith a blue print of a bar screen, which may possibly be of interest to some of the readers of the paper. The screen has a beveled looking glass in a small panel above the horse-



Design of Screen for Bar.

shoe. The carvings are machine work of the Waddell Mfg. Company of Grand Rapids, Mich., and the large mirror in the center is beveled plate. The screen has a solid panel back, and the design here shown is in use in one of the leading hotels. I had to hold the design low on account of the low ceiling and fans. It should have been about 1 foot higher, which would have made a far better showing. In that case the effect would be to enlarge the horseshoe only, leaving the rest of the design as it is. The construction is of white wood and finished in curly maple, polished with dark moldings, and trim on the order of a light colored walnut stain, not too dark.

Are Mill Men Getting Careless ?

From APPRENTICE CARPENTER, *Fort Morgan, Col.*—There is a subject I would like to see the practical readers discuss exhaustively, and that is the methods employed by the lumber mills in turning out trim, flooring, &c. If the mills keep on getting more and more careless about milling, siding, moldings, flooring, &c., what will the carpenters do? It is possible that if all carpenters would refuse to buy poorly milled lumber, especially flooring, then the lumber yards would enter a strong protest, the lumber dealers in turn would make complaint to the mills, and things might then be different. It is certain that a reform in this line is needed, and I should like exceedingly to hear from others on this subject, as it is one which cannot be too freely ventilated.

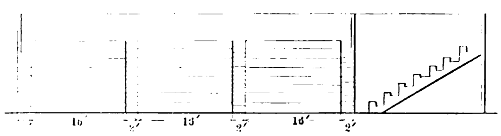
Making Portland Cement.

From D. P. B., *Redford, N. Y.*—Answering "E. F." of Jamaica, I would say that Portland cement is made in two ways. One is known as the wet method, consisting in mixing the materials together in water and grinding them to a pulp, which after evaporation to the proper degree of stiffness are made into balls or bricks. These are dried and calcined to the point of vitrification and then ground. The other method is to grind the materials to a powder separately, after which they are mixed with water and made into bricks which are then dried, calcined and ground. I give the constituents of four varieties, as they may be of interest in this connection. The ingredients are 65 to 75 parts chalk to 25 to 35 clay.

Constituents.	1	2	3	4
Lime	59.06	62.81	60.33	55.06
Silicic acid	24.07	23.22	25.98	22.92
Alumina	6.92	5.27	7.04	8.00
Oxide of iron	3.41	2.00	2.46	5.46
Magnesia	0.82	1.14	0.23	0.77
Potash	0.73	1.27	0.94	1.13
Soda	0.87	1.27	0.30	1.70
Sulphate of lime	2.85	1.30	1.52	1.73
Clay sand	1.47	2.54	1.04	2.27

Design Wanted for Grand Stand.

From B. H., *Decorah, Iowa.*—Will some of the many readers of *Carpentry and Building* furnish for publication plans for a grand stand, rough sketches of front and end of which are submitted herewith. The stand should



Design Wanted for Grand Stand.

have a capacity for seating about 300 people, and is to be built on a college campus. The back and sides are to be boarded, the roof is to be shingled, and I should like the front appearance as artistic as is consistent with economy of cost.

Truss Wanted for Gambrel Roof.

From C. H. M., *Perry, Okla.*—May I ask Mr. Kidder if he will illustrate and describe in the Correspondence Department of the paper a truss for a gambrel roof, say, of 30 to 34 feet span, and where the rafters are of the same length. I would also like to have him show the construction where the rafters are not of the same length. His last article on "Joints in Scissors Trusses" is very fine indeed, for the simple reason that it is so useful to country carpenters and architects. In my opinion, the paper is getting better all the time.

California Redwood for Outside and Inside Finish.

From D. P. B., *Redford, N. Y.*—In reference to the inquiry of "W. S. W." of Sterling, Kan., regarding redwood, I would say that if he will go to Lyons and examine the shingles of the upper story of the house in that place once owned by Captain Maxey, he will be in a position to tell us something about redwood. The house is in the northeastern part of the city, near the salt mine shaft. I built it in 1887, when I was quite young. It can easily be distinguished by its Gothic roofs. When in California I did not notice any more shrinkage than with pine, but I was not looking for it, neither was I attracted by it.

Laying and Painting Canvas Roofs.

From LEARNER, *Winchendon, Mass.*—I would like to ask through the columns of the paper in regard to the laying and painting of canvas on piazza and flat roofs. Should the canvas be painted while wet, or should I wait until it is dry? What kind of paint should be used? There are many opinions in this section as regards the wetting and painting of roofs of this kind. I should like to hear from those who have had experience in this line of work, and I feel pretty sure of finding such through the correspondence of *Carpentry and Building.*

Size of Rafters for Hip Roof.

From H. M. S., *Indianapolis, Ind.*—What are the smallest sizes of rafters which can be used with safety in a hip roof on a building 32 x 56½ feet?

Note.—Our correspondent fails to mention an important fact in connection with his roof, and that is the pitch. In a general way it may be stated that the steeper the roof the smaller the size of the rafter which could be used with safety, and conversely the flatter the roof the larger the size of rafter required, other things, of course, being equal. We submit the inquiry of our correspondent, however, to the readers of the paper for such discussion as they may be disposed to give it.

Dividing a Circle by the Steel Square.

From OLD SUBSCRIBER, *Rochester, N. Y.*—Will some of the readers of *Carpentry and Building* please explain through the Correspondence columns the method of dividing the circumference of a circle into any number of equal parts by the use of the framing and bevel square.

Explanation Wanted of Construction of Tool Chest Lid.

From A. S. W., *Shawnee, W. Va.*—I have been a reader of *Carpentry and Building* for nine years, but have not asked many questions during that period. I would now like to know if "W. S." of Walcott, Iowa, will more fully explain the construction of his tool chest lid, reference to which is made in the October issue. I would also like to know how he locks the drawers.

A View of the Labor Situation.

From MR. SMILEY, Pittsburgh, Pa.—I note with interest the discussions that appear from time to time in the Correspondence columns of the paper, and one of them in particular, "What Constitutes a Day's Work for a Carpenter?" has provoked some thought on my part, not, however, along a line that would be permissible in your columns. The whole question of labor in all mechanical and building trades, as largely controlled at the present time, is in my opinion unjust and not founded on equitable principles. There is an ethical side to this question, of which the men in our crafts are either not conscious or do not care to recognize. In the first place strikes are not only a needless expense to all concerned, but are demoralizing to every interest involved. It is very evident to the observant mind that the principal source of trouble is not so much with the "rank and file" of craftsmen, as with the scheming demagogues who, acting from a selfish motive, largely dominate them. It has been curtly remarked that "the devil keeps the stile where such men pass"—men actuated by such motive and operating by such methods—and every one passing here must pay toll, not silver or gold, but conscience. Now we admit that differences will continue to arise between capital and labor, but our craftsmen will take a higher place in the "eyes of the world" when they decide to submit all differences for settlement to the only rational method—arbitration.

Then again, it is not always the man who is able to hang the most doors or to lay the most flooring in a day who is the best man, either for himself or his employer. The carpenter who may be able to hang 14 doors in nine hours (?) may be considered good to-day, but what will he be worth in five or ten years hence? The things that ought to be considered, and will be, in the end are not only skill and physical endurance, but moral integrity and adaptability. It counts infinitely more for the craftsman at times, if he has the power to discern that the quality of his work and an amiable attitude toward his employer's interests, have more to do with his own ultimate success and that of his employer's than quantity. This incident, which came up under my own observation some years ago, will illustrate my point: Two men were working "partners" on a large building. The younger, noticing some work being improperly done, said to the older, "I think that fellow is wrong." The elder replied, "D—— the difference. We are not paid for thinking; we are only paid for working."

LAYING OUT CIRCULAR ARCHES IN CIRCULAR WALLS.*—XIII.

By CHAS. H. FOX.

IN this issue we give attention to face patterns, templates, &c., with direction for cutting a full center or bullseye radiant arch. The plan is shown in Fig. 114, while in Fig. 115 is represented the directing curve of the soffit. The example taken is a very simple one, consisting of an arch containing only four stones, so that dividing A E of the directing curve into two equal parts, as shown at C, the point at which the joint is required may be obtained. The tangent and normal to the center point 7 of the element which belongs to the soffit of the joint is given in F C′ and C′ 2, respectively, of the diagram.

The student having projected Figs. 114 and 115, and the developed molds of the outer face, Fig. 116, as well as those required at the inside face, in the manner already described for similar operations in previous issues, he will next draw in Fig. 116 the chord line C C′ and the oblique lines J G and G J′, as well as the verticals 2 J′ and 2′ J. This will give in the inclosed figure the shape and size of the rough stone at the face, out of which the top stone of the arch may be formed.

In Fig. 114 set off C′ 2 equal to C *b* of Fig. 116 and draw the radial 2 1 and the line 1 1′ parallel with the opening line. The width of the stone as required at the lower surface C C′ of the rough stone is given in E 1′. The required size of the rough stone out of which the side stones may be formed is given in the face mold of Fig. 116, together with the figure inclosed within 3 C′ *c f* of Fig. 114.

We show in Fig. 122 the template as required to give the proper direction or curvature of the drafts at the oblique lines J G and J G of Fig. 116. The construction of this template, together with that of a similar one as required for a like purpose at the oblique joint lines of the stones has been fully explained in connection with Figs. 80 to 91. These templates will be designated as Nos. 3 and 4, for in order to cut the stones in a systematic manner each mold or template should be marked with some number or special designation, so as to properly distinguish one pattern from another.

Now to form the top and bottom stones, we shall first give directions for shaping them out of rough stock and cut the stones entirely by hand—that is, without the aid of machinery. Having selected a stone of the size as given in C′ C 2′ J G, &c., of the face mold of Fig. 116, transfer to the face of the stone the contour of the figure in question, and at the same time transfer the positions of the verticals C K and *a* G of the figure to the stone, so that they will occupy the same position there as at the mold. Rough out the sides of the stone to the contour, as given above, then take No. 3 template, the construction of which may be seen in Fig. 122, and apply it in the manner shown in Fig. 117 to the lower surface C C′ of the stone, and there mark the contour *a d b*. Now at C C′ cut a draft to the direction of the curve line, the draft requiring, of course, to coincide with the curvature of template No. 3. This done, cut a straight draft at the vertical D B, and there mark a hard line to correspond and to occupy the same position on the stone that the line *a* G occupies on the face mold. Next, at the points given in K K cut sinkings in such a way that when winding blocks are placed in C′ and K′ and a straight edge applied to them, while another edge is placed at the draft in B D, the sinking made in K will coincide with the surface of the sinking block when the under edges of the straight edges are "out of wind." The points thus obtained in K K, together with that already given in B of Fig. 117, will show the proper direction at which to form drafts from B to J of the stone. Cut the drafts, making use of template No. 4, to give the proper curvature, then cut a draft at J 2 out of wind to that at D B. Next cut a draft at 2 C′, making use of template No. 5, which is not here developed, and which contains the contour as given at convex face of joint mold, in order to give the proper curvature. Repeat the operation for the other half of the stone, which will give a draft entirely around it. The next step is to form the surface as for a circular piece of ashlar, applying the straight edge in a direc-

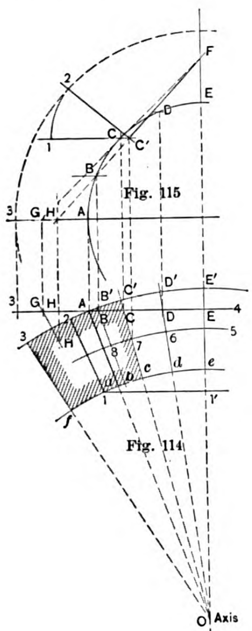


Fig. 114.—Plan.
Fig. 115.—Elevation of Directing Curve, Tangent and Normal.

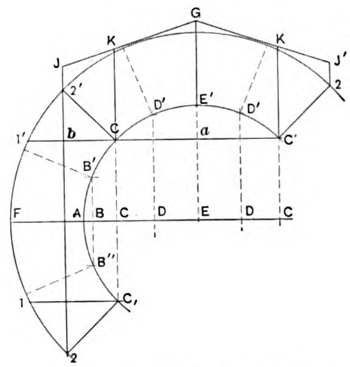


Fig. 116.—Developed Face Molds.

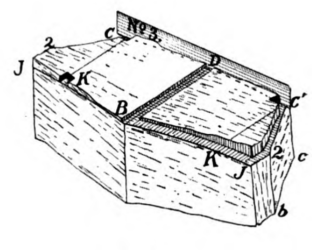


Fig. 117.

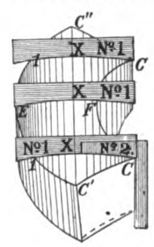


Fig. 119.

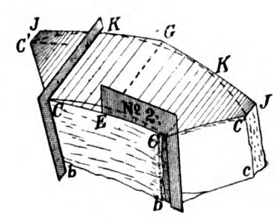


Fig. 118.

Figs. 117, 118, 119.—Diagrams Showing Application of Working Bevels, &c.

Laying Out Circular Arches in Circular Walls.

* Copyright, 1902, by Charles H. Fox.

tion parallel with the vertical B D, when no difficulty will be experienced in the cutting of the surface. At this surface mark the curves, together with the joint lines of the face mold proper, noticing in the application of the mold that the center vertical E G of the mold coincides with the vertical at B D of the stone. Now at the points given in C C′ by the mold cut drafts through the lower surface, making use of the square, as shown in Fig. 118, to give the direction for forming the surface of the drafts. Cut the drafts good and true. Now take No. 2 template and apply it as shown in Fig. 118, the angle of the template being placed to the exact point C of the mold. In this position mark at the drafts the radial line, as C *b* of Fig. 118.

The direction is now given in the line C *b*, together with that of the joint line as given by the face mold, at which to form the plane surface of the joints. Drafts are cut at the lines in question, then another either at C′ *c* or *c b* of Fig. 118, out of wind to the draft opposite to it. The joint being a plane surface may then be readily worked. After the joint surfaces are formed rough off the inside face of the stone to its required thickness. In this case E′ *e* of Fig. 114 is that required; this may be trammeled from the face. If the inside of the stone requires to be clean leave on a sufficient quantity of stone; inspection of the diagram of Fig. 119. Other drafts may then in the same manner be cut at C 1, &c., then applying a straight edge in a direction parallel with the plumb line the surface of the face may readily be formed. This cut, mark upon the surface the contour of the face mold, noticing as before directed that the plumb line of the mold is placed exactly over the hard line C′ C″ of the stone. Now cut drafts through the soffit surface. Applying No. 2 template to the level lines C 1, as shown in Fig. 119, the direction may be given at which to form the surface of the drafts.

Having cut the drafts correctly apply the square to the plumb line in the manner shown in Fig. 120, and a straight edge to the point given in C with the face mold. The direction of the cutting line of the soffit and of the joint surfaces may thus be obtained. Obtaining these the stone may then be finished in the manner described. The top stone may be formed after the corresponding radial drawn at the draft, as C *b* of Fig. 118.

From these directions we think the cutter will experience little, if any, difficulty in forming the stones, either of a model or of an arch, in actual practice. We may remark that the faces of the several stones may readily be planed, the section 3 C′ *c f* of Fig. 114 giving that required for indicating the direction for forming the stones which

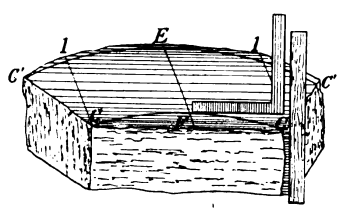


Fig. 120.

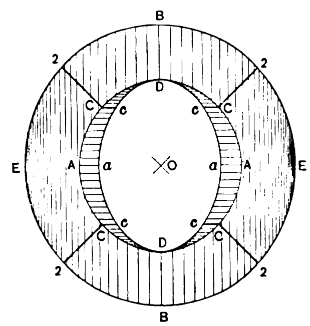
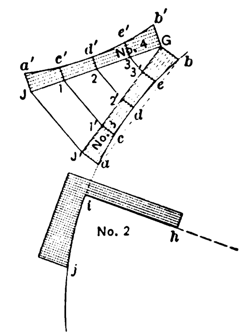


Fig. 121.

Figs. 120 and 121.—Diagrams Showing Application of Working Bevels, &c.



Figs. 122 and 123.—Diagrams Showing Construction of Working Templates.

Laying Out Circular Arches in Circular Walls.

if rough, point it down first time, leaving on sufficient rough at the arris or soffit line so that the arris may be clean when the stone may be finished. After this is done, mark at the inside face the mold for the stone in question, applying the points corresponding with C C′ of the outer face molds to the lines given by the No. 2 template; this completes the directions as required to finish the exterior and soffit surfaces. If the curves of the outer and inside face molds are divided each into the same number of equal parts, a number of points may be obtained at which to apply the straight edge, which will greatly accelerate the working of the twisted surfaces. Now trammel at the inside the cutting line and finish the inside arris, which will complete the working of the stone.

Now, banker up the side stone and transfer to the outer surface the plumb and level lines, as 2′ 2 and C, 1, of the face mold, Fig. 116; then cut a draft at the plumb line, and on this mark the hard line, as C′ C″ of Fig. 119. This done, at the level lines cut drafts to conform to the curvature of No. 1 template. To do this, two templates are required exactly alike; for that matter, two No. 3 templates may be made exactly duplicate, with the center ordinate *d′* 2 of Fig. 122 marked correctly upon each. Then having cut a draft, say at the lower line, as C 1 of Fig. 6, to the direction of one template, cut another draft, say at E F, in such a manner that the top edges of the templates will be out of wind when the two templates are applied at the same time to the two drafts, and the X line of the templates placed exactly over the hard line joining C′ C″. What is meant may be clearly seen on an belong to the sides of the arch. After the faces are planed the joint surfaces may be formed as before, then mark upon the stones the contour of the face molds and form the stones as directed above.

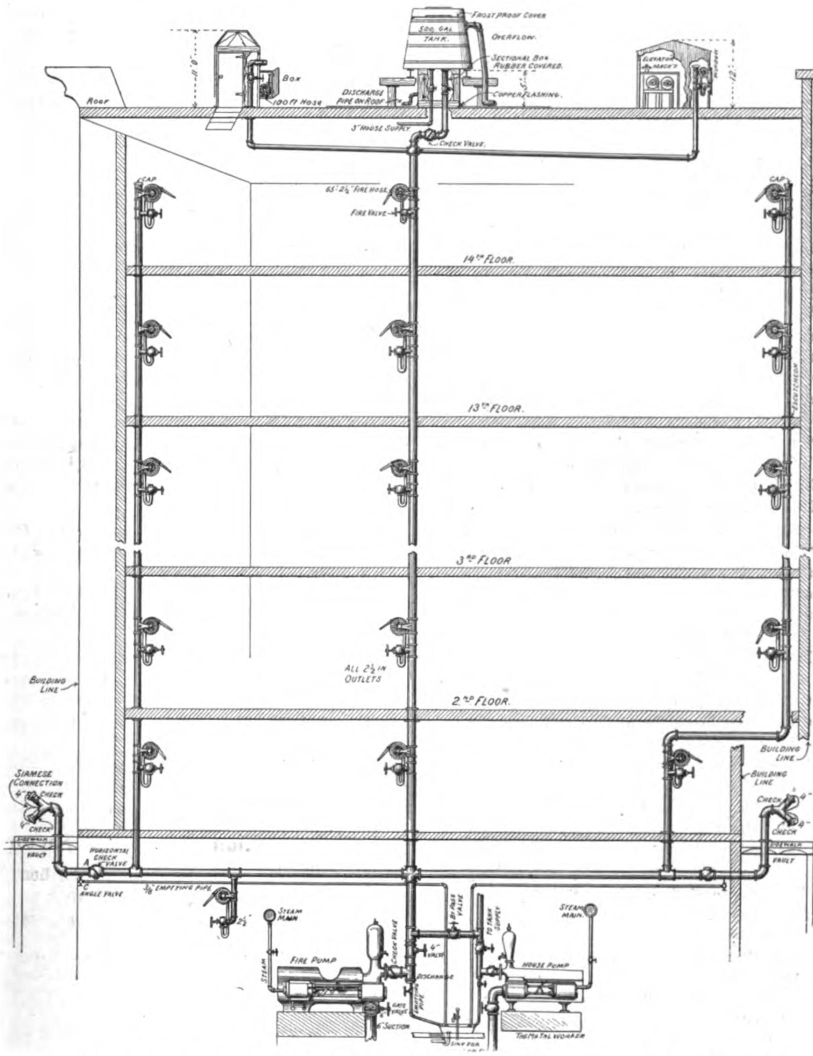
Ventilation in Indiana Factories.

Indiana has enacted a law for the health and safety of factory employees. It provides that no less than 200 feet of air space shall be allowed for each person employed in day time, and 400 cubic feet for each person working during the night hours (provided the room is lighted with electricity). State Factory Inspector D. H. McAbee says he is unable to enforce this law because the State has provided no way of determining whether or not the ventilation is adequate. A test that will show the condition of the atmosphere in a factory must be made so delicately and accurately that only an expert analyst can do the work. Even his analyses are not always reliable because conditions are changing constantly. A room impure of air at one time of the day may pass inspection at another time. Where the conditions meet the exact letter of the law the factory rooms are often filled with foul air. In such case a chemical analysis will show a large amount of carbon dioxide. Discussing this element of the air, Dr. Hurty, secretary of the Indiana State Board of Health, says: "Carbon dioxide is not a poison in the strict sense of the term, yet there are no life-sustaining properties in it. The per cent. of vitalizing oxygen is decreased by it and the worker breathes 'thinned' air. The lungs of the workman begin to degenerate, and he declines in health."

FIRE PROTECTION IN LARGE BUILDINGS.

A FEW months ago extraordinary effort was made through the influence of the Board of Fire Underwriters, with the co-operation of the Fire and Building Departments of Greater New York, especially in the Borough of Manhattan, to establish stand pipes, or fire lines, in all public buildings and apartment hotels to prevent a repetition of the disaster which befell the Park Avenue and Windsor hotels, with the attendant loss of life and damage to property in the immediate neighborhood. According to reports, says a recent issue of *The Metal Worker*, when the fire alarm was given, not a single fire line or hose was to be had on any of the different floors, from the basement to the roof. Consternation was thus created among those already panic stricken when it was known that hardly any provision had been made for their safety.

Since that event the Fire Department has been working zealously to make it necessary, in fact compulsory, to have all buildings where there is the least possible danger equipped with modern hose reels and the best made, close woven 2½-inch linen hose on each and every floor adjoining stairways, a hose to be attached to the 4-inch galvanized iron stand pipe with 2½-inch branches, and with 2½-inch polished brass angle valves, with soft seat, to insure safety from leakage. It is also required that there be attached to each valve 65 feet of 2½-inch hose, placed in a position to make it conspicuous at all times. This is to impress patrons and tenants that, in case of fire, it is only necessary to grasp the hose nozzle on the reel attached to the stand pipe on any floor, and with one pull the hose will release itself from the reel in a quarter of a second. When this is done, still retaining the nozzle in the left hand and holding the open end downward, it is only necessary to open the fire valve by unscrewing it. Then, the water in reserve in a large tank on the roof, as shown in the illustration herewith, will be abundant for protection, with the aid of the fire or house pump in the basement, until the arrival of the engine from the Fire Department, which will connect with the special connection on the outside of the building and pump water from the street service mains into the building through the piping system provided for fire protection.



Fire Protection in Large Buildings.—Vertical Section, Showing Piping, Pumps, &c.

The illustration shows the method employed in placing the stand pipes or fire lines in position, which the Fire Department is laboring to have observed in every building where the city has jurisdiction. In the basement a large Worthington pump, or some similar pump, is located, adjoining the house pump and cross connected with the by-pass, so that either can be used in case of emergency to keep the fire pump primed up. A line of 5-inch galvanized iron pipe is carried fro mthe pump to the tank, with a check valve on it near the tank to prevent inch galvanized iron pipe is carried from the pump to the engines are working, to supply the various branches. There are also other check valves at the bottom of the pipe, at the branches, to prevent the escape or loss of water from the tank when the pumps are not running. This arrangement of the check valves renders the supply of water carried in the tank available in case of a fire before the pump can be started. It also enables the use of the two outlets on the roof in the deck house when under sidepump pressure. The tank outlets on the roof, at each side, can also be used for service in case of fire in an adjoining building.

A line of 4-inch galvanized iron pipe is carried across the basement ceiling, connecting with the main 5-inch stand pipe and pump. These lines are continued outside of the building line into the vault, and come up through the sidewalk, ending with a Siamese connection, to receive the pipe from the steam fire engines. Just inside of these Siamese connections the check valves A, A, with soft seat, are placed to keep the water from escaping from the tank or the pump into the street services. Water is kept in these lines between the pump and the check valve, which are held absolutely tight by the pressure behind them. Just outside of these check valves small ⅜-inch pipes connect with the 4-inch pipe and have an angle valve for the purpose of emptying the outside pipe in case of repairs or freezing weather. These pipes are carried to the basement sink, where they discharge, and this sink also receives the discharge from pipes with valves on them leading from the base of the main pipes on each of the pumps.

It will be seen that there are valves and hose on the outlets in the deck house on the roof, so that this fire protective service is immediately available without the delay that might be entailed through an endeavor to get inside of the building. Dry goods and storage houses and similar buildings have separate tanks and automatic sprinkler lines, some keeping one or two tanks in reserve with 10,000 gallons of water available in emergency. The sprinkler system is designed on somewhat the same lines as the fire protective line, having a large stand pipe on each side of the building with 3-inch branches taken out and carried across the ceiling, hanging from the beams, reducing in size as it continues, until it is ¾ inch at the furthest point; all cross discharge lines having ½-inch outlets, 30 inches apart, with ½-inch soft metal jets. As the branches are taken out of each floor a controlling valve is placed close to the stand pipe, to facilitate repairs or other necessities. The sprinkler system also has the Siamese connection at the sidewalk level outside the building line, with a distinctly marked metal plate, so that the Fire Department can tell which is the sprinkler system and which is the fire protection system.

This method of protection against fire has proved most efficient under test, and the small cost should not interfere with its general use, not only where it is required by law, but throughout the country wherever a building containing a valuable stock exists. The general provisions of such systems in buildings will be gladly received by the trade which is called upon to install them as an increase in the demand that may be made upon their services.

Cement and Sawdust Tiles.

It is said that excellent tiles can be made with a mixture of Portland cement and sawdust, and that nails can be driven through them without causing them to crack. In a recent issue of the *Thonindustrie Zeitung* the following proportions were given as suitable for the manufacture of the tiles: Damp sawdust 100 parts by weight, Portland cement 240 parts, water 48 parts. The sifted sawdust is well moistened and allowed to stand for 24 hours before being employed for mixing with the proportions of cement and water mentioned. The sawdust is used in a damp condition to prevent it from absorbing from the mixture the water required for the proper setting of the cement; and during the process of drying after molding, the tiles are repeatedly sprinkled with water with the same object in view. Previous attempts to make durable tiles with a mixture of sawdust and cement are said to have failed owing to the absorbent action of the sawdust.

Convention of the Texas Builders' Exchange.

The fourth annual convention of the Texas Builders' Exchange was held in the Temple of Honor Hall in Galveston, Texas, November 30 to December 2, inclusive. It was the original intention to have held the meeting on November 2, but on account of the quarantine against San Antonio, it was decided to postpone the convention until the end of the month. Representatives were present from Galveston, Dallas, Beaumont, San Antonio and Cleburne, Texas, and from Shreveport, La. The members were called to order at 11 o'clock on November 30, when in a brief address President Oppermann of the Galveston Exchange, in a brief address, welcomed the delegates, the response being made by President Boettler of the State Exchange. Reports of officers and committees were read and other routine business transacted.

In the way of entertainment, there was a ride around the city, which was most enjoyable, as it brought the visitors to many points of interest in the Eastern and Western portions of the city, also through the southern section and the residential districts. A stop was made at the sea wall and a promenade on the concrete protection work was made a feature of the trip. The excursionists returned to the city about 6 o'clock well pleased with the entertainment which the committee appointed for the purpose had provided for them.

The second day's session was commenced at 9 o'clock on the morning of December 1, when matters of general interest pertaining to the association were considered. The entertainment provided for the afternoon was an excursion on the bay.

During the forenoon of the third day's session the officers for the ensuing year were elected, as follows:

President, L. R. Wright of Dallas.

Vice-President, David E. Sayre of Beaumont.

Secretary and Treasurer, H. C. Oppermann of Galveston.

Sergeant-at-Arms, M. C. Asborne of Cleburne.

While the convention was in session a committee from the Galveston Exchange took the visiting ladies on an inspection tour of the United States revenue cutter Galveston.

After the business of the convention had been transacted a vote of thanks was extended in the shape of the following resolution, which was unanimously adopted:

Whereas, The membership of the Galveston Builders' Exchange have exemplified the very essence of true and cordial hospitality in their welcome to the visiting delegates to this, our State Exchange, in annual session; and

Whereas, Every visiting delegate feels sincerely grateful for the hospitable treatment while in the city of Galveston; therefore be it

Resolved, That we extend to the Galveston Builders' Exchange, and also to the citizens of Galveston, our sincere thanks for the loyal and generous reception we have received during our visit to the city.

The committee presenting the resolutions consisted of William Illingsworth of Dallas, W. M. Hagy of San Antonio, J. T. Booth of Beaumont, Edward Browne of Houston, J. C. Greene of Cleburne, W. C. Torbett of Waco, all of Texas, and A. Benoit, representing the Builders' Exchange of Shreveport, La.

It was decided to hold the convention next year in Waco, the date to be decided later by the Executive Committee. The afternoon of the third day was given up to a Galveston banquet, known as an oyster roast, but in reality an oyster feast, because the roasted oyster plays but a minor part in the entertainment. A special train carried over 200 delegates and their friends to an oyster farm, where everything had been prepared for the occasion. Bud Randolph of Houston acted as toastmaster, and there were impromptu remarks by a number of the visiting delegates, and the occasion was one of social good fellowship.

WHAT BUILDERS ARE DOING.

THE regular quarterly meeting of the Baltimore Builders' Exchange was held at their rooms, at Lexington and Court street, on Tuesday evening, December 1, in accordance with the announcement contained in our last issue. As a prelude to the meeting a banquet was served, covers being laid for nearly 200 members of different trades connected with the building industry and represented by the membership of the Exchange. At the head of the table was seated Charles L. Eidlitz, president of the Building Trades Employers' Association of New York City, Prof. Otto Fuchs, President John H. Short of the local exchange, and ex-presidents Isaac S. Filbert, S. B. Sexton, Jr., Benjamin F. Bennett and John Kelley. As soon as the good things which had been provided had been duly considered, a season of speech making was enjoyed, President John H. Short introducing as the speaker of the evening Mr. Eidlitz, who suggested that employers must act speedily in perfecting their organizations, in order to meet the problems which were confronting them from day to day. He then led up to the situation which formerly existed in New York City, comparing it to the conditions as they are to-day. Among other things he said:

"Of late some of your members have been considering the advisability of uniting, and the time is now ripe for doing this. Let a month go by, let a week go by, yes, let a day go by, and your grasp on the situation will weaken just that much. In your Builders' Exchange all of the building trades are represented, and under a suitable leader you can be successful in this venture. From the lesson of the 'graft' proposition in New York, you can show to labor what can be done, only you must hold together and be firm when once you have set down your foot. If you don't act, and act soon, labor will run you to the ground and will put you in a position that will be hard to get out of. Intelligence combined with force is a strong combination, and if rightly brought together in this it cannot fail to win out."

After the remarks of Mr. Eidlitz, which were followed with the closest attention by those present, the meeting adjourned until the regular session, which was to be held later in the month, when the question of forming an association would come up for definite discussion.

Among the building improvements in contemplation it is interesting to note the operation which is to be carried out by Contractor Edward J. Gallagher, on Grove street and on Kenwood avenue. On the former thoroughfare will be erected 20 two-story brick dwellings, each covering an area 12 x 38 feet, and having flat tin roofs with galvanized iron cornices. The 13 dwellings on Kenwood avenue will be 13 x 44 feet in size and will rest on brick foundations with stone beds. There will also be a group of seven two-story structures built in East Lanvale street, each having a frontage of 14 feet and a depth of 44 feet. These will be of brick and stone, with pitched roofs covered with tin.

Chicago, Ill.

While the building situation in Chicago is anything but active at the present moment, there is early indication that the new year wll see a revival of building. There is scarcely an architect in the city who has not on his files plans for buildings of greater or less magnitude that are held up because of the uncertainty of labor and the feeling that materials are higher than they will be. As far as materials are concerned, prices are coming down more nearly to the point where they meet the wishes of the owners. Brick is low and plumbing and gas fitting have been reduced 20 per cent. within the last 60 days. Steel, while showing no actual reduction in price on the tonnage basis, is figured very close by contractors, who make estimates on completed buildings, and such castings as enter into the construction of buildings are lower in price. Lumber is still high, but not higher than should be expected, because of the rapidly declining source of supply.

Taking a broad view of the situation, the population of Chicago has increased in a much larger proportion than the buildings can accommodate it. This is particularly true of desirable residence property. Rents accordingly are high, and this fact offers another temptation to builders to prosecute the work which they have had under consideration for some time.

The only element still lacking to bring about the desired activity is the uncertainty and high price of labor, and this obstacle is being met both by local contractors and by the newly formed association of building trades employers, and the prospect is that by the time the weather will permit the breaking of ground in the spring the labor element will be brought down to a basis where it is possible to erect both residence and business structures at a profit to their owners.

According to the figures of the Building Department, permits were taken out in November for 564 building improvements, having a frontage of 15,777 feet, and estimated to cost $2,965,080, as against 454 permits for buildings having a frontage of 15,065 feet and costing $3,083,550, in November of last year.

Hazleton, Pa.

The second annual banquet of the Builders' Exchange took place at the Central Hotel on the evening of Thursday, December 3. The members and their guests first assembled at Union Hall at 8.30 in the evening, and a half-hour was spent in pleasant social intercourse. At 9 o'clock they adjourned to the parlors of the Central Hotel, where they listened to a number of selections by Schmauch's orchestra, and then repaired to the dining room, where a banquet was served. The decorations were of a rather elaborate character, the floral display being especially noticeable, and the orchestra being concealed behind a screen of palms. After the guests had rendered full justice to the many good things placed before them, the assemblage returned to Union Hall, where a pleasant hour was spent in renewing acquaintances and establishing general good fellowship. The committee having charge of the banquet discharged their duties in a most satisfactory manner, and the occasion was one long to be remembered by those present.

Los Angeles, Cal.

During the month of November 649 building permits for improvements, valued at $1,183,914, were issued, as compared with 625 permits for construction work, valued at $1,045,000, issued in October, and 496 permits for work valued at $1,129,954 in November, 1902. Builders anticipate a continuation of the activity which has characterized the last year. Apparently the drawbacks to building at this season are not sufficient to put a check to operations.

Manila, P. I.

Many new buildings are being constructed in Manila and the provinces, and altogether there is considerable activity in the building line. Among the most important work of the past few months may be mentioned the three new modern buildings on the premises of the San Lazaro Hospital, the Government laboratory, and the municipal building of Manila. This building, which was commenced by the Cosmopolitan Hospital Association, has been properly braced and reinforced, and when completed will be a modern and substantial office building for the city officials. Plans for a two-story steel frame addition to the Government printing office have been prepared. The Bureau of Architecture also has under way plans for the Agricultural Building at La Carlota, Negros; for a new jail at Karlac; a new school house at Bulan, and for a warehouse on Engineers' Island, Manila Bay.

Minneapolis, Minn.

The members of the Builders' and Traders' Exchange held their second annual banquet in their rooms in the Kasota Block on the evening of Wednesday, December 2, when nearly 100 representatives of the building industry were present. Music was furnished by the Minnesota Quartette, supplemented by impromptu songs by the colored waiters. The toastmaster of the evening was W. A. Elliott, who introduced the various speakers of the evening with remarks of a tenor which placed every one at ease. After welcoming the guests from St. Paul and Duluth, J. S. Corning, president of the St. Paul Exchange, was introduced. He responded with some rather humorous remarks and concluded by inviting his hearers to the banquet to be given by the exchange which he represented. The next speaker was E. G. Wallinder of Duluth, who dwelt upon the relations of architects and builders and urged the two to work closer together and thus avoid many of the misunderstandings which are often credited to a lack of intimate acquaintanceship. This speaker was followed by F. G. Corser, who responded for the architects, and then by C. E. Hale, who was called upon to respond to the toast, "The Quarry," on account, no doubt, of his connection with the Kettle River Quarries Company. The brick manufacturers were represented in the list of toasts by John S. Bower, who, among other things, pointed out the difference in the manufacture of brick 20 years ago and at the present time. Harold Johnson had for a toast the subject, "Ornamentation," while George M. Gillette discussed the development of the iron business, and emphasized its importance as marking the progress and development of civilization. Other speakers were D. W. Smith, who told why mill work is so high at the present time; G. E. Casey considered the subject of steam heating, W. K. Morrison spoke of the hardware business, and L. L. Sanford referred to the extended advances which have been made in the field of electricity. James G. Houghton, Building Inspector of the city of Minneapolis, in a few brief words urged contractors to do good work. George W. Turner spoke from the standpoint of the decorator, and J. L. Hague had something to say from the viewpoint of the plumber.

New York City.

There is very little change to note in the building situation since our last issue, except, perhaps, the feeling as to the coming season is a trifle more hopeful. This is not wholly based upon the value and number of the improvements now projected, as indicated by the permits daily filed with the Bureau of Buildings, for these are not altogether encouraging, but rather upon the necessity of greater housing accommodations to meet a constantly increasing population and to restore to a more normal condition the supply of rentable dwellings, flats, apartment houses, &c. It is natural that the greatest activity should be along the line of the subway and in the upper section of the city. The demolition of the large number of dwellings to make room for the new Pennsylvania Railroad station, the increased terminals of the New York Central Road at Forty-second street, as well as to clear the space for the approaches to the new East River bridges, has contributed in no small degree to the dearth of housing accommodations and created the necessity for others to take their places. Much, of course, will depend upon the labor situation in the early spring, but it is hoped that matters will by that time be so adjusted as to permit of a volume of operations upon a scale commensurate with the requirements of the city's population.

Since January 1, 1903, and up to the second week in December, there have been issued in the boroughs of Manhattan and the Bronx permits for 1685 new buildings, estimated to cost $77,300,000, as compared with 1609 permits for improvements, costing $85,953,400, in the same period of 1902. In the former period $10,328,500 were spent for repairs and in the latter $8,900,000.

As a result of the recent agitation in labor circles, it has just been announced that Local Union No. 2 of the International Association of Bridge and Structural Iron Workers has resolved to abolish walking delegates, their duties in the future to be performed by the members of the Strike Committee of the union.

Oakland, Cal.

Satisfactory progress is being made on all the large buildings under construction in Oakland. The new hospital building, at Twenty-fourth street and Broadway, will be completed by January 1. The structure is four stories high, with a large attic, basement and sub-basement. The contracts for the new Carnegie Library Building at Berkeley were let a couple of weeks ago. The principal work will be done by Robert Greig for $35,000.

Philadelphia, Pa.

The operations in the city as a whole continue to show unmistakable signs of contraction, although there is a fair degree of activity in certain sections. According to the report of the Bureau of Building Inspection for November, there were 602 permits issued, covering 911 building operations, which were estimated to cost $1,472,165. As compared with the same month last year, these figures show a decrease of $644,085 in the cost of improvements, and there is also a falling off as compared with October of the present year, when the contemplated building improvements were estimated to cost $1,843,605. During the month of November there were issued permits for 343 dwellings, ranging from two to four stories each, estimated to cost $642,200. Permits were issued for four new stations, to cost $210,000; for five manufacturing establishments, to cost a little more than $197,000, while alterations and additions call for an expenditure of $212,635. The Thirty-fourth ward continues to be the scene of the greatest activity in the building line, although the Second and Nineteenth wards made an excellent showing for the month.

The Master Builders' Exchange and the Master Employers' Association, at a concurrent meeting on December 16, passed the following resolution:

"Be it resolved, in view of the fact that all agreements between employers and workmen do not expire at any one stated time, that we recommend that all existing agreements remain in force until they expire; that no new agreements shall be entered into that will admit of the sympathetic strike and that will not secure arbitration of all differences, work to continue meanwhile, and that wherever agreements do not forbid we recommend and insist that the resolutions set forth September 7, 1903, shall be strictly adhered to."

These resolutions were as follows:

"*Resolved*, On and after a time to be fixed at the discretion of the Advisory Board of the Master Builders' Exchange, no workman shall be employed on any of our buildings in Philadelphia, unless he is willing to agree not to engage in any sympathetic strike and to arbitrate any differences that may arise, work to continue meanwhile."

Pittsburgh, Pa.

The building situation in the city at the present time is not altogether encouraging, owing to the differences existing between employers and employed in some of the various branches of the trade. The plumbers in Pittsburgh and Allegheny went out on strike October 1, owing to the master plumbers refusing to meet the demands for an advance of 50 cents a day, or from $4 to $4.50 for eight hours' work. As a result the plumbing trade in the Pittsburgh district has been at a standstill ever since that date. About the middle of November the Builders' Trade League called out other craftsmen, such as bricklayers, stone masons, tinners, painters, &c. and the building operations have been very greatly curtailed. Recently the tinners, apparently becoming tired of the situation, returned to work, and the indications appear to be that the men in the other trades will soon follow the same course. Latest advices prior to going to press are that the plumbers are becoming more or less uneasy and have within a few days brought one of their officials to Pittsburgh with a view to effecting a settlement of the strike, if possible.

The Building Trades' Council has been weakened somewhat in its fight with the Builders' Exchange League by the settlement of the dispute between the sheet metal workers and the master tinners and the withdrawal of the hoisting engineers from the council.

Portland, Oregon.

Notwithstanding the rainy weather of the past month, contractors and builders have been busy throughout the city and in the suburbs. Over half a million dollars' worth of work has started during the month, and contractors believe that winter weather will not be able to check building to as large an extent as heretofore. The building of residences, which was the prominent feature of the summer months, will probably drop off somewhat during the next few months. According to local architects, a goodly number of three and four story brick structures will be undertaken. One feature of the residence building during the past few weeks is the construction of houses ranging in the neighborhood of $15,000 in cost. It is estimated that over 100 buildings of this sort have been put up on the East Side during November. Among the larger work undertaken during the month are the alterations to be made in the Fleischner, Mayer & Co. building, on First street, and the alterations in the A. O. U. W. Temple, on Taylor street.

Salt Lake City, Utah.

This has been a great church building year in the city. A sum approximating $500,000 has been expended, or will be, on contracts for church buildings during the year. The amount represents the construction of nine new houses of worship and the remodeling and improving of two old buildings. Seven different sects are represented. The First Presbyterian Church, the most pretentious of the new buildings, will cost when completed $120,000, the Westminster Church will cost $30,000, the Liberty Park Methodist Church will cost $10,000, the Unitarian Church will cost $15,000, the Seventh Day Adventist Church between $3000 and $4000, the new Mormon meeting house, on Eleventh East street, will cost $6000, the one at First and L streets $12,000, and the one just completed on State street will cost between $20,000 and $25,000, and the Jewish Synagogue on Third East street will cost $10,000. Beside these the Episcopalian Church and the Mormon Church have made extensive additions. It is generally expected that building will ease off rapidly from now on, on account of the advent of winter weather. Construction work on the various buildings throughout the city is being pushed to completion as rapidly as possible.

San Francisco, Cal.

During the last week of November only 12 contracts were filed, calling for an expenditure of $92,444. In general architects complain that their clients are disinclined to build for the present. The work undertaken in November was chiefly of a minor character, consisting of betterments and the smaller class of dwellings. Some unusually fine work is, however, planned for the future. On California street, from Montgomery east to Sansome, a number of fine office buildings are to be put up, the property owners in that district having an understanding, however, that not more than one large building is to be undertaken at one time. Under this arrangement no other important work will be undertaken until the completion of the Merchants' Exchange Building. When this is finished other buildings will be constructed in turn, as follows: The Fireman's Fund Insurance Building, the Mutual Life Insurance Building and the Bank of California Building.

Plans for the latest of San Francisco largest hotels have been completed. This hotel will be erected by Herbert E. Law on Pine and Stockton streets, construction work to begin next July. The designs are made after the style of the Lombard builders of the early Italian Renaissance period. The structure is planned with a view to utilizing the declivity on both Pine and Stockton streets. Where the ground is highest the building will be but six stories high, and where it is lowest the building will be 12 stories high. It will be built in the shape of an angle in order to give all of the rooms outside windows. There will be between 750 and 800 rooms in all. There will be two courts in the lower part of the building, each of them 50 x 65 feet in area. One of these will be planked by a large rathskeller, a billiard room, bar, bowling alley and garage. The cost of erecting the hotel is placed at approximately $100,000.

COST OF BUILDING IN 1903.

IN our issue for January last we presented some very interesting comparisons in the costs of building, showing by means of carefully compiled figures arranged in tabular form the changes which had taken place in leading lines during the previous five years. From these it was seen that the cost of building in New York City had increased in that period practically 30 per cent. The cost of ordinary labor showed an advance of 20½ per cent.; carpenters' wages, about 21½ per cent.; bricklayers' wages, 30 per cent.; plasterers' wages, 25 per cent.; painters', about the same amount; sheet metal workers', 13 per cent., and plumbers' and steamfitters', a trifle more than 13¼ per cent. The price of pig iron had risen 100 per cent. since 1897; structural steel, 94½ per cent.; builders' hardware, 40 per cent.; heating and ventilating, 56 per cent.; Rosendale cement, 24 per cent.; common brick, 8 per cent.; copper wire, 31½ per cent.; sheet copper, 50 per cent.; spruce lumber, from 32 to 46 per cent.; white pine doors, 100 per cent.; hemlock joists, 57 per cent.; tin plate, 22 per cent.; wire nails, 22 per cent.; cut nails, 64 per cent.; linseed oil, 30 per cent., and so on through the list of materials entering into building construction.

Comparing present costs in the building trades with those prevailing at the time the figures referred to were published, shows that some rather interesting changes in values have occurred during the past twelve months. It is found that some materials cost more and others less, while labor is higher. In discussing this phase of the building situation, a recent issue of the *Record and Guide* says: "Last spring the structural ironworkers secured an increase of 50 cents a day, and their wage is now 56¼ cents an hour, or $4.50 a day of eight hours. They also obtained concessions in the way of double pay for all overtime. While the union was able at that time to command this increase, a feeling survives in some quarters that the compensation is too high, and a rumor is current that a large firm of employers will presently reduce the rate, or make an effort to do so.

"Steamfitters, who received $4 a day a year ago, are now drawing $4.75; and by agreement already entered into they will be allowed $5 after the first of next August. Good workmen of this trade are already being paid $5. Plumbers have had their wages raised from $3.75 to $4.25 a day. Plasterers have received 68¾ cents an hour, or $5.50 a day, since July 1, when an agreement signed last fall went into effect, and now are the highest paid mechanics in the building trades. A year ago their rate was $5 a day, and five years ago they were getting $4. Plasterers' laborers received an increase of 25 cents as the verdict of the arbitration board, so that their daily wage is now $3.25.

Scale of Wages

"The wage scales of bricklayers, painters, carpenters, stonecutters and setters and sheet metal workers were not changed during the year. Bricklayers receive 65 cents an hour ($5.20 per diem), and the maximum current rates for other trades are: Carpenters, 56¼ cents; stonecutters, 62½ cents; painters, 43¾ cents, and sheet metal workers, including tinsmiths, 50 cents.

"The most important advance of prices in the line of building materials during the year has been in Hudson River brick. In November, 1902, the common sort were selling at $5.25 to $5.75 per thousand, while this fall they commanded $7 to $7.50. But this is a valuation which cannot be called permanent. The year's supply has been only about half the normal, while the requirement since the strikes ended has been unprecedented.

"The distinction for the longest fall in prices belongs to pig iron, which a year ago was quoted officially at $25 for No. 1 Northern Standard, at Jersey City, not mentioning the premium exacted for so-called prompt delivery, and is priced now at $15 to $16. No. 2 Foundry Southern (steamship pier, New York), now goes at $13.25 to $13.75. If early in January, 1902, when No. 2 Foundry was selling at $11.50, f.o.b. Birmingham, any one had predicted that in September the same iron would sell at $25, he would have been voted down; and if a year ago some one had prophesied that the price would be almost or quite cut in half before the close of 1903, he would have been nearly as far away from what seemed likely. Whether consumption can suffer from high prices has scarcely received a distinct answer, but that consumption has suffered from something is certain. The importance of pig iron to builders, of course, is that of a basic material, and because of its influence upon structural shapes and builders' hardware and equipments.

"Structural material for which during June and July of 1902 3 cents was paid at the mills, has been getting easier for builders ever since the tide was turned in the fall of 1902 by the inrush of foreign material. Beams and channels are now obtainable by dealers at $1.75 to $2. Builders' hardware, which advanced fully 40 per cent. on the average between 1898 and 1897, has begun to participate in the downward tendency of things made of metal, and it is noticed that jobbers are reducing stocks to the lowest dimensions, believing it will be cheaper to replenish in the future.

Cement Industry.

"The cement industry is also experiencing a setback. Last fall the demand was still so far in excess of the supply that large importations were being made. The Lehigh and Atlas companies doubled their plants, and the Coplay interests also enlarged their capacity. Numerous small plants were built during the winter; many more were projected. Consequently heavy increases in production blossomed into overproduction in the summer time when the strikes were on, and certain anticipated railroad orders had not arrived. Prices of American Portland fell from, let us say, $2.25 wholesale to the present standard price of $1.60, though there was a period in between when the article could be bought at a much lower valuation.

"Lumber, being in strong hands, has not only maintained its price schedules of last year, but has increased them in most lines. So many kinds are 'scarce' that little can be hoped for in the way of lower prices. Though new building work in many cities has been more or less dulled, repair work has been brisk everywhere, requiring so much stock that there has been no sign of an oversupply.

"During 1902 the American Window Glass Company dominated the glass situation. Outside factories were combined under the Federation Window Glass Company. The Independent Glass Company was reorganized, and all three combinations worked in harmony as to prices. The Jobbers' Association quotations for glass from store in January, 1902, were 90 and 10 per cent. discount. They advanced to 90 and 5 per cent. in March, to 90 per cent. in April, to 89 per cent. in May, and to 88 and 5 per cent. in July. In December they had dropped back to 90 and 10 under a new list. The present year has seen evidences of slowness in trade, and the average of prices correspondingly lower.

"Linseed oil, which for City Raw, in lots of five barrels or more was quoted at 67 cents during July, 1902, has since fallen to 37 cents. The price which turpentine has reached is unusually high, and varnish manufacturers are considering the advisability of advancing prices of their products on this account.

"Lime has seen an advance of 5 cents all around, and lath averages high, and will probably go higher this winter. Plaster has remained stationary. Bluestone has had the best business in seven years.

"Finally, as regards the general cost of building, it is seen that the cost of brick walls, and of lathing and plastering them, has greatly increased during the year; brick, lime, lath and plasterers' wages being responsible. It costs a little more also to lay wood floors, to insert window frames and to put on the trim. Not so large an outlay is required for the material to paint the outside of the house, but the varnish for finishing the interior woodwork is more expensive.

"On account of the increase of plumbers' and steamfitters' wages, the expenditure for putting in the plumbing and the equipment for heating a building is larger than last year. The concreting of the cellar floor will cost less, but the flagging of the sidewalk brings a bill with larger figures than last year.

" Structural iron work, on the whole, is higher; though the price of material has fallen, housesmiths' wages have enlarged.

" Any kind of a building, then, costs more to erect in the metropolis at the present time than a year ago, and this must be largely a permanent condition, more likely to be intensified than diminished, since it is principally due to increased wages."

New Publication.

Handy Lumber Tables. Size, 5 x 7¼ inches. 24 pages. Bound in paper covers. Published by the Industrial Publication Company. Price 10 cents, postpaid.

This little work contains a series of tables of board measure, plank measure, scantlings reduced to board measure, together with other data and memoranda which are likely to be found of interest and value to the builder and lumberman. Among the miscellaneous data may be mentioned the comparative value of different woods, showing their crushing strength and stiffness, the relative hardness of woods, the comparative weight of different woods in green and seasoned states in pounds and ounces per cubic foot, the shrinkage in dimensions of timber after seasoning and the percentage of water in different woods.

The British Standard Size of Bricks.

The following standard has been agreed upon between the Royal Institute of British Architects and the Brick Makers' Association, and has been drafted in consultation with these bodies and representatives of the Institution of Civil Engineers and ordered to go into force on May 1, 1904. The Council recommend that members should insert this standard in their specifications under the title of "The R. I. B. A. Standard Size of Bricks." 1. The length of the brick should be double the width, plus the thickness of one vertical joint. 2. Brick work should measure four courses of bricks and four joints to a foot. Joints should be ¼ inch thick and an extra 1-16, making 5-16 for the bed points to cover irregularities in the bricks. This gives a standard length of 9¼-inch center to center of joints. The bricks, laid dry, to be measured in the following manner:

a. Eight stretchers laid square end and splay end in contact in a straight line to measure 72 inches.

b. Eight headers laid side by side, frog upward, in a straight line to measure 35 inches.

c. Eight bricks, the first brick frog downward and then alternately frog to frog and back to back, to measure 21½ inches.

A margin of 1 inch less will be allowed as to *a*, and ½ inch less as to *b* and *c*.

This is to apply to all classes of walling bricks, both machine and hand made.

An Open Air Theater.

Among the interesting constructions in connection with the group of buildings forming the University of California at Berkeley, Cal., is an open air theater, which has just been finished in accordance with plans drawn by John G. Howard, the supervising architect of the various University buildings. It is well known that the climatic conditions there are such as to permit of the assembling of out of door audiences at almost any season of the year, and the site of the theatre is one that is sheltered on all sides by natural surroundings. The building is the gift of Mrs. Phoebe A. Hearst, and the designs are said to follow the amphitheater at Epidaurus more nearly than that of any built in classic times, and is composed of a "Logion," or stage, and auditorium, corresponding to the "Theatron" of the Greeks. The former is enriched by a complete classic order of Doric columns and entablature, the ends of the side walls toward the auditorium forming two massive pylons, each pierced by entrances, these being from the rear.

The auditorium is 254 feet 8 inches in diameter, divided into an inner and outer circle, the two being separated by a wall 4 feet in hight. The central pit, corresponding to the orchestra, is 50 feet 8 inches in diameter. The inner circle consists of 12 rows of steps, 6 inches in hight, rising 5 feet 5 inches above the pit, and will be occupied by temporary seats, which will accommodate 1454 persons. The outer circle consists of 21 rows, or steps, each having an elevation of 1 foot 6 inches divided by 11 aisles 3 feet in width, and seating 4228 persons. Surrounding the extreme outer circle is a path which will ultimately be covered with a colonnade. The total elevation of the outer circle is 37 feet 11 inches above the pit. The extreme width of the stage is 146 feet 10 inches, with depth of 33 feet, hight of stage floor above the pit, 5 feet 5 inches, and total hight, 40 feet 8 inches. Later it is intended to surmount the stage by a double colonnade.

The material throughout is concrete, of which 100,000 cubic feet were used. In excavation 10,000 cubic yards of earth were removed. The total seating capacity of the amphitheater is 6914. Since its completion the theater has been the scene of performances of classic plays and other exercises, and has proved to be admirably adapted to the purpose for which it is designed.

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SUPPLEMENT CARPENTRY AND BUILDING, JANUARY, 1904.

CARPENTRY AND BUILDING

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The Local Building Situation.

The year which has just been brought to a close has been notable in the building world in many respects, but principally for the progress made in establishing the relations between employer and employed upon a more stable basis. Locally the developments have been such as to create a situation which it is expected will insure the execution of a large volume of business the coming season along lines comparatively free from labor disturbances or other hindrances to active building operations. That such a state of affairs is greatly to be desired everyone must appreciate who takes into consideration the number of buildings yet in a partially finished state, the amount of work projected but held in abeyance through a variety of causes, and more especially the fact that the growth of the city during the past two years has been so rapid that construction work, particularly under the tenement house law, has not only failed to expand in proportion, but has fallen behind the annual average of preceding years, thus creating in a sense a scarcity of housing accommodations. The attention of builders is, however, being more largely directed to supplying the apparent deficiency in this class of structure, as may be seen from the fact that during the year just closed permits were issued for 442 flat and apartment buildings, costing nearly twenty-three and a quarter millions of dollars, while in 1902 permits were issued for only 238 buildings of this class, costing in round numbers fifteen millions of dollars. In contrast with these figures, it may be noted that in 1903, permits were taken out for 56 private dwelling houses costing $2,280,000, as compared with 130 the year previous, estimated to cost $8,161,000, and that there were 28 hotels projected last year, involving an estimated outlay of $9,500,000, whereas in 1902 permits were taken out for 46 hotels costing a trifle over $21,000,000. Taking the figures for the entire year, it is found that in 1903 in the boroughs of Manhattan and the Bronx, 1757 permits were issued for building improvements estimated to cost nearly $81,500,000, while in the twelve months of 1902 the permits issued numbered 1703 and called for an expenditure of $88,000,000. From these figures it will be noticed that while there was an increase in the number of buildings projected during the past year, there was a decrease in their estimated value, showing that the average cost of each building declined in 1903 as compared with the year before, from which it may safely be inferred that the tendency for the time at least is toward a cheaper class of structure. With regard to the coming season, the amount of new work to be done will depend upon a variety of circumstances, not the least important of which will be the market for mortgage loans and its particular bearing upon large operations. Viewing the situation from all points, however, the consensus of opinion would seem to indicate a belief in a big year in the building line, not only in this immediate territory, but throughout the country at large.

New Phase of Building Trades Agreements.

Still another phase which the past year has developed has to do with trade agreements. It is well known that ever since yearly agreements have been made between employers and the various unions, these agreements have expired at some time in the spring, usually on April 30. This arrangement was by no means satisfactory to employers, as it projected a controversy over wages, hours or trade regulations into what should be a very busy part of the building season, and often caused a great deal of valuable time to be lost by the cessation of operations until an agreement was reached. Further than that, it gave the unions a strong point of advantage over the employers, as the latter were, of course, anxious to proceed with their building contracts in the early spring and make as much headway as possible. Concessions were often made for this reason which would otherwise have been stoutly contested. It might be claimed, on the other hand, that the men were as anxious as the employers to work regularly in the pleasant spring months, but while this seems reasonable, it has not shown itself to be a consideration of much potency in governing the actions of workmen. The past year presented a favorable opportunity for making a change in this respect. The New York builders and contractors have been engaged in a controversy with the unions which continued the greater part of the year. Many issues were fought out, among them being the curtailment of the power of the walking delegate, who had grown to be an autocrat. Not the least important among the changes accomplished, however, was the substitution of January 1 for May 1 as the date for trade agreements to go into effect. This reform has just been announced, the plan to accomplish it having been kept quiet until enough contracts with unions had been made on the new basis to assure its success. The trades covered comprise the housesmiths, or structural iron workers, hoisting engineers, wood workers, sheet metal workers, metal lathers, electrical workers, plumbers, steam fitters and pipe and boiler coverers, with possibly some others. The agreements with elevator constructors expire on April 1; the bricklayers, plasterers and marble workers on May 1, and the tile layers on July 1, but under the arbitration agreement no strikes can be declared. The wages to govern these trades for the year 1904-05 have also been practically settled, so that no trouble is apprehended on that account. Ultimately, however, it is expected that all the trades will be induced to make their agreements date from January 1. It is understood that a similar movement is on foot in a number of other cities.

Estimates of Cost on Season's Work.

The new arrangement will be vastly more satisfactory than the old one for a variety of reasons, but chiefly for the removal of the uncertainty which embarrassed architects and contractors in making estimates of cost on the season's work. With agreements settled by January 1 they can figure on surer conditions, as labor, which is always the greatest element of cost, has heretofore been the most uncertain. The accomplishment of such a reform as this is one of the compensations for a year of practical renouncement of business by builders and contractors. Such a conflict had been impending for a long time, but was avoided by the employers, who knew that if it was precipitated it would ruin the building trade for an entire building season, if not longer. They made concessions until the situation became intolerable. The crisis was reached at the opening of the building season last year, when the walking delegates became more arrogant than ever, confident that the employers, with a great volume of presumably profitable contracts in hand and much more in sight, would yield every point demanded rather than suffer their operations to be interrupted. These walking delegates have had a rude awakening from their dream, being now shorn of much of their power to foment trouble. The employers, on the other hand, are in a position to embark with confidence upon the operations of the coming year, and look forward, as intimated, to a period of very great activity, as many building projects which had been postponed last year are being revived, and new ones are rapidly taking shape.

Exhibition of the Architectural League.

For many years past the Architectural League of New York has made a practice of holding an annual exhibition of the work of members of the architectural and allied professions, which has attracted a great deal of attention not only on the part of those naturally supposed to be interested in such matters but of the general public as well. Arrangements have been completed for holding the nineteenth annual exhibit of the League in the building of the American Fine Arts Society, at 215 West 57th street, New York City, the display to be open to the public from Sunday, February 14, to Saturday, March 5, inclusive. The exhibition will consist of architectural drawings in plan, elevation, section, perspective and detail, as well as drawings of decorative works, cartoons for stained glass, models of executed or proposed work, together with work executed in stone, wood, bronze, wrought iron, mosiac, glass and leather. There will also be sketches and paintings of decorative subjects. The special object of the exhibition is to show complete illustrations of individual rather than a large number of incomplete works, and to this end the committee having charge of the affair have requested those intending to participate to accompany the perspectives and elevations with carefully rendered plans of the same, also large scale drawings or details of some portions of the work, as well as models of architectural details and sculpture in wood or stone. In connection with the exhibition a most interesting feature will be a series of public lectures by members of the profession upon topics appropriate to the occasion. Another feature of the nineteenth annual exhibition will be the drawings submitted in the competition held under the auspices of the Architectural League for the gold and silver medals, the President's prize and the Henry O. Avery prize. The subject of the medal competition is a recreation pier for an American seaport of the first class, while the President's prize, which is open to members of the Architectural League only, is to be awarded to the best design for a stained glass window, representing the Annunciation. The design will include at least two life sized figures and ornamental or pictorial accessories, together with suitable space for a memorial inscription. The Henry O. Avery prize is for the best design for an electrolier suitable for a newel post in the hall of a public library. The various committees having charge of the exhibition and prizes are such as to warrant the expectation of a most successful affair.

The Master Builders' Association of Holyoke, Mass., at their annual meeting, January 6, elected the following officers: President, C. L. Thorpe; vice-president, D. J. Toomey; secretary and treasurer, F. J. Curley; directors, Edwart Hart, L. P. Trowbridge, Arthur Lalibertie and Michael Cleary.

Revision of Chicago's Building Ordinances.

One of the effects of the recent fire at the Iroquois Theater, Chicago, with its appalling loss of life, has been to set in motion the legislative machinery looking to the revision of the building ordinances of the city with a view to more effectively safeguarding life and property. Shortly after the terrible disaster Mayor Harrison extended an invitation to co-operate to the leading architectural bodies and builders' associations, requesting that each body appoint a committee to inspect the ruins, ascertain so far as possible the facts in connection with the disaster and report their findings in due course.

The committees appointed by the various bodies were as follows:

Illinois Chapter of the American Institute of Architects: President, George Beaumont; Edward A. Renwick, I. K. Pond and William A. Otis.

Chicago Architects' Business Association: President, George L. Pfeiffer; Harry B. Wheelock, E. Stanford Hall, C. B. Adams, Meyer J. Sturm, F. W. Hessenmueller, Thomas H. Mullay.

Builders' and Traders' Exchange: John Dick, William Grace, Daniel Freeman, Frank O Connell, O. W. Holmes, A. E. Wells and C. W. Gindele.

Builders' Club: Victor Falkenau, A. E. Wells, C. W. Gindele, Joseph Downey, Elliott W. Sproul, A. Landquist and John Griffith.

Masons' and Builders' Association: F. B. Robinson, John W. Snyder, Frederick Bulley, A. Landquist, John Griffith and J. E. McNichols.

In addition to the above the State's Attorney selected the following architects to assist him in a special inquiry which he has undertaken with a view to an investigation of the matter for the grand jury: J. L. Silsbee, William A. Otis, Edmund R. Krause, M. F. McCarthy and C. Hansen.

Another movement with a view to solving the question of the safety of the theaters and places of amusement in the city is being conducted by the Chicago *Tribune*, which has appointed a committee of representive men made up of architects, building contractors, engineers and fire insurance specialists. The architects are W. L. B. Jenney of Jenney & Mundie, 520 New York Life Building; Charles S. Frost of Frost & Granger, 184 La Salle street; James Gamble Rogers, 1615 Ashland Block, and William A. Holabird of Holabird & Reche, 1618 Monadnock Block.

The building contractors are John M. Ewen of Starett-Thompson Company; William A. Merriman, Western manager of the George A. Fuller Company, 1027 Marquette Building; Addison E. Wells, president Wells Brothers' Company, 1004 Monadnock Block, and William Grace of the William Grace Company, 1408 Wabash avenue.

It is sincerely to be hoped that the reports of these various committees will show who was responsible for the disaster, and that such remedial measures will be adopted by the municipal authorities as to prevent a similar occurrence.

New York State Builders' Convention.

The convention of the New York State Association of Builders will be held in Buffalo, January 21, 1904, the details being in the hands of the Buffalo Builders' Exchange. The programme that has been arranged calls for a business session in the morning at 9.30, at which the officers will submit their annual report and E. F. Eidlitz, the attorney for the State body, will submit his legislative report.

At noon a luncheon will be served. The afternoon will be taken up with an informal business session and the evening with a dinner at the Ellicott Club, the delegates being the guests of the Buffalo Builders on this occasion.

VARIED EXTERIORS FROM THE SAME FLOOR PLANS.

IN observing the architecture of the dwellings which are to be found in the smaller cities and suburban districts of the country, one cannot fail to be impressed with the diversity of the exterior treatment of the buildings and the ingenious manner in which, in many instances, the desired effects have been accomplished. The purpose of the designers is obviously to avoid as much as possible any striking similarity in the buildings, and to render the architecture of the place in which they are located as varied and interesting as circumstances will permit. This is especially true in street architecture, where entire rows of houses are often put up which, for the most part, are based upon the same set of floor plans, but with the exteriors so diversified in their treatment as to relieve any semblance of monotony. In order to do this the plans are perhaps slightly modified in some of the more unimportant details for the purpose of giving the desired exterior effect, but the floor arrangement is essentially the same. Again, it is very often the case that a certain arrangement of rooms in a dwelling appeals so strongly to the popular taste that many intending builders are desirous of having homes based upon that general scheme, but with the treatment of the exterior different from any other house constructed from those plans. Growing out of this fact, the architect is very often called upon to duplicate many times over some particular design which has attracted attention on the part of those interested in home building, with the result that the structure is reproduced with some slight modifications in many parts of the surrounding country.

With a view to showing our readers how this general scheme of treatment has been carried into effect in some of the suburbs of New York City, we present as the basis of the double supplemental plate accompanying this issue pictures of several houses, all of which were erected from the same floor plans, the various views shown on the half-tone plate having been made from photographs taken especially for *Carpentry and Building*.

The elevations, plans and details which are found upon this and the following pages relate to the house in the circular picture in the upper left hand portion of the half-tone plate. The other houses shown were built from the same plan, but with such modifications as were necessary to meet varying individual requirements. Referring to the house in the circular picture, the foundation walls are of brick, 8 inches thick, with 8 x 12 buttress piers, as shown in the cellar plan. From top to bottom the foundations are treated with a coat of Portland cement and sand, and the entire cellar bottom is covered with 3 inches of cinders and Hoffman's cement, topped off with ½ inch of cement and sand. The house is balloon framed, with girders 6 x 8 inches; sills 4 x 6 inches, laid flat in mortar; the first and second floor joist 2 x 10 inches, the third floor joist 2 x 8 inches, the collar beams 2 x 6 inches and the outside wall joist 2 x 4 inches, all placed 16 inches on centers. The posts at the corners and angles are 4 x 6 inches; the ribbon strips are 1 x 6 inch hard pine; the rafters are 2 x 6 inches, placed 20 inches on centers; the valley rafters are 2 x 8 inches, the veranda sills 4 x 8 inches, veranda beams 2 x 8 inches, veranda rafters 2 x 6 inches and the veranda ceiling beams 2 x 4 inches, all placed 20 inches on centers. The plates are made of 2 x 4's, spiked together. The partition studs are 2 x 3 and 2 x 4 inches, placed 16 inches on centers.

The outside frame of the building is covered with ⅞ x 10 inch sheathing boards, over which is a layer of good building paper, this in turn being covered with bevel siding. The main and dormer roofs are covered with Washington red cedar shingles, laid about 5½ inches in the weather. The veranda has ⅞ x 3½ inch white pine

Front Elevation.—Scale, ⅛ Inch to the Foot.

Varied Exteriors From the Same Floor Plans.—J. A. Oakley & Son, Architects, Elizabeth, N. J.

flooring, driven up in white lead; ½-inch beaded ceiling, 8 x 8 inch turned staved columns of white pine and balustrade, as shown in the details.

The first-story floor is of 1 x 10 inch hemlock, laid diagonally, with a top floor of ½ x 2 inch North Carolina comb grained pine, with building paper between the two. The second and third story floors are of ⅞ x 3½ North Carolina pine, laid in courses and blind nailed. Each floor has a row of 2 x 3 inch hemlock bridging, as do also the partitions on each floor. All door jambs have ½ x 2½ inch molded edge stops, those for the library and parlor being of white wood, while all others are selected cypress. The sash in all windows in parlor, library and the two front bedrooms are glazed with American plate glass, and all other sash with double sheet glass. The doors are of cypress, the main ones on the first floor having five cross panels, and all on the second and third floors, as well as in the kitchen, four panels and molded both sides.

The kitchen is fitted with 18 x 30 inch cast iron sink and 35-gallon galvanized iron boiler, and a No. 258 Provident portable range, made by Richardson & Boynton Company, 232 Water street, New York City. In the pantry is a porcelain cast iron butler's sink, with nickel plated Crane bibbs, plug and chain. The laundry, which is immediately in the rear of the kitchen, has a set of three Alberene washtubs, with ash tops, made by the Alberene Stone Company, 393 Pearl street New York City. The bathroom has a 5-foot porcelain lined bathtub, a 22 x 30 inch marble countersunk slab with a marble basin and 10-inch marble back and sides, with nickel plated fittings. Just beyond the bathroom, and lighted by a window from the outside, is placed a water closet of the embossed siphon jet type, with copper lined low down oak cabinet tank, with seat, back and cover of oak, and nickel plated hinges.

Varied Exteriors From the Same Floor Plans.—Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

The trim of doors and windows is of cypress, except in the library and parlor, where it is white wood. The first-story trim has 9-inch molded head, and second and third story 7-inch head. The main flight of stairs is of cypress, with the exception of the treads, which are of Georgia pine. The newel is 7 x 7 inches in cross section, paneled as shown. The walls and ceilings of the various rooms in the house are plastered with two-coat work, the finishing coat being N. J. Adamant Company's finishing No. 3 and lime putty, well mixed. The kitchen and bathroom are finished to a hight of 4 feet 6 inches from the floor, and are lined off in imitation of 3 x 6 inch tile.

All the interior wood work, except in the library, is finished natural, with one coat of liquid wood filler and two coats of Flood & Conklin's crystal finish. The library is finished in imitation of mahogany, while the parlor has two coats of white lead and linseed oil, followed by two coats of white enamel, giving a smooth, white finish. The hard wood floors on the first story are filled and treated with two coats of floor varnish.

The house is piped for gas and wired for electric lighting throughout, with electric bell in the kitchen. The wires run through porcelain bushings and circular loom tubing and on porcelain knobs, all in accordance with the rules of the Board of Fire Underwriters. The heating is by means of a No. 281 New Hub hot air furnace, made by the Smith & Anthony Company of Boston, Mass. The pipes running through the partitions are covered with metal lath, and the sides and studs are covered with tin. The registers in the first floor are 10 x 12 inches, and those of the second floor are 8 x 10 inches.

The outside wood work, except the shingles, have two coats of pure linseed oil and Atlantic white lead, the tin work is treated to two coats of metallic paint, the foundation and chimney tops have two coats of paint, and the porch ceilings have one coat of filler and two coats of spar varnish. The shingles on the roofs have a coat of creosote stain.

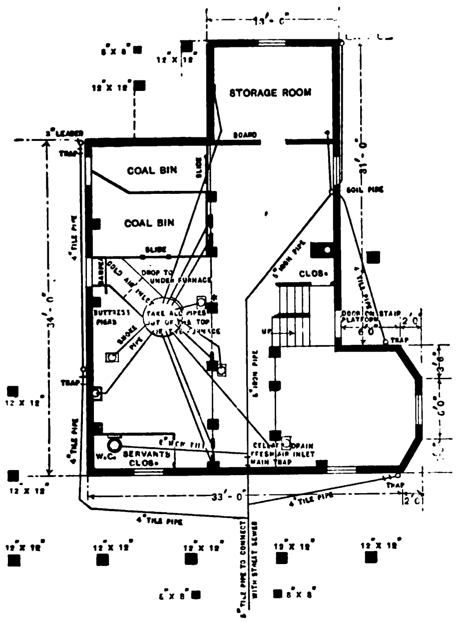
The houses shown on the half-tone double plate were erected at various points in Elizabeth and Roselle, in accordance with plans prepared by Architects J. A. Oakley & Son of Elizabeth, N. J.

Decline in Cost of Building.

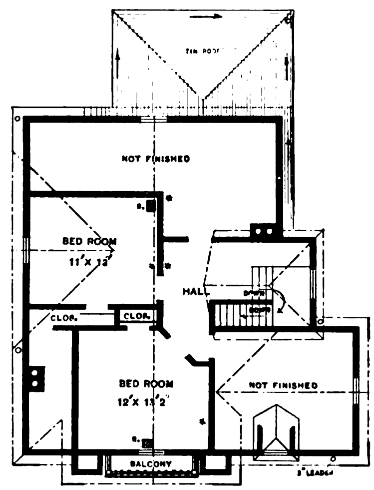
Contractors and builders throughout many sections appear to be nearly a unit in the belief that building operations the coming season will be less costly than was the case last year. In some instances, prices of materials have already declined and some builders go so far as to intimate that building can be done next summer at from 10 to 15 per cent. less than was the case last year. Some large projects are said to have been held in abeyance, pending a reduction in the cost of operations, but the falling off in quotations of iron and steel has led them to believe that the situation will develop sufficiently in their favor to warrant a resumption of operations in the near future.

In this connection it is interesting to note the views of Supervising Architect J. Knox Taylor, who is reported to have stated that there has been a great drop in the cost of construction of government buildings during the past few months and that the decrease all along the line is as much as 25 per cent. The cost of labor and building materials, he says, is everywhere tumbling rapidly and he believes that prices will go still lower. Mr. Taylor states that there is now keen competition for government work, while a year or so ago bids were comparatively few. He stated a few days ago that proposals received that day were from 20 to 25 per cent. lower than they were eight months ago.

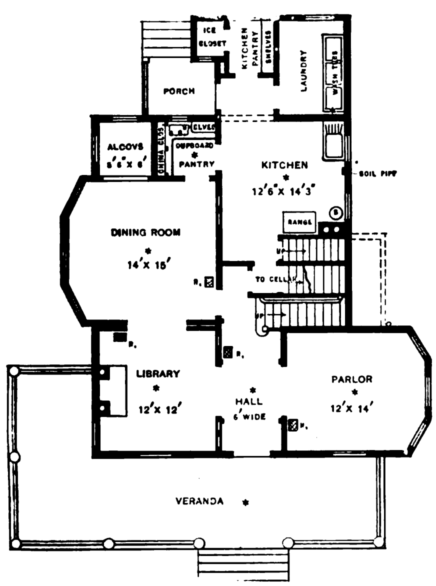
ONE of the most interesting developments in the local situation since our last issue went to press was the acceptance of the application of the George A. Fuller Company for membership in the Building Trades Employers' Association. This step renders the latter organization the strongest local body of its kind in the United States and the most thoroughly organized body of building contractors ever formed in New York City.



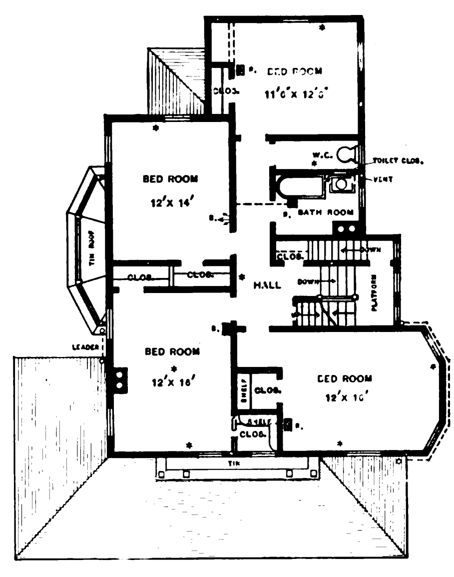
Foundation.



Attic and Roof Plans.

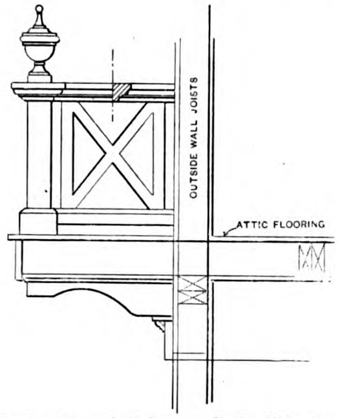


First Floor.

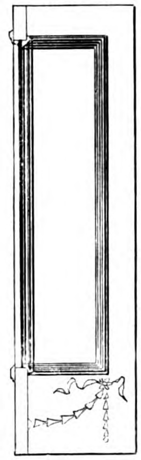


Second Floor.

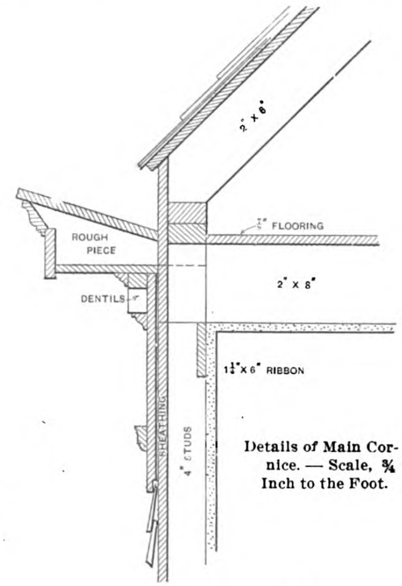
Varied Exteriors From the Same Floor Plans.—Scale 1-16 *Inch to the Foot.*



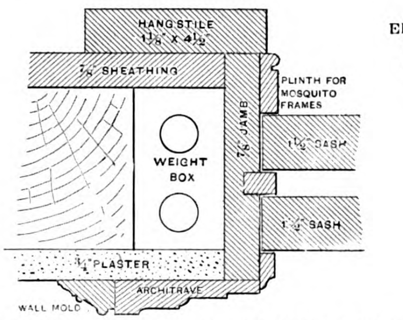
Section through Balcony.—Scale, ½ Inch to the Foot.



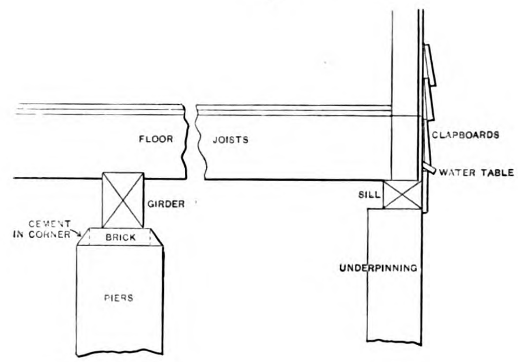
Elevation of One-Half of Front Door.—Scale, ⅜ Inch to the Foot.



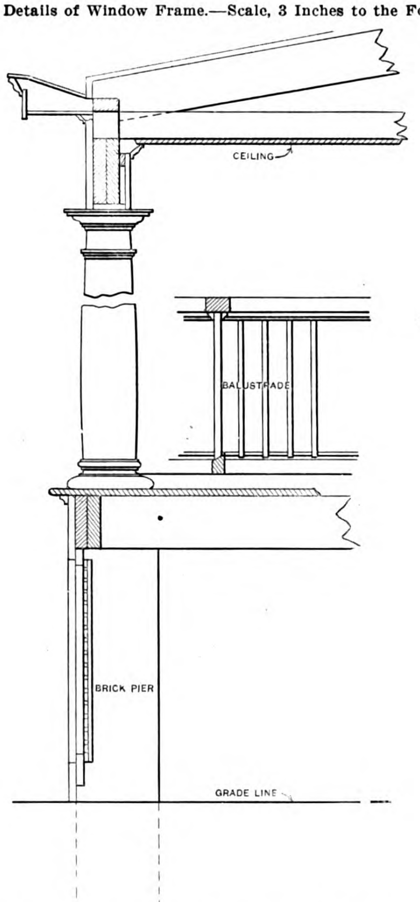
Details of Main Cornice. — Scale, ¾ Inch to the Foot.



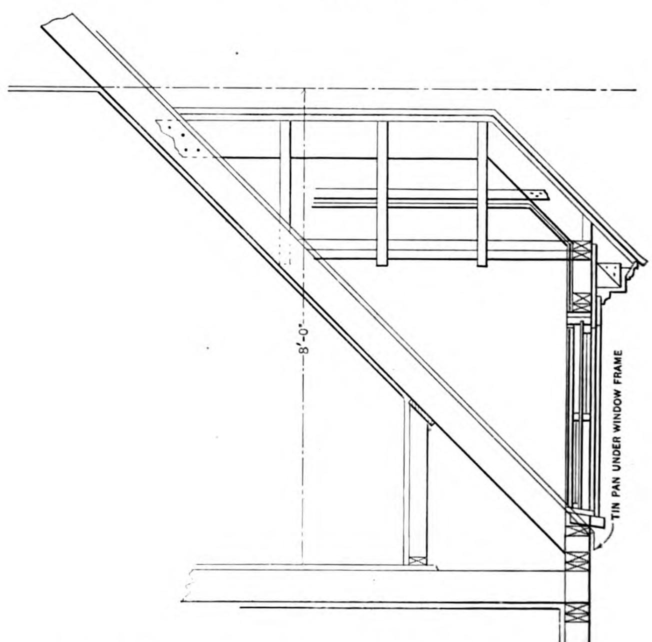
Details of Window Frame.—Scale, 3 Inches to the Foot.



Details of Water Table and Girder Construction in Cellar.—Scale, ½ Inch to the Foot.

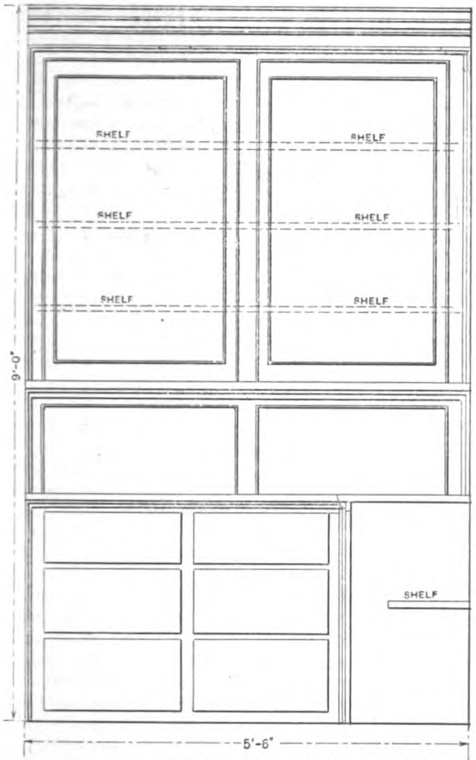


Details of Veranda Cornice, Column, Balustrade, &c.—Scale, ½ Inch to the Foot.

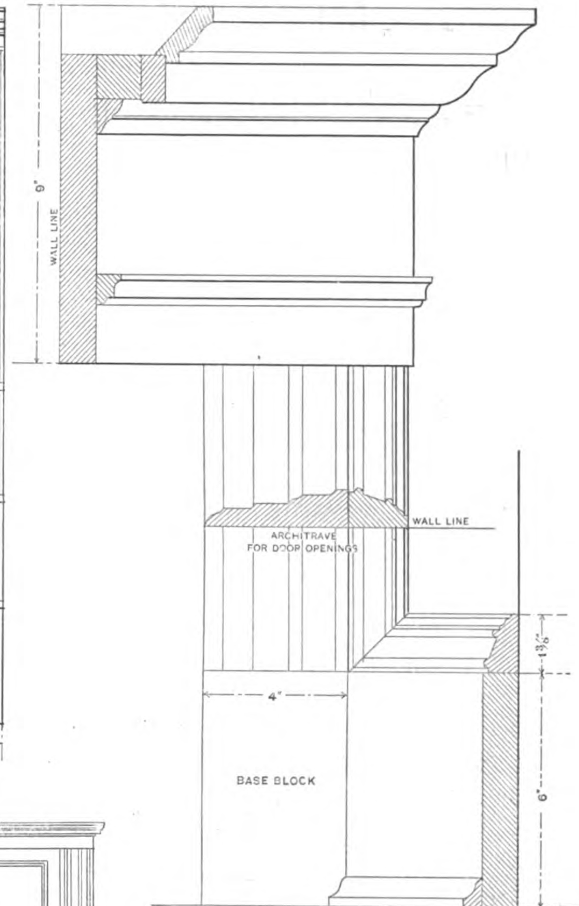


Details of Dormer Window.—Scale, ⅛ Inch to the Foot.

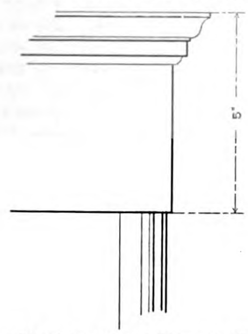
Varied Exteriors From the Same Floor Plans.—Miscellaneous Constructive Details.



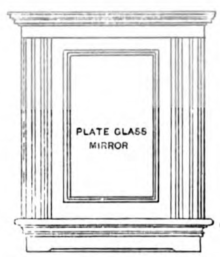
Dresser in Butler's Pantry.—Scale, ½ Inch to the Foot.



Details of Trim for First Story Except the Kitchen —Scale, 3 Inches to the Foot.

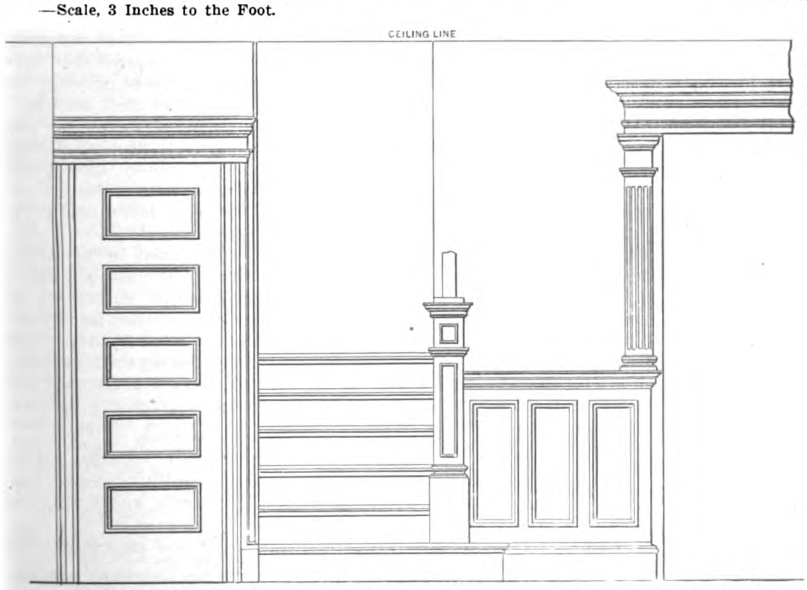


Head Finish for Second Story and Kitchen. —Scale, 3 Inches to the Foot.

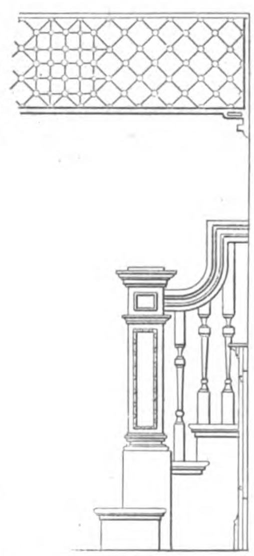


Toilet Closet in the Bathroom.— Scale, ⅜ Inch to the Foot.

Plan of Toilet Closet in Bathroom. —Scale, ⅜ Inch to the Foot.



Elevation of Main Stairs, Paneling and a Portion of the Trimmed Opening from Hall to Parlor. —Scale, ⅜ Inch to the Foot.



Main Stair Newel and Balustrade.—Scale, ⅜ Inch to the Foot.

Varied Exterior From the Same Floor Plans.—Miscellaneous Constructive Details.

THE ELEMENTS OF CONCRETE WORK.*—II.

BY FREDERICK W. TAYLOR AND SANFORD E. THOMPSON.

THE cost of concrete depends more largely upon the character of the construction and the conditions which govern it than upon the first cost of the materials. In a very general way, we may say that when laid in large masses or in a very heavy wall, so that the construction of the forms is relatively a small item, the cost per cubic yard in place is likely to range from $4 to $7. The lower figure represents contract work under favorable conditions with low prices for materials, and the higher figure, small jobs and inexperienced men. Similarly, we may say that for sewers and arches, where centering is required, the price may range from $7 to $14 per cubic yard. Thin building walls under eight inches thick may cost from $10 to $20 per cubic yard, according to the character of construction and the finish which is given to the surface.

These ranges in price seem enormous for a material which is ordinarily supposed to be handled by unskilled labor, but it must be borne in mind that skilled workmen are required for constructing forms and centers, and often the labor upon these may be several times that of mixing and placing the concrete. As a rule, unless the job is a very small one or under the personal supervision of a competent engineer, it is cheaper and more satisfactory to employ an experienced contractor than day labor. Green men under an inexperienced foreman may be counted upon to mix and lay not over one-half the amount of concrete that will be handled by a skilled gang under expert superintendence.

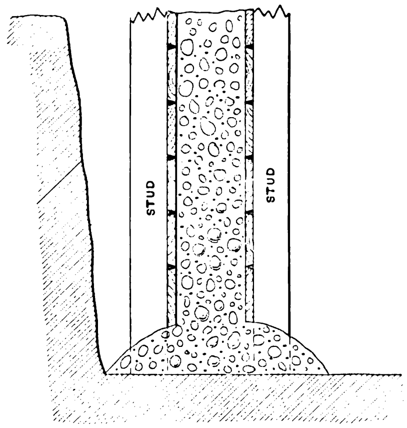


Fig. 6.—Showing Construction of "Form" Where Base of Footing is Enlarged.

The Elements of Concrete Work.

A close estimate of cost may be reached, in cases where the conditions are known in advance, by taking up in detail and combining the various units of the material and labor as outlined below.

Cost of Cement.—As the price of Portland cement varies largely with the demand, it is necessary to obtain quotations from dealers for every purchase. It is such heavy stuff that the freight usually enters largely into the cost, and quotations should therefore be made f.o.b. the nearest point of delivery to the work. The cost of hauling by wagon may be readily estimated by assuming that a barrel of cement weighs 400 pounds (gross), and that a pair of horses will haul over an average country road a load of, say, 5000 pounds, traveling in all a distance of 20 to 25 miles in a day. This assumes of course that the teams are good and properly handled.

Having found the cost of the cement per barrel, delivered, the approximate cost per cubic yard is at once obtained from the table presented in the previous issue. If, for example, the cost is $2 per barrel and proportions 1 : 2½ : 5 are selected, the cost of the cement per cubic yard of concrete will be $1.29x$2.00=$2.58.

Cost of Sand.—The cost of sand depends chiefly upon the distance hauled. With labor at 15 cents per hour, the cost of loading (including the cost of the cart waiting at pit) may be estimated, if handled in large quantities, at 18 cents per cubic yard, or on a small job at 27 cents per cubic yard. For hauling add about one cent for each 100 feet of round trip. The additional cost of screening, if required, will vary with the coarseness of the material, but 15 cents per cubic yard may be called an average price for this, unless the sand is obtained by screening the gravel, when no allowance need be made. Having found the cost of one cubic yard of sand, the cost of the sand per cubic yard of concrete is readily figured from the table referred to. If, for example, the cost of sand screened, loaded and hauled 1000 feet is 52 cents per cubic yard, the cost per cubic yard of concrete for proportions 1 : 2½ : 5 will be 0.45x$0.52=$0.23½.

Cost of Gravel or Broken Stone.—If broken stone is used upon a small job for the coarse aggregate, it is usually purchased by the ton or cubic yard. A ton of broken stone may be considered as averaging approximately 0.9 cubic yards, although differences in specific gravity cause considerable variation. A two-horse load is generally considered as 1½ to 2 yards. The latter quantity requires very high sideboards. The cost of screening gravel, if necessary, while a very variable item, may be estimated at 35 cents per cubic yard. The cost upon a small job of loading gravel into double carts, with labor at 15 cents per hour, may be estimated on a small job at 38 cents per cubic yard. If handled in large quantities, 25 cents is an average cost. The cost of loading includes loosening and also the cost of the cart waiting at the pit. Hauling costs about one cent per cubic yard additional for each 100 feet of round trip. If, to illustrate, the cost of gravel picked, screened, loaded and hauled 1000 feet is 83 cents per cubic yard, the cost of the gravel per cubic yard of concrete for proportions 1 :2½ :5 will be $0.91x$0.83=$0.75½.

For distances up to 300 feet both sand and gravel can be hauled more economically by wheelbarrows than by teams. The cost of loading wheelbarrows is about half the cost of loading carts, while the cost of hauling with barrows per 100 feet is about four times greater.

Cost of Labor.—With an experienced gang working at the rate of 15 cents per hour, the cost of mixing and laying concrete, if shoveled directly to place from the mixing platform, will average about 80 cents per cubic yard in addition to the work on forms. If, as is usually the case, the concrete be wheeled in barrows, 9 cents per cubic yard must be added to the above price for the first 25 feet of haul, and 1¼ cents for each additional 25 feet wheeled. With other rates of wages, the cost may be considered as proportional. With a green gang, the cost will be nearly double the above figures, but as the men become worked in and the organization perfected, the cost should approximate more nearly the prices given.

The labor on forms is not included in the above. This is an extremely variable item. The cost of building rough plank forms (not including cost of lumber) on both sides of a 5-foot wall may be as low as 14 cents per cubic yard of concrete, with other thicknesses of wall in inverse proportion. On elaborate work the price, which is really dependent upon the face area, may reach several dollars per cubic yard of concrete.

The Strength of Concrete.

The strength of concrete varies, 1, with the quality of the materials; 2, with the quantity of cement contained in a cubic yard of the concrete, and 3, with the density of the mixture.

We may say that the strongest and most economical

This matter had been adapted by the authors for *Carpentry and Building* from one of the chapters of their complete work on "Concrete," about to be published.

mixture consists of an aggregate comprising a large variety of sizes of particles, so graded that they fit into each other with the smallest possible volume of spaces of voids, and enough cement to slightly more than fill all of these spaces or voids between the solids of the aggregate. It is obvious that with the same aggregate the strongest cement will make the strongest concrete.

Materials Should be Tested.

On important construction the various materials to be used should be carefully tested, and specimens of the mixture selected made up in advance and subject to test. As a guide to the loads which concrete will stand in compression,—that is, under vertical loading where the hight of the column or mass is not over, say, 12 times the least horizontal dimension,—we may give the following approximate figures as safe strengths, after the concrete has set at least one month, for the proportions which have previously been selected in this article as typical mixtures.

The figures compared with the results of recent experiments on 12-inch cubes allow a factor of safety of six at the age of one month, or nine at the age of six months, and are based on conservative practice. The relative strengths of the different mixtures are calculated from original investigations of the authors.

Safe Strength of Concrete in Direct Compression.

Proportions.	Pounds per square inch.	Tons per square foot.
1:2:4	390	28
1:2½:5	350	25
1:3:6	310	22
1:4:8	260	19

For a vibrating or pounding load, take one-half these values.

Comparing the values with those adopted by other authorities, we notice that the new regulations of the Bureau of Buildings of the Borough of Manhattan, Greater New York, which are printed in *Carpentry and Building* for December 1903, give 350 pounds as the limit of direct compression on concrete. This is for concrete mixed 1:2:4 or in such proportions "that the resistance of the concrete to crushing shall not be less than 2000 pounds after hardening for 28 days." As 1:2½:5 concrete of good materials and properly made will readily answer the latter requirement, the figures selected by the writers compare favorably with the New York schedule. A committee of the Boston Society of Civil Engineers recently presented a report suggesting an allowable loading on concrete, mixed one part cement to nine parts of properly graded stone and sand, of 30 tons per square foot "except in piers or columns of which the hight exceeds six times its least dimension." On concrete mixed one part cement to seven parts properly graded stone and sand, "where the hight of pier or column is more than six times and does not exceed 12 times its least dimension," the suggested loading is 25 tons per square foot. The allowable compressive fiber stress of the concrete in steel concrete beams is usually allowed to exceed the limit of stress in direct compression. The New York Building Laws, for example, allow an extreme fiber stress in compression of 500 per square inch, whereas, as stated above, the limit in direct compression is 350 pounds per square inch.

The tensile strength of concrete is very much less than the compressive strength. Experiments made by the authors, with mixtures of average proportions, give the ultimate fiber stress in beams as about one-eighth the breaking strength in compression.

Construction of Forms.

The best lumber for forms or molds for concrete is white pine, because it is easily worked and retains its shape after exposure to the weather. Except, however, in cases where a very fine face is required, motives of economy generally demand the use of cheaper material, such as spruce or fir or, for very rough work, even hemlock. Green lumber is preferable to dry because less affected by the water in the concrete. Crude oil is perhaps the best material for greasing forms.

If the plank or boards are thoroughly oiled and are not exposed for too long a time to the hot sun and dry air, which tend to warp them, they may be used over and over again. In some instances this same lumber can afterward be employed elsewhere. For example, in the construction of a factory building Mr. Thompson advised the use of 2-inch tongued and grooved roof plank of green spruce for the forms, and after using over and over at least four times, no difficulty was found in laying it on the roof. The planks were merely slightly gritty and discolored by the grease employed to prevent adhesion of cement. Lumber which is planed one side is necessary where a smooth face is required, and is sometimes advisable in rough work where the forms must be removed within 24 or 48 hours, because the concrete adheres less to planed lumber and that which does stick is more easily scraped off, thus effecting a saving of labor which more than balances the cost of planing. Many concrete experts advise the use of beveled edge stuff in preference to tongued and grooved. The edges crush as the board or plank swells, and this prevents buckling.

Square corners and thin projections should be avoided when possible. A beveled strip in an external corner will give to it a finished appearance.

Either 1-inch boards or 2-inch plank are suitable for forms. The distance apart of the studs depends in part upon the consistency of the concrete and the thickness of the walls. If the concrete is laid quite wet and the mass is large, there may be considerable pressure exerted before the cement sets. On the other hand, there is less liability of the boards being forced out of place by ramming than when a drier mixture is used. The authors have found that in comparatively thin walls laid with a wet mixture the stringers may be spaced 5 feet apart for 2-inch plank and 2 feet for 1-inch boards. This represents about the limit if an absolutely straight face is desired. Even with this spacing the lumber will spring slightly in places where very short lengths of it are used.

Size of Studding.

The size of the studding depends upon the hight of the wall and the amount of bracing which it is convenient to use. For a low form of 1-inch stuff 2 x 4 inch studs may be satisfactory. If this size is used for a higher wall, horizontal timbers must be placed and carefully braced at distances about 5 feet apart to prevent the studs from springing. For 2-inch plank the studding must be heavier. Common sizes are 4 x 6 inches, 2 x 10 inches and 4 x 10 inches, depending upon the character of the work and the material at hand. The toes of the diagonal braces which run from the studding or horizontal timbers down to the ground must rest securely against stout posts or other immovable supports. The use of these diagonals may be avoided in many cases or their number reduced by connecting opposite studs with through bolts or wire.

If in placing the concrete the forms commence to buckle, they must remain in their warped position unless trueness of face is of sufficient importance to warrant tearing down the concrete and replacing it. A carpenter is so accustomed to truing us his timber after it is in place that it is difficult for him to realize that a thin wall of concrete cannot be straightened in the same way. The fact that a crack once made in concrete which is set is almost impossible to repair cannot be too strongly impressed upon the woodworkers.

Concrete forms should be nearly water-tight but need not be absolutely so. If undressed lumber is used, cracks of noticeable width may be battened. Vertical joints between the ends of planks may be stopped in the same way.

The lower portion of a foundation wall in a trench excavated in earth so stiff as to stand nearly vertical may sometimes be laid with no form at all, and then narrowed in at the top to the required thickness.

If the sides of the trench are sloping it is generally cheaper to save concrete material by carrying the forms to the bottom. A thin wall may be greatly strengthened by spreading the base, which is readily accomplished by starting the boards or plank 6 or 8 inches above the bottom of the excavation and allowing the soft concrete to flow out under them on both sides of the wall so as to make footings, as shown in Fig. 6. The studs may run to the bottom, as indicated by the dotted lines but should be tapered and greased so that they may be readily pulled out without injury to the concrete.

The method of construction and the design of forms for a cellar wall of plain concrete are well described by C. G. Taylor in *Carpentry and Building* for August, 1903. The thickness of wall which he gives may be slightly reduced by inserting reinforcing rods of steel in the concrete. For all walls under 9 or 10 inches in thickness, small steel rods ¼ or ⅜-inch in diameter, spaced about 18 inches apart, will greatly increase the stiffness and add to the safety of the structure, especially while the concrete is hardening.

The length of time which concrete should be allowed to set before the forms are removed depends upon the condition of the weather, the strain which is to come upon the work, and upon the consistency employed in mixing. When there is to be no immediate external pressure, a good rule for determining whether wet concrete is sufficiently hard is to press upon it with the broad part of the thumb. If a dent is thus made, the concrete is too soft to admit of removing the forms. It is usually possible in dry weather to raise the forms within 24 hours of the time of placing the concrete, even if slow setting Portland cement is used. Care must be exercised, however, to prevent any blow or jar upon the fresh work. If the wall is thin or is to be subjected immediately to earth or water pressure, it may be advisable to allow the forms to remain for several weeks. The setting of concrete is retarded by cold or wet weather. When mixed very wet, it sets and attains its strength more slowly than when mixed with less water.

Fixing Marble Veneer.

In veneering brick walls with marble, the slabs used are rarely less than ¾-inch thickness, although the Romans are said to have veneered in the walls in the Baths of Caracalla with slabs of only ¼-inch thickness. It is usual to leave a clear space of ¾-inch between the marble and the wall to include the plaster backing, and any slight irregularities in the wall surface. Polished marble suffers from the disintegrating influence of damp, so that the slabs should not be fixed until the walls are fairly dry. If there is any doubt about the walls being dry, it is best to leave open joints in the marblework for some time, so as to admit of free circulation of air behind and prevent condensation. It is best to leave open space where possible between the marble and the wall, and, with this object, it is better for the backing to be laid in narrow vertical strips so placed that each slab may rest against at least two of them. The best fixing is obtained when a slab can be inserted between two projecting string-courses of solid marble built into the wall. Grooves or rebates may be cut in the upper and under side of the string-course to receive the slabs, and the groove receiving the upper edge of each slab, to allow sufficient "play," so that the slabs may not be crushed or injured in the event of a settlement of the wall behind. It will be understood that extremely careful workmanship is necessary in fixing marble lining, so as to avoid injuring the edges of the slabs; great care is requisite in cutting them to the proper size, and in setting out the work before it is fixed. The hooks and staples used in fixing, says the *Stone Trades Journal*, should be of copper or gun metal, and so arranged as to afford a support for the slabs, and so prevent them from being subjected to any undue pressure. Beads and ovolos are frequently worked upon the arrises, or else the slabs are finished square at the edges, so as to make a simple arris, no attempt being made to deceive the eye by an invisible angle joint. The angles are usually strengthened by means of gusset shaped blocks of freestone or terracotta, fixed inside with plaster or cement.

A SMALL frame dwelling 40 feet long, 20 feet wide and one story in hight is being constructed in sections, of yellow pine, by W. E. Tinison of 262 Greene avenue, Brooklyn, N. Y., for the use of an Episcopal missionary on the West Coast of Africa. The house will be shipped to Sierra Leone so as to reach its destination ahead of the missionary, Miss Mahoney, who will sail in February. The statement is made that this will be the only wooden dwelling in the settlement.

Schedule of Architects' Minimum Charges

At the recent convention in Cleveland of the American Institute of Architects the schedule of minimum charges for professional services was revised, a copy of which we have just received from Glenn Brown, Secretary of the Institute. As being of general interest to many of our readers, we present the schedule herewith:

The architect's professional services consist in making the necessary preliminary studies, working drawings, specifications, large scale and full size details, and in the general direction and supervision of the work, for which the minimum charge is five per cent. upon the cost of the work.

For new buildings, costing less than $10,000, and for furniture, monuments, decorative and cabinet work, it is usual and proper to charge a special fee in excess of the above.

For alterations and additions to existing buildings, the fee is 10 per cent. upon the cost of the work.

Consultation fees for professional advice are to be paid in proportion to the importance of the questions involved.

None of the charges above enumerated covers alterations and additions to contracts, drawings and specifications, nor professional or legal services incidental to negotiations for site, disputed party walls, right of light, measurement of work, or failure of contractors. When such services become necessary, they shall be charged for according to the time and trouble involved.

Where heating, ventilating, mechanical, electrical and sanitary problems in a building are of such a nature as to require the assistance of a specialist, the owner is to pay for such assistance. Chemical and mechanical tests, when required, are to be paid for by the owner.

Necessary traveling expenses are to be paid by the owner.

Drawings and specifications, as instruments of service, are the property of the architect.

The architect's payments are due as his work progresses in the following order: Upon completion of the preliminary sketches, one-fifth of the entire fee; upon completion of working drawings and specifications, two-fifths; the remaining two-fifths being due from time to time in proportion to the amount of work done by the architect in his office and at the building.

Until an actual estimate is received, the charges are based upon the proposed cost of the work, and payments are received as installments of the entire fee, which is based upon the actual cost to the owner of the building or other work, when completed, including all fixtures necessary to render it fit for occupation. The architect is entitled to extra compensation for furniture or other articles purchased under his direction.

If any material or work used in the construction of the building be already upon the ground or come into the owner's possession without expense to him, its value is to be added to the sum actually expended upon the building before the architect's commission is computed.

In case of the abandonment or suspension of the work, the basis of settlement is as follows: Preliminary studies, a fee in accordance with the character and magnitude of the work; preliminary studies, working drawings and specifications, three-fifths of the fee for complete services.

The supervision of an architect (as distinguished from the continuous personal superintendence which may be secured by the employment of a clerk of the works) means such inspection by the architect, or his deputy, of work in studios and shops, or of a building or other work in process of erection, completion or alteration, as he finds necessary to ascertain whether it is being executed in conformity with his drawings and specifications or directions. He is to act in constructive emergencies, to order necessary changes and to define the true intent and meaning of the drawings and specifications, and he has authority to stop the progress of the work and order its removal when not in accordance with them.

On buildings where the constant services of a superintendent are required, a clerk of the works shall be employed by the architect at the owner's expense.

HOUSE MOVING.*

BY O. B. MAGINNIS.

IN taking up the subject indicated by the above title I feel that no apology is necessary, as the field has beeu hitherto untouched to any extent by writers on building construction and kindred topics. The science or actual practice of house moving is one which is in itself a specialty, being the outcome of the improvements of cities, the widening of streets, the erecting of better houses on occupied lots, transfers of property, &c., and is a familiar incident in connection with most all communities. Generally the practical house mover combines shoring and needling in his business category of house moving, but as I have already treated on these subjects in earlier volumes of the paper, I will at once take up the most important and most difficult.

Let me state at the outset that successful moving is only accomplished after very careful thought and procedure, as it necessitates not alone a full knowledge of building construction on the part of the house mover, but he must also have a native or acquired knowledge of the elements of civil engineering. This is essential, because not only do statics and dynamics enter into the work, but the forces and mechanical powers as well. Houses being composed of many materials—details so arranged by man's skill that they form a perfect whole—are perfectly safe and secure while at rest and undisturbed; but should any lateral movement occur at their bases, their statical condition is immediately altered and their structure impaired. For this reason, then, it is imperative that the house mover should be a skilled mechanic, preferably a carpenter or mason and experienced in the work—that is to say, he should have worked under an expert or foreman on large and small jobs of brick and frame houses, for nowadays both kinds of structures are frequently moved.

Now as to the tools and appliances necessary. I might state that successful moving depends on accurate and reliable machines, especially constructed for the purpose, and I will describe them in the way in which they are required, although the work embraces both skilled and unskilled labor, ranging from the ordinary laborer who digs, hauls and carries, to the carpenter, electrician and mason who complete the work and make all safe and secure. In addition to the ordinary simple implements of labor, as shovels, pickaxes, hods, wheelbarrows, crowbars, short and long cold chisels, saws, hammers, &c., there are several other tools required, among which are the following of unusual form:

First, there is the "pump," a technical term used to designate the builder's screw or pump screw, illustrated in Fig. 1, and which is used in connection with and at the ends of timbers for the purpose of increasing their length by means of a long bar or lever. This indispensable tool is perhaps the most essential in house moving and raising, being used in great numbers, in lieu of wedges, owing to the fact that it is more powerful and reliable. In itself considered, it is a revolving wedge and by reason of its form incapable of moving, provided it is properly fitted into the end of the timber, which must, of course, be of sound and solid wood. It is of such a nature that it may be applied either in a horizontal or vertical position, thus rendering it of the utmost utility, as will be noted as the article progresses.

The following list of manufactured sizes will be found useful when purchasing apparatus for this class of work. The figures are applicable both to pump and jack screws:

Manufacturers' List of Pump and Jack Screws.

Diameter of screw.	Hight of stand. Inches.	Hight over all. Inches.	Lifting capacity. Tons.
1½	6	10	12
1½	8	12	12
1½	10	14	12
1½	12	16	12
1½	14	18	12
1½	16	20	12
2	8	12½	20
2	10	14½	20
2	12	16½	20
2	14	18½	20
2	16	20½	20
2	18	22½	20

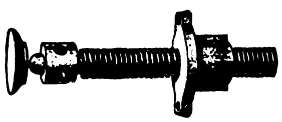


Fig. 1.—Builders' Pump Screw.


Fig. 3.—A Cant Hook.

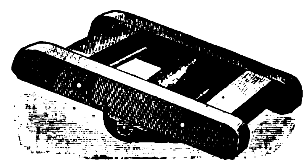


Fig. 4.—Builders' Truck or Roller.

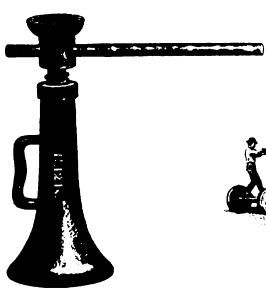


Fig. 2.—Jack Screw.


Fig. 5.—Method of Moving Light Frame Buildings.

House Moving.—Showing Some of the Various Tools and Appliances Employed.

Another tool of the same nature as that already described, though applied directly, is the locomotive or screw jack, shown in Fig. 2. This is worked like that shown in the previous figure, with an iron bar or lever. By reason of the probability of the ends sliding or slipping on the top plate, or the jack tipping on its base, the tool is never applied to apparatus or shores except at right angles to the axis of the timbers, whether they be placed vertically or horizontally, but the ends must be kept flat against the face of the timber. In Fig. 3 is shown a "cant hook," used by the house mover in turning over the heavy timbers on which he supports and moves the buildings. In Fig. 4 is shown the builders' roller, of which he generally uses two, three or more, for the purpose of transferring by rolling the aforesaid timber from one place to another, as the reader will learn later on. In the meantime he will readily appreciate the

* Copyrighted, 1901 and 1903, by Owen B. Maginnis.

fact that the extra size and weight of the timbers would necessitate the employment of a great number of men to carry them about, while the simple appliance here shown obviates any such performance.

Considering now the motive power required, I would state that primarily buildings of the lighter frame class were moved by man power applied to levers or ropes, in connection with blocks and tackles, acting directly with a pull and haul, or in the manner indicated in Fig. 5 of the illustrations, with the assistance of a windlass or roller, either acting direct or with a pawl. The picture shows how a light frame church was moved, and at the same time it clearly explains how the apparatus was applied by man power in turning a fixed drum capstan, revolved by spur gearing and cranks. The whole apparatus is mounted upon a large frame work supported on wooden wheels. The ground being of a soft, clayey nature, it was necessary to place upon it thick planks, to act as the surface over which the rollers upon which the building moved could more readily pass. This method being of an extemporized nature, can be readily adopted by carpenters or building contractors in the smaller communities, more especially as the appliance can be readily made by the carpenters themselves.

There is, however, a cheaper and just as available motive power, always obtainable, and that is the direct

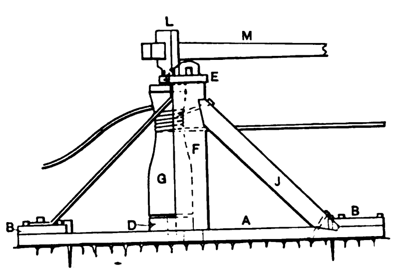


Fig. 6.—Side View of Windlass or "Crab."

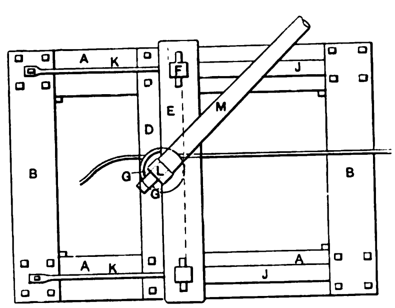


Fig. 8.—Plan View.

House Moving.—Showing Various Views of a Windlass.

acting horse-power applied to the windlass, or "crab," as it is technically designated in the United States, and which is illustrated in Figs. 6, 7 and 8, representing respectively side, end and plan views.

This machine, which is generally found in use in the larger cities, is constructed for the most part of timber, and consists of a base or frame, A A and B B, of 3-inch oak or yellow pine timbers bolted together, the transverse end pieces B B being notched down into the side pieces in order to prevent their racking. A third middle piece of oak, D, crosses the center and is placed there to sustain the vertical revolving drum or capstan G, which it receives in a central hole or pocket, P. Two uprights, F F, of 3 x 8 inch oak, are mortised and tenoned at the bottoms into each of the sides A and A, and kept from jumping out by a wooden taper key driven into slots in the tenons underneath. They are also kept from racking laterally by the short angular braces H H, shown in the end view. These uprights are prevented from overturning by the diagonal compression timber braces J J, measuring 3 x 6 inches in cross section, which counteract the pulling strain by being notched and bolted to the uprights F F and sole piece A A. As a further strengthener, 1-inch wrought iron tension diagonal braces, K K, are similarly placed on the pulling side, to maintain the equipose pressure on the frame and keep the strain as vertical as possible. The upper cross piece E, of oak or hickory, is held in position by being mortised, tenoned and keyed to the side pieces, and in this, at the center, revolves the capstan G. A semicircular cut is made to receive it and there retained by a wrought iron collar strip, which is hinged at one end and fitted with a slot, staple and pin at the other.

All the foregoing will be readily comprehended by a careful study of the illustrations, as the details are here presented in a way to show all the salient features. The drum or capstan G, being subjected to great strain, is turned out of a solid piece of hickory or locust, the latter being preferable on account of its density of fiber, which renders it less liable to strip or sliver under the friction of the rope. It is also preferable by reason of its smoothness at the bearings, which, of course, tends to greatly decrease friction. It should be turned smooth in the lathe to about the form shown, but not less than 12 inches in the thickest portion nor 8 inches in the thinnest. A collar must also be turned on the top and bottom, as

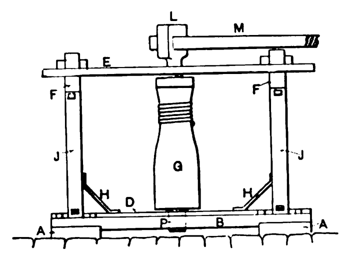


Fig. 7.—End View.

indicated, to form a flange, and the bottom pin must be left at least 4 inches, or one-third the diameter of the drum. The top pin, where it fits into E, may be of the same diameter, but the top, L, will require to be thicker, if the shaft or capstan bar M is to fit into the mortise as shown. Should its top end be finished square, then 3 or 4 inches will be sufficiently thick for the purpose. The object of turning the drum to this shape is to prevent the rope from slipping down; also to regulate the speed of the "move," which can be done by sliding the rope turns down or up, as required. The bar is made of stout, well seasoned hickory, running from 6 inches in thickness at the inner end to 3 inches at the outer, and is either shaped to fit into a mortise on the drum head, as in the illustration, or made wide and mortised square to fit over it. It is equipped with ⅜ x ½ inch strips of wrought iron, to prevent its splitting. Its length is 10 to 12 feet, and the outer end is fitted with a ½-inch galvanized wrought iron eye bolt or hook and nut, to which the whiffletree of the horse is attached.

The entire machine is fastened down to the street or road by long iron or steel spikes, forged somewhat similar to a railroad spike. These with a maul are driven home between the joints of the Belgian pavement, or into the asphalt or clay, depending, of course, upon the location of the moving operation. Of course, longer and broader spikes will be needed for asphalt or clay, but small crowbars will do.

(*To be continued.*)

ARCHITECTS and builders appear to be of the opinion that there will be a building boom in Harrisburg, Pa., just as soon as the prices of materials and labor justify the starting of buildings which have been planned. The city needs several large buildings, including a modern hotel, a city hall and several apartment houses, and the adjustment of all matters affecting building operations will be welcomed by all.

Remedying Dampness and Efflorescence in Walls of Buildings.

Some rather interesting comments regarding methods of remedying dampness and efflorescence in the walls of buildings are presented in the work of a German chemist by the name of Adolph W. Keim, and as the subject indicated is one which appeals strongly to architects and builders in whatever part of the world they may be situated, we present the following rather copious extracts:

Most of the methods which have been proposed for curing damp walls have been based on the use of waterproof plastering or paint, or depend on the principle of employing hollow walls, with or without ventilating apertures. The former device may, in certain cases, fulfil the desired end, although as a rule it merely hides the mischief for a time and actually aggravates it. The plan of using hollow walls with ventilating channels, whilst more correct in principle, is both costly and difficult of application to old houses.

Two Methods Described.

Vaudoyer has the following remarks on these two methods: Imagine the wall of a basement to be affected by moisture, and to exhibit efflorescences on its external surfaces; it would be of no use to try to shut the damp into the wall, we must rather afford it an opportunity of being dried by the air, whilst endeavoring to remove the cause. With this object air channels should be inserted in the walls above the ground level, cellars may be excavated where none already exist, the inner and outer plastering of the walls may be removed, and any precautions similar to those which are employed in new construction may be adopted. In cases, however, in which these precautions are no longer possible or when in spite of them the effects of dampness still continue to exhibit themselves, recourse must be had to other means, such as the following: To prevent the moisture which is present in the wall of a building, and shows itself on the interior surface, from influencing the air of the apartments, the best plan is to face the wall with hard tiles, set on edge at a distance of about an inch from the face of the wall so as to permit a circulation of air between the wall and the inner casing. It is beneficial to give the inner surface of tiles a coat of asphalt, especially those which are tied to the wall, while the outer surface may be coated with plaster (?), which, when perfectly dry, can be painted or plastered, or, since wall paper does not adhere well to plaster of Paris, it may be pasted upon coarse linen.

This system would afford all needful security, and no further harm would arise from the moisture even if it still remained in the wall which was originally affected by it; but even in the wall itself it would be markedly diminished by the ventilation which would be established between the wall and the inner casing. A less expensive expedient would be to erect wooden battens against the wall, with diagonal ties, to nail laths upon these, and then plaster the laths. This would give a thin partition, isolated from the wall. The wooden battens, being in contact with the damp wall, would have no great permanence; they should at least be well tarred and have sheet lead interposed between them and the wall; a free circulation of air is, moreover, absolutely necessary. Wooden wainscoting amounts in fact to an isolated partition, and it is certain that the partial, or, if necessary, the complete lining of the walls of a room with wood is a great protection against damp; nevertheless, the ill effects of moisture on the building itself will still have to be feared if a free circulation of air is not provided for behind the wainscot, the back surface of which, moreover, should be well tarred.

Isolated Partitions.

Although the system which has just been described is to be preferred to any other, it nevertheless has the disadvantage of reducing the size of the apartment considerably; we have therefore to consider whether other devices may not in some cases be adopted.

In cases where the wall in question is an interior wall separating two apartments, both of which require to be screened from damp, there is no alternative but to adopt the system of isolated partitions; for, if any coating impervious to moisture were applied immediately to the wall, the result would simply be to inclose the damp in the substance of the walls and would promote a destructive action, which would be all the more detrimental because it would escape observation. But where the damp shows itself in only one of the rooms, it would seem that to suppress it on that side of the wall would drive it to the opposite one, where, however, it would not be so harmful as in the former case, because at that side the air might be relied on to evaporate it to a large extent. In such a case it is better to avoid the use of an isolated partition, and to apply directly to one side of the wall the waterproof coating which is regarded as the best protective. It must, however, be admitted that few of these will long maintain their coherence with a wall which is perpetually damp. Framed partitions take such a coating more readily than walls built of stone. The material selected for application should, if possible, be one that will penetrate into the substance of the wall. Such an application may also be employed for the inner surface of an exterior wall, if this has a favorable aspect. For if one of the surfaces is exposed to the influence of the air, the damp will be able to escape from the whole thickness of the wall.

Although this plan presents indisputable advantages in some cases, there are others in which the wall may be coated with glazed tiles, affixed with good mortar; or, in rooms where a tiled wall is not appropriate, the rough side may be left exposed, and can then be covered with paint and any desired style of ornamentation. In some instances, tiles saturated with asphalt may be used; in others the whole surface may be covered with thin sheets of lead. The chief difficulty in using metallic plates is to find a suitable material for attaching them to the wall. This is required not only to harden readily, but also to adhere firmly to both the surfaces to which it is applied.

It would be superfluous to remark that a damp wall to which cement, or any other waterproof material, is to be applied, should first be stripped of its former coating, and allowed to dry for some time before the new coat is laid on. And it must further be remarked that rendering with mortar consisting of hydraulic lime and sand gives a surface which is quite unsuited to receive a coat of oil paint, since the latter would not adhere well, but would speedily peel off.

C. G. Demich has proposed some extremely complicated ventilation attachments, which are so costly that scarcely any one would introduce them into old buildings, on which account I pass them over. But he also gives the following method for protecting against damp:

An excellent method (he says) of preventing the escape of water vapor from damp walls is to cover them with small glazed clay tablets. These tablets, which can be made by any potter, are about ⅞-inch square and ⅝-inch thick, and are glazed on one side. They are attached to the wall, with the glazed side outwards, by good mortar or plaster and small clamps. A wall covered with such tablets has not an unpleasant appearance, but when lighted up at night the glitter is injurious to the eyes. To avoid this the tablets may be fixed with the glazed side toward the wall, the rough side coated with a thin layer of fine cement, floated, and papered. When the damp is not excessive the wall may be covered in the same way with old window glass, then floated with cement and papered.

ANOTHER new theatre, of the modern French style of architecture, is to be added to the long list of amusement places which have been constructed in New York City during the past few years. It will occupy a site at Broadway and 62d street, adjoining the Empire Hotel, and will be completed in accordance with plans prepared by John H. Duncan, of 208 Fifth avenue. The building will cover an area 100 x 115 feet in size, with a 25 foot entrance extension to Broadway. The dressing rooms will be in a 25 foot front building extending from the rear of the stage on Columbus avenue, this arrangement rendering them free and independent of the theatre proper and the stage. No columns will be used in the auditorium, which will have a seating capacity for 1600 people, exclusive of the boxes. There will be a balcony and a gallery, the stairs landing at the center with cross aisles. The stage will be carried on steel beams and cement arches and the structure will be fireproof throughout.

SOME NOTES ON BUILT-UP COLUMNS.

By C. Tobyansen.

If any of the readers have any doubts as to the meaning of the several architectural terms employed in these articles I beg to refer to Fig. 1, which will serve as a glossary of names as applied to the parts of a column.

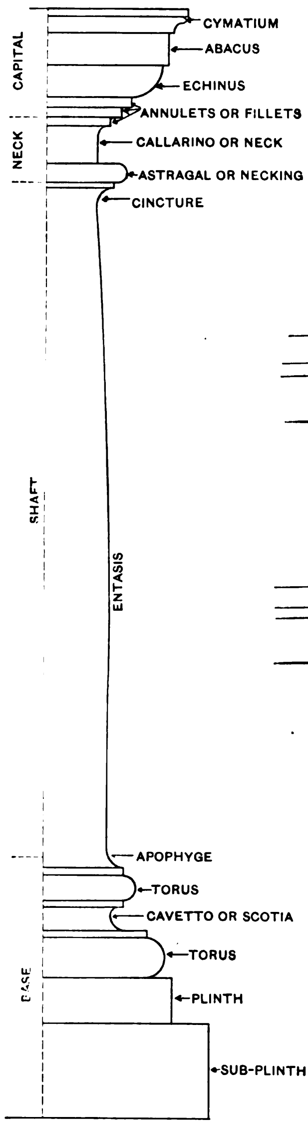


Fig. 1.—Names of Parts of a Column.

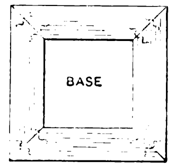


Fig. 2.—Showing Miters.

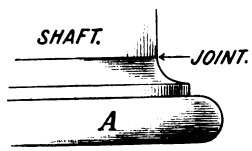


Fig. 4.—Poor Joint.

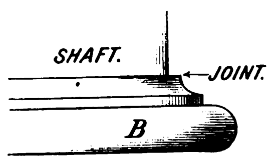


Fig. 5.—Good Joint.

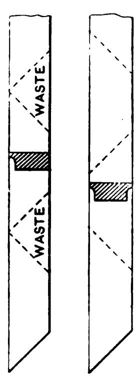


Fig. 3.—Showing How to Cut Stuff with Little Waste.

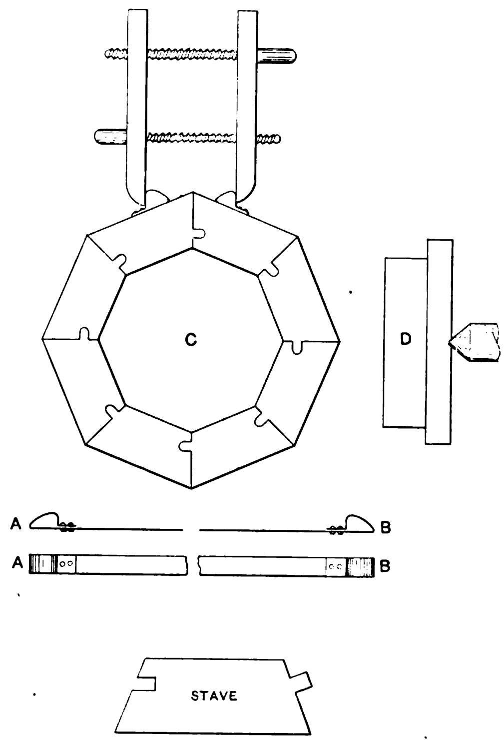


Fig. 6.—Details of Clamping Apparatus, Form of Stave and Block for Turning Columns.

Some Notes on Built-Up Columns.

There are other appellations, but those named are the ones most commonly employed.

The squares at top and base, plinth and abacus, are preferably mitered, as shown in Fig. 2. By molding both sides of the stuff for the abacus either side may be used for the face, thus cutting the stuff with scarcely any waste. This idea is well illustrated in Fig. 3. The circular base and cap molding are generally built up of several layers of stuff flatways to the grain. This stuff should be carefully surfaced on the jointer, planed to the required thickness and circled out on the band saw a little larger than the size to which it will finish. They may now be nailed together and turned. Care must be taken in nailing that the nails are well inside of the deepest cut, else the tools will suffer severely, not to mention the strain on one's temper. In the cheaper grades of Western columns, so-called, the bases are often staved together like the shafts, a method which, in the estimation of the author, is bad practice. It stands to reason that moisture will cling longer around the concave or convex molds and crevices than upon the vertical plain shaft. Glue joints, therefore, will soon be affected, even though fairly well painted, and the result is premature decay and destruction to appearances.

There is another constructive feature upon which I desire to comment. Some architects specify joints made above apophyge at the base of the shaft. This I regard as decidedly wrong. The base is flatways of the grain and the shaft is endways. The consequence is uneven shrinkage, which soon makes an unsightly broken joint, as at A of Fig. 4 of the illustrations. True, the ancients made the joint here as a rule, but then they worked in stone. Better then, if here the joint must be, to make it as shown at B of Fig. 5. It may not be pure style, is not, in fact, but it makes a good job, and if style is all important make the shaft correct with apophyge and fillet and the joint between this last and the torus.

In the September issue of *Carpentry and Building* there appeared three different methods of building shafts, but I cannot consider any of them as very practical. The first two methods described necessitate a large number of hand screws. In fact, as many for each couple of staves as we use for the whole column. By the third method I do not see how a good pressure can be brought to bear on a larger number of staves than six, and it is self evident the larger the number of staves the rounder the shaft and thinner the material needed, both of which are practical advantages. In our shop the clamping arrangement shown in Fig. 6 of the cuts is used, A B representing an iron band bent around the wooden cleat at the ends and riveted, as shown. A small screw should be run into the block itself through the band. It is rather annoying to have the block slip out just as you are about to put on the clamp. In regard to this point I speak from experience.

The manner of application is shown at C of the same figure. The bands for a taper column must, of course, diminish in size. Three times the diameter at the point of application and 1 inch added for unevenness will be found about right. And, speaking of unevenness, it is a good plan to take a little off the corners of the staves, as indicated at A A in Fig. 7. It renders the shaft more nearly round and the clamps fit closer. This form of stave can be run on any ordinary molder without pitching the side heads. It is a very particular job, however, and requires great care and accuracy in order to make perfect joints all around. It is advisable to run a short piece first and cross cut this into as large a number of short pieces as there are staves required for each clamp. Put these together and slip a clamp around them. If the sticking is at all faulty it can be detected and remedied, thus avoiding the spoiling of the stuff or a poor job. It might be mentioned that Fig. 7 represents a section of a piece of stuff containing material for two staves of cut on the bevel shown at B.

In laying out the work it is well to bear the protractor, Fig. 8, in mind. This little instrument is of great assistance in finding the width of the stave, also the level required. A complete circle contains 360 degrees and the number of degrees for each stave is found by dividing the whole by the number of staves. Thus a column of ten staves will require 36 degrees to each. Knowing that the lower angle of the triangle in which the stave is contained has 36 degrees, as demonstrated in Fig. 9, the other two angles are easily found. We know that the sum of all angles in a triangle is always 180 degrees, also that the two angles of an isosceles triangle, meaning a triangle two sides of which are of equal length, are always alike. These two angles then must necessarily contain 72 degrees each, as

$$72 + 72 + 36 = 180.$$

If we have 12 staves the equation will stand

$360 \div 12 = 30$, and again $30 + 75 + 75 = 180$, &c.

We now take our bevel or bevel square, as it is often called, and apply it to the protractor, as shown in Fig. 8, setting it to the degree required, and being extremely careful that the plate touches equally as well at the center C. Now take a piece of board, such as indicated in Fig. 9, and draw the line A B along the bevel. Reversing it, the line C D crosses the first line a little distance from the edge. This crossing point, E, of the lines is the center of the column. We now mark off our semi-diameter and draw the face line of the stave parallel to the edge of the board. Set down the thickness of the stuff and draw the base line of the stave, and there we are, width, bevels and all. This manner of laying out is positive and direct, saving a lot of time over the common way of spacing around the circle with a pair of dividers a half dozen times or so before it comes out even.

It will be observed that the groove runs in parallel to the face of the stave, while the tongue stands squarely on the side. They should fit together loosely, but still have bearing enough to afford some support to one another in gluing up, as it would be difficult to get 10 or 12 staves in glue at once without this assistance. Two men are needed in the glue room, one to spread the glue and the other to build up. It takes two to handle the clamps anyway. We use a couple of pieces cut out as shown in Fig. 10 in which to rest the staves when building up, and always make one job of it—that is, glue the whole shaft up complete and not in halves.

In Fig. 10 is shown a different form of construction, which has some practical advantages where the building up of shafts is not an every day occurrence. The staves marked A A, or the key moldings, as we will call them, have a tongue on each side and beveled enough to meet a square stave. The idea is to run this key molding in large quantities at a time and keep it in stock. Whenever a number of columns are wanted it will be necessary only to get out the square staves and saw a groove in each side. The key molding will accommodate any width of stave required, always using the same number, however. The bevels can be figured the same as already shown, counting the bevel moldings only. Thus, if there

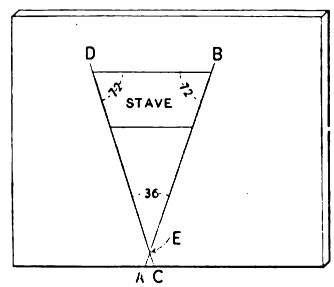


Fig. 9.—Laying Out Sizes and Bevels.

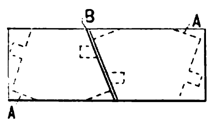


Fig. 7.—Section of Stuff for Two Staves.

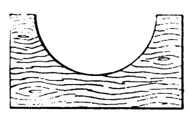


Fig. 10.—Rest for Staves in Gluing Up.

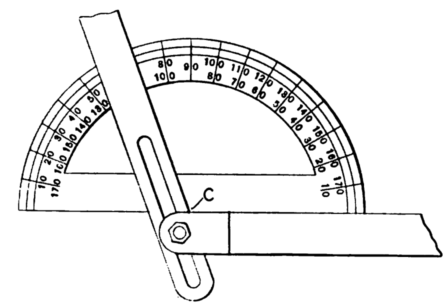


Fig. 8.—Protractor and Bevel Square.

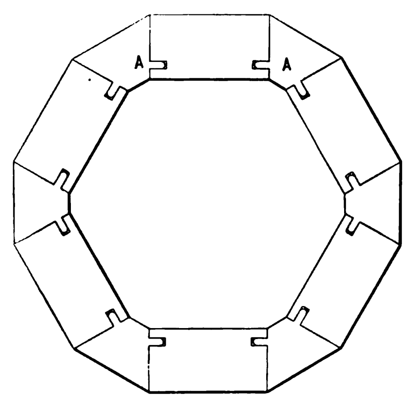


Fig. 11.—Another Construction of Built-Up Column.

Some Notes on Built-Up Columns.

are 12 staves we divide 360 by 6, which gives us 60 degrees.

As previously remarked, it is a particular job setting up the sticker to run staves and it takes considerable time. By keeping this key molding in stock we avoid setting up for every lot and thus cheapen the product. This manner of construction, so far as known, is original with the writer. When tapered staves are required we make a couple of "jacks" of the required taper and run the staves through a second time, putting the jack on the tongue side and running the groove head only. The staves should be left about ⅛ inch wider than the finish size in the first run, allowing this much for the second cut and avoiding burning the cutters. If there are one or two shafts, only it is simply necessary to nail a piece of the stuff across each end to receive the centers. With a larger number it pays to make blocks, as indicated at D of Fig. 6. If they are correctly made they will fit nicely into the hollow ends, require no nailing or screwing at all, and are quickly applied to one shaft after another as they are turned. This has reference, of course, to shafts of the same size.

It has been suggested in connection with the hollow shafts that the base and plinth blocks be perforated, also the floor under the base, thus giving free access of air to the interior of the column and preventing dry rot. The writer submits the suggestion to the readers of the paper without comment, not being in a position to practically judge of its merits.

It is with a feeling of reluctance that the writer leaves the subject of columns, which has been treated in its barren, practical aspect only. The voices of centuries echo through it and the history of ages cluster about it—history, sacred and secular, ancient and modern, pagan and Christian. Progress and retrogression are depicted in its lines, advance and decadence of art in its conception. We should like a mental ramble with the readers down the avenues of time, some dozen centuries or so, tracing the subject in its historical and archæological aspects. We hope that some of the readers will express their views in this respect and will await their pleasure, meanwhile turning our attention to other practical phases of wood turning.

Some Suggestions on Painting Hard Wood.

Painting hard wood may seem a very foolish thing to do, but quite often the painter is called upon to do it to satisfy some notion or wrong idea of style of his customers, or, in some cases, the necessity arises to paint over a stained and weather-beaten vestibule door or store front which may be in such a state of decay as to make refinishing impossible. The writer of this article, says the *Painters' Magazine*, has had many occasions to notice where it had to be done, and just as often the painted hard wood was cleaned off again and finished in the natural style. The ideas of our customers quite often require us to do almost impossible jobs. A short time ago I was called upon to give expert testimony on a spoiled job of hard wood painting. A well-known New York painter and decorator received an order about 15 months ago to clean off the varnish and paint over the trimming and wood work of about four rooms in a fashionable residence. The tint selected was an ivory white, flat finish, four-coat job. He used a remover for cleaning off the old varnish having an alkaline base, by the way, the only practical remover for such work. The job, after finishing, looked all right, except in one front room, where a panel on one of the doors showed a brownish stain. This panel received an extra coat of paint and the job was completed. Not long afterward, the one room in question began to show discoloration, and the paint began to soften. This discoloration consisted of brown streaks and spots on the panels and flat surfaces such as cross stiles, &c. After inquiring into details, I found as follows: The wood work had been cleaned with a varnish remover. The same kind of remover was used in all the rooms; the work was properly cleaned, and the effects of the remover neutralized by vinegar, the latter being especially carefully done. The same men did the job in all the different rooms, and in general, the work was done in all the rooms in exactly the same manner. The wood work was properly sandpapered and sufficient time allowed between coats. About one year after the work showed up in three of the rooms in good condition, including the bathroom. The one front room was badly discolored, and the paint was so soft it could be pealed and scraped off, and the work had to be done over again. The wood work in the first three rooms I found to be oak, ash and other wood not containing any sappy or oily substances, but the one front room, where the trouble occurred, was trimmed with rosewood, a wood containing a great deal of oil and fat. This oily substance, not being held in check by a hard undercoating, such as shellac, united with the paint, softening and discoloring it. Had the remover been at fault, no doubt the discoloration would have shown in the moldings and crevices first, and would have caused yellow streaks and would not have impaired the hardening of the paint; but, as a matter of fact, the discoloration was reddish brown and the paint soft and most prominently on the flat surfaces, where the paint was worked out thin while the moldings were not affected. The painter, not being acquainted with the nature of hard woods, could scarcely be blamed, although in this case he had to remedy the trouble at his own expense. Even the experienced wood finisher and polisher will get into trouble by using hard gum varnishes on some kinds of woods, especially rosewood, and no doubt there is hardly a finished piece of furniture or piano made out of rosewood which does not show a dimmed and oily appearance.

Good advice may be here given to the painter who is called to do such work, to study the nature of the wood first, and if there is the slightest sign of its containing fat or oil to at least give the wood a good coat of shellac before painting. Much worry and trouble may be averted and a little extra expense at first may save him a good deal of money in the end, especially in a case where he has to satisfy a good customer in order to keep his patronage.

London's Unemployed.

The workers of London are now passing through the regular period of winter unemployment and the greatest distress is said to be found among the builders. The carpenters and bricklayers are at the mercy of the weather; for these workers, and for the unskilled laborers dependent on them, winter always means idleness and destitution. The engineering trade is also in an extremely depressed condition. The bulletin of the state of employment published by the *Labor Gazette* shows a steady increase of the number of the unemployed. The figures show that six per cent. of the trade unionists of the entire country are now workless. It is to be borne in mind, moreover, that the 500,000 trade unionists tabulated in the *Labor Gazette* returns represent only about one-twentieth of the total working population of Great Britain. Doubtless the extent of unemployment is even greater outside the trade union ranks than it is inside. But even the 6 per cent. proportion applied to the whole laboring population would give, at the lowest estimate, a total of 600,000 unemployed. In some districts of London the distress caused by unemployment is appalling. In the Victoria Dock district, for example, two-fifths of the workers are said to be positively destitute and two-fifths more to be on the verge of want. The workers of London probably suffer more through unemployment than those of any other city in the world.

The value of building improvements for which permits were issued last year in Louisville, Ky., by Building Inspector Robert J. Tilford, shows a most healthy growth in that development of the city. This total was $2,430,337, of which repairs called for $163,691; additions, $85,025; frame houses, $781,851; brick, $1,399,770. The heaviest month of the year was November, when nearly $600,000 was given as the value of proposed buildings, for which permits were granted. This included the Seelbach Hotel. The fiscal year, which ended August 31, fell short of the past calendar year, the permits aggregating $1,918,872 in value.

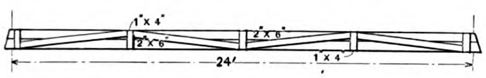
CORRESPONDENCE.

Constructing a Circular Pavilion.

From A. S., *Fairfield, Wash.*—I would like to have some of the readers furnish sketches and instructions covering the best and simplest method of constructing a circular pavilion with conic roof, projecting cornice and having crown mold, facia, plancier and frieze. I desire the entire structure to be of wood, and the correspondent answering the inquiry to give the method of procedure from foundation to apex.

Strength of Floor Beams for Public Hall.

From S. L. C., *North Loup, Neb.*—Although I am practically a new subscriber to *Carpentry and Building*, with which I am greatly pleased, I desire to ask the opinion of the practical readers with regard to the carrying strength of 2 x 12 inch joist, 24-foot span. The room is to be used as a hall and I want to know if there is danger of overloading. Are two 2 x 6 pieces, placed one on top of the other and braced on both sides with



Strength of Floor Beams for Public Hall.

1 x 4 inch pieces, as indicated in the sketch sent herewith, stronger than 2 x 12 inch timber, and how much?

Notes— We submitted the inquiry of our correspondent, together with his sketch, to Mr. Kidder, who comments as follows: A 2 x 12 inch wide pine or spruce beam is not strong enough for the floor of a hall 24 feet wide between bearings. It is probable that 2 x 12 inch Oregon pine joists, full to dimensions, and spaced 12 inches on centers, would be safe, but they would bend considerably. It would be wiser to use 3 x 14's placed 16 inches on centers. It is impossible to build up a beam by placing one beam on top of the other and trussing with boards so as to get the strength of a solid timber of the same dimensions. On page 444 of Part II of my work on "Building Construction and Superintendence" is described a method of building up two timbers to make a compound girder, by which about 95 per cent. of the strength of the solid beam may be obtained.

Corrected Figures Regarding Concrete Work.

From SANFORD E. THOMPSON, *Newton Highlands, Mass.*—In "The Elements of Concrete Work, Part I," by Frederick W. Taylor and the writer, published in the January issue of *Carpentry and Building*, I notice on page 13 an error in the figures in the answer to the example which illustrates the use of the table of "Materials for One Cubic Yard of Concrete." The correct quantities of materials required for the 36.2 cubic yards of concrete are: 47 barrels packed Portland cement, 16½ cubic yards loose sand and 33 cubic yards loose gravel.

These quantities are all calculated from the second line in the table given, which states that for one cubic yard of concrete, in the proportions 1 : 2½ : 5, there will be required 1.29 barrels of cement 0.45 cubic yard loose sand and 0.91 cubic yard loose gravel or stone. If one cubic yard of concrete required these materials 36.2 cubic yards of concrete will require 36.2 times these values. The calculation for each of the items is therefore as follows:

$1.29 \times 36.2 = 46.7$, or in round numbers 47 barrels cement.

$0.45 \times 36.2 = 16.3$, or in round numbers 16½ cubic yards loose sand.

$0.91 \times 36.2 = 32.9$, or in round numbers 33 cubic yards loose gravel.

I very much regret the error in the manuscript, but trust the above correction will be in time to prevent any of the readers from being misled by the figures in the January number.

Criticism of Plank Frame Barn Construction.

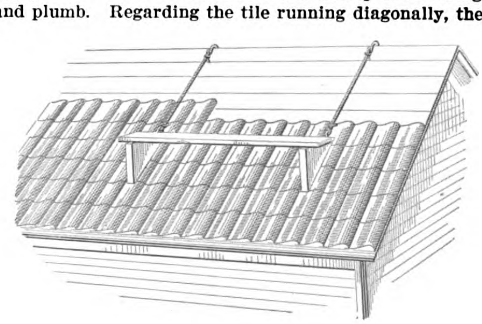
From J. M. B., Monroeton, Pa.—In the December issue of *Carpentry and Building*, page 327, the correspondent, "S. H." of Minneapolis, wants to know the weak points of his barn frame, a sketch of which was presented in connection with his communication. I think one weak point is what he calls the plate in the gable, which is made of two 2 x 8 inch pieces, equal to a 4 x 8 inch, with a span of at least 30 feet between purlin posts, which are only 2 x 6 inches. In my opinion, with the haymow filled with hay, the gable will bulge or spring out, as the weight, 45 to 50 tons, will exert quite a pressure. As to the remedy I am not so clear. He might use a flat truss or a beam large enougn to stand the pressure; one, say, 16 inches wide at the center and tapering to 8 inches at each end. I will say, in conclusion, that I have had no experience with plank frames.

Merits of California Redwood.

From G. T., *Mount Etna, Iowa.*—In answer to "W. S. W.," Sterling, Kan., in regard to the merits of California redwood for outside and inside finish, I would say that I like it very much as to lasting quality for outside finish. I think, however, it is a little tedious to work and, of course, splits easily, as well as takes much more paint to finish, but I believe it excels the pines that we get nowadays, and for doors, especially the outside ones, it is the best, as the doors do not swell to amount to anything, so can be hung much closer to the jambs.

Laying Tile Roofing.

From BERGER MFG. COMPANY, *Canton, Ohio.*—More or less has been said in the columns about scaffolding for shingling roofs, so we are constrained to describe a method of laying tile roofs in which staging is oftentimes used. In fact, our customers in a number of instances have been obliged to build a scaffolding for applying different classes of metal roofing. In the accompanying sketch a roof is shown to be covered with metal tile and showing one kind of scaffolding which has been highly satisfactory. There is always room on the ridging to fasten the hooks, and the ropes holding a scaffold can be adjusted to the position in which it is needed. The roof can either be lined with a chalk line, commencing at the eaves, or a movable string can be used as a guide for laying the tile. This is the only way to apply either metal or earthen tile and keep them straight and plumb. Regarding the tile running diagonally, there

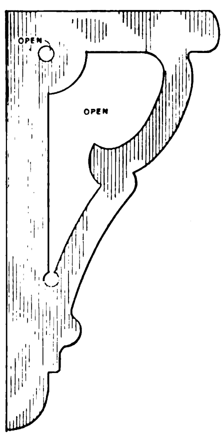


Laying Tile Roofing.

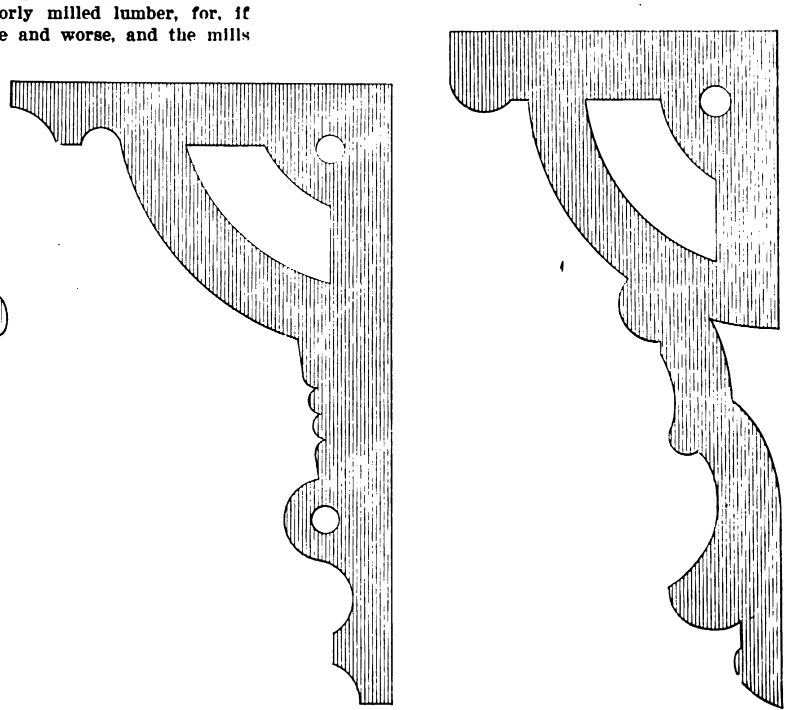
should be no trouble in this respect with metal tile when laid by a good workman with care. We finish a metal tile roof at the ridge with a special ridging after the tile laying has been completed.

Are Millmen Getting Careless?

From G. J. S., *Millersburg, Iowa.*—In reference to the letter from "Apprentice Carpenter," in the January issue of the paper, I would say that in my opinion the mill men are either careless or are incompetent, as quite a lot of the work turned out by the mills is not done in a workmanlike way, and at the same time it is very annoying to the carpenter when putting it in position on a building. More especially is this the case if he is a good workman and takes pride in doing his work in a proper manner. Very often the material is in such shape that it necessitates a lot more work for the mechanic, and there is ample field for improvement on the part of the mill men. If, however, the carpenter is a bungler, and there are not a few of them, he will nail up the stuff just as it comes from the mills. With all this said, however, I do not wish to be understood as implying that all mills turn out poor work. There are mills turning out good work, and these are the ones that should be patronized by lumber dealers and all users of mill work. It often happens, however, that the mills doing good work are called upon to compete with some "Cheap John" concern employing poor workmen and using second-hand machinery, and as a consequence the proprietor is at less expense and puts in such low figures as to get the work. The man, however, who patronizes such concerns is the loser, and at the same time he is encouraging the "Cheap John" mill and discouraging the mill that does good work. It must be clear to any intelligent person that it is worth more money to do a job of mill work in a thoroughly workmanlike manner, as it should be done, than to do it in a slipshod, careless way. Now, we mechanics must refuse to use this poorly milled lumber, for, if we do not, it will get worse and worse, and the mills now doing good work will be obliged to slight their product in order to compete with the "Cheap John" mills, and the chances are that we will have poor work in the future, which is always an eyesore to the man who takes pride in doing his work in a proper manner. I sincerely hope the readers of *Carpentry and Building* will take up the matter and see what results can be accomplished. We carpenters must have better mill work if we expect to turn out a good job and without too much inconvenience and extra labor.



Bracket for a Clock Shelf.



Brackets for Porches.—Scale, 3 Inches to the Foot.

Designs for Brackets.

Designs for Brackets.

From W. G. MUMMA, *Admire, Kan.*—I send herewith designs of two brackets for porches, which are of moderate cost, and which may be made double if desired. I also send a design for a small bracket, well adapted for supporting a clock shelf, although it can be used for other work. The drawings indicate so clearly their profiles that further description would seem to be unnecessary.

Some Suggestions Regarding Prices of Material and Labor.

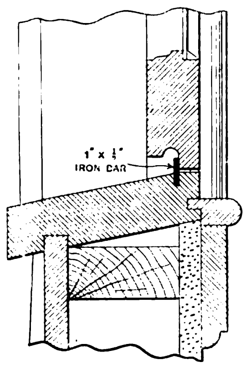
From M. L. H., *Cleveland, Ohio.*—I am not the oldest reader of *Carpentry and Building*—dare not make any such claim—but I have read it many, many years—I think at least 20, and I know it is the best paper (or should I say periodical) of its kind published. There is always something interesting and practical, excepting always the stories of men who can lay 10,000 shingles in a working day. There is, however, one point that has received but little attention compared with its importance. I refer to the subject of prices of materials and labor in different sections of the country. Would not correspondents be willing to exchange ideas on this question, giving the value of dimension lumber, cut stone, like window and door sills, all kinds and quantities of both; also shingles, flooring, clapboards, excavation, masonry, brick and stone work, all kinds of roofing, and, in fact, everything that goes into the construction of a modern building, be it intended for residence or business purposes? I have a copy of both of Hodgson's estimating works, and every mechanic ought to have one, but, in my opinion, they are not quite up to date. I wish the author would give us some estimating rules for factories, business buildings, &c., going deeply into details, as he doubtless can do if he tries. Now, Mr. Editor, if you deem this proposition practicable, I will do my part by giving both Chicago prices and also those of Cleveland, Ohio. Whatever you conclude to do, I shall always take pleasure in recommending *Carpentry and Building.*

Note.—The questions raised by our correspondent involve a pretty broad discussion, but that they are of deep interest to builders in every section of the country goes without saying. We refer the letter of "M. L. H." to our readers and shall be very glad to have them discuss it along the lines indicated, and if the response is as general as the importance of the subject would seem to warrant, much valuable information will be forthcoming.

Suggestions for Young Carpenters.

From APPRENTICE CARPENTER, *Fort Morgan, Col.*—I am greatly interested in *Carpentry and Building* and like to read the letters from brother craftsmen, but in regard to the question of an average day's work for a carpenter I am inclined to the opinion that the average is pretty high. Let me say a word to young carpenters: It is not how much work you do, but how good the work is done.

I think a man ought to do a good day's work, but the high standard which some of the readers have been advocating, such as 6000 and 7000 shingles, and 10 and 12 doors a day, is getting pretty high for an average. Trying to do too much work in a day is the cause of many a man losing his job. Take time enough to do good work and your employer will have no cause for complaint, especially if he values his reputation for good, honest work. If he does not, you had better quit him and seek a job



Constructing a Swinging French Window.—Vertical and Horizontal Sections through Window Frame.

elsewhere, for if you learn to slight your work when you are young you will do it when you are old. I believe there are too many men trying to do a contracting business when in reality they ought to be working under some good carpenter until they learn how to estimate the cost of a building and to do good, honest work. I believe a man should have good tools if he wants to do good work. He should also take pride in keeping the tools free from rust.

Constructing a Swinging French Window.

From FRANK J. GRODAVENT, *Manila, Philippine Islands.*—Some time ago a correspondent made inquiry with regard to the construction of a swinging window so as to render it impossible for the rain to beat into the room. In reply, I would say that my idea of a swinging French window, made water tight at the sill, is shown by means of the sketches sent herewith, representing horizontal and vertical sections through the window frame. I have used this idea of construction for many years and always find it effective and satisfactory. For cellar windows hung at the top there is nothing better. A strip of hard wood ⅜ x ⅞ inch, used instead of the iron bar, answers very well.

Suggestion Wanted for Bachelor's Pipe Rack.

From LEE, *Brooklyn, N. Y.*—Will you kindly publish in the Correspondence department of the paper a request for a sketch or ideas of a bachelor's pipe rack, to be made of oak and given a weathered finish?

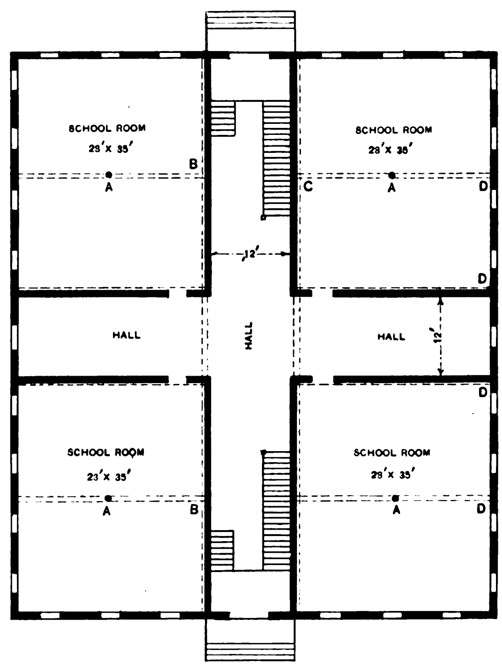
Laying Hard Wood Floors.

From I. F., *Germantown, Ohio.*—I have been a reader of *Carpentry and Building* for some years, but have during that period never asked any questions. I now have a big job of hard wood floor to lay, of tongued and grooved white oak strips, ½ inch thick by 2 inches in width. The floor is to be laid over an old floor, which is of ⅞ inch white pine. The building is heated by means of a hot air furnace and there is a cellar under the entire house. What I would like to know is the best plan for laying the floor so as to obtain the most satisfactory results. Should the boards be grooved at both ends and how close together should I place the nails? Should I nail through the surface at the butt corner joints and should I lay paper under the floor? I have put down a number of hard wood floors, but some of them are not staying the way I laid them. I think that a discussion of this subject might prove interesting to others as well as myself.

Strengthening a School Building.

From W. H. W., *Campbellton, N. B.*—A few days ago I was asked by the school board of this town to visit the school with a view of making certain repairs, &c., which were necessary. I am sending a rough sketch of the floor plan and would say that it is quite a large building, with stone foundations 2½ feet thick and basement about 8 feet high. The building is of brick, three stories in hight, the first story having 12-inch walls and the others 8-inch, with mansard roof on top. The sides of the roof are shingled, while the center of the roof is pitch and gravel. The dotted lines on the plan represent the girders in the basement, set on brick piers about 16 x 16 with stone caps. I notice where the girders join together, as at C, there is a space of about 2½ inches. Going up the main stairs and noting where they join the wall, it appeared they had left the wall about 1 inch. I am of the opinion that the building is spreading or bulging at the points D D D D, as from what I can learn the foundation is built on a clayey soil. The stone work is built plumb up with the brick work on the outside, causing the outside of the wall to cant or lean out.

If some architectural reader or building inspector will tell me the probable cause of and remedy for the trouble at an early date, I shall be greatly obliged, as in about two weeks 400 children will be in the building, which I think is unsafe. It was built only about seven years ago, but I understand they had a local man with very little experience as an inspector. I might say that I shall recommend the placing of several iron rods through the building at the first and second floors, with heavy iron plates on the outside of the structure. These are to be tightened by a turn buckle in the center.



Strengthening a School Building.

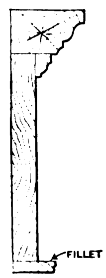
Then in the spring the foundations could be strengthened. You might put this inquiry in the Correspondence department, as I should like to obtain the views of as many readers as possible.

Design Wanted for Store Building.

From C. A. B., *Petersburg, W. Va.*—I desire to ask through the Correspondence columns if some of the readers will furnish for publication a design for a store building 30 x 80 x 21 feet and two stories in hight. The main front room is to be 30 x 50 feet and the lower story 11 feet in the clear. The wareroom in the rear is to be 30 x 30 feet in area. I desire the building to have a glass front, with entrance in the center, the office to be at the front on one side. What is wanted is a design for a store suitable for a small country town, but with modern improvements and plain finish. The structure is to be of wood.

A Question in Door and Window Construction.

From A. J. B., *Waterloo, Iowa.*—I would like to know, through the Correspondence columns of the paper, if it is the practice among architects of the best buildings to



A Question in Door and Window Construction.

specify that the head of a door or window be coped to receive the inside casing where the bottom member of the head consists of a fillet, as shown in the accompanying sketch, or whether the base block is coped out to fit the base or is fitted up against it. I would also like to know which would be considered the most practicable.

Is there any fixed rule for the distance from top or bottom of the door for placing the hinges or the lock? Here is a chance for the readers to express their views and start an interesting discussion.

Inside or Outside Cold Air Supply.

From C. F., *Syracuse, N. Y.*—In reply to the correspondent asking in December about cold air supply, I would say that in the opinion of some of the best heating engineers, one of the strongest recommendations for the hot air furnace system is that it cannot heat a building without sending into it, or the various apartments of it, a continual flow of air. Naturally this air must be supplied to the furnace from some point, or the flow would cease. Provision must be made for the escape of air that is already in the building, or apartments, or the inflow will soon stop, as two things cannot occupy the same place at the same time. This naturally suggests some means of ventilation. If the system is to work to the best advantage it will remove the foul air already in the room or building. When these provisions are made, if the air supply is taken from out of doors, the source of the purest available air, an ideal heating system is provided. In locations where the temperature of the air frequently goes to 20 or 30 degrees below zero, it can be readily seen that it would require considerable fuel to heat continuously the air supplied from out of doors; and, again, where a building of good size is heated throughout and is only occupied by a few persons it is not necessary to change the air so frequently. Under such circumstances economy is secured without any especially bad result from placing a large register in the floor of a hall, or of some room connecting with all the other rooms, so as to take the air from the building down through the furnace and back again into the various rooms. Naturally this air does not enter the furnace at as low a temperature as the outside air, consequently there is not so severe a tax on the fuel pile to raise the air to a desirable temperature again. Those who do furnace work in the colder districts of the country provide a cold air duct so arranged that the air supply can be taken from either out of doors or from an inside register at will; or a mixture of air can be secured by means of specially arranged dampers in the ducts, which prevent the absolute closing of either of the sources of air supply without opening the other. This arrangement prevents the destruction of the furnace from overheating. The size of the register used inside should be ample in the open work area, and the area of these various openings should be equal to the combined area of the various hot air pipes taken from the furnace. When an inside air supply is used its area should never be less at any point than that of the combined area of the hot air pipes, although the cold air supply may be reduced 20 or 25 per cent. when taken from outside without disadvantage under some conditions. An ample supply of air to the furnace and some provision for the air already in the building to escape are two essentials which when provided for tend to the successful operation of a furnace heating system. Taking all the air supply from inside the building and depending on the leakage around doors and windows for a change of air is hardly to be recommended, even though such a custom is followed in severe climates to some extent.

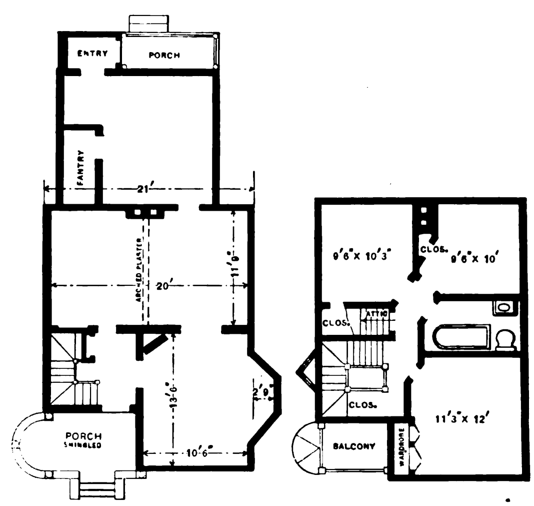
Rule for Saw Kerfing.

From J. S., *Muscotah, Kan.*—Will some reader of the paper give through the Correspondence columns the principle for finding the distance between saw kerfs? Perhaps "W. S. W.," of Washington, Iowa, whose very interesting reminiscences were published a short time ago, will favor us. I have been reading *Carpentry and Building* only a short time, but I find in it much valuable information.

Note.—The subject raised by our correspondent was discussed at considerable length in the volume of the paper for 1895, but as our correspondent states that he has been a reader for only a short time, he doubtless has no file for that year. There are various methods of accomplishing what he desires, and we therefore present the inquiry above in order that the readers may describe the particular manner in which they obtain the kerfs for circular or bent work.

Elevations Wanted for Floor Plans.

From J. W. H., *Lynbrook, L. I.*—I send herewith first and second floor plans of a house for which I desire some of the architectural friends of the paper to



Elevations Wanted for Floor Plans.

furnish attractive elevations. I have purposely omitted locating the windows so that the correspondent replying can place them according to the dictates of his best judgment. The kitchen can be changed in any way, except that I want an end kitchen porch to the left hand and cellar stairs in same, also a bulkhead cellar opening outside in order to go down into the cellar.

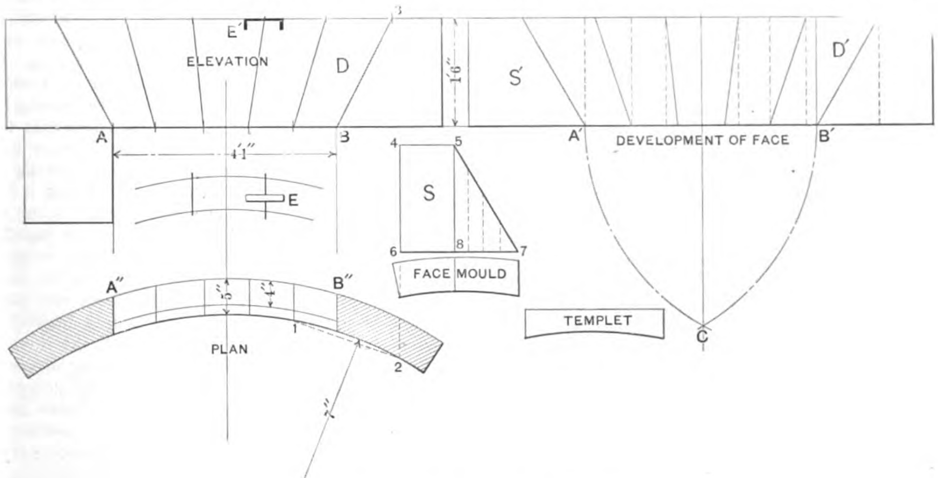
Laying Out a Lintel Arch in Stone.

From Komoroff, *Philadelphia, Pa.*—There has been no problem in stone work about which more has been written and discussed than arches circular in plan and elevation, with the several methods of producing the finished stone from the rough block. This is one of the parts of stone cutting for which the planer has not yet been utilized, but if the plan of the arch is not too much curved, so that there would be a waste of stone, a piece of material containing two or more arch stones may be run through the face and then the patterns laid on and the stone quarried. In the diagram presented herewith it can readily be seen that the planer could be used to great advantage. The key to the stones on each side could be run through, allowing enough stone for quarrying, and the same could be done with the springer and the one next to it. A careful measurement will disclose the fact that there is very little difference in the sizes, and if the stones were gotten out separately the time saved in cutting by the planer would more than compensate for the waste of stone, as time is the factor in business in these days of close competition. The result would also be a true cut face. The diagram which I present shows a lintel in pieces, with radiating joints in elevation and parallel in plan, a number similar to these having been cut out of marble from a plan and elevation which were furnished.

The first work is to find the developed face pattern. To do this lay off the plan as shown. Then transfer the length of the opening around the curve A″ B″ to a straight line, as A′ B′. Then with A′ B′ as centers and with radius equal to the distance A′ B′ strike arcs intersecting at C, which will be the center from which to draw the joints. Divide the distance A′ B′ into the same number of spaces as there are stones required, and draw through these points lines from C. Make the lintel the hight required and the springer the size as shown, which when completed gives us the developed face pattern.

To find the size of the stones, we will take, for example, the one marked D in the elevation. The developed pattern D′ will give the face size. Drop a line from 3 in the elevation to the plan and connect 1 and 2; then the widest part will give the thickness for that stone. The others are found in a similar manner.

In cutting the stones, we will take the springer S, and, having found the size of the stone required, the face being sawn, we lay on the pattern S′ and mark on the lines. Cut the top and bottom 4 5 and 6 7, after which take a face mold made from the plan and apply it on each bed. Be sure that the patterns are correctly placed, else the face will be in twist. Run the face through in drafts parallel to 5 8. In order to finish the triangle 5 7 8, we first find the point along 5 7 by placing a straight edge along 4 6 and working the draft out of twist to it, as shown by the dotted lines. Cut 5 7, straightening from point to point, or one may use a templet, as shown, and work the drafts across parallel to 6 7. It would be well to have two, so that the tops will show the face out of wind. In work like this always have plumb lines marked on the pattern for a guide. It is also well to have the work clamped, as shown at E and E′. I would say that much time could have been saved if joint molds had been furnished, as the joints could have been cut first and then applied, while the drafts could be cut all around, thus saving much trouble occasioned by the rod and templet.



Laying Out a Lintel Arch in Stone.

Some Suggestions for the Ambitious Carpenter.

From C. J. W., *Norfolk, Va.*—Will the editor kindly allow me space to ask a few questions of the rapid door hangers and shingle layers; also to make a few remarks which may turn the current of discussion into more profitable channels? For some months past there has been more or less said in the columns of the paper relative to what or how much constitutes a day's work. All answers to the question have, so far as I have noted, been descriptive of the ability of the writer or of some one else to hang or lay shingles by wholesale. Permit me to inquire, Does this constitute the carpenter's trade, speaking of it as a trade? Is this all that a carpenter is supposed to know? Does it determine a man's capabilities, considering the business as a whole? Does it show that these men are better mechanics than one who may possibly do one-third, or even less, of the feats recited, and, of more importance than all, does it tend to elevate the trade in any manner or elevate the men themselves? I take it the reverse is the case in every instance.

Far be it from me to decry any man from doing his very best—that is every man's bounden duty—but what is more desirable is that more brains should be put into the work. It may be contended that there are very little brains required to hang a door. Permit me to say that there are far more required than thousands who hang doors have stopped to realize. Men who choose to put brains as well as muscle into the execution of their work can be picked out at once by even an inexperienced eye when performing the simplest operations of the trade.

Again, in regard to "E. L." of Safford, Ariz., in the October issue of the paper, who proposes that the unions take up and settle the matter, I would ask, Would this be wise? Would it not be manifestly unjust to the workman, his employer and to the public at large? The following extract, taken from a recent issue of a Southern building paper, states the matter fully:

> From a union point of view the wage earner admits no distinction between competence and incompetence. A carpenter, a bricklayer, or a plasterer who is capable of doing more and better work than the less capable man is, according to union principles, of no more value than his inferior workman. This theory, which other labor unions seek to have admitted for practice, is a stumbling block between employing capital and wage earning labor. A

horse is a horse, but no one of ordinary sense would advance the argument that one horse is as good as another. The distinction might be carried through an infinity of comparisons. The workman of brains, ambition and a proper conception of relative values underrates himself and does himself an injustice when he tries to elevate his inferior in skill and capacity for work to his own level. . . . Unionism and its principles are all right when properly construed and practiced, but all the principles in creation cannot equalize values where no equalization exists.

An observant Englishman who visited these shores a short time ago stated that an American mechanic always worked with one eye upon his job and the other eye upon something better. This is true to a certain extent and laudable in every case, but are the workmen preparing themselves to fulfil the obligations of a better situation with credit to themselves and to their employers? Are they endeavoring to master the intricacies of the business and could they, if required, work a molding, for example, with hollows and rounds? Could they make a 16-light pair of sash by hand? Could they make an old style door with moldings worked upon the stiles and rails, coped or mitered at the angles? Possibly there are a few who take delight in doing these things; possibly others may say, "We do not have to." Do they know that there is a quiet, but forcible and pronounced evolution taking place in the carpenter's and kindred trades? Do they know that at the present time there is more hand work done in these trades than there has been for years? Are they among those who are preparing themselves for the change, or are they in the class to be relegated to the scrap pile?

I fully believe, and all indications point to it, that this country will before many years have the most artistic homes and surroundings of any place on the face of the earth. The people are being educated and are already demanding it. I do not mean artistic, as understood by the mass at present, but as understood by the best artists. Even a plain, square box may be made so that it is a joy to its owner and gives pleasure to all who see it. To accomplish this it must be made by hand. Machinery can repeat, but cannot create. It is creations that are being demanded, not the repetitions. All these—men, isms, &c.—are the educators, just the same as the chromo of a few years ago was educating the people to receive the photogravure and half-tone work of the present time. Do not understand me as for a moment holding the opinion that hand work will wholly supersede machine work, but rather that machine work will not be carried to the extreme, except perhaps for the cheapest kind.

A few words now to the young members of the trade. There have been several letters in the past few years asking that we give the young men a chance, also some asking how to read plans. From my own observation the fault lies wholly with the young men themselves. My experience, and I have gone through the whole gamut, has been that I have failed to meet the first employer or workman who refused to teach me something, or who refused to answer my questions in regard to a piece of work. The principal thing to be thought of is to use discretion, then show both your employer and his foreman that you are willing to be taught, and that you are willing to forego some of your pleasures at night to attain your end. Do not ask or expect any employer or foreman to teach you and pay you wages for the time taken in learning. There are a thousand different methods to attain your end without encroaching upon your day's work.

Again, do not make yourself an animated gas bag; do not criticise other men's work; look after your own, and whatever it is do it to the very best of your ability as regards both quality and quantity. Observe your fellow workmen, notice how they do their work, and try to improve upon it. Of course, this is to be done quietly and unobtrusively, or else you will soon render yourself obnoxious. Bear in mind that, no matter how poor a mechanic a man may be, there will always be something he can teach you.

I had been out of my apprenticeship for ten years, and at the time had charge of a large high school building, when an apprentice boy taught me how to pull a nail with a plain hammer. It was, of course, done by observing how the boy did it. I learned the trick all the same, and some time after mentioned the matter to him. In regard to reading plans there is no royal road to learning. Take any simple article and try to draw it as you see it. Take a box, for instance, try drawing it to a scale; take half or one-fourth size, 6 inches or 3 inches to the foot, then draw sections and match them, the same as a draftsman. With a little practice, and taking more difficult objects as you improve, all your troubles will vanish. Some years ago, while traveling in Canada, I came across a man who had taught himself the whole science of hand railing. He had bought himself a book and worked out everything alone, using the stove pipe to represent a well hole. I had the pleasure of giving this man his first job of hand railing, and he proved one of the most thoroughly taught men it has been my lot to meet. This man did not bewail his lot, neither was he asking to be given a chance; instead he prepared himself for it, bided his time, and when the opportunity did come, he was prepared to improve it. Some persons have a natural aptitude for learning; to others again it is very hard work. Do not, however, let that discourage you, nor allow it to prevent you from trying. The harvest that is hardest to gather is always the best garnered.

LAW IN THE BUILDING TRADE.

WHEN CONTRACTOR CANNOT RECOVER BALANCE OF CONTRACT PRICE.

A contractor cannot recover the balance of the contract price for the erection of a building, where he has failed in its performance by substituting, without the owner's consent, inferior workmanship and materials in place of those required; and, by making changes and omissions so as to effect a large saving to himself, and consequent damage to the owner, and the latter has not waived the nonperformance of the contract.—D'Amato *vs.* Gentile (N. Y.), 65 N. E. Rep., 1116.

CONSTRUCTION OF CONTRACT REGARDING SUBMISSION.

A clause in a building contract provided that "no alteration may be made in the work . . . except on a written order of the architect," did not require the parties to obtain such an order, where the change was not in the work, but of the parties doing the work.—Drumbeller *vs.* American Surety Company (Wash.), 71 Pac. Rep., 25.

WHAT ARE NOT "EXTRAS" IN EXCAVATIONS.

Specifications of a building contract provided that all foundations should go down to the natural, undisturbed earth and deeper than shown on the drawings, if necessary to reach such foundation. The foundation was dug below the point shown on the drawings, and the contractor charged for same as extra work. It was held that this was a part of the work and material covered by the contract price, and was not beyond or outside the contract price, and the contractor should have protected himself against such hardship by proper stipulation.—Wear Bros. *vs.* Schmelzer (Mo.), 92 Mo. App. Ct. Rep., 314.

LIABILITY OF ARCHITECTS FOR COMMISSIONS.

One's aid, whereby a firm of architects gets a contract for work on a building, is sufficient consideration for the agreement of such firm to pay him a part of its commission.—Lord *vs.* Murchison, 80 N. Y., S. Rep., 321.

OWNERS MUST LIVE UP TO CONTRACTS.

Where one agrees to do the roofing of a building and he is to receive in payment a second mortgage on a house, subject to nothing except a first mortgage, and there is a mechanic's lien on such house, he is entitled to recover the contract price, and is not obliged to accept such second mortgage.—18 Pa. Supr. Ct., Rep. 456.

WHEN OWNER MAY RETAIN FOR LIEN OF SUBCONTRACTOR.

A building contract stipulated that if at any time there was evidence of any lien, &c., chargeable to the contractor, the owner could retain sufficient to indemnify him against the same, and the Court held that, when the contractor sued the owner, the latter was entitled to a credit for the amount of the subcontractor's judgment enforcing a lien on the property.—Wear Bros. *vs.* Schmelzer, 92 Mo., App. Rep., 315.

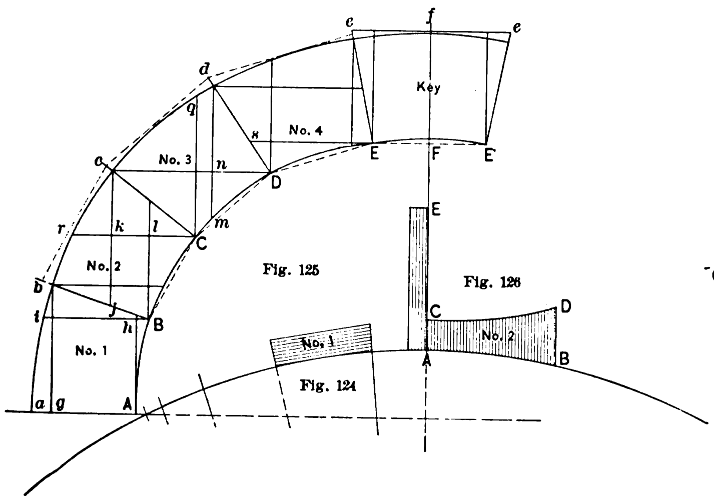
LAYING OUT CIRCULAR ARCHES IN CIRCULAR WALLS.*—XIV.

By Chas. H. Fox.

ATTENTION will now be given to the formation of the stones in a radiant arch, the outer face surface of which may be "rubbed" or tooled. Referring to the diagrams, Fig. 125 shows the outer face molds. The required size of the several stones for the face in question is indicated by A *a* *b* B, B *b* *c* C, &c., of the diagrams. The required size of the stones through the wall may be ascertained in the manner explained for a similar operation already described. In A B of Fig. 124 is shown the outer face curve of the wall, while the construction of template No. 1 will be apparent from an examination of the drawing. The construction of template No. 2 may be described as follows: In Fig. 127 draw the right line 0 0', then with each point successively as centers and with the radius with which the outer wall curve of the plan may be drawn describe arcs, as A B and D C. Set off A E of any desired length and complete the template, as shown. We may assume as having already been constructed the templates described in the October issue (Figs. 80 to 91) as required to give the direction in which to form the drafts at the oblique lines B C, C D, &c., of Fig. 125, together with the joint patterns of Figs. 93 to 98. This tour, &c., of the face mold, noting at all times that the plumb line of the mold is placed over that marked on the stone.

We next cut the bottom joint. This surface is made perfectly square with that of the face, in the manner a similar surface may be formed in a piece of circular ashlar. Having cut the joint, mark upon the surface the joint mold, noticing that the point A of the mold is applied exactly to the point given in A with the face pattern. This rule must be observed at each joint surface, and is one to which the cutter must pay especial attention. Now to obtain the cutting lines of the top joint surface.

The face mold gives in B *b* the direction of that required at the face, but another is also required at the soffit surface. This may easily be obtained, as follows: Take No. 2 template and apply it, as shown in Fig. 130, to the level line B *i* of the face mold, and at the point given at B cut a draft to the radiating edge of No. 2. This done, take the square and apply it in the manner shown in Fig. 131 to the vertical A *h*; then place the straight edge to the point at B, and in this manner "twist



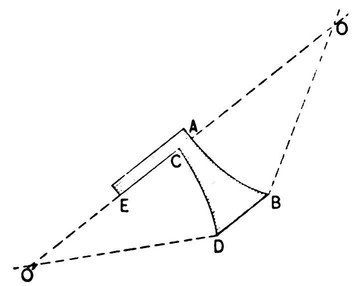


Fig. 127.—Constructing Template No. 2.

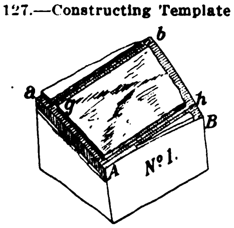


Fig. 128.—Forming Stone No. 1, or the Springer.

Fig. 124.—The Outer Face Curve of the Wall, Showing Template No. 1.
Fig. 125.—The Outer Face Molds.
Fig. 126.—Template No. 2.

Laying Out Circular Arches in Circular Walls.

done, cut "reverses" of the convex curve of each joint pattern, and number them in such a way as to prevent any mistakes arising in their application to the joint lines of the stones.

Now to form stone No. 1, or the springer, we proceed as follows: Mark upon the outer face of the stone the contour of face mold No. 1, then rough down the sides of the stone to the direction thus obtained, after which cut a draft at the joint line A *a* to the direction of template No. 1. The next step is to cut a straight draft, as shown in Fig. 128, to the direction given, with the plumb lines A *h* and *g* *b* of the face pattern. Mark upon the drafts when finished the hard lines, noting that the lines correspond to the position of the corresponding verticals of the mold. We have now obtained in *b* *h* points at which to apply the reverse of the joint mold of No. 2 joint surface. To this direction form the curve draft, as shown.

The face may now be readily cleaned by applying the straight edge in a position parallel with that of the verticals of the stone, or the face may be formed by making use of the No. 1 templates in the manner indicated in Fig. 119, and explained in the diagrams of the previous issue. Of course, care must be exercised not to cut the drafts below the surface of the first cut at the vertical line *g* *b*. Having formed the face, mark upon it the con-

through at the draft" the cutting line required, Fig. 131 showing clearly what is meant. Having obtained the cutting line at the soffit, the surface of the joint may readily be worked. The stone may now be completed in the manner explained for the similar operations in the cutting of the stones of the preceding plate, after which the joint surfaces may be cut.

Now banker up stone No. 2. Mark on the face mold, and transfer correctly to the stone the direction as given by the plumb and level lines, together with that of the oblique lines *b* *r* *c* and B C. Now cut a draft at *b* *r* *c*, to conform to the curvature of the template developed for that purpose. Then, as shown in Fig. 132, cut a draft at the level line *r* C, making use of No. 1 template to obtain the proper direction. Cut a draft at *c* C to the reverse of No. 3 joint mold. Now place a winding block at *c*, and another at *k*, and at the point *j* cut a sinking in such a manner that when a winding block be placed in the sinking made it will conform to the under surface of a straight edge which may be placed upon the three winding blocks at one time. This brings the surfaces in *c* *k* *j*, respectively, into one plane.

Now cut a sinking at B, "out of wind" to that just made at *j*. Of course, by placing winding blocks at *j* *k* *l* B the condition required may readily be obtained. Referring to Fig. 132, the student will clearly see what is meant. Now cut a draft at the joint line B *b* to the direction given with the reverse of No. 2 joint mold; then cut the draft at B *c* to the direction as given with the template of *b r c*. This completes a draft around the stone. Cut the face, applying the straight edge as before in a direction parallel with the vertical *j c*. Now mark on the face the face mold. Then in the manner described above for a similar operation cut the top joint surface, and on it mark the joint mold No. 3.

Now to cut the lower joint surface proceed as follows: First apply the square to the vertical B *l*, and cut a draft through the soffit at the point B; this cut, take No. 2 and apply it in the manner shown in Fig. 133 to the level line *r* C, so that the radiating line A E is exactly over the point *l*. In this position, placing a straight edge to the draft just cut, a line may readily be "twisted" through the soffit, which will give together with the joint line the proper direction at which to form the surface of the joint. Cut the joint, and then mark on the joint molds, and complete the stone as before directed in connection with stone No. 1.

For stone No. 3 first cut the draft at the oblique line *c d;* then with No. 1 cut a draft at the level line *c* D. Now place winding blocks at *d* and *n* and cut a sinking in *m*, in the manner described above for the similar operation in No. 2 stone. Cut the draft at C D, and another at the joint line C *c*, which, as shown in Fig. 134, gives a draft around the stone, and which may then be completed in the manner described for the cutting of Nos. 1 and 2 after the similar work had been done.

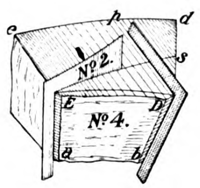


Fig. 129.

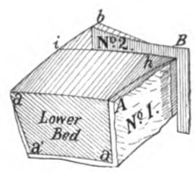


Fig. 130.

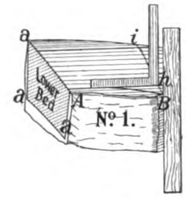


Fig. 131.

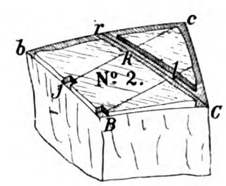


Fig. 132.

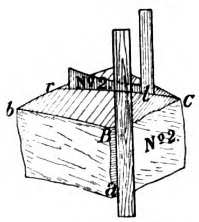


Fig. 133.

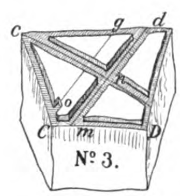
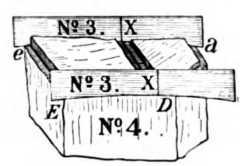


Fig. 134.



No. 135.

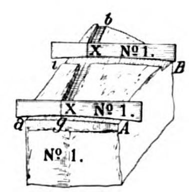


Fig. 136.

Figs. 129 to 136 inclusive.—Cutting the Various Stones for a Radiant Arch.

Laying Out Circular Arches in Circular Walls.

In Fig. 135 is shown the manner in which the face of No. 4 may be cut, making use of the No. 3 templates, constructed by the method of Figs. 80 and 84. These are applied as shown, the line as that of X of the templates exactly to the plumb line D *p*, take the top of templates out of wind, which gives in one operation the direction at which to cut the circular drafts at the oblique line *d e* and D E. In Fig. 129 is shown the manner of applying the square, together with that of the No. 2 template, as required to give the direction for forming the joint surfaces. The diagram is self explanatory.

There are many methods by which the keystone may be formed, but we think the better one will be to first cut the face as for a piece of circular ashlar; then form the beds as above directed for the similar operation at No. 4, shown in Fig. 129. From these explanations we think the cutter will be able to readily form the several stones.

An interesting incident in connection with the construction of the subway in New York City occurred in connection with the building which stood on the northeast corner of Forty-second street and Broadway, occupied on the ground floor by a drug store and haberdashery and on the second floor by billiard parlors. The course of the subway is such as to pass under the foundations of this building, and owing to their character they could not be dug under with security. It was thus necessary to take down the building, but the agent of the property insisted that if the structure was torn down it should be replaced in as good condition as before. The subway contractor, therefore, in taking down the building, numbered the various parts, stored the materials pending the completion of the tunnel at that point, and is now putting them together again, using, so far as possible, the very same pieces. Some, however, were too much worn to pass muster and new ones were necessary. The contractor would have been glad to have even used the old cut nails to satisfy the demands of the agent, but this was out of the question, and he had to resort to the more modern articles.

The Baltimore Builders' Exchange as a Central Body.

A letter has just been sent to the members of the Baltimore Builders' Exchange by Secretary John M. Hering, announcing a general meeting, to be held Tuesday, January 26, to consider the amendments presented at the special meeting held December 23, 1903. The idea of making the Builders' Exchange a central body for all Employers' Associations of Building Trades and for individuals where there is no association, has had the attention of the Board of Directors for some months, the need of such an organization being more apparent every day. The letter refers to the experience of the building trades in other cities as furnishing ample proof of the efficacy of this method to promote and protect the best interests of its members amid the conditions as they exist to-day. The proposed amendments are designed to make of the Exchange such a central body as that referred to, yet preserving all the privileges and advantages of the Exchange heretofore enjoyed.

The letter of Mr. Hering also enclosed a copy of the resolutions adopted by the National Building Trades Employers' Association at Chicago, in December last, relating to the "open shop." It is suggested that the amendments be carefully studied by the membership, and if favorably impressed with this attempt to broaden the scope of usefulness of the exchange, to make every effort to interest contractors engaged in every kind of building work, and urge them to organize and become affiliated with the Baltimore Exchange upon its new plan.

WHAT BUILDERS ARE DOING.

WHILE the season is not as yet sufficiently advanced for the builders to definitely determine what the outlook for spring business will be, the opinion prevails that Akron, Ohio, will see a reasonably active season. The city is not threatened with any labor trouble, and as there has been a reduction in the cost of material, prospective builders are encouraged by the general conditions which prevail, and that the amount of business the coming season is likely to be in excess of that of the corresponding period of 1903.

At the annual meeting of the Builders' Exchange, held at their headquarters in the Hamilton Building on December 22, there was a large attendance, and the reports of the officers, which were well received, showed the affairs of the organization to be in a splendid condition. At this meeting the directors for the ensuing year were elected, as follows: John Crisp, F. C. Kasch, W. A. McClellan, O. L. McMillen and J. E. Peterson. It was decided to hold the annual banquet of the exchange on the evening of Thursday, January 21, and arrangements are now being made to render it an occasion of special importance to the building trades in the city and vicinity.

The directors held a meeting on December 26 and organized by electing the following officers: F. C. Kasch, president; John Crisp, vice-president; M. A. McClellan, treasurer, and F. J. Wettach, secretary. The appointment of the regular committee to take charge of the work of the exchange is to be anounced by President Kasch at the next regular meeting.

Boston, Mass.

There is a fair amount of building in progress in Boston and the suburbs, the major portion of the capital invested, however, being in business structures rather than in dwellings, although of the later there are a number in progress. The feeling as regards the coming season seems to point to considerable activity, provided the labor situation is such as not to seriously interfere with the projects which are now under way.

Building Commissioner James Mulcahy, who was appointed by Mayor Collins some months ago to succeed Charles S. Damrell, has rearranged the offices of the department to some extent and also the method of doing business. Under former commissioners the applications for permits for building improvements were filled out and referred to the local inspectors, who would visit the lot or premises and indorse on the back of the application that the permit should or should not be issued. This gave the inspectors authority which in the opinion of the present commissioner belongs only to the head of the department. The method has been entirely changed and a Department of Plans organized, the duties of the staff connected with which, under the personal supervision of the commissioner, are to pass upon all applications and plans submitted, and when they are found to be in accordance with the building laws and ordinances, a permit is issued and a duplicate copy of the application and plans is given to the inspectors, whose duty it is to see that the plan and application filed and approved are faithfully and intelligently carried out.

Brooklyn, N. Y.

According to the report of Superintendent William M. Calder the year 1903 was the most satisfactory that the Brooklyn building trade has experienced for many years. The figures indicate a large increase in the building operations as compared with the year before, the aggregate value of the improvements for 1903 being placed at $26,629,220, as against $21,730,073 the year previous. The nearest approach to the volume of operations last year was in 1899, when the improvements were valued at nearly $25,500,000. Builders have operated very successfully under the new tenement house laws, which were passed April 14 last, the figures showing that from that date up to the end of the year there were 545 tenement houses erected, costing $4,491,800, while from April 10, 1902, to April 14, 1903, there were 251 tenement houses erected, costing $2,437,400, and from April 10, 1901, to April 10, 1902, there were only 83 tenement houses erected, costing a trifle over $807,000. In his report Superintendent Calder states that especial attention is given to plumbing rules and regulations and to unsafe building violations. He regards the outlook for 1904 as excellent, owing to the many improvements, either already effected or proposed, which will undoubtedly cause an increase in operations.

Buffalo, N. Y.

The building situation in and about Buffalo continues most satisfactory, there being a reasonable amount of work in progress through the winter months. According to the figures issued by Deputy Building Commissioner Henry Rumrill, Jr., there were 2011 permits issued in 1903 for building improvements estimated to cost $6,263,402, as against 2109 permits for improvements costing $5,433,078 in 1902.

A striking feature is the number of permits issued for the erection of two-story frame dwellings, the total being far beyond the records of previous years. A large percentage of these buildings will be put up in South Buffalo in the region of the Lackawanna steel plant and the West Shore Railroad yards at West Seneca. While there are no buildings at present in course of erection or planned the individual value of which exceeds $400,000, there are a number which will cost in excess of $50,000 each. The largest structure now in progress is the one being put up for the William Hengerer Company on the site of the old Tifft house in Main street, this being a six-story fire proof building, estimated to cost $367,000. The next largest is that of the Keystone Warehouse Company, a six-story structure to cost $350,000. The Buffalo Milk Company are putting up a three-story milk depot, to cost $100,000, and the congregation of the Evangelical Lutheran Church of the Holy Trinity are putting up a fine stone edifice in Main street at a cost of about $80,000. There is a good demand for new houses, and quite a few, both brick and frame ones, are being put up. The prices of building materials have changed but little, and the labor situation continues peaceful. Some contracts with the labor unions continue in force for the coming year, but the general building situation here, while healthy, does not warrant a further advance in the workmen's wage scale, and the hope is expressed that the workmen are too appreciative of this condition to demand it.

Chicago, Ill.

The figures which are available show that while building operations in the city have been upon a rather liberal scale during the past year, they are not up to the record of the year before, at least so far as regards the value of the improvements projected. The number of buildings, however, for which permits were issued was in excess of any year since 1896, thus showing what has been noted in connection with building operations in New York City—a tendency toward a cheaper class of structure. During December of the year just closed the Building Department of the city issued permits for 345 buildings, having a frontage of 10,738 feet and estimated to cost $1,969,000, as compared with permits for 301 buildings in December, 1902, having a frontage of 10,194 feet and costing $2,457,100.

According to the figures for the 12 months of last year permits were taken out for 6135 buildings, having a frontage of 174,930 feet and involving an estimated outlay of $33,645,975. In 1902 permits were taken out for 6074 buildings, having a frontage of 186,609 feet and costing $48,070,390. In order to equal the record of 1902 it is necessary to go back just ten years, to 1892, when building operations in the city were at their maximum. The feeling as to the coming season in the building line is of a hopeful nature and some are of the belief that the volume of operations will be fully equal, if not in excess of, the year which has just passed.

Holabird & Roche, architects, have let to Wells Brothers Company the general contracts for two large steel buildings on State street, the first known as the Adams Building, to be erected with a view to its occupancy by many small retailers of dry goods and kindred lines. It occupies a space 100 x 145 feet and will be 14 stories high, so constructed that three more stories can be added at will. The contract amounts to about $800,000, while the total cost of the building ready for occupancy will be about $1,000,000. The building will require 2500 tons of structural steel, contract for which has not yet been placed. Active building operations will begin March 1. The second large building is the Chicago Savings Bank Building, to be known as the Madison Building, at the southwest corner of Madison and State streets, which will cost about $750,000 when completed, Wells Brothers' contract being for approximately $600,000. The lower floor of this building will be occupied by a bank and upper floors will be fitted up as offices and salesrooms. It will require 1550 tons of steel, contract for which is not placed. Active building operations will begin May 1. Subcontracts for both buildings are now open for bids. The same contractors have secured the contract for erecting the Chalfonte Hotel, at Atlantic City, N. J., to be erected after plans of Addison Hutton, a Philadelphia architect. The steel contract for this building, aggregating 800 tons of structural shapes, has been placed with the American Bridge Company.

Cincinnati, Ohio.

Notwithstanding the strikes and labor troubles during the past year, the building business in Cincinnati and vicinity was of a most gratifying nature, and by many regarded as more satisfactory than for many years. The labor question has, without doubt, been a most serious hindrance to still further advancement along the lines of building improvement, and has caused quite a number of good sized operations to be held in abeyance. The electrical workers are demanding an advance in wages, but nothing definite has as yet been given out as to the probable basis of settlement. The plumbers' strike, which has been quite a hindrance, is still in progress, but at the present writing it looks as if it might be settled at an early date. The master plumbers are offering $4 per day of nine hours, when the regular price is said to be 35 cents an hour for the same time, but the plumbers, while not disposed to cavil over the matter of wages, have taken up the cudgel in behalf of what is known as the "open shop"—that is, to work where and when they please.

According to the figures of the Building Department, the total number of permits issued during 1903 was 2502, calling for an estimated outlay of $4,502,255. In the year before the number of permits issued was 2571, covering improvements aggregating a valuation of $4,669,585.

The outlook for 1904 is regarded as very good, as there are a number of important building projects contemplated, and which, it is thought, if the labor question does not interfere, will be carried to completion. The improvement which has been noted in the last 30 days was much more encouraging than during the two months previous. Among some of the large operations in the city may be mentioned improvements which are being carried out by the Baltimore & Ohio Railroad Company, of which not more than one-third was completed last year; and a hotel to cost $1,500,000.

Cleveland, Ohio.

The building outlook in Cleveland is not as bright as at the same period a year ago. Local contractors do not expect a boom year, but are hopeful that later in the winter enough new work will come out to cause the year to be an average one in the volume of business. Last year there were 3226 permits issued for building improvements, estimated to cost $6,250,991, while in 1902 there were 3172 permits issued for buildings costing $6,559,545. Looking over the figures for the past year it is seen that March was the banner month as regards the number of permits issued, while in respect to importance June took the lead. In order to insure greater harmony in the building trades, there has been organized an Executive Board of the building trade employers, comprising delegate representatives to a central body, whose aim and object will be to reduce to a minimum the disturbances in the building industry. The president of the association is E. H. Towson, who for several years was president of the Builders' Exchange. The vice-president is John Leese, a prominent plumbing contractor, and the treasurer is L. Dautel, a mason contractor, with W. B. McAllister, a carpenter contractor, as secretary. The movement has the backing of the Builders' Exchange, and already the indications are that it will wield a very helpful influence the ensuing year.

The Builders' Exchange of Cleveland held a unique Christmas celebration on the evening of December 23, when upward of 300 of the members assembled at headquarters in the Chamber of Commerce Building and deposited presents for each other in a huge stocking suspended from the ceiling. When all had arrived, adjournment was taken to the top floor of the building, where four Kris Kringles were in waiting to receive the members and distribute the gifts. The hall was decorated with holly and evergreens, and an old fashioned fire place added to the attractiveness of the scene. Among the gifts were many amusing hits upon the members, toys of every description being found in the stocking. Following this feature a "Builder-ine-ograph" was introduced in the form of an electric stereopticon, which was used in displaying cartoons of prominent members, drawn by a local artist, illustrating their foibles. This was accompanied by a humorous lecture. Music by the Builders' Exchange quartette and by soloists, together with a number of witty speeches and refreshments in harmony with the season, provided other entertainment.

Columbus, Ohio.

The members of the Builders' and Traders' Exchange of Columbus, Ohio, held their annual meeting on Monday, January 4, when the rooms were thrown open from 11 a.m. until 8 oclock in the evening. At a meeting on December 16 the Nominating Committee for new officers appointed by President Edgar reported a ticket for 1904, and on January 4 the votes were cast for the various candidates, resulting as follows:

President ....J. W. Heckart.
First vice-president ....Walter Collins.
Second vice-president ....Walker Smith.

BOARD OF DIRECTORS:

J. J. Marvin, Humphrey Jones,
Lewis Fink, R. A. Edgar,
B. S. Stevenson.

Building operations during the past year have been of a rather gratifying character, and Building Inspector Weadon states that the increase in the value of the improvements over the previous year will be in the neighborhood of $1,000,000, the grand total being about $4,000,000.

Davenport, Iowa.

There has been an unusual degree of activity in the building line in Davenport, Iowa, during the past year, and contractors and builders are of the opinion that 1904 will witness a most gratifying degree of prosperity in that particular section. Operations have not been confined to any one portion of the city, but have been scattered so as to show improvements in every quarter. Throughout the entire county there has been a noticeable improvement, and dealers in building materials say that the volume of their business has exceeded that of a year ago in many respects. Large barns, which have come into vogue in the past few years, have been erected to a considerable extent, and this has been quite an item in the volume of the building business. City work has been confined in large measure to the erection of small houses for renting purposes, there having been a scarcity of this class of building. The demand for rentable houses is accounted for only by reason of the added industries which have come to the city in the last few years and the increase in activity which the older manufacturing plants have encountered in the same time.

Detroit, Mich.

The building situation is rather quiet at the present time, and there is nothing in sight to indicate any undue activity until the spring season is fully opened. The amount of work done during the yast year makes a very gratifying comparison with 1902, the increased valuation of the improvements aggregating very nearly $1,000,000. According to Permit Clerk C. W. Brand, there were issued last year 3383 permits for building improvements, costing $6,912,600, while in 1902 there were 3038 permits issued for building improvements costing $6,052,400.

Fall River, Mass.

The annual meeting and banquet of the Builders' Association was held on the evening of January 6, and was a most successful affair. The following officers were elected: President, Joseph Dickinson; vice-president, Robert Nicholson; secretary, John Dinnie, and treasurer, A. K. Hunter. The Board of Directors consists of A. H. Leeming, Robert Nicholson, F. L. Allen, C. H. Sears, Joseph Morin, H. N. Cash, A. P. Gorman and C. E. Earle.

The Auditing Committee is made up of Messrs. Grant, Francis and Allen, and the Social Committee of Messrs. Leeming, Nicholson and Daley.

The banquet was a fine affair, and during the evening a handsome gold mounted unbrella was presented to President Dickinson, in recognition of his services to the association, Chauncey H. Sears making the presentation speech. President Dickinson made a suitable reply and expressed the hope that none of the members would try to borrow the umbrella, for reasons which were left to conjectures.

Los Angeles, Cal.

The total number of building permits issued during 1903 was 6395, calling for an expenditure of $13,046,338, as aagainst 4863 permits, salling for an expenditure of $9,603,132, in 1902. In 1901 there were 2730 permits issued, calling for an expenditure of $4,099,198, and 1852 permits, calling for an expenditure of $2,489,006, in 1900. The number of permits and the aggregates of the improvements authorized for the years just prior to 1900 were about the same as those for that year. The expenditures authorized during 1903 were greater than those authorized in any previous year, but the gain was not, however, so great as that of 1902 over 1901, and the probabilities are that the expenditure for building during 1904 will show a still smaller percentage of gain over the year just closed.

The record for the month of December, 1903, shows a total of 535 building permits, authorizing an expenditure of $1,010,814, as compared with 488 permits, authorizing an expenditure of $1,139,922, for December, 1902, showing an increase for the month in the number of permits, but a decrease of something more than 11 per cent. in the valuation.

Neither builders nor architects see any cause for alarm in the slight reaction revealed by the December record. The holidays have always exercised a reactionary influence over building operations in this city, and this year the talk of a lumber war has added to the usual quietness.

Oakland, Cal.

The lack of any adequate system of building permits in this city renders it necessary to rely upon the records kept by the Sanitary and Plumbing Inspector in making a comparative statement as to building operations. According to statistics compiled by the Sanitary Inspector, 750 permits for new buildings and for additions to old buildings were taken out during the year, as compared with 597 permits taken out during 1902. The estimated value of the work undertaken during 1903 was $2,500,000, while the estimated value of the work undertaken during 1902 was placed at about two-thirds of this amount. The construction work of the last year was remarkable for the large increase in residence building, being almost double the amount undertaken during the previous year. The building of flats, however, showed a falling off from 167 in 1902 to 135 in 1903. The construction of business buildings was about equal for the two years, as regards the number of permits, though the value of business buildings undertaken during 1903 was much larger than the value of similar work in 1902. Oakland builders claim that the outlook for the coming year, owing to cheaper materials and to the improved condition of the labor market, is fully as good as it was at the beginning of 1903.

Philadelphia, Pa.

The amount of building which was projected during the year which has just closed was in excess of that of any previous year since the building department was established. There were 7469 permits issued, covering 12,000 operations, the estimated cost of which was placed at $32,509,595, as compared with 7628 permits, covering 11,369 operations and costing $28,703,195, in the 12 months of 1902. The nearest approach to the past year's figures was in 1901, when there were 8713 permits issued, covering 12,840 operations and costing $29,519,710. The greatest growth of the city has been in the Eighth, Ninth, Twenty-second, Twenty-seventh, Thirty-third and Thirty-fourth wards. The estimated cost of the building improvements was the greatest in the Ninth Ward, the work projected being estimated to cost $6,174,820, but this includes the permit issued for Wanamaker's new store, to cost in the neighborhood of $5,000,000. The total amount spent in 1903 for brick dwellings was $11,232,605. In this was included 4415 two-story houses, costing a trifle over $8,000,000, also 666 three-story houses, costing $2,784,000, and 39 four-story houses, costing $405,000. Operative builders appear to be devoting more and more attention every year to the erection of comfortable two-story houses for persons of moderate means, these buildings containing from six to nine rooms, and costing anywhere from $2000 up to $3500 and $4000. According to the figures of the Bureau of Building Inspection, there were 30,668 two-story brick houses built in the city from 1896 to 1903, inclusive, and at a cost of a trifle over $50,000,000. There were erected during the same period 3905 three-story houses and 39 four-story houses, all of brick. The growth of the city's industries in the same period is indicated by the erection of 588 new factories, at a cost of $10,293,500. It was also necessary to erect 83 new school buildings at a cost of $5,661,000.

The presidents of the various organizations of employers in the building trades in Philadelphia, at a meeting on December 16 with the Advisory Board of the Master Builders' Exchange, passed resolutions which, in a measure, modified the enforcement of the decision to employ no workmen who will not agree to refrain from sympathetic strikes after January 1, 1904. The resolutions, which were adopted unanimously, "recommend that all existing agreements remain in force until they expire, and that no new agreements be entered into that will admit of the sympathetic strike, or that will not secure arbitration of all differences between employer and employee, work to continue meanwhile." It is also recommended that whenever existing agreements do not forbid, the resolution sent out December 7, 1903, to employ no workmen who will not agree to refrain from sympathetic strikes and to submit all differences with employers to arbitration, &c., shall be strictly adhered to.

The organizations represented at the meeting in question were the Electrical Contractors, the Bricklayers' Company, the Granite and Stone Cutters' Association, the Steam Fitters' Association, the Tin and Sheet Iron Workers' Association, the Pipe Coverers' Association, the Master Plasterers' Company, the Mason Builders' Company, the Frankford Carpenters' Association, the Germantown Carpenters' Association, the Master Carpenters' Company of Philadelphia, the Mill and Woodworkers' Association, the Sheet Metal Workers' Association and the Master Plumbers' Association.

The members of the Master Builders' Exchange held the annual celebration on December 31 at their rooms in South Seventh street. There was an impromptu stage at one end of the rooms, on which a number of vaudeville acts were rendered, and previous to the entertainment a luncheon was served to the members and their guests. After a most enjoyable evening the celebration was concluded with an address by John Atkinson, chairman of the Advisory Board, in which he appearel to the builders to stand together in their fight against sympathetic strikes.

Pittsburgh, Pa.

In common with some of the other leading cities of the country Pittsburgh's building operations for the past year show a slight falling off as compared with the previous 12 months. The figures of the Bureau of Building Inspection show that during the year just passed there were 3164 permits issued for building improvements estimated to cost $16,962,690, while in the year previous there were 3949 permits issued for building improvements involving an outlay of $17,218,550. The figures for December last indicate a decided contraction of operations as compared with previous months and also with the corresponding month of 1902. The value of the building improvements projected in December last was $334,666, which compare with $801,237 in November, $845,246 in October and $1,044,190 in September. In December, 1902, the value of the improvements are placed at $697,724, which figures compare with $1,152,449 for November of the same year, $1,379,694 for October and $2,030,679 for September.

The outlook for the coming season depends in a large measure upon the final adjustment of existing labor difficulties. As is well known, the plumbers in the city have been out on strike since October 1, but are gradually returning to work. Other craftsmen, such as tinners and roofers, painters, &c., have been out on a sympathetic strike, but these labor troubles are being gradually adjusted. Prices of building materials are being reduced all along the line. While union labor is still insisting upon an increase in wages, it is stated that in no case is labor willing to be reduced in proportion to the lower costs of building material. At the same time many workmen in the various branches of the building trades are becoming uneasy and are deserting the Building Trades Council. At the present writing it looks as though the labor troubles in the Pittsburgh district would be cleared up by April 1.

In a general way it may be stated that the outlook for the building trades in Pittsburgh this year is exceptionally good, provided, of course, present labor troubles are adjusted, and this now seems certain. A number of large structures will probably be started this year, including a mammoth hotel on the cathedral site, Fifth avenue, and bought by H. C. Frick. The cathedral is now being torn down. A theater is to be erected on Sixth street and another on Ninth street. The Polytechnic Institute, being built by Andrew Carnegie, will employ hundreds of men, will cost at least $5,000,000 and will probably take several years to complete it.

Portland, Oregon.

The number of building permits issued in Portland during 1903 was 1611, calling for an expenditure of $3,552,795, as compared with 1260 permits calling for an expenditure of $2,750,185 in 1902, and 445 permits calling for an expenditure of $1,629,143 in 1901. City Engineer Elliott estimates that from one-fourth to one-third should be added to the total valuation on account of the underestimating of work due to a desire on the part of builders to escape the fees charged. During the month of December the number of permits issued was 91, calling for an expenditure of $131,644, as compared with 105 permits calling for an expenditure of $155,390 during the month preceding. The building operations undertaken during December show a continuance of the decline which began several months ago and were but little more than one-third of the monthly average for the year.

Builders state that much has been done during 1903 toward the building up of the city in a modern way. During the year 12 buildings, costing upward of $20,000 each, were completed at a total cost of $724,000. Five large buildings, to cost in the aggregate $560,000, are now under way. Arrangements are now under way to place construction on a more modern basis. Before many weeks a Building Inspector, with authority to force contractors to live up to modern building laws, will be in power. Plans are under way to remove fire traps and dangerous structures and to improve sanitary conditions.

Reading, Pa.

The amount of new building which was undertaken in the city last year bears a very close parallel in the value of the improvements to those of the year before. According to the figures of Building Inspector Harry A. Heckman, the number of permits issued for building improvements last year was 534, calling for an estimated outlay of $1,087,300, while for 1902 the value of the improvements amounted to $1,072,600.

The outlook for the coming spring is regarded as much more encouraging than it was at the corresponding period the year before. There will be a new business high school erected in the early spring, to cost, with the ground, something over $300,000. It is likely that there will also be a nine-story fire proof hotel erected, and there is some talk that the Philadelphia & Reading Railway Company will erect additional shops on the plot recently acquired on North Sixth street. So far as the attitude of labor is concerned, the opinion prevails that conditions have practically reached a normal state with a possibility of easy sailing for the coming summer.

San Francisco, Cal.

The Bureau of Buildings has compiled figures showing that during the year 1903 permits were issued to the value of $15,254,762, while during 1902 the permits issued aggregated in value $12,173,049, showing a gain of $3,081,713 for the year just closed. During 1903 there was expended in alterations and improvements to old buildings $2,900,483, and during 1902 the amount was $1,124,707.

Building prospects at the opening of the new year are better in some respects than they have been for three months. From inquiries made in the offices of a large number of architects, it would seem that there will be less speculative construction during the present year than during some recent years, and there will likewise be fewer flats put up. On the other hand, orders have been given for the preparation of plans for many substantial downtown business buildings which are required for immediate use. This class of work will go ahead in the spring, and with labor less difficult to obtain than last year construction promises to proceed with less delay. Persons contemplating the erection of frame buildings are doubtless held back, to a certain extent, by the war in the lumber trade. The reduction in the price of lumber has already benefited this class of builders greatly, but builders seem to believe that by holding off even more satisfactory rates for lumber can be obtained.

During the last week in December contracts were let by Isaac Liebes to the amount of $65,233 for the construction of a nine-story and basement fire proof building on the southeast corner of Turk and Jones street, and by Mrs. Golda Alexander, to the amount of $225,000, for the erection of an 11-story fire proof, brick and stone hotel on Geary street.

Salt Lake City, Utah.

The annual report of Building Inspector Ulman shows that building permits were issued during 1903 to the total value of $1,557,294, which is somewhat below the record for 1902, but the amount of actual building done was, however, considerably greater than during 1902. Architects and builders estimate that upward of $1,500,000 was expended during 1903 on buildings for which the permits were taken out during 1902. Several of the larger buildings, which were begin in 1902, are still to be finished. These include the Federal Building and the Catholic Cathedral. There was, during a portion of the year, a slight depression in building operations, owing to strikes and labor difficulties and to the advanced price of building materials, and in some cases to an actual shortage in the latter. The increase in prices has not been so noticeable in brick and steel as in lumber, which increased during the year about $2 per 1000 feet.

The prospects for building in 1904 are considered favorable. The fact that the Short Line and the Rio Grande railroads alone contemplate expending an aggregate of $2,000,000, is bound to have a stimulating effect. Builders believe that if strikes and panics can be avoided the volume of building for the present year will exceed any previous record.

Seattle, Wash.

The total number of permits issued by the Building Inspector during 1903 was 6914, calling for an expenditure of $6,495,731. This is a gain over 1902 of $163,591 in valuation. This gain is not large, but in view of the fact that 1902 was a phenomenal one in building operations here, the showing for 1903 is considered extremely good. Building operations in Seattle were conducted during 1903 on more substantial lines than at any previous time in the history of the city. A number of modern business buildings were erected and an unusually large number of flats, apartment houses and dwellings were constructed. For business blocks and club buildings alone more than $1,000,000 was actually spent during the year. Labor troubles during the year were on the whole slight, and building operations were not seriously disturbed.

According to builders the new year starts off with bright prospects. Work on the excavation of the Public Building has been started, ground will soon be broken for the new Library Building and a start on the $600,000 Alaska Building will be made this month.

Spokane, Wash.

During the year just closed 1495 permits, having a total valuation of $2,510,945, were issued, in comparison with 1102 permits, with a valuation of $1,321,714, during 1902. The records show that not only has the past year exceeded previous ones, both in the number of permits issued and in valuation, but that the permits issued during the last year show an average cost of $1663 each, in comparison with an average cost of $1200 each in 1902. Without counting dwellings, tenement houses, flats and small blocks, there are now proposed for the coming year building permits and Government buildings to be started, representing a total outlay of $1,500,000. None of the buildings included in this total are to cost less than $20,000 each.

St. Louis, Mo.

In many respects the year which has just closed has been a remarkable one in the building and real estate lines in the city of St. Louis. The transfers of real estate have been upon a large scale, and property in many districts has steadily advanced in price. In the outlying sections, however, the opposite tendency has prevailed and offerings have been made at very low figures. A large amount of building in the way of new hotels has been carried on, and in addition to the structures already completed, or in the course of erection, including the Jefferson, Washington, Hamilton, Buckingham, Lorraine and others, innumerable temporary buildings, forming a chain and network about the Exposition grounds, will provide facilities for the hundreds of thousands of guests. While building operations of the past year have been good, they are generally regarded to be somewhat below the demand for living apartments.

According to the figures of Building Commissioner G. U. Heimburger there were issued in December 317 permits for buildings estimated to cost $1,263,184, as against 282 permits for improvements costing $1,062,488 in December of 1902. Taking the total figures for 1903, it is found that there were 4802 permits issued for buildings of an estimated valuation of $14,544,430, as against 4502 permits for buildings costing $12,854,035.50 for the 12 months of 1902. The opinion seems to prevail in building circles that if the cost of materials and labor should assume a decided downward tendency, operations will be greatly stimulated after the World's Fair buildings are completed. At present the prices of materials have declined, as compared with the highest figures, from 15 to 20 per cent.

Syracuse, N. Y.

A very gratifying increase in the value of building improvements last year, as compared with 1902, is noted in the figures issued from the office of Fire Marshal Erasmus Pellenz. The gain is due wholly to the increase in the value of the new buildings put up during the last 12 months, as the amount expended for additions and alterations was less than for similar work in 1902. According to the figures of the Fire Marshal there were 293 new buildings projected last year, estimated to cost $1,461,070, and 316 permits for additions and alterations costing $294,433, making a total for the year of $1,755,503. In 1902 there were 584 permits issued for new buildings, additions and alterations, involving an estimated outlay of $1,402,575.

Tacoma, Wash.

The building records for 1903 show that 1313 permits, with a total valuation of $1,699,724, were issued during that year. In 1902 a total of 893 permits, with an aggregate valuation of $1,099,000, were issued, showing a gain of $600,000 in the aggregate cost of new construction undertaken during 1903. Of the buildings constructed during the last year 802 were for dwelling houses costing a total of $19,218. Four buildings were erected, costing from $20,000 to $40,000 each.

Notes.

As we go to press the annual convention of the Pennsylvania State Association of Builders is being held in the city of Scranton. The sessions will continue during January 13 and 14, builders being present representing an extended territory. It will be recalled that the asociation was organized at a meeting held in Warren, Pa., on March 18 of last year.

The past year in Bellows Falls, Vt., has been one of remarkable activity in the building line, the amount expended in new residences and tenement buildings being probably larger than ever before.

There is a growing feeling among leading architects and builders in Baltimore, Md., that considerable work will be undertaken in the spring, provided prices of materials are not prohibitive and matters run smooth in the labor world. There is at present more or less work under consideration, which will doubtless be carried to completion if the conditions are favorable.

The record of building operations in Providence, R. I., for the past year shows a greater amount of capital to have been invested in building enterprises than during the previous 12 months. The figures show that in 1903 there were 1061 buildings erected or improved at an estimated cost of $3,711,950, as against 1166 buildings erected or improved in 1902 at an estimated cost of $3,384,950. It was in 1901, however, that these figures were exceeded, the estimated cost of the 1271 buildings erected or improved that year being $4,893,075. Going back, however, to 1895, we find that the 1638 buildings erected or improved that year involved an outlay of $5,228,175, which is the record for the past decade.

The statement is made that never before, even in boom times, has Richmond, Va., seen such a period of building as that which was witnessed during the past year. It is pointed out that the investment of nearly $2,500,000 in building operations was due not to any unusual causes, but to the natural steady growth of the city.

Notwithstanding the high prices of labor and materials, and concerning which but little abatement appears to be expected in the near future, those engaged in the building trades in Washington, D. C., look for an active season in the building line. The past year has been an unusually prosperous one for those engaged in building operations, the only drawback to the generally satisfactory conditions having been the complications arising from labor trouble. There is, however, reason for believing that these difficulties will soon be adjusted in such a way as to enable the work in prospect to be carried to completion.

The Master Builders' Association of New Jersey have recently filed articles of incorporation, with headquarters at 116 Henry street, Orange, N. J. The trustees who signed the incorporation papers are Robert L. Tobin of East Orange, H. Roolvink of Elizabeth, Andrew Dickinson of Paterson, Lewis F. Strugis of Morristown, Richard H. Hughes of Long Branch, Dennis Mullin of Jersey City, and George B. Rule of New Brunswick.

The present activity in real estate and the drop in prices of lumber have caused a hopeful feeling to prevail among builders in Wheeling, W. Va., who now look for a good spring business.

CONSTRUCTION OF BOX CORNICES.

FOR the benefit of those readers who may be particularly interested in this part of the builders' work, we present herewith some comments and illustrations from a valued correspondent, showing a few methods of constructing box cornices, which, with slight modifications, are adapted to frame, brick or stone structures. The sectional views show so clearly the construction employed that comparatively little description is necessary. In Fig. 1 is shown a wooden cornice of the colonial style applied to a brick building, the roof being of slate, with sunken gutter. Fig. 2 is a vertical section through the cornice of what may be designated as a large two-story Palladin porch. In the construction of this matched spruce or hemlock boards, 8 to 10 inches wide, are securely nailed to the rafters, the gutter, of the same material, being constructed as shown and flashed with tin or copper, according as the cost of the work will permit. Great care, however, should be taken to extend the flashing well up under the shingles, which are laid with a good quality of water proof paper between them and the roof boards. The ceiling of the piazza or porch is of narrow matched and beaded ⅞-inch North Carolina pine, laid with broken joints at the corners. A small cornice is shown at the intersection of frieze and ceiling. In Fig. 3 is indicated the construction of a rather simple cornice, another example being given in Fig. 5. In Fig. 4 is more clearly shown the manner of shingling a roof, starting at the eaves with three thicknesses. In laying roof shingles, something less than one-third of their length should as a general thing be exposed to the weather, and as the shingles run 16, 18 and 20 inches in length, the exposure to the weather should be not more than 4½, 5½ and 6 inches respectively. When, however, shingles are applied to the sides of a building there may be a greater exposure to the weather than when used upon roofs.

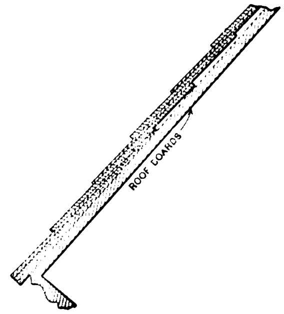
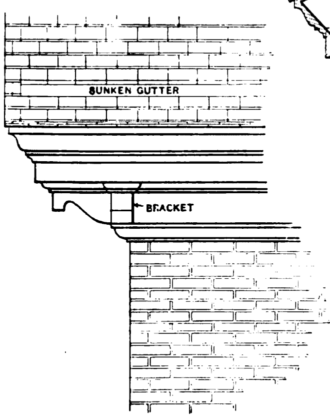
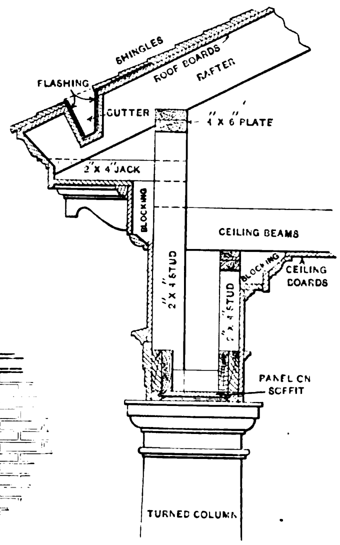


Fig. 4.—Showing Manner of Shingling a Roof.





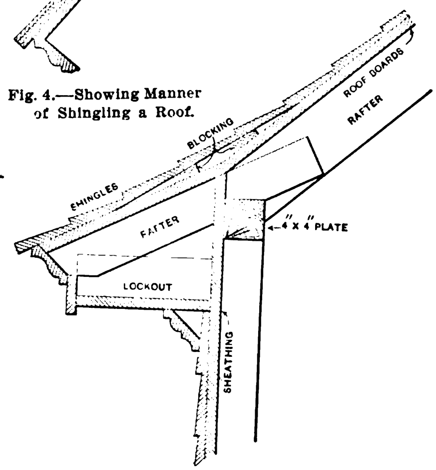


Fig. 1.—Wooden Cornice on Brick Building. Fig. 2.—Cornice of Palladian Porch. Fig. 3.—Cornice of Simpler Construction.

Construction of Box Cornices.

In Fig. 6 is represented a wooden cornice applied to a brick wall. In this case the wall plate receiving the rafters is firmly anchored to the wall by means of a heavy rod running down through the wall plate into the masonry. The cornice is carried by jacks or lockouts built into the wall as indicated by the dotted lines. In the case shown the flashing is carried up on the roof and around the balustrade. In Fig. 7 is illustrated a simple method of constructing a porch cornice, while in Fig. 8 is shown another method of applying a wooden cornice to a brick wall.

Some Comments on Staining Wood.

Staining wood may be divided into two classes—the staining or dyeing proper, and a sort of painting in which the coloring matter, in a liquid state, partially penetrates the pores of the wood and is held by them. Dyeing colors the fibers to a greater or less depth, in the same manner as the fibers of fabrics are colored by the deposition of a coating of coloring matter in and upon them, and occasionally by actually changing the colors of the fibers themselves. Staining, properly speaking, says a writer in one of our exchanges, is an exceedingly unsatisfactory method of coloring wood, as the pigment usually penetrates but a very little way into it. The slightest scratch or abrasion of the surface shows the natural color. When this happens, as it almost invariably does after a short time, repair is practically out of the question. In dyeing, the coloring matter can usually be made to stain the fibers for some little distance into the body of the wood, and thus a much more durable color is effected. In the case of veneers—a piece of wood not over ⅛ inch thick—it is possible, by careful manipulation, to produce a tolerably even color throughout the wood. In general, wood can be made almost any desired tint, from red rose color, through the blues, to black. Most of the bright colors, however, are liable to fade, and their use is not to be recommended.

At the present time, naturally, woods are in great demand, and it is often convenient to imitate the color of some precious wood upon one less costly. Thus we may, upon cherry or maple, imitate rosewood or ebony. Ebony, in fact, can be imitated upon a great variety of woods; the method of producing the color, however, must be varied for the different kinds. The books are filled with instructions for producing black walnut stains, and dyeing woods to imitate black walnut. A more useless or senseless practice could hardly be imagined, for black walnut is really the last wood in the world which one would wish to imitate. Its color is bad, and its only recommendation is that it is easily worked and is considerably harder than pine. At the present time mahogany is somewhat difficult to get, and it is fashionable to use substitutes for it which are mahoganized. Cherry is one of the most commonly used woods for this purpose. If properly treated, cherry is one of the finest cabinet woods which we have; and it seems almost a pity to use it for imitating anything else, even though it be mahogany.

A great number of recipes are given in the books for mahoganizing, but the workman in using them is usually in the dark, because no explanations of the reasons for the directions are given. One of the English recipes says, after getting the surfaces of the wood smooth, rub with a solution of nitric acid and then apply a solution of dragon's blood. The solution is made by dissolving 1 ounce in a pint of alcohol and adding 1-3 ounce of carbonate of soda or common washing soda. Sulphuric acid will answer just as well. Its office is to darken the wood and prepare it for receiving the dye, which is the dragon's blood. Our own experiments lead us to believe that the only advantage of the washing soda is to neutralize any of the acid which may remain behind. Another recipe calls for the acid treatment of the wood first, which is then followed by a liquid made with 2 ounces of logwood. 8 ounces of madder, 1 ounce of fustic and 1 gallon of water. This is boiled two hours and then applied to the wood. Unfortunately there are no recipes, so far as we know, which give directions for using logwood, dragon's blood, &c., in the shape in which they are found in the stores. For example, instead of logwood in chips, it is much more convenient to buy a little 4-ounce box of the extract of logwood, and instead of the madder coming in the old form, it can now be obtained in the form of a solid, which is all ready to be dissolved in boiling water. By dissolving separately the logwood, dragon's blood and madder in water, and then, after getting them of good strength, mixing a little of each and drying on a waste piece of wood, the proper proportions necessary to get just the color desired are easily found. It must be borne in mind that the logwood gives a purplish tone to the mixture, and that the others, if kept to themselves, will only produce a yellow. The stain, when put upon cherry without an acid being previously applied, will give a sort of dirty yellowish-brown. If the acid is added afterward, the red will speedily make its appearance. Besides producing the red color, the acid has another effect, which is very valuable in imitating old and dark mahogany—it darkens the wood very materially. The greatest amount of darkening can be obtained by brushing the wood with the weak acid and then warming it. The heat intensifies the action of the acid, but if too long continued it is possible to scorch the surface, making it look as though a hot iron had passed over it. Indeed, acid may be used for staining almost any wood a dark brown. It would be possible, by a combination of yellow and red stains, to produce the color of mahogany on almost any common woods. In Dicks' Encyclopedia we find the following directions for producing a dark mahogany color: "Boil ½ pound of madder and 2 ounces of logwood in a gallon of water; apply with a brush while the liquid is hot; when dry, go over the whole with a solution of pearl ash made of 2 drachms of pearl ash to a quart of water." We have some doubts as to the action of this solution on cherry, though it might act well enough on other woods. Permanganate of potash is often mentioned as being a good material for imitating certain kinds of woods. It comes in the form of crystals, which are readily dissolved in water. When put upon the wood it penetrates deeply and produces a pink color at first, but this, by the decomposition of the permanganate of potash itself, soon changes to a dark brown. This is a durable color, consisting of a metal oxide distributed wherever the liquid has penetrated.

Many woods get their best color by age. Among these are mahogany, oak and cherry. Usually, by imitating the chemical action to which they are subject with time, we may produce the same results quickly. If we wash oak with lime water, or better yet, aqua ammonia, we darken its color as though with age. Lime water also darkens mahogany, and greatly improves the colors of some kinds. It also has an effect on cherry. Maple is a very easily stained wood, but it appears to have been somewhat neglected by those who wish to imitate the more valuable woods. The only colors which we remember having seen upon maple are a dark blue-gray, produced by an iron solution, and a yellowish tint due to the varnish.

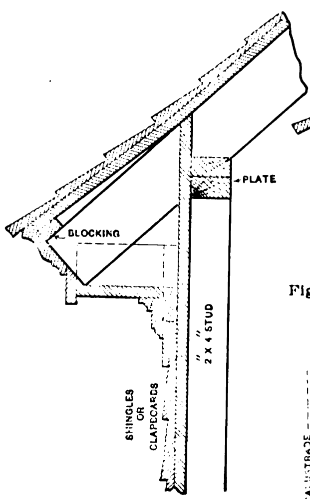


Fig. 5.—Another Example of Simple Cornice Construction.

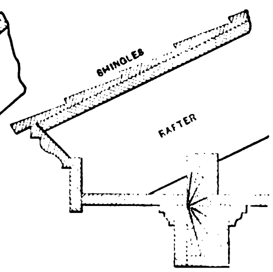


Fig. 7.—A Simple Porch Cornice.

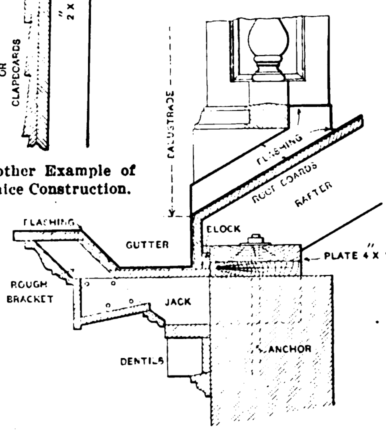


Fig. 6.—Wooden Cornice Applied to a Brick Wall.

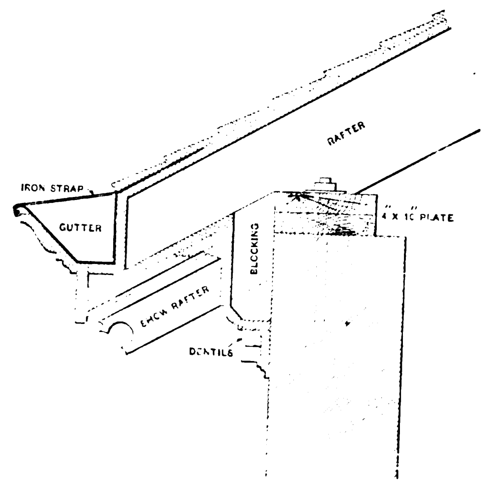


Fig. 8.—Another Method of Applying a Cornice to a Brick Wall.

Construction of Box Cornices.

Removing Spots from Furniture.

In describing a method for removing spots from furniture, a writer in one of our exchanges suggests that the most convenient furniture cleanser and polish is a mixture of two tablespoonfuls of olive oil, one tablespoonful of strong vinegar and one-half spoonful of spirits of turpentine. This mixture, applied with a cloth, will remove any spots of dirt, &c., and when afterward rubbed with a soft cloth a good polish will result.

Some Notes on Building Materials in South Africa.

Since the late war in the Transvaal, South Africa, the attention of many readers of this journal has doubtless been directed to that section of the world and the possibilities of a trade opening have been pondered with serious intent. It is generally understood that the war left the country pretty well devastated of buildings of all kinds, and that there is more or less of a demand for building materials of all descriptions. A reader of this journal who has been for several years a resident of South Africa sends us the following interesting notes regarding the trade in building materials in that section, all of which tend to show most clearly the situation as it at present exists. Our correspondent says:

During a six years' residence in South Africa it has often been a matter of surprise to me that the United States of America have not made a bigger bid for the trade in building material for this country, especially as it is entirely import. It has been my aim to note only those articles in constant demand and those that have only to be seen to create a demand. It is necessary for the reader to bear in mind the following facts about transport:

The Cape Government railways (for short, the C. G. R. in future) are the only common carriers in Cape Colony, Bechuanaland and Rhodesia, and on their figures virtually all the other lines in South Africa base their charges. There being no opposition the C. G. R. charge $5, or about £1 for the carriage of a barrel of cement weighing 300 pounds for a distance of 800 miles.

Sawn Lumber.

The standard size is the 3 x 9 inch deal, usually from the Baltic. The following are the standard cuts of a deal: Two pieces, 3 x 4½ inches; four pieces, 2¼ x 3 inches; six pieces, 1½ x 3 inches; two pieces, 1½ x 9 inches; four pieces, 1½ x 4½ inches, and three pieces, 3 x 3 inches.

It will easily be seen that each of these groups represents the results of cutting up one solid deal:

The C. G. R. base their charges as follows: A solid 3 x 9 inch is counted as weighing 6 pounds per running foot. A sawn 3 x 9 inch is counted as weighing 5½ pounds per running foot.

The deal is sawn either at the coast or up country. The lumber dealer up country usually charges 1 cent per running foot for cutting. The sawing in South Africa is simply atrocious. Surely American hemlock and spruce, ready sawn but bundled, could compete on favorable terms with the Baltic deal. Here I must sound a note of warning to American shippers. Instead of tying up bundles of pine and white wood boards, &c., with a piece of rope, fasten them together with hoop iron. The nail holes do not matter. This also applies to the sawn deal. The Oregon pine is imported as a deal. It is very useful, but its hardness is the objection in the building trade.

Tongued and Grooved Material.

The standard floor board is 6 inches by 1 inch and weighs 1 pound per running foot.

The only ceiling board is 6 inches by ½ inch and weighs ⅓ pound per running foot.

The weights are those used by the C. G. R. in charging up freight.

I would here remark that South Africa is particularly sunny and very notorious for its dry, hot winds and dust, consequently 6-inch material shrinks a lot. In two years' time the tongue is nearly out of the groove. To make matters worse the C. G. R. do not hold themselves responsible for tongues and grooves that are smashed. The reader can picture the resulting effect after two years' service.

It is only within the last three months that I have been able to obtain a flooring narrower than 6 inches, and even then it was 4 inches, and yet it was only the same price per square foot as the 6-inch. Hitherto on inquiring for narrower flooring one was always met with the rejoinder: "Oh, that is a special order," which meant about six months' delay in delivery. The States should supply South Africa with narrow flooring and ceiling, and that of a wood better able than the Baltic to withstand the climate.

Doors.

It is useless to send out doors with white wood panels if future trade is desired. Pine panels are bad enough, but those of white wood are usually an abomination. In fact, white wood is totally unsuited to the climate. The door that has big knots where the lock and butts should be will certainly not create a demand for American goods. This description of door must be about fourth class, or perhaps it does not run to a class. The five-panel door would give the best results. Three months of the climate will crack any glued moldings ever seen. At the present time I am trying some cypress doors, but can already see the fault in the panels, which appear to be too thin.

Windows.

The American article is the best seen out here, but here it must be remarked that almost every rain storm in South Africa is accompanied by a gale of wind, hence the need for a rebated sill. All pulley stiles should be sent out minus the cross cuts for the pockets, as our black freight handler would make a baggage smasher turn green with envy, and the ready sawn pocket always comes out second best. The best results are obtained with ½-inch cypress parting strips, and all linings, &c., of ⅞-inch stuff dressed both sides.

Inside Trim.

There is only one style of trim used in South Africa. It is called an architrave and is made in Sweden. The joints are mitered, but putty is cheap. Queen Anne trim, with head and plinth blocks, would be far and away the best suited to the climate. Pine would be the best material, and white pine at that for choice. Our dry, hot winds from the deserts would forbid any man in his sober senses from using white wood.

The only base is a plain board of Baltic surmounted by a torus mold. Window stools, aprons and door saddles are unknown.

Metal Ceiling.

This is one of the most important members on the card, and should command the attention of every exporter, as the following story goes to prove. About a month ago a neighbor living in the Transvaal happened to see a ceiling that I had put up. Noting how it was done and learning that it came as cheap as ceiling boards, he promptly gave an order for the metal and took his way home to sell his ceiling boards with broken tongues and grooves to his less wary neighbors. In addition to this it must be borne in mind that in South Africa the number of buildings with ceilings of lath and plaster can be counted on the fingers of one hand. I have only seen one, and that was the Post Office in Cape Town. The ceiling must be either wood or metal. Fire underwriters favor metal, and housewives swear by it as a preventive of dust. It is rather strange, but I have never seen any memoranda as to sizes and manner of erection.

Hardware.

South Africa still worries along with the old fashioned solid cast butts. One owner objecting to the cost of Stanley loose pin steel butts, I put then in at my own expense, just for ease and convenience. In the future that owner will never have anything else, for he took in at a glance the fact that these butts allow the door to swing back clear of the trim and to be easily taken off for moving and for laying of linoleum, &c.

The English rim lock, which is in almost universal use, measures on an average 6 x 5 x 1 inch, weight, about 3 pounds, has a key 6 inches long and retails at $9 per dozen. The furniture is usually supplied separate; it has two small pieces of thin stamped brass for key and handle escutcheons. These plates are fastened with brass tacks, which very soon become loose. The finished effect is simply immense, after one has been used to the neat American pressed steel mortise lock. The English mortise lock is little used and would soon turn a man's hair gray, as it goes right through into the molding. The American cast iron rim lock usually has the handle too close to the jamb for any one who is accustomed to the giant lock of South African use. Until about five years ago every night latch was of English make, with a key about 4 inches long. The American, with its numerous small keys for any thickness of door, is fast supplanting the Britisher, as no two locks can be opened with any key, and better still, these goods come with full instructions for their application.

Roofing Material.

The standard roofing material is galvanized corrugated iron. The principal claims made for it are, First, it does not perish in the scorching winds; next, it requires a lighter frame to support it; next, it is little injured in transport; then it will stand without paint, and, lastly, any kind of a butcher can put it on. The iron is usually 26 gauge, has 3-inch corrugations and a sheet will show 24 inches with one lap. To guard against driving storms it is laid either lap and a half or double lap. The sheets run from 6 to 10 feet in length ordinarily. Five feet, 11 feet and 12 feet can also be obtained, the first named being used for fencing, as it is immune where the white ant holds sway. The iron is usually fastened to purlins, so-called, of 2¼ x 3 inches, or 1½ x 3 inches, and these again are nailed to principals from 4 to 7 feet apart. An 8-foot sheet must have three supports—in fact, in time a 6-foot sheet will sag with two supports, but still it won't leak.

The universal fastening is a 2¼ or 2½ inch galvanized cone head screw with washer. A hole is punched through the iron into the wood and the screw is driven home with a—what's that?—a screw driver? No, sir, a hammer. A carpenter on the C. G. R. on being asked for what purpose the nick was made in the head of the screw, replied that it was to fool the man who tried to remove it with a screw driver, as he would eventually have to pull it out with a claw hammer. The district engineer sacked him on the spot.

What is needed here is a metal shingle that can be laid on 2 x 1 inch lath, about 12 inches apart, nailed to rafters placed about 24 inches on centers. This would effect a saving in the boards. The reader must know that the freight on wood to points about 1000 miles from the coast is about $2.50 per 100 pounds; add to this the initial cost of about 5 cents per square foot, and the bill will soon become a large one. Of course, the moneyed man would have his roof boarded and felted to receive the shingles. Yet how could he? It is safe to say that he has never seen an advertisement which showed him what were the advantages of any American article in the building trade. It does not seem likely that any wealthy men would have wooden if they knew of steel ceilings.

I believe the following to be the best method of creating a demand for American goods of all kinds: Let every merchant and dealer be requested to devote a space in their store or show room for a display of every article as it appears, either in use or application. Some will refuse, but their cash books will soon tell them at what cost. Ordinary advertising matter is just a waste of paper and ink.

A Fire Proof Dwelling.

It is stated that an architect in Chicago has recently been instructed by a client to design and erect for him a dwelling which, while of the ordinary type, will be thoroughly fire proof. The house will be two stories and attic high, extending over an area of 30x40 feet and will contain eight rooms. It will be located at the northwest corner of Sherwin and North Ashland avenues. The exterior will be of brick, while the interior will be very likely framed with steel beams and posts with tile or concrete partitions and floors of concrete, the roof being covered with shingles. The estimated cost of the house is $10,000, and it is believed that it will on account of its novelty not cost more than the ordinary dwelling. In commenting upon this a recent issue of *The Construction News* says that much interest has been aroused among the manufacturers of fire proof materials, and there is considerable competition brought about by the desire of each manufacturer to have his materials used, and for this reason very low prices will be obtained. There has been in the history of this city only three or four fire proof houses constructed, not more than that number at any rate. It is making things a little more secure, because one never knows what might happen, and the cost should be simply reckoned as a matter of insurance against the dangers we know not of.

Some Comments on House Planning.

A short time ago an architect in Milwaukee by the name of Peter Brust delivered an address before the South Side Women's Club, in the course of which he discussed the planning of homes. He intimated that the subject involved two considerations—utility and beauty, emphasizing the point that our homes should not be merely places to eat and sleep, but should have charms for the occupants, and that they should be places with associations or with delightful possibilities. According to his views, the house should be so situated that the principal living rooms will be toward the south, although in cities the position is determined very much by the location of other buildings. In taking up in detail the requirements of the home, the speaker began with the entrance, which he stated should be vestibuled to keep out the cold in winter. From the vestibule leads the hall, which usually contains stairs to the second story, and from which the principal room can be entered, with also a direct passage to the kitchen, so that the servant can answer the door bell without passing through the living rooms. There should also be a rear hall and stairway for servants' use, which may also be utilized by members of the family who wish to go to their rooms unobserved by visitors. The time honored parlor, said the speaker, is being abandoned by many people for a larger living room and a small library. The living room should have a fire place with a real wood or coal fire. The dining room should be between the living room and the kitchen, sliding doors closing off the living room so that the noise of setting and clearing away the table may not be heard. The pantry or china closet should be between the dining room and the kitchen, forming a vestibule or passage to keep the noise and odors of the kitchen out of the dining room. The kitchen should have a rear entrance in which a refrigerator may be placed and, if possible, this should be located in the partition between the entry and the pantry, so that food stuffs may be put in from the pantry side. The kitchen should be provided also with a closet for pots and kettles and for supplies, also a closet for brooms and cleaning utensils. In the planning of the kitchen there should be windows on two sides in order to secure a good circulation of air in summer.

On the second floor the bedrooms should be arranged as much as possible along the sunny side of the house. The bath room may be on the north side and as nearly above the kitchen plumbing as possible. Soil pipes from bath rooms should not pass down in partitions between living rooms. There should be a closet off from the hall for linens and a small one for brooms. Each bedroom should, of course, be provided with a closet.

The heating of houses is most generally done by means of hot air furnaces or hot water boilers. The furnace is the cheapest to install, easily managed and provides fresh, warm air. Its disadvantages are that the air is too dry, sometimes scorched, and it is at a higher temperature than desirable for breathing, because it must be warm enough to heat the walls and furnishings of the rooms. The hot water boiler costs as much as the furnace to install, is not difficult to manage and provides an agreeable heat, but no fresh air circulation. If, in addition to the direct radiators, a system of indirect radiators are installed in the basement, which heat air the same as a furnace and circulate it in the rooms at a temperature of 70 degrees, then there is pure fresh air to breathe and agreeable direct heat for warming rooms. The living rooms and bedrooms should be ventilated, but the ordinary methods are not effectual. Fire places are good ventilators, but ventilating pipes passing up into the attic are not. The best way is to make the furnace or boiler chimney of heavy sheet iron, set into a large brick chimney. The furnace smoke pipe will heat up the space around it, causing an upward current of air, thus making this space an excellent ventilating flue. The ventilating pipes from the room should be connected to this flue in the basement, because the cold foul air in the rooms will easily fall to the basement through cool pipes, while it would not rise through them to a still colder attic. In ventilating the kitchen the warm air is to be carried off. There the register should be in the ceiling.

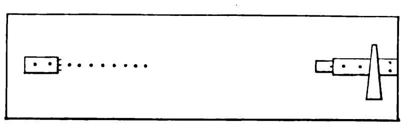
with direct connections to the chimney at the same level or a point higher up, but not in a cold attic, else there will be a downward draft.

The exterior of the house should be as simple in its mass and general treatment as possible. Breadth is perhaps the most marked feature of the homelike house. As few features as possible, and these uniform in treatment, together with well proportioned windows and refined details, usually produce pleasing results, while a house with several gorgeous features will soon weary the most superficial observer.

In outlining a few guiding principles governing good architecture, the speaker said: "The basis of architecture lies in construction. Its object is to perfect the forms of buildings in consonance with their practical uses so that they may be pleasing to the eye. The beauty of architecture depends very largely upon the extent to which it expresses construction. The principal elements of beauty and expression are entirely independent of the so called styles. These elements are proportion of mass to mass; proportion of openings to wall surface; proportion of shadows to light and relative values of color. The design of the building may invest it with a character of massiveness, of lightness, of vigor, of dignity, of richness, of grace and elegance, or with combinations of these attributes. In designing, the architect must, in his own imagination, picture the building as it will look when completed, and determine with which of the above mentioned attributes it shall be invested. He must know what part each plays in producing this effect. In addition he must consider the decoration of the component parts, this involving the texture of surfaces, repetition of lines, units and groups, gradations and contrasts in color and texture, while finally the entire composition should possess simplicity and order. A building to be in good taste must be appropriate to its purpose, which latter will often determine whether it should be massive or light, dignified or picturesque. All features and ornaments should contribute toward emphasizing one general motive dominating the design. Every feature which does not contribute toward this end is superfluous.

Finishing Sash and Doors in Small Shops.

One of the interesting problems which confronts the operator in a small wood working establishment is the best method of economically finishing doors and sash after they come from the clamp. Of course, in large factories, where the output would justify using a sander and trimmer, the problem is easy of solution, but in a small establishment, especially where there are a lot of odd sizes, the sash and doors have to be taken to the table where the over-wood is cleaned off before sandpapering. Now, the table is where the trouble begins, and the way in which the difficulty is overcome is described by a correspondent in a recent issue of the *Wood*



Finishing Sash and Doors in Small Shops.

Worker, as follows: "There has to be some way of fastening the work to the table while it is being dressed and trimmed, and in the case of a batch of odd sizes it takes more time to fasten the work from sliding than it does to clean it off. The device, too, should be easy of adjustment. I enclose a sketch of a table top we have just put in use and find it a great time saver. It consists of a 2-inch hardwood top, one end of which is fitted with a block 6 inches long, traveling in a groove. The other end of the table has a stationary block, which can be moved up the table to suit the size of door. This block is fitted with ½-inch iron dowels, which correspond with a row of ½-inch holes in middle of table, for adjustment. The door is placed against the stationary block and the sliding block is moved up to the work by a wedge operating between it and the fulcrum, which is bolted immediately behind the block. This block is lipped both above and below the table, and is drawn back by a spring when wedge is removed.

Day Classes of the New York Trade School.

When the New York Trade School, First avenue and 67th street, New York City, opened its workshop to day students in December for the 23d successive season, the enrollment numbered 257 names, divided among the following departments: Plumbing, 120; electrical work, 60; bricklaying, 30; carpentry, 14; house painting, sign painting and cornice work, 11 each. For the classes in bricklaying, electrical work and plumbing the applications exceeded the accommodations and much to the regret of the management many young men had to be turned away. As showing the wide range of territory in which the demand for trade institutions exists, it may be stated that 69 members of the day classes are from New York City; 48 from New York State outside of the city; 42 from New Jersey; 26 from Pennsylvania; 18 from Massachusetts; 9 from Connecticut; 4 from each of the states of Michigan, Ohio and Illinois; 3 from each of the states of Maine, New Hampshire, Vermont, Wisconsin and Louisiana; 2 from each of the states of Rhode Island, Iowa, California and Florida, and 1 each from Colorado, Washington, Kansas, Minnesota, South Dakota, Alabama and South Carolina, with 3 from the Dominion of Canada.

Slate and Tile Roofers' Agreement for 1904.

We present herewith the articles of agreement entered into between the Slate Roofers' Association of Pittsburgh, Pa., and the International Slate and Tile Roofers' Local Union No. 2. The agreement was made on December 26 last, and will terminate on December 31 of the present year. The various sections of the agreement read as follows:

Rule 1. This agreement is confined to Allegheny County, Pa.

Rule 2. Eight hours on the roof shall constitute a day's work. All employees must start to work promptly on the job at the regular starting time and remain at work until quitting time.

Rule 3. Regular hours shall be from 8 o'clock a.m. until 12 o'clock m.. and from 12.30 o'clock p.m. to 4.30 p.m., except where special arrangements are made.

Rule 4, Sec. 1. The rate of wages for slate roofers shall be 50 cents per hour.

Rule 4, Sec. 2. Where it requires not more than one and one-half hours to complete a roof, then for such time the regular rate per hour shall be paid.

Rule 5. Workmen shall be paid double time for Sundays and the following legal holidays—viz., July Fourth, Labor Day and Christmas.

Rule 6, Sec. 1. Employees shall pay their own car fare to job from their own homes, provided the fare does not exceed the amount necessary to go to shop; the employer shall pay all extra car fare.

Rule 6, Sec. 2. Employers will pay traveling expenses and full board first week, after that one-half board while out of the city, except when other arrangements are made.

Rule 7, Sec. 1. Each shop employing on an average one journeyman per year shall be entitled to one apprentice, and one additional to every six journeymen employed, based on the average of journeymen employed.

Rule 7, Sec. 2. All apprentices shall be governed in conformity with the laws of Pennsylvania and under control of the employer.

Rule 8. Employees must, wherever employed, exercise diligence in doing a fair day's work. On evidence of time wilfully lost, a reduction in their pay may be made for such time lost, and where material is destroyed by the neglect or incompetency of a workman, he shall pay such loss to his employer from his wages.

Rule 9, Sec. 1. When the union cannot provide the employers with first-class slate roofers to execute their work, then the employer reserves the right to employ whom he pleases for the proper execution of his work.

Rule 9, Sec. 2. Local Union No. 2 or its workmen shall not order a strike on a shop or job on any dispute or misunderstanding, but any dispute or misunderstanding shall be referred to the Executive Committee of the employers' association and the union, and in case they fail to agree the dispute shall be settled by arbitration, the employer to select one man, the union one man, and these two a third man. The decision of these three shall be accepted as final; pending this decision there shall be no cessation of work.

Rule 10. That should either party to this agreement desire any change in this scale at its expiration, three months' notice prior to the termination of this scale is to be given the employers or workmen, stating specifically, in writing, what change is desired; otherwise this agreement is to remain in force for another year.

SPECIAL ARTICLES OF SETTLEMENT.

That the men return to work in the respective shops as prior to the commencement of this difficulty, and that this settlement shall be without prejudice to either employer or employee as at present working.

P. LE GOULLON,	SAMUEL NOCK,
SCOTT A. WHITE,	LEWIS WEBER,
P. F. JONES,	P. F. MULVEHILL,
GEO. P. HELT,	ED. LE GOULLON,
H. E. SCARBOROUGH,	ERNEST THORNTON,
P. LE GOULLON, President.	JOHN MASSIE, President.
SCOTT A. WHITE, Secretary.	JOHN O'CONNOR, Acting Sec'y.
Committee.	Committee.

Approved by the Builders' Exchange League December 26, 1903.

SAML. FRANCIS, President.
E. J. DETRICH, Secretary.

International Exposition at Milan, Italy.

In connection with the official inauguration of the Simplon Pass, an international exhibition, under the patronage of the King of Italy, is to be held in Milan in 1905. A prominent feature of this exposition will be what is termed an "International Working Hall for Industrial Arts," by which is meant an exhibition of manufacturing and other processes by means of machinery and appliances at work. A pamphlet which is being sent out by the management of the proposed exhibition states that this department is intended to demonstrate in an educative manner the remarkable work accomplished by machinery in all lines of industrial effort. It is designed to illustrate the latest improvements in manufactures and will be open to all countries. The exhibits will not only include modern machinery, but also any process of manufacture by which, through a series of successive operations, partly manual and partly mechanical, raw materials are gradually transformed into industrial or artistic products. The exhibits in this hall will be classified in six sections, as follows: 1, The Graphic Arts; 2, Manufactures of Metals and Wood; 3, Ceramics, Pottery and Glass; 4, Textile and Kindred Manufactures; 5, Leather, Wall Papers, Tapestry, &c., and 6, Products of Industrial Art generally.

The International Working Hall will be open to individual exhibits, as well as to aggregated or associated exhibitors wishing to illustrate specific lines of manufactured goods. Intending exhibitors are invited to communicate with the secretary of the International Working Hall for Industrial Arts, Milan Exhibition, 1905, Piazza Paolo, Ferrari, No. 4, Milan, Italy, sending details concerning the nature of their machinery and such other information as will be required by the management. A fee will be charged for space, based upon the position of the exhibit in the hall, and the ground it will occupy. A repair shop will be established where workmen will be permitted to carry out repairs with their own tools by permission of the committee. The committee will permit the sale of the exhibits shown in the working hall, a small commission being charged upon such transactions.

SOME rather interesting examples of cement construction have recently been completed in Lowell, Mass., the most notable perhaps being the coal shed and boiler house of the Merrimac Mfg. Company. This is a structure 500 feet long and 33 feet wide, with walls 40 feet high, and is a combination of structural steel and reinforced cinder concrete construction. The I beam columns constituting the frame are placed 12½ feet apart and the space between filled with cinder concrete reinforced with steel rods. The roof of the boiler house is 420 feet by 45 feet, made of reinforced concrete supported by steel trusses placed 12½ feet on centers. In constructing the roof, the wooden centering was secured to the trusses, and on it was laid 5 inches of cinder concrete reinforced with expanded metal, thus forming a roof composed of a series of slabs 5 inches thick, 12½ feet wide and 45 feet long. Over this was laid a tar and gravel roof.

Rapid Work on a Modern Building.

A striking feature in connection with the new loft building just completed on the former site of the Union Club House at the northwest corner of Fifth avenue and Twenty-first street, was the rapidity with which the work was finished, taking into account the fact that operations have been greatly complicated and delayed in New York City during the past year through differences existing between employer and employed in various branches of the building business. The work of demolishing the old Union Club House was commenced the first week in January of last year and in the latter part of March the excavations for an 11-story and basement loft structure were commenced. On May 1 the teamsters' strike interrupted the work for six weeks. The excavations, however, were completed about the end of June, and by August 26 the stone and brick work up to the eighth story of the structure was finished. On December 15 the building was completed, and, passenger and freight elevators being in operation, the first tenant moved in. This is said to be the only important structure which was commenced and finished in 1903.

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J. A. O/

SUPPLEMENT CARPENTRY AND BUILDING, FEBRUARY, 1904.

USES, BUILT FROM THE SAME FLOOR PLANS, MAY BE ATTRACTIVELY VARIED.

N ARCHITECTS.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS
232-238 WILLIAM STREET, NEW YORK.

MARCH, 1904.

The Baltimore Fire and the "Skyscraper."

The destructive conflagration which, at the beginning of the second week in February, wiped out the very heart of the business section of the city of Baltimore involving a loss conservatively estimated at one hundred millions of dollars, subjected the modern steel skeleton structures in its path to an attack far more powerful than such buildings have probably ever been called upon to withstand. The fire was one of those appaling visitations which one would suppose should have been impossible in these days of perfected fire fighting systems and modern building construction, yet it only tended to strikingly demonstrate the fact that, with all the preventive appliances at hand and the solicitude which is exercised to guard against extensive city fires, a blaze originating in a so-called fire proof structure filled with combustible material is very apt, when fanned by a wind of the velocity of a gale, to spread so rapidly as to defy the efforts of the best trained fire department. The reports which first came to hand from the scene tended to create the impression that the effects upon the buildings of steel skeleton construction were altogether disastrous and that the work of the flames had been most complete. It was perhaps natural, under such circumstances, that prominent architects, builders and committees of experts interested in fire proof construction should desire to visit the ruins with a view to studying the effects of the fire and noting some of the lessons obviously to be drawn from such a furious conflagration.

The Steel Frame Vindicated.

The results of the investigations which have thus far been made are a complete demonstration of the effectiveness of the steel skeleton form of construction as applied to towering office buildings or "skyscrapers," as they are so frequently called. Indeed, the fire resisting qualities which this form of construction developed were such as in a measure to surpass the expectations of experts, for it had been generally conceded that an intense heat like that generated by the furious progress of the Baltimore fire might destroy the life of the metal in a steel skeleton frame, even if the encasing masonry of brick should withstand the disintegrating effect of the flames. The reports of experts show, however, that in every case the framework remains practically intact, requiring but a minimum of expense for repairs upon the structural parts. Probably the most notable of the several modern buildings subjected to the fierce heat was the 16-story Continental Trust Company Building, constructed of steel and tile and regarded as the highest type of fire proof construction in the city. After the ruins had sufficiently cooled, the architect of this building, D. H. Burnham, examined it most carefully, reporting that the steel cage, floor arches, main partitions, &c., with slight exceptions, remained practically intact. Some of the apron beams between the supports of the windows of one story and the sills of a number of windows were found to be warped, and will, of course, have to be replaced. All the tile floor arches in this building are reported in good condition, the only apparent damage being the complete destruction of all the ornamental and marble work, wooden floor strips, glass and fixtures. A representative of one of the leading building contracting concerns in the country pronounced structurally intact the buildings in which his people were interested, and a cursory examination made by the building department of the city is said to have disclosed no structural weakness in any of the steel buildings affected by the fire.

Lessons Taught by the Fire.

From this it is obvious that while the conflagration was a catastrophe from which the city of Baltimore may be slow in recovering, by reason of the tremendous property losses entailed, yet it has been the means of demonstrating in a most striking manner the soundness of the principles on which modern fire proof construction is based, and has carried lessons which municipal authorities throughout the length and breadth of the land should not allow to pass unheeded. One important lesson which it teaches is the necessity of safeguarding the window openings in tall buildings, and this can be done most effectively by the use of iron shutters in combination with metal window frames and metal sash containing wire glass. Had the buildings continguous to the structure in which the Baltimore fire originated been provided with efficient window protection, there is reason to believe they would have withstood the fierce heat of the flames until such time as the fire department could have brought the original blaze under control. One fortunate feature of this lamentable disaster is that few lives were lost, and practically no one was made homeless, thus eliminating from the catastrophe some of the heart-breaking features which accompany most large city fires, when numbers are driven from their homes and thrown out shelterless and penniless upon the world. The most serious inconvenience that will be experienced will be the extensive derangement of business arising from it, but, judging from the admirable attitude displayed by the citizens under the trying conditions, they will, in due course, recover from their troubles, and Baltimore will rise from its ashes an even more beautiful and dignified city than before. There are already such evidences of recuperation that encourage the hope of the early restoration of trade, and, in the not very distant future, the entire rebuilding of the devastated district in a manner creditable to a people who have always shown progressive qualities in the past.

National Association for Sheet Metal Workers.

The advantages of association and co-operation among men engaged in kindred lines of trade have been amply demonstrated in the experience of the various local, state and national organizations of manufacturers, merchants and tradesmen which have been formed throughout the length and breadth of the country. In many ways, the association idea has been fruitful of good results. Apart from the direct pecuniary benefits accruing to the members, the mere fact that men engaged in the same line of trade can get together at meetings of their association and become acquainted with each other has tended to remove much of the jealousy and suspicion formerly too prevalent among competitors, a feeling of friendliness and confidence taking its place. Moreover, the cut-throat competition which in former years existed in many trades, to the disadvantage of all engaged in them, has been largely eliminated from those trades in which associations exist. Many trade abuses, too, have been done away with, and business methods have been regulated in such a manner that all have been benefited thereby. At this day there are but few of the leading trades which are unprovided with local associations, as well as with State and national organizations. Among the tradesmen, however, who have not reached this point are the master sheet metal workers, and there is probably no trade in the country to-day which would seem to be more in need of such assistance as is provided by organization. Communications from master sheet metal workers in various districts, who are connected with local associations of their trade, testify to the advantages secured through these organizations. The communications show that a strong demand exists for the local organization of master sheet metal workers to form themselves into State and national organizations, which shall embrace the whole trade throughout the country, for, as a leading sheet metal worker puts it, "No kind of business has lagged and gone backward in the past 25 years as has that of the master sheet metal worker." Such a condition would not have existed had there been a national association in the trade, to bring its members together for mutual conference and action in matters vital to the interests of all. What has been good for other trades should surely be good for this one, and what has proved valuable locally to master sheet metal workers in cities and districts is bound to be still more valuable, if extended to embrace the whole country. It seems that the master sheet metal workers, as a body, are strongly in favor of organizing a national association. But they are waiting for some local organization, or some prominent and progressive member of the trade, to take the initiative in the matter. It is to be hoped that such a man, or body of men, will soon be found; for a step of this kind cannot be taken too soon.

Responsibility for the Iroquois Theatre Fire.

After an investigation extending over a period of nearly three weeks the coroner's jury returned a most sweeping verdict, finding eight city officials and theater attachees responsible for the terribly destructive fire at the Iroquois Theater in Chicago in January, by which hundreds of human lives were sacrificed. The list of those responsible includes the Mayor of the city, the president and manager of the theater, a fire marshall, a city building commissioner, a building inspector and various theatre employees.

In its verdict the jury enumerates the causes of the fire as follows:

By the grand drapery coming in contact with an electric flood or arc light situated on an iron platform on the right hand of stage facing the auditorium.

The city laws were not complied with relating to the building ordinances, regulating fire alarm boxes, fire apparatus, damper or flues on and over the stage and fly galleries.

We also find a distinct violation of the ordinance governing fireproofing of scenery and all woodwork on or about the stage.

The asbestos curtain was totally destroyed, and was wholly inadequate, considering the highly inflammable nature of all stage fittings, and owing to the fact that the same was hung on wooden buttons.

The building ordinances were violated by inclosing aisles on each side of lower boxes and in not having any fire apparatus, dampers or signs designating exits on orchestra floor.

The building ordinances were violated in that section regulating fire apparatus and signs designating exits on dress circle.

The building ordinances were violated in that section regulating fire apparatus and signs designating exits on balcony.

Generally the building is constructed of the best material and is well planned, with the exception of the top balcony, which was built too steep, and therefore difficult for people to get out of, especially in case of an emergency. We also note a serious defect in the wide stairs in the extreme top east entrance leading to the ladies' lavatory and gallery promenade, the same being misleading, many people mistaking this for a regular exit, and, going as far as they could, were confronted with a locked door which led to a private stairway, preventing many from escaping and causing the loss of fifty to sixty lives.

Architectural League Prizes.

One of the features of the after dinner events at the annual exhibition dinner of the Architectural League, Friday evening, February 12, in the galleries of the building of the American Fine Arts Society, 215 West Fifty-seventh street, New York City, was the presentation of prize medals by the president of the league, Arnold W. Brunner. The subject of the gold and silver medals competition was a recreation pier, the gold medal being awarded to J. W. Corbusier, and the silver medal to John Crowthers Grant. The president's prize, a bronze medal, for the best design for a stained glass window representing the Annunciation, was awarded to Joseph Loomis, and the Henry D. Avery prize went to Richard N. Burnham, for the best design for an electrolier suitable for a newel post in the hall of a public library.

Two Unique Southern California Houses.

(With Supplemental Plates.)

One of the two half-tone supplemental plates which accompanies this issue of the paper carries illustrations of two Southern California dwellings of rather unique architecture. The lower one, which the reader at first glance might think was a chapel or church, is a residence on Orange Grove avenue, Pasadena, while the other is a log cabin residence at Los Angeles, and is known as "La Rusticana." The pictures show very clearly the general style of architectural treatment, as well as their picturesque surroundings.

Modern Steel Frame Buildings Fire Proof.

Concerning the effects of the Baltimore fire upon modern fire proof buildings, William Barclay Parsons, chief engineer of the Rapid Transit Commission in New York, expressed the following opinion shortly after his return from the scene of the fire:

I found that all the modern, really fire proof buildings had come out of the conflagration practically unscathed and intact, the first reports to the contrary notwithstanding.

By really fire proof buildings I mean those where the steel frames are protected by noncombustible material, such as brick and terra cotta, with a thin curtain wall on the outside attached to the steel frame, and with floors and partitions of brick or terra cotta. There were a number of such buildings, from 12 to 18 stories in hight, within the fire zone, and I visited a number of them. I found them structurally substantially uninjured. The steel frames were not distorted, and the fire proof partitions and floors were all in place, except occasionally, when a heavy safe had broken through the flooring and fallen two or three stories.

In these fire proof buildings everything combustible had been absolutely destroyed; every vestige of furniture, doors, trim and floor was gone. To give you an idea of the intensity of the fire which raged within these buildings let me tell you that even the sleepers, which are the long pieces of wood encased in the concrete floor and to which the transverse flooring is nailed, had been consumed, and this notwithstanding the fact that they were protected on three sides from contact with the flames by noncombustible concrete, and were detached from one another. As for the walls, I found that those in which the chief component part was brick stood the ordeal best. As in other fires, the walls made of granite fared worse. Under the influence of the extreme heat the granite scaled badly, and practically all the walls in which granite was used will have to be replaced.

Terra cotta, as a general thing, stood well, the damage to the exteriors composed of that material being chiefly due to falling *débris* of nearby buildings.

RECENT advices from Waterloo, Iowa, indicate a belief among architects and contractors that the present will be the banner year in the building line in the history of the city. Plans now under way cover a larger amount of building improvements than has been projected for some time past. Business structures, together with a large number of dwelling houses, will be put up as soon as the season opens.

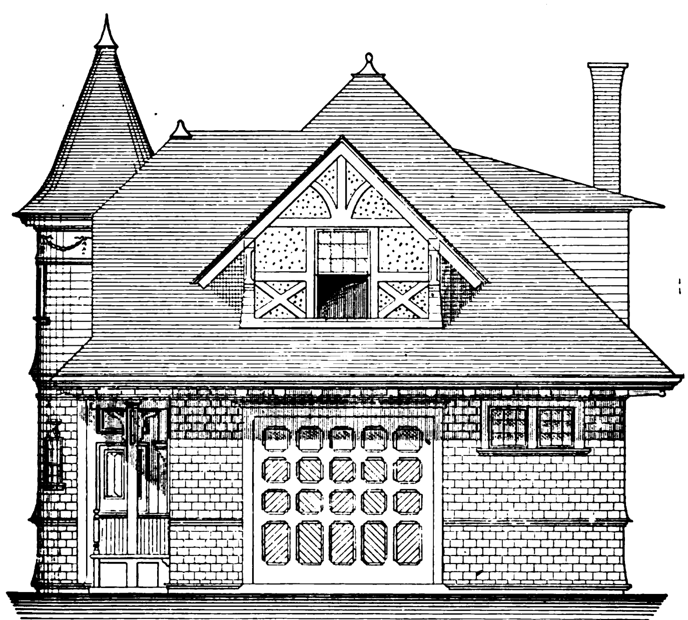
CARRIAGE HOUSE AND STABLE.

We have taken for the subject of one of the half-tone supplemental plates sent out with this issue of the paper a carriage house and stable of attractive exterior and with an arrangement of rooms likely to interest many of our readers. It will be seen that upon the main floor is a large carriage room with cement floor, the drain being at the front near the sliding doors, so that as the carriages come in they can be washed and cleaned before they are rolled back to the space beyond. At the right and left of the door opening to the stalls are harness closets provided with double doors. A feature of the building is the arrangement and location of the side entrance and stairs which lead to the second floor, these being such that from the side porch the carriage room may be gained, or one may pass directly to the second story without the necessity of entering the main portion of the building.

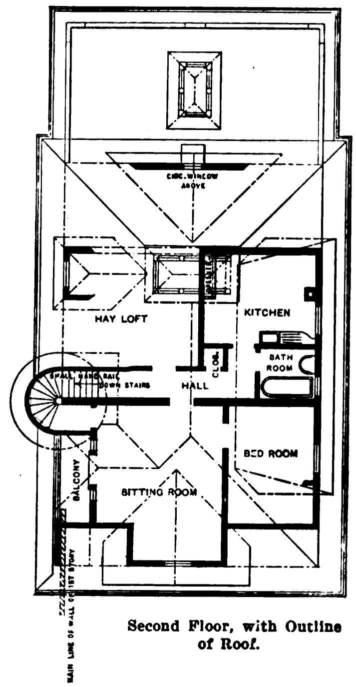
On the second floor are a large sitting room, bedroom, kitchen and bathroom for the family of the coachman, while beyond is the hay loft. Opening from the sitting room is a small balcony, clearly shown on the plan and elevation.

According to the specifications of the architect the timber used in the frame of the building is spruce, the sills, plates and corner posts being 4 x 6 inches and the studding 2 x 4 inches, the latter placed 16 inches on centers. The frame is covered with sheathing boards ⅞ x 8 inches, tongued and grooved, with a layer of building paper over them, this in turn being covered with shingles, exposed 5 inches to the weather and broken at the belt course 3 feet 6 inches from the ground. The roof is shingled, one of the features being the heavy overhang. The stalls have cement flooring and wooden partitions with iron grills above. The slide by which hay is passed extends directly to the stalls on the first floor.

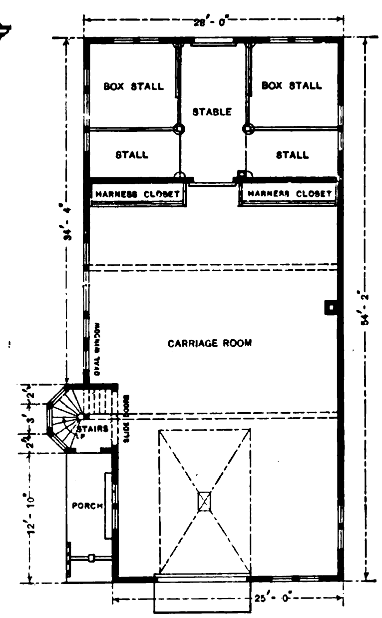
The carriage house and stable here shown is located on the grounds of the residence of Gilbert M. Stratton, on Ocean Parkway, Brooklyn, and was erected in accordance with drawings prepared by J. Sarsfield Kennedy, architect, of 44 Court street, Brooklyn, N. Y.



Front Elevation.



Second Floor, with Outline of Roof.



Main Floor.

Carriage House and Stable.—J. Sarsfield Kennedy, Architect, Brooklyn, N. Y.

Owing to the decline in the prices of materials and the more favorable attitude of labor, builders in Allentown, Pa., are looking forward to an active season. Architects are at present busily engaged on drawings of contemplated work which includes some rather pretentious undertakings in the building line.

Modern Stable Fittings.

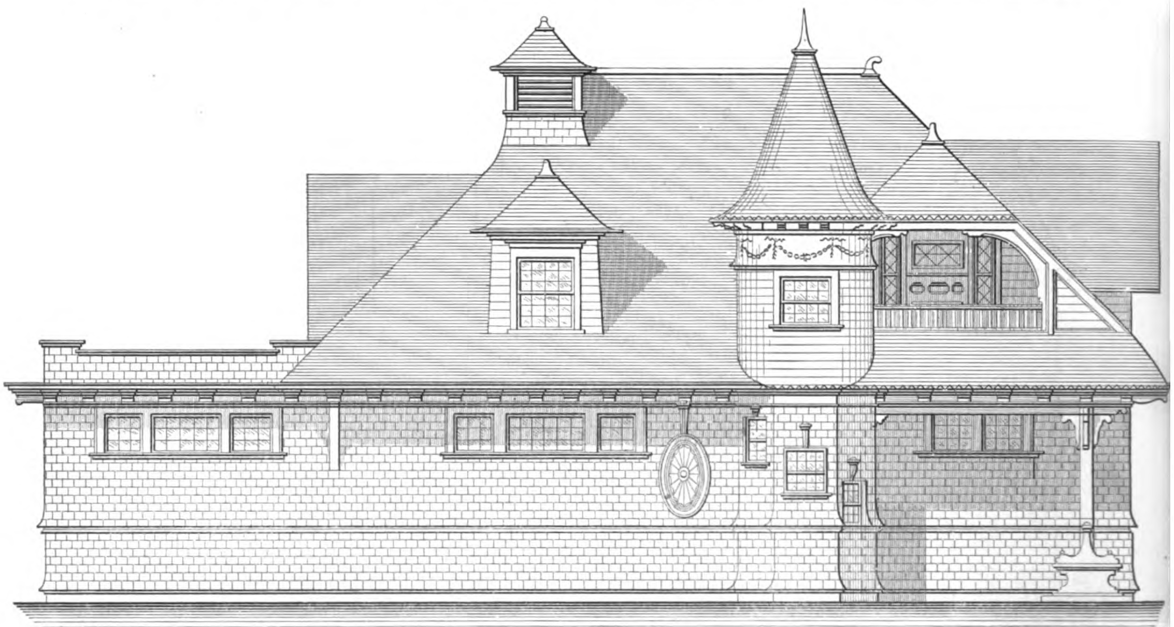
The great strides which have been made in recent years in the housing of the horse is a matter of special interest to the architect and builder, as it must naturally be to the owner of the animal itself. There was a time when, according to all traditions, the floor of a stable should be of earth or of wooden planks but at the present day other ideas of sanitary requirements prevail and a great change in these matters has been wrought. In one of the daily papers not long ago a writer presented some comments on the modern stable and its fittings, which are of interest, in a general way at least, to many of our readers, and we present the following for their consideration.

In referring to the use of planks for floors of stables the writer expresses the view that it was "without exception the most unsanitary arrangement which could have been imagined. The effects were manifold and far reaching. The wood acted as an absorbent sponge under the hoof, becoming saturated with urine, in which the horse stood and slept. As the great weight of the horse was transferred from spot to spot, the excess was naturally brought prominently to the surface, and the result was, first, that the animal contracted acute indigestion from the noxious fumes. This annoyed him, developed vicious tendencies, started him cribbing, etc., and finally his hoofs became affected or diseased outright, all due to the foul air in which he lived and slept. Therefore the remedies used, as long as the horse remained in the same surroundings, were simply palliatives and not curatives, and the last state of that horse was worse than the first.

Once ammonia gets into wood there is nothing which will take it out, and it should be clearly understood that the natural smell of a horse in a sanitary stall is not objectionable, either in the stable or on the clothes. It is simply the stale and fermented refuse which surrounds stables that is a disgrace to civilization. Here the great change has come in, and has been almost universally adopted by the more wealthy, as well as the more up-to-date owners of valuable horse stock, of whatever class or type.

The first step was the use of the small oblong, vitrified bricks, so long used in England. These have a glazed, non-absorbent surface, are almost as hard as iron, and well-nigh impossible to chip, the edges of which are cut away for perfect drainage facilities, being rounded off so that a chipped brick or even a cracked brick in a stall is an extreme rarity. Being slightly roughed, the horse will not fall if he throws himself around, and each day a few pails of water can be thrown in, the stiff brush applied, and the entire surface made sweet and clean. A detail in the laying of these brisks is that every tier or row drains direct to a central inverted "T" grating, which runs about half-way up the stall, and then direct into the cesspool, within striking distance, and which in turn either drains into an outer pool, or is emptied each day. Not only is this the most desirable sanitary condition, but a horse in such a stall has 20 per cent. placed on his value by appearance alone.

Most of the best stalls in the leading stables of the various metropolitan cities of this country are now equipped with the famous Musgrave specialties, that English firm having built most of the really important stables on the continent of Europe, and the introduction of their work here has marked a distinct advance right along the line. As a rule, the woodwork of the stalls is teak, with a 2-inch dado; the wood extends upward about 4 feet, or as high as a horse might be expected to kick under ordinary conditions, and above that is stout iron railing, a novel feature being the immensely strong way in which the stall posts are sunk into the concrete, or screwed to the floor, as necessary. This permits a telescope rod to be withdrawn from the interior of the stall wall proper, and extended to a rear wall or post. This rod being about 3 inches in diameter, and having a blanket hung over it, transforms the stall to all intents or purposes into a loose box for a sick or restive horse to which it is desired to give additional freedom of movement. Thus the posts, etc., have no base above ground, which is one of the features specially designed to keep the animal from hurting himself by accident.

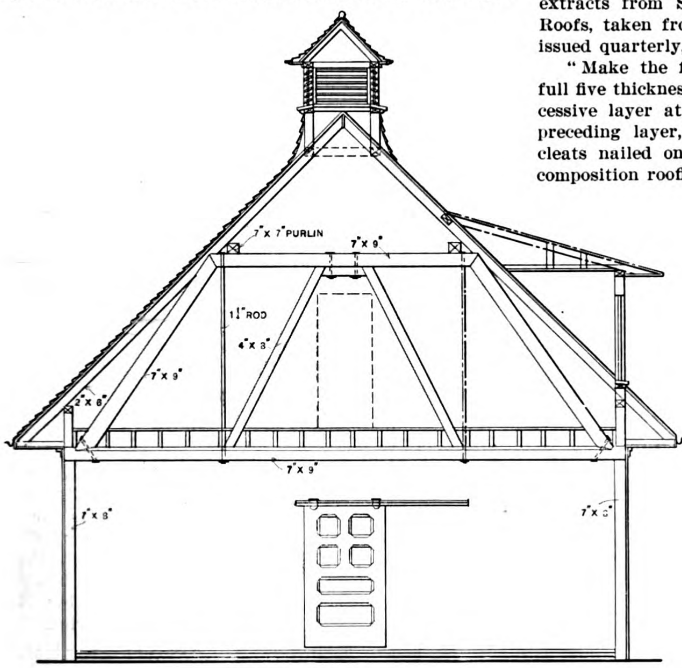


Carriage House and Stable.—Side (Left or South) Elevation.

Along this line it will be found that all the mangers, which are of metal, have usually broad lips, with carefully rounded exteriors, the lips rendering it impossible for a horse to grasp such a breadth with his teeth, thus breaking up cribbing at the outset. The halter is fitted with a traveler, running along the head of the stall, so that when a horse moves around the halter goes with him. As the oat manger and the water manger are on opposite sides, the horse eats to the left, and, wanting to drink, moves over to the extreme right. This the traveler permits him to do, and he does not slop his dry food. The halter can also be attached to a spring apparatus which permits a short, 4-foot head line, which is automatically extended as the horse backs away or turns, but at once recoils itself, out of the way, directly the horse moves forward, thus rendering entanglement round the feet an impossibility.

The hay is no longer placed in a rack above the animal's head, whence it was pulled down to waste, trodden underfoot, but is now contained in a division of the manger, with a suitable wire screen over it, so that while the horse has still, desirably, to pull it out, only a certain amount comes each time, and instead of falling to the floor the surplus falls back into the manger. This makes the horse eat much slower, as well as obviating waste. In the oat and general feed manger, there are fixed small rollers which prevent a horse "throwing" his food to the side and out.

The sides of the stall, being of wood, have drainage devices for any water which may be splashed at or against them and trickle down, so that there is constant



Vertical Cross Section.

dryness and absence of wet fermentation, and germ birth is discounted. The doors are fitted with neat devices which necessitate the insertion of the finger and thumb to open, and so prevent the most clever rogue from opening the door himself, a trick many horses have. They cannot get out of order, and are very simple but effective.

There is a total revolution in the saddle and harness room. The old pegs on which anything was hung that was not thrown down gave way to a series of space-economizing devices for saddle racks, and harness bosses for bridles, &c. The racks for interchangeable name letters are legion; pole racks are made with burnished brass fittings which can be taken from the uprights to be cleaned; burnished brass racks for broom, shovel and fork; telescopic suspensory racks which hold harness at any desirable hight for cleaning purposes; nonabsorbent teakwood pails with monograms; racks to stretch girths and surcingles, and keep them the correct shape and size; halters of all leather with brass trimmings, and, probably the most welcome of all, an adjustable harness-cleaning table, which at will is a 5-foot square table or, by folding up the side leaves, becomes an inverted "V" shaped saddle rack, with end drawers for polish, &c. This table, when used for washing, soap, &c., has special drainage features, which at once carry away surplus moisture. In fact, the list is well-nigh endless, and almost every detail is either a decided innovation of modern times or a decided improvement on what has hitherto been in use.

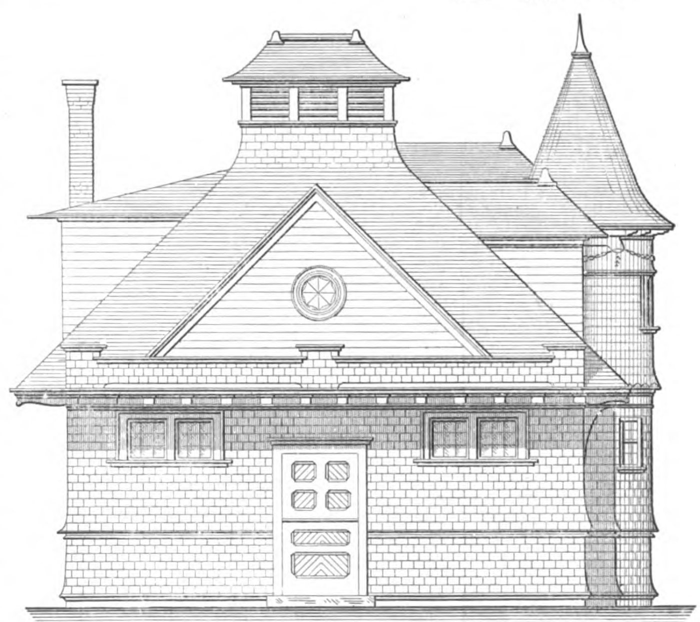
Slag Roofing for Flat Roofs.

More or less inquiry has recently been made with regard to the laying of slag roofs, and as bearing upon the subject we take pleasure in presenting herewith some extracts from Specifications for Slag Roofing for Flat Roofs, taken from a recent issue of a little publication issued quarterly, under the name of "Headquarters:"

"Make the first course next the walls or eaves of full five thicknesses or layers of felt. Then lap each successive layer at least two-thirds of its width over the preceding layer, firmly securing the felt with tins or cleats nailed on in the manner customary to the best composition roofing, and thoroughly mop the surface underneath the outer layer of the first course and underneath each succeeding layer, as far back as the edge of the next lap, with a coating of hot coal tar pitch, in no case applied hot enough to injure the woolly fiber of the felt.

"The quantity of felt to be used per 100 square feet of roofing to be not less than 70 pounds.

"Over the entire surface of the felt thus applied spread a good, heavy coating of hot coal tar pitch, heated as before specified, and completely cover the same with a coat of slag, granulated and bolted for the purpose, using no slag larger than that which will pass through a ⅝-inch mesh, and none smaller than that which will be caught by a ¼-inch mesh. The slag to be free from sand, dust and dirt, and applied perfectly dry and while the pitch is hot."



Rear Elevation.

Carriage House and Stable.

A JOINT MEETING of the Executive Committee of the Master Builders' Association of New Britain, Conn., and the Executive Committee of the Carpenters' and Joiners' Union was held February 13, when a minimum wage scale of $2.80 a day was agreed upon. It was also agreed to allow one apprentice to every six journeymen.

CONVENTION OF NEW YORK STATE BUILDERS' ASSOCIATION.

THE convention of the New York State Association of Builders, held in Buffalo on January 21, was the most successful gathering in the history of the association, there being present a total of 235 delegates, representing 18 different cities and 35 different organizations of builders.

The delegates at the opening session of the convention were called to order by President Walsh at 11 o'clock, when George W. Maltby, President of the Buffalo Exchange, extended a few words of greeting, assuring all that the local association was very happy in the privilege of playing host to the delegates to this State meeting. He reminded them that the object of these meetings was to calmly and conservatively consider the problems of the builders as they confront them to-day, calling to mind that the needs of the various districts were diverse in the extreme, but stating that if a liberal spirit were pursued platforms acceptable to all could be adopted. He touched upon the elaborate entertainments, and said along this line that the State Association should be conservative, and while the entertainment provided by the local exchange would not be lavish, such as given, was offered in a generous, hospitable spirit.

The following is a list of the official delegates to the convention, not including the Buffalo contingent:

ALBANY, N. Y.—Richard Wickham, W. G. Sheehan, E. A. Walsh and James H. White.

AMSTERDAM, N. Y.—K. B. Schotte.

BATH, N. Y.—M. E. Shannon.

BINGHAMTON, N. Y.—C. J. Moffat, E. W. Seymour and W. J. Newing.

BROCTON, N. Y.—E. C. Bailey.

ILION, N. Y.—H. F. Dennis and F. O. Harter.

JAMESTOWN, N. Y.—Charles Swanson.

NIAGARA FALLS, N. Y.—Fred J. Allen, James Wynes, William Gillett, John Sandstrum, John Lennon, J. H. Rothrock & Co., C. F. Braas, John Petman, W. J. Cowdrick and John H. Finnell.

NEW YORK, N. Y.—Ernest F. Eidlitz, S. M. Wright, Charles S. Cowen, Frank M. Weeks, John J. Roberts, S. Meyers, William Cranford, Luke S. Burke, Charles F. Harts, S. E. Pelham and R. Taylor.

OLEAN, N. Y.—B. U. Taylor.

ROCHESTER, N. Y.—H. Stallman, Jr., John Karwick, Charles Hasenhauer, Fred Gleason, A. W. Hopeman, J. B. Pike, F. G. Sauer, William Maas, Martin La Force, W. A. Perkins, R. Williamson, Albert Bullis, Charles Hetzler, J. E. Summerhays and J. L. Stewart.

UTICA, N. Y.—William Fisher, E. C. Richards, R. R. Roberts, William Carson, J. H. Grant, H. H. Edgerton, F. P. Stallman, Henry Stallman, John Luther, J. J. L. Fredrick, A. E. Beale, B. McSteen, T. Pierrepont, E. C. Pierrepont, Albert Bullis, J. J. Young, Henry Waltzen, W. H. H. Rogers, J. A. Smith, George Swan, T. H. Swan, Moses Knapp, John Bailey and S. Bleisheim.

The report of James M. Carter, secretary-treasurer, showed the State Association to be in splendid condition, decided numerical and financial gains having been made the past year, and that there was scarcely a city or town in New York State that was not now represented in the State Association. Mr. Carter urged that the association adopt a uniform style of contract to govern, in so far as practicable, the agreements made between the individual members of the association and the union bodies, and recommended that the uniform date of expiration of these agreements be January 1. He also urged that the contractors disapprove of the sympathetic strikes, and provide for an arbitration committee to handle and adjust all grievances existing between the two bodies.

A report from the various delegates on the building and labor situation in the various cities was then given, these reports showing the pay of the mechanics to be slightly in excess of that of the year 1902. The convention was unanimous, however, in the sentiment that workmen's wages were now high enough, and that no advance in their scale should be made the coming season. The report also showed the general building situation of the State to be somewhat less active than a year ago.

Ernest F. Eidlitz of New York City, counsel of the State Association, tendered a most interesting report of the legislative work of the association. He is recognized as the leading authority on building law in the State of New York, and consequently his report each year of the new laws enacted and his explanation of these laws is of decided interest and real value. Mr. Eidlitz said that obnoxious legislative matters, both local and State, usually resulted because of ignorance as to the merits of the case on the part of the legislators and indifference to the true situation on the part of the builders. He therefore urged that all builders of the State co-operate with the Legislative Committee in the carrying out of the State legislative work.

James M. Carter gave a brief report of the meeting held in Chicago, called for the purpose of forming a National Building Trades Employers' Association, and he expressed the opinion that the National Association formed in Chicago was going to make the same mistake as the old National Association—that of extravagance. He also expressed the belief that a national body formed of the various State associations, with a small working executive committee, was the most feasible line on which a national organization could be formed.

W. H. Hunt, president of the Cleveland Builders' Exchange, gave a brief talk on the Cleveland employers' movement, and said that by getting together they had been able to force the labor organizations to adopt vastly more fair and honorable tactics in the dealings with their employers.

A committee composed of one member from each organization represented in the convention having been named by President Walsh to nominate officers for the coming year. Stephen M. Wright, as chairman of the committee, reported the following nominations: President, Charles A. Cowen, New York City; vice-president, Fred Gleason, Rochester; counsel, Ernest F. Eidlitz, New York City; secretary-treasurer, James M. Carter, Buffalo. These were unanimously elected to the offices as designated.

Entertainment.

The social affairs of the convention took the form of an informal luncheon served at noon, in the spacious Assembly Room of the Builders' Exchange. Over 300 people gathered there at noon to meet and lunch with the delegates. At 6.30 p.m. a dinner was served at the Ellicott Club, over 200 delegates and friends attending these festivities. On both occasions the delegates were the guests of the Buffalo Exchange.

After the good things to eat and drink had been disposed of Colonel John Feist of Buffalo, as toastmaster, presented the various speakers, who responded to the toasts assigned them. The first speaker was Frank W. Carter of the house of George W. Carter Sons Co., whose toast was "Some Side Lights." His response was a vigorous plea for the "open shop," the form operated by his concern. He said in part:

We believe that in union there is strength. We believe that men have inalienable rights to form themselves into organizations. We believe that through such organizations much good ought to accrue to the individual, and through him to his city, his State, his nation—the world. We believe that they ought to create a healthy rivalry between man and man. We believe, further, that a man has as much right to stay out as he has to go into a labor union; that if he needs he can achieve his position in the world better as an isolated factor than as one of many, it is his clear duty to remain that isolated factor; that if he finds the restrictions that to some men are as meat and drink poison to him and his strength, he has no business in a labor union. We believe, too, that the rights of these combinations do not include a new application of the old brute might that made the right of primitive man, whether this might is exercised through a physical strength that lays his opponent to the ground or through the weight of an influence that counts itself in votes and attempts to direct the legislation of the land, or through the thousand and one insidious and devious paths that have hindered work and workmen many times. These summed together, gentlemen, make significant part of our business credo. You will note, if you please, that we grant fair play; that we concede to the non-union man. At the same time we arrogate something to ourselves, our own responsibilities, our own rights, for we hold that as our brains, our training,, our experience, our abilities, our money, are the materials that go into the construction of our business, we, and we alone, are the responsible heads, and we, and we alone, are the ones to direct our employees, to tell them how many hours they may work, how much they shall accomplish, to what other work dependent on their own they shall for the time be transferred, what pay they shall receive.

Now let me say again, we admit that in unions there lies a chance for tremendous good, the upbuilding of men's character by practice and by precept, the education of men in books and in pictures, in a delight in nature, in the enjoyment of such interests as make life full and rich to you and to me, the awakening of human sympathies, the bettering of home conditions, the interchange of ideas and of thought, that ought to result in improved methods of work, in labor saving and health saving devices, the pleasant gatherings with wives and children that should be truly recreative—these are the things we believe unions can accomplish. Do they? We cannot answer. We leave it to their own consciences, for organizations do sometimes have souls. Some of you may tell us that the trend of modern events is combination. We know it. You may point to department stores and trusts, even to nations themselves. We grant them, but can you deny that these are all at one end of the line and must soon come back on the rebound to a healthy condition?

So far shall they go and no farther, must be the keyword of all combinations of men or of capital, and how far can be determined only by consulting the rights of the individual.

The next speaker was E. B. Green of Buffalo, who responded in a most interesting manner to the toast, "Relation of Architect and Builder." He was followed by Frank M. Weeks of New York City, to whom was assigned the toast, "The Employers' Association of New York." Then came Fred Gleason of Rochester, who talked of "The State Association." He in turn was followed by Ernest F. Eidlitz of New York City, who discussed "Opportunities."

The speaker next on the list was William H. Hunt of Cleveland, who considered at some length "The Need of Organization." What he had to say so strongly appeals to the situation of to-day that we give the following extracts from his remarks:

Actuated by similar motives and inspired largely by the aggressive methods of organized capital, labor has been infused with the spirit of the times, and has intrenched itself in formidable union, making such demands as can no longer be sustained. Capital and labor must share, therefore, the responsibility for the present reaction from the flood tide of business prosperity. Human nature is much the same, whether the man be master or journeyman, and when men are associated together in a corporation or a union there is but greater power given the same instincts. The employer and the wage-earner alike have striven to profit in the utmost measure during the recent years of our phenomenal industrial progress.

The paramount question is, In what manner can public confidence be sustained, and continued prosperity be assured? The builder and the dealer seem to have found a common ground upon which they can meet to transact their business, and maintain peace and harmony in their trade relation. It is the aim of the dealer to obtain the highest market price and of the contractor to buy as low as possible. If there exists a practical monopoly in a given material, and a scale or price is fixed, the builder accepts the inevitable and pays the price demanded. He does not attempt to "smash" the combination because the combination has been effected; destructive competition had perhaps so demoralized the industry that a "living" profit might be assured upon the capital invested.

Digressing for a moment, and touching upon the question of organization among the builders, there must ever be competition in the building trades. The varying individual talent or individual capacity cannot be combined upon any commercial basis of equality. During all this period of the merger and the combination the builder has stood alone, practicing his vocation in his own peculiar way, and fighting his battles as his individual judgment best directed. Trade associations have been but partially effective in accomplishing the desired end, as no association representing a single branch is strong enough to sustain the fundamental principles vital to the industry as a whole.

The builders' exchange idea affords primarily a business convenience, a social and sometimes a civic or legislative body. The aggressiveness of organized labor, the frequency of unreasonable, unlawful and un-economic demands, the pernicious practices of many of the unions, due in large measure to the so-called "walking-delegate" or business agent, the enforcement of the sympathetic strike and other evils have made necessary compact and effective organizations of building trades employers, that their own interests may be properly protected.

The Building Trades Employers' movement, supporting certain fundamental principles which are but the rights guaranteed every American citizen under the constitution of the United States, is moving forward with a mighty impetus. A grave danger lurks, however, in the haste with which some of these movements are thrown together, and the conflict of opinion as to the wisest and best plan of procedure. Conditions have been more favorable in some cities for unionizing the various crafts, thus obliging the contractors to adopt generally the policy of trade agreements, which establishes practically the policy of the closed shop. Greater resistance to the damands of union labor in other cities has made possible a continuance in part of the policy of the open shop.

It is not my purpose to discuss the merits or demerits of either policy, but I confidently express my belief that the trade agreement, defining as it does, for a period of time, the wage scale and hours and conditions of labor, is the one instrument that has prevented the building industry from reaching a state of complete chaos. No agreement should be made which does not preserve the cardinal principle of individual liberty. Why should not the relationship between employing contractor and the journeyman be upon a business basis? This view of the question is now held by many of the foremost builders of the country. There is a basis, moral and reasonable, upon which peaceful and harmonious business dealings may be established, and this can only be reached by calm and deliberate counsel.

Compact local organizations among the building trades employers is essential; first, trade associations, each dealing with the journeymen of its branch upon the question of wages and hours; then the central body, comprehending all branches of the trade, supporting the fundamental principles that should govern every builder in his dealings with labor.

An effort has recently been made to organize a National Building Trades Employers' Association. I cannot refrain from directing attention to this movement, because of the danger there may be in having inflicted upon comparatively peaceful communities Chicago's troubles. The general labor situation in Chicago has been worse than in any other city of the country. Troubles in the building trades have been aggravated because of disputes with motormen, conductors, teamsters, stockyard employees, &c., until the entire business community has been outraged by the demands of labor bodies.

I do not question the sincerity or honesty of purpose of the estimable gentlemen who have launched this so-called National Organization. The eight cardinal principles adopted are such as can be and should be indorsed by every builder. There are, however, questions of expediency involved in our attitude toward the labor problem. It has been demonstrated that labor disputes cannot be adjusted by Fourth of July orations or pyrotechnic display. This policy only aggravates the situation. The rights of the employer can be better sustained and labor more effectively forced to deal fairly by conservative and thoughtful counsel upon the part of the builders in determining the wisest and best way to act.

Mr. Hunt's remarks were followed with the closest attention, and what he had to say was not without effect. The toast, "Buffalo's Growth," was responded to by A. J. Elias of Buffalo; "The Press" was assigned to John R. Joslyn of the same city, and Stephen M. Wright of New York City related many interesting and amusing "Experiences."

The banquet closed what was regarded by all present as a most interesting and profitable meeting.

Convention of National Builders' Supply Association.

The National Builders' Supply Association held their annual convention in Buffalo, February 2 and 3, the headquarters being in the Hotel Iroquois.

The opening session of the convention, which was executive in character, was held Thursday morning at 9 o'clock, President John A. Kling of Cleveland, Ohio, being in the chair. The general business meeting opened at 2 p.m. Hon. Herbert P. Bissell of Buffalo gave the address of welcome, the response being given by President John A. Kling.

The following papers were read: Address on "Cement," by Charles A. Matcham of the Lehigh Portland Cement Company; paper on "Lime and Hydrated Lime," by Charles Warner of Charles Warner Company; paper on "Sand-Lime Brick," by L. F. Kwiatkowski of New

York; "The Newest Building Material," by J. A. Ferguson, President American Hydraulic Stone Company, Denver, Colorado, and an address on "Association," by Addison H. Clarke of William Wirt Clarke & Son, Baltimore, Md.

Wednesday morning a meeting of the association and all the manufacturers of Portland cement was held, after which the following officers were re-elected for the ensuing year:

President, John A. Kling of the Cleveland Builders' Supply Company, Cleveland, Ohio.

First Vice-President, C. E. McCammon of L. H. McCammon Brothers, Cincinnati, Ohio.

Second Vice-President, Gordon Willis of Hunkins-Willis Lime and Cement Company, St. Louis, Mo.

Treasurer, J. N. Thayer of O. C. Thayer & Son, Erie, Pa.

Secretary, Richard Kind of the Toledo Builders' Supply Company, Toledo, Ohio.

On Tuesday afternoon the ladies accompanying the delegates to the convention were given a trolley party to Niagara Falls, and on Wednesday afternoon they were given a theatre party at the Star, witnessing the comedy, "Nancy Brown." On Wednesday afternoon the delegates were taken on a trip to Niagara Falls and around the Gorge Route.

Convention of Pennsylvania State Association of Builders' Exchanges.

THE annual convention of the Pennsylvania State Association of Builders' Exchanges was held in Scranton, Pa., according to programme, on January 13 and 14. The gathering was a thoroughly representative one, there being present delegates from the leading cities of the State. The meeting was called to order a little after 11 o'clock on the morning of the 13th, William Hanley of Bradford being in the chair. The principal business was the adoption of a constitution and bylaws, and this occupied the attention of the delegates for the better part of two days.

According to the constitution as finally adopted, the objects of the association are "to promote and protect the interests of its members, to maintain just and equitable treatment in their relations with each other and with their employees, to encourage the formation of associations of contractors in every community in the State, and to promote and protect the business interests of the members to the end that the confidence of the building public may be sustained and that continued and uninterrupted prosperity in the building industry may be assured."

Any builders' exchange or builders' employers' association is eligible to membership in the State association, and representation to it shall be upon the basis of five delegates for every central organization, for every exchange of 100 members or less, and one vote for each additional 50 members or fraction thereof.

On January 14 officers were elected for the ensuing year as follows:

President, Edwin S. Williams of Scranton, Pa.
First Vice-President, Albert Wales of Sharon, Pa.
Second Vice-President, W. H. Dennis of Bradford, Pa.
Secretary, John S. Elliot of Pittsburgh, Pa.
Treasurer, E. J. Detrick of Pittsburgh, Pa.

EXECUTIVE COMMITTEE.

Col. George C. Ricarts of Oil City, Pa.
J. Charles Wilson of Pittsburgh, Pa.
William Hanley of Bradford, Pa.
Henry Burger of Lancaster, Pa.
S. S. Kime of Harrisburg, Pa.
Charles Schank of Erie, Pa.

The association recommended an elaborate declaration of principles, affirming that there shall be no limitation as to the amount of work a man shall perform during his working days, that there shall be no restriction in the use of any manufactured material except prison made, that no person shall have the right to interfere with the workmen during the working hours, that the use of apprentices shall not be prohibited, and that the foreman shall be the agent of the employer. The Executive Committee was authorized to fix the time and place for holding the next convention.

On the evening of the 14th a banquet was tendered the delegates by the Scranton Builders' Exchange at the Hotel Jermyn, covers being laid for 200. A number of toasts were proposed, and the speeches were received with evidences of keen appreciation. John S. Elliot of Pittsburgh responded to the toast "Organization;" John S. Stevens of Philadelphia, to the toast "Discipline;" John R. Wiggins of Philadelphia, to the toast "Constitutional Liberty;" John Atkinson of Philadelphia replied to the toast "Unity of Action;" S. S. Kime of Harrisburg talked about "Legislation," and William H. Shepard of Wilkes-Barre had something to say about "Hindrances."

Treating Red Oak to Secure "Weathered Oak" Effect.

In answering one of its readers, who made inquiry as to the method of treating red oak to secure the weathered oak effect, the *Painters' Magazine*, in a recent issue, says: It can be done with an alkaline solution or by staining with either water stain, spirit stain, or oil stain. Weathered oak is a term employed to designate the natural appearance given to dressed oak by age and exposure to the elements. The depth of the effect depends upon the length of time of exposure and the location. It may be simply a light brown or a brownish black effect or any intermediate hue between these. There is no set rule or standard. The following solutions will stain red or white oak to the weathered effect, and penetrate well into the wood. These must be applied repeatedly until the proper depth is obtained:

1. Equal parts of sulphate of iron (green copperas) and water.

2. Iron filings or the scales from a blacksmith's forge, steeped in sulphuric acid and water. Apply the liquid from this with a sponge tied to a stick until the wood is dark enough.

3. Dissolve 1 ounce bichromate of potash in 1 pint of water. Use this alternately with No. 2, always permitting each coat to dry.

4. Dissolve 2 ounces each of American potash and American pearlash in 1 quart of water and apply to the wood with a sponge on a stick, but take care that your hands do not come in contact with it. Give alternately one coat of this and one coat of No. 1 or No. 2.

All of these solutions tend to raise the grain of the wood somewhat, and if it is to be finished, the surface must be smooth sandpapered. A quick drying weathered oak stain can be prepared by saturating with alcohol equal parts of Vandyke brown and ivory black in fine powder, mixing this with shellac varnish to a thin paste, and then thinning with wood alcohol to thin consistency for brushing. Or the aniline black nigrosene B with a trifle of Bismarck brown may be dissolved in alcohol and used with shellac varnish and alcohol as above, or diluted with water and used as water stain.

The spirit stain, however, is best for fine work, as it does not raise the grain, and the shellac acts as binder, giving a nearly dead finish without a second operation. An oil stain can be made by using Vandyke brown and ivory black in oil, using turpentine or benzine as thinners and a good brown japan as drier.

In staining red oak the stain must be more of the blue black character than for white oak.

THE Iroquois Theatre fire in Chicago has led to a general quickening of public conscience in the matter of fire escapes, sprinkler systems and fire protection generally, and a large number of property owners who have heretofore avoided or neglected to conform with the city ordinances in regard to fire escapes and elevator shafts are now, either voluntarily or because of awakened public sentiment, installing such protective devices.

OUT-DOOR FURNITURE.

BY PAUL D. OTTER.

IN a little town, tucked away in a bay along the Atlantic Coast, this subject was suggested by the lamp post shown in Fig. 1. In the mind of the genius who spied the tree as a likely support for one of the village lamps it no doubt was thought a mere makeshift—handy, however, as it needed no ladder to attend to the light. Years ago the summer house and other forms of rustic construction were much a part of a well conducted estate—then a long period—when out-door accessories, useful or artistic, were little seen; even the dog was denied his special house and was consigned to the barn or allowed the warmth of the house, to grow lazy and unmindful of intruders.

Now a return to these out-door comforts is very noticeable, being mainly due to the rapid acquirement of farm and suburban homes by the city man. His ideas of comfort and adornment are in evidence within the home, and without there is a seeking after landscape effects, if the extent of ground permits—the location by some prearranged plan of certain fixed features that will be pleasing to the eye from the central point, the dwelling.

Fig. 1.—A Rustic Lamp Post.

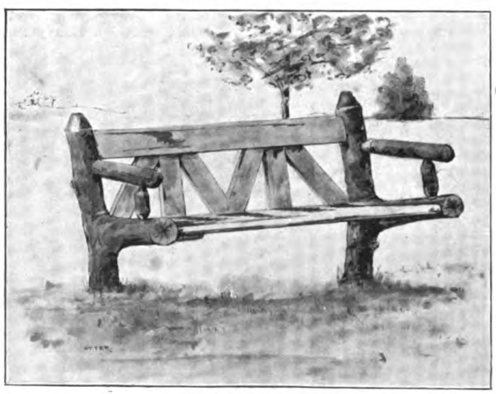


Fig. 2.—A Quaint Settee.

Fig. 3.—Chair with Tree Stump for a Base.

Out-Door Furniture.

These features are much in the province of landscape gardening, but as accessories the artificial, the constructive, must be made use of, which require the ever necessary carpenter. We would all be living in tepees were it not for the carpenter.

There is a certain dignity in having some of the outdoor pieces of furniture fixed, immovable, as a seat inheriting the stump of a tree, a bench ever inviting one to tarry awhile in the sun, for even in February there are often exceptional days when, wrapped in overcoat, a seat out-doors in a wind protected place is a great tonic.

With the suggestions offered in the illustrations there can be no fixed dimensions accompanying them, as they will depend on the material in hand. Inspiration to produce the odd or quaint piece of rustic work must arise from the fact that a condemned tree has upon it sections which will answer for the main members of the proposed construction. Take, as an example, the settee, Fig. 2. It is quite possible to find two members which will "pair," giving a ready made support to seat and back. In this instance, being a fixed seat, sufficient length should be left to set in ground, as a fence post, previously coating the buried portion with coal tar.

It is more often accidental that the favorable location for a seat, or flower stand, is immediately over the stump of a tree, which may be converted to the purpose of a support, to be more substantial than any other. Where such is the case, and other conditions congenial to establishing a seat, such a chair illustrated in Fig. 3 may be constructed at a very comfortable hight by sawing off at a somewhat extreme angle, making the front hight of seat board 17 inches from the ground. Into this board, which should be not less than 1½ inches thick, bore holes in a slanting manner near the edge, into which the spindles are inserted. These spindles and the bow should be, properly, of hickory. A young green sapling can be bent and conformed for the bow to an enlarged shape of the seat, securing the two ends to the front posts, which are natural curves, first being inserted in holes in the stump and secured by nailing to corner of seat. Spacing off the under part of bow, bore the same number of holes as in seat for the spindles, giving them more flare at top. The spindles being selected from green hickory, averaging ¾ inch in diameter, may now be cut. The measure of each being regulated by the bow slanting to the front, each end is then trimmed by a chuck to fit the holes into which they are inserted, and held by wire nails driven and clinched against an iron. A "fitching" may now be easily worked in and out between each spindle, pulling them well up under the bow, securing at intervals with a nail, and at the ends against front stakes. This is done with a much lighter and more pliable hickory stick; it not only reinforces the appearance of the bow, but strengthens it materially when thoroughly set and dry to shape. This is referred to in detail, as the use of the withe assists greatly in bonding together what is at first pliant construction. The barrel hoop to-day is still the hickory strap, however primitive.

No home is complete without sharing part of it with the birds. It is true, since the importation of the English sparrow, the little rascal has it all his own way; he and his fellows constitute a union unto themselves; no other bird carpenter or home builder is allowed to set up a home short of the woods. The purple martin, a respectable citizen and "man of the house," has little chance, however plucky, against this selfish horde. We fear the shotgun is the only thing to clear the way for him, and when once a tenant, he will renew the lease every spring on his return from the South, besides bringing a fine selection of songs to entertain you at the breakfast table. The illustration, Fig. 4, is away from the conventional pattern of years ago, when the attempt was generally to make, in minature, a dwelling. The overhanging rain and wind protecting roofs, it is thought, will be appreciated by the occupants, and the bark slab sides be more appropriate to bird nature. The plans for this house, when prepared, call for seven rooms; the basement consists of a hoop or ring to accommodate visitors. The "elevation," 25 feet from the ground on top of a planted pole, or, if possible, a tree cut off at about this hight. The situation, 75 or 100 feet in front of the windows of the living rooms, is everything in giving enjoyment to the housed in or the invalid.

In constructing out-door furniture the aim should be to have the parts sufficiently stocky to stand the sun and rain without warping or cracking. Therefore, very little inch material should be put into such work. Factory made furniture, for this reason, is undesirable and will weather few seasons, although of late many substantial patterns are made that stand well under the protection of the porch or veranda.

In addition to the light, portable furniture of the piazza, a substantial heavy piece located, for the open air season, at a nearby point on the lawn will save much nightly carrying in of chairs and rockers. Such a piece, Fig. 5, will give welcome dignity, placed just off the driveway or walk leading to porch steps. A roomy bench or settee, Fig. 6, permanently placed in view of the tennis court, should not be overlooked. Here, or near about, might be constructed a luncheon table. It may, however, be a matter of individual desire where the table shall be located, as one spot at a certain time has a greater attraction over another. The artisan and we plain people may favor the level, grassy lawn, but the feminine portion of a wealthy man's household seek to give a proper setting to their functions, or lawn parties—the scene to look bright and gay by locating the table and benches in front of a bed of flowers or a hedgerow; the position at another time, toward the fall, transferred to the vicinity of the ripening grapes on the arbor. Once meals are partaken in the open air there will be many repetitions; even at so late a day it is hard to shake off Adam-like habits. The table, then, Fig. 7, should be built in no flimsy way. The under structure may be mortised and tenoned, then nailed, while the top is made of heavy stock, strengthened by battens. Hooks are then provided to catch into staples in the under part.

(*To be continued.*)

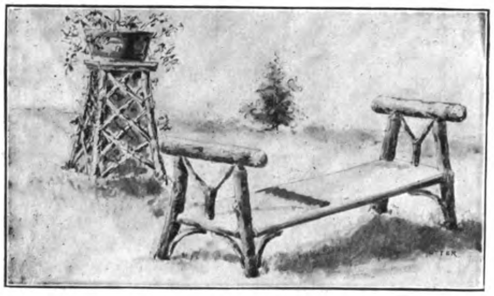


Fig. 6.—A Tennis Court Bench.

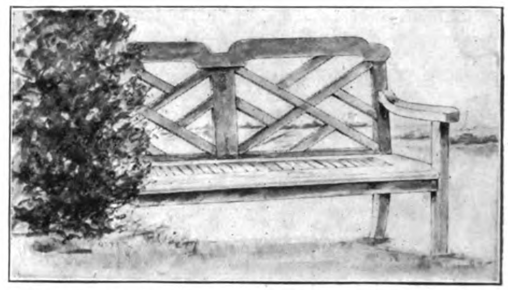


Fig. 5.—A Heavy Piece for the Lawn.

Fig. 4.—An Ornate Bird House.

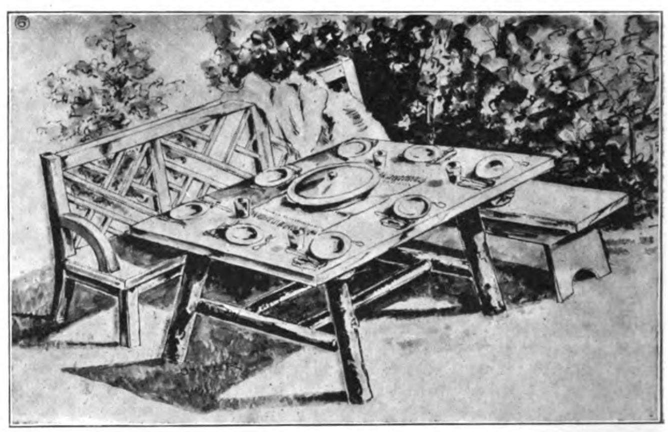


Fig. 7.—Table for the Lawn.

Out-Door Furniture.

The Building Situation in New England.

The building outlook for New England does not appear as bright to most observers as was hoped for in the autumn. Inquiries among the architects in various cities bring out the fact that there is little more work in sight than last year at this time, and last season was a poor one in building. The principal demand is for high class residential property, to be built for occupancy by the owner. Next come residences, single and double, to rent at from $30 to $45 a month, for there is a dearth of this sort of rentable property all through the larger centers of New England. Landlords are advancing their rents and tenants are looking about with the intention of building for themselves, but are confronted with the high prices of most materials and by the still higher price of labor. While plumbing and heating materials are somewhat lower, lumber is up in the air, and labor is still higher up, with nothing to show that there is any change in the purposes of the unions to maintain wages where they are, excepting where it is possible to increase them. Of cheap tenements there are apparently enough. It is a little early to definitely size up the season's building operations, but the general opinion is that it will be no better than last year so far as residential property goes. As for manufacturing buildings, no expects any great activity this season, though there will be a good deal of new building in the aggregate. There should be about the usual amount of new business blocks.

THE ELEMENTS OF CONCRETE WORK.*—III.

BY FREDERICK W. TAYLOR AND SANFORD E. THOMPSON.

THE advisability of employing machinery for mixing the concrete depends chiefly upon the quantity to be laid. On a small job the first cost of mixing machinery and the running expenses, such as the labor of the engine man, which continue when the machine is idle, may bring the cost of machine mixed concrete higher than hand mixed. The decision may be based entirely upon the cost per cubic yard of concrete laid, provided a first-class machine is employed, since good concrete can be made either by machine or by hand.

The foreman for a gang of concrete mixers need not be of great intelligence, but must be one who will obey orders strictly, and know how to keep all of his men constantly busy. The amount of work turned out will depend to quite an extent on the arrangement of the gang, whether each man has certain definite operations to perform over and over again, and whether these operations fit into the work of the rest of the gang so that none of the men have idle moments.

A gang of at least six men besides the foreman is required even on small work, while as many as 23 men may be effectively employed. In addition to these, an inspector is generally necessary to watch the placing of the concrete and see that the mixture is uniform and of proper consistency. Italian laborers make good men for mixing and transporting the concrete.

The materials for the concrete ought, of course, to be deposited as near the work as possible. The cement, whether it comes in bags or barrels, must be sheltered from the rain. Covering with plank is insufficient. Bags should be protected from moist atmosphere; a cellar is likely to be too damp. To keep the sand and stone as near the mixing platform as possible, it may be advantageous to haul the materials as they are required from day to day. If the sand or stone pile is at any time further from the measuring boxes than a man can profitably throw with shovels without walking, say more than 8 or 10 feet, do not hesitate to have it loaded into wheelbarrows and dumped into the measuring boxes. Materials can be wheeled in barrows for any distance between 10 and 25 feet from the platform at about the same cost as they can be shoveled direct with a long throw.

There are many methods of mixing concrete by hand, all of which with care will produce good work. For the convenience of the inexperienced the following directions for the work of a small gang of six men with foremen may be useful. They are given merely for illustration, and must be more or less varied to suit local circumstances.

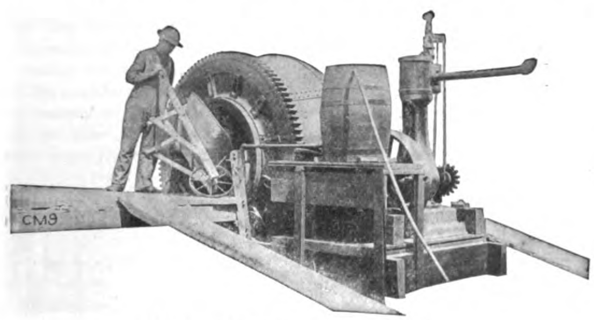


Fig. 7.—The Gilbreth Rotary Mixer.

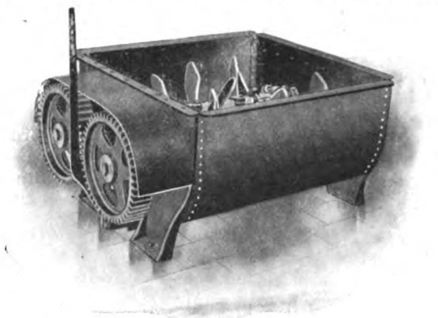


Fig. 9.—The Iroquois Duplex Mixer.

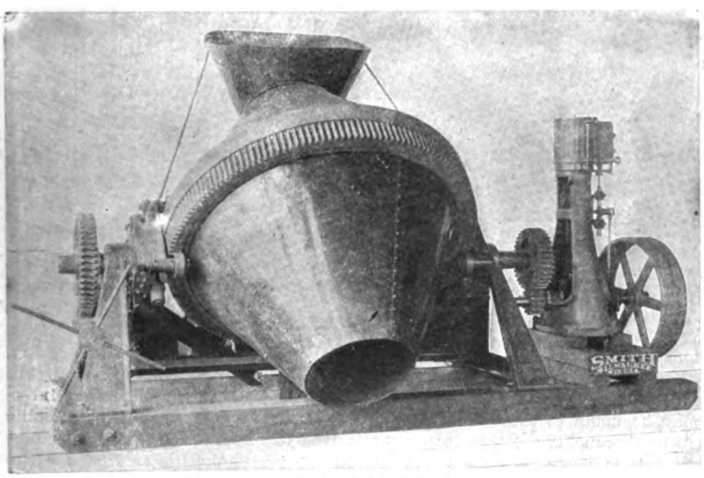


Fig. 8.—The Smith Mixer.

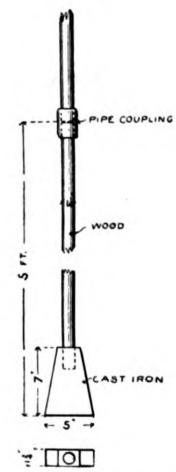


Fig. 11.—Rammer for "Mushy" Concrete.

The Elements of Concrete Work.—Various Styles of Mixers.

Directions For Mixing Concrete.—Assume a gang of four men to wheel and mix the concrete, with two other men to look after the placing and ramming.

When starting a batch, two mixers shovel or wheel sand into the measuring box or barrel—which should have no bottom or top—level off and lift off the measure, leveling the sand still further if necessary. They then empty the cement on top of the sand, and level it to a layer of uniform thickness, and then turn the sand and cement with shovels three times dry, as described below, after which the mixture should be of uniform color.

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[This matter has been adapted by the authors for *Carpentry and Building* from one of the chapters of their complete work on "Concrete," about to be published.—EDITOR.]

While these two men are mixing sand and cement, the other two fill the gravel measure about half-full, then the two sand men take hold with them, and complete filling it. The gravel measure is lifted, the gravel hollowed out slightly in the center, and the mixture of sand and cement shoveled on top in a layer of nearly even thickness.* The water may be poured from pails directly on the top of these layers, and after soaking in slightly the mass is ready for turning.

The method of turning with shovels dry materials which have already been spread in layers is as follows:

Two men with square ended shovels stand facing each other at one end of the pile to be turned, one working right handed and the other left handed. Each man pushes his shovel along the platform under the pile, lifts the shovelful, turns with it, and then, turning the shovel completely over, and with a spreading motion drawing the shovel toward himself, deposits the material about 2 feet from its original position. Repetitions of this operation will form a flat ridge of the material, on a line with the pile as it originally lay, and flat enough so that the stones will not fall off. Two other men should immediately start upon this second ridge, turning the materials for the second time and forming as before a flat ridge which gradually replaces the last. A third mixing is accomplished in a similar way.

The quantity of water used must be varied according to the moisture in the materials and the consistency required in the concrete. While the opinions of engineers regarding the proper consistency vary widely, it is advisable, the authors believe, for an inexperienced gang to use an excess of water. The rule may be made in hand mixing to use as much water as can be thoroughly incorporated with the materials. Concrete thus made will be "mushy."

After the material has been turned twice, as described, and as soon as the third turning has been commenced, two of the mixers may stop turning, and load the concrete into barrows and wheel to place. They should fill their own barrows, and after the mass has been completely turned for the third time by the other two men the latter should start filling the gravel measure for the next batch.

If the concrete is not wheeled over 50 feet, four experienced men ought to mix and wheel on the average about 10½ batches in ten hours. This figure is based on proportions 1 : 2½ : 5, and assumes that a batch consists of one barrel (four bags) Portland cement with 9.5 cubic feet of sand and 19 cubic feet of gravel or stone.

Assuming that 1.29 barrels of cement are required for 1 cubic yard of concrete—as given in Part I in *Carpentry and Building* for January, 1904—one barrel of cement—that is, one batch—will make 0.78 cubic yard of concrete; hence 10½ batches mixed and wheeled by four men in ten hours are equivalent to 8¼ cubic yards of concrete. This is for the very simplest kind of concreting and makes no allowance for the labor of supplying materials to the mixing platform or building forms.

On large contracts machinery for mixing concrete is universally replacing hand work. The economy of this is usually as much due to the appliances introduced for handling the materials and the concrete as to the saving in the actual labor of mixing. Any arrangement which requires shovelers to measure and spread materials before they enter the mixer results simply in the saving of the process of hand turning of the concrete and the labor of shoveling it into the vehicle, and this saving is partly balanced by the cost of maintaining and operating the mixer; in fact, on a small job this cost of maintaining and operating almost invariably exceeds the saving in hand labor and renders the expense with the machine greater than without it.

The design of the appliances or plant for handling the materials, and to some extent the selection of the type of mixer, depend upon the local conditions, the quantity to be mixed per day and the total volume of concrete. It is evident for a large mass of concrete masonry that it pays to invest a considerable sum in machinery to reduce the number of men and horses required. If, however, the work goes slowly, and on account of other conditions only a small quantity, we will say not over 50 cubic yards, can be deposited in a day, the cost of expensive machinery cuts a very large figure and hand labor may be cheaper. In estimating the interest on the cost of the plant to be charged against a cubic yard of concrete, instead of dividing the interest per day by the usual output, one must take the interest for the year divided by the total amount of concrete to be laid in the year. In other words, one must allow for the days when inclement weather prevents work. For the depreciation, the value of the entire plant when new, minus its estimated value after the job is completed, is divided by the total number of yards of concrete. Some of the other running expenses, such as the wages of the engineman, may continue from day to day, whether or not any concrete is being laid.

Concrete mixers are of two general classes: 1, continuous mixers, into which the materials are fed continuously, usually by shovelfuls, and the concrete discharged in a steady stream; and, 2, batch mixers, designed to receive at one charge, say, a barrel or a bag of cement with its proportionate volume of sand and stone, and after mixing to discharge it in one mass. It is impossible to separate these two classes very distinctly, because many of the machines are capable of both uses.

The authors are opposed, as a rule, to the use of continuous mixers, unless the materials are measured and fed mechanically, on account of the difficulty in obtaining a homogeneous mass. When the ingredients are measured out by hand, spread in layers one above an-

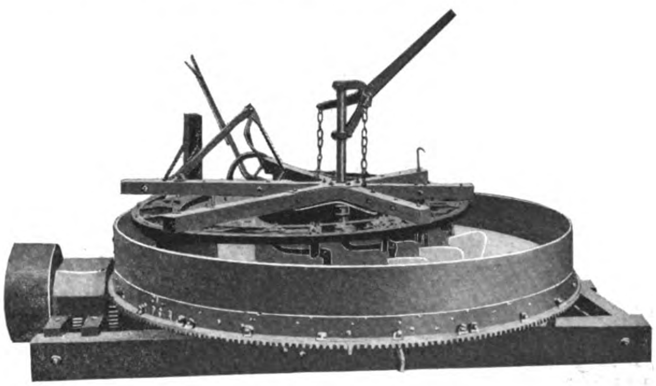


Fig. 10.—The Campbell Mixer.

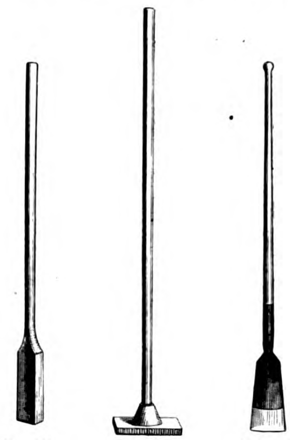


Fig. 12. Fig. 13. Fig. 14.
Various Forms of Concrete Rammers.

The Elements of Concrete Work.

* Some engineers prefer to spread the stone on top of the sand and cement, while others prefer to mix the water with the sand and cement before adding it to the stone.

other, and then, starting at one edge, are shoveled into the mixer, the proportions of the materials in the resulting concrete are regulated by the thickness of the layers of the different ingredients rather than by the dimensions of the measuring boxes. If in one portion of the pile the layer of cement is thicker than in another, the resulting concrete will be proportionately richer. With "batch" mixers, all the materials being placed in the machine at once, the homogeneity of the product depends upon the character and time of mixing, instead of upon the care exercised by the laborers in feeding, and less inspection is necessary.

The regulation of the water supply in machine mixing, as in hand mixing, is largely a matter of judgment. Even if the materials were all supplied under absolutely uniform conditions, the same volume of water would not produce from each batch a concrete of uniform consistency, because as the concrete is laid the water works up through from one layer to the next, so that more water may be necessary early in the morning than later in the day. It is well, nevertheless, to roughly measure the quantity each time, varying the amount from batch to batch, as the condition of the materials and the state of the mass require.

The mixers illustrated in Figs. 7 to 10 represent a few general types of machines of modern design. One of the simplest forms of concrete mixers, which is not included in our illustrations, is a steel cubical box mounted on a timber frame. The materials are dropped in from above through a hinged door on one side, and the concrete is mixed by revolving the box and then dumped into carts or cars below. The mixer itself is inexpensive, but the cost of erecting it and of raising the sand and stone often renders it less economical than more expensive types.

A recent style of rotary mixer, shown with engine in Fig. 7, may rest on the ground, or, in fact, slightly below the surface. The materials are dumped or shoveled into the opening on either side of the mixer, and the water introduced through a pipe. The mixer revolves constantly and the mixing is performed by stationary plates and rods. After a time, which in most cases need be only one-half minute, the concrete is ready for discharging, at the same or even a slightly higher level, into barrows or carts.

Another form of revolving mixer is shown in Fig. 8. The materials are introduced into one end of the cone, and after rotating and striking against mixing blades are dumped, with the machine still running at full speed, by changing the slant of the mixer, so that it is in the position shown in the illustration.

Fig. 9 shows an excellent type of paddle mixer, which is placed upon a raised platform. The sand and stone, which may be measured by hand, wheelbarrows or derrick buckets, with the cement and water are dumped in at the top, and mixed by the paddles on the two shafts revolving in opposite directions. As soon as a batch of concrete is mixed a trap door in the bottom of the machine is opened and it falls into carts or cars, or on to a platform to be shoveled to place or into wheelbarrows.

The mixer, illustrated in Fig. 10, consists of an open revolving pan in which are stationary plows which mix the concrete. The outlet is through trap doors in the bottom.

Placing Concrete.

Since the introduction of concrete into engineering construction the opinions regarding the best methods of placing it have completely changed. Formerly, even in massive foundation work, it was laid in blocks not over 12 inches thick, constructed alternately, and then after thoroughly hardening the forms were removed and the spaces between filled in. Now it is recognized that for water tight work or for the strongest construction the concrete should resemble as nearly as possible one solid mass of stone with no joints. Formerly most specifications required that the stuff should be laid so dry that the water after violent ramming would just glisten on the surface, while now it is the usual practice, although not yet universal, to require a "quaking" consistency, pudding-like, or even wetter. A "mushy" concrete, in which a rammer will sink of its own weight, is most suitable for thin walls or other construction requiring steel reinforcement, recent tests by Prof. Charles L. Norton of the Massachusetts Institute of Technology proving conclusively that a wet mixture best protects the metal from rusting or fire.

Concrete may be shoveled directly from the mixing platform if it is on the edge of the excavation, but usually must be conveyed in buckets, barrows or larger receptacles. The chief requirement in handling and transporting concrete is to prevent the separation of the stones from the mortar. In hand mixed concrete, especially for thin walls requiring the stuff to be carried in buckets, there is a tendency to allow the stones to separate on the mixing platform so that a lot of them come together when cleaning up the last pailful.

In most situations wheelbarrows are a convenient vehicle, and the runs may be placed so as to drop the concrete from the barrow directly into position. If this arrangement is not practicable, a metal chute may be used, provided the concrete is mixed so wet that the mortar will not stick to the trough and cause the stones to separate. On very thin walls it is sometimes advisable to shovel the concrete from the barrow so as to keep a perfect mixture. In other places, where the concrete must be raised, galvanized iron buckets are suitable.

Ramming When Mixed Wet.

Very little ramming is necessary if the concrete is mixed wet. It is usually well, however, to lightly puddle the mass so as to drive out any bubbles of air and to prevent the collection of a mass of stones in one place. The rammer, weighing about 8 pounds, in Fig. 11, is the design of William B. Fuller for use with "mushy" concrete. The handle may be lengthened, as shown, by screwing a pipe coupling on to the wood. A "post hole" tamping bar with iron shoe, shown in Fig. 12, has been successfully used for soft concrete by the writers. A piece of 2 x 3 inch studding cut to the required length and smoothed off so as to be readily grasped by the hands is also a serviceable tool. If a dryer mix is used, so that the material merely quakes on ramming, an ordinary round, square or oblong rammer, as illustrated in Fig. 13, may be used to compact the material, instead of puddling it.

A fairly good face may be obtained with mushy concrete with no special care by keeping a uniform mixture throughout. Thrusting a square pointed spade down close to the form or using a thin steel tool, like the ice chisel shown in Fig. 14, will bring the cement to the face and give the wall a smoother appearance. If an extremely smooth face is desired in certain small areas it may be obtained by plastering the forms with a fairly stiff mortar mixed about one part cement to two parts sand, and then immediately, before it has had opportunity to set, placing the concrete up against it.

Stone "pockets"—that is, collections of stone with scarcely any sand and cement, which often appear in the face of a concrete wall—are generally due to the use of too little water in mixing. In a wet mixed concrete, however, they may sometimes occur from employing too little sand in proportioning, from improper mixing of the materials, or from careless placing. An excess of water may also cause these voids, when the mortar is so wet that it runs away from the stones or flows out through crevices in the forms. In a 4-inch building wall which Mr. Thompson was recently constructing he noticed these occasional voids, formed by a collection of gravel stones, and the inspector claimed that they were unavoidable—that the concrete was mixed just right and was carefully placed. To satisfy himself on this point, Mr. Thompson, instead of his usual hasty trip to the work, spent an hour or two on the staging watching the man who was placing the concrete, but giving him no instructions. He made notes, however, of every place where the man had carelessly allowed the stones to separate from the mortar, and, on removing the form, found a small stone pocket at every one of these points, but in no other place. Afterward, with the use of the same materials, but a little more care in placing, the irregularities were entirely avoided.

When laying fresh concrete upon a surface which has set, the latter must be thoroughly cleaned of all dirt and "laitance," or powdery scum, and thoroughly wet down. Then, unless the mass is to be subjected simply to direct compression, it should be coated with a thin layer of mortar, mixed one part cement to two parts sand, or richer if desired, and the new concrete placed upon it immediately.

CORRESPONDENCE.

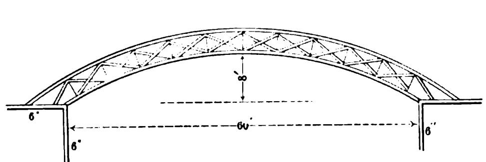
Design Wanted for a Hennery.

From W. B. W., *Melrose, Mass.*—I would like to have some of the readers furnish a sketch for a hennery of a capacity for keeping about 50 hens; also an incubator, showing the way to turn the eggs. I desire especially to know the best way to fit up the inside of the hennery.

Note.—We refer the above inquiry to our readers for their attention, but would remark in passing that our correspondent may obtain suggestions from the illustrated articles which appeared on the subject in past volumes of the paper, more especially in May, 1894.

Design Wanted for Circular Girder.

From W. L. S., *Boonville, Mo.*—I would like to have some of the readers suggest to me a suitable design for a circular girder, the rise to be about 8 feet in the center. This is for a lumber yard and the span is about 60 feet. I think the Correspondence columns are a great help to



Design Wanted for Circular Girder.

a person, and through their medium he becomes acquainted with the different ways of doing things.

Note.—With no desire to anticipate the replies which we trust our readers will contribute, we would suggest that the correspondent may find much that is of interest in the designs of circular trusses shown on page 46 of the February issue for last year.

Making a Five-Pointed Star with the Steel Square.

From C. V. F., *Knightstown, Ind.*—Will some reader of the paper kindly give a rule by which a five-pointed star can be made with the use of the steel square, where the diameter is given?

Remedy for Worm Eaten Posts.

From G. G., *Garfield, N. Y.*—Can any of the readers of the paper give me a remedy for powder posting of hickory, and by "powder post" I would say that I mean worm eaten? What is the best method of seasoning wood of the kind mentioned?

Designs Wanted for Lunch Stands, Pagodas, &c.

From G. M. B., *Clayton, Mo.*—Will some of the many readers furnish, for publication, illustrations of lunch stands, pagodas, exhibition cases, etc., which would be suitable for use at the coming World's Fair in the city of St. Louis?

Cleaning an Oil Stone.

From J. W. T., *Weatherby, Mo.*—I would like some one to tell me through the Correspondence columns of the paper how to clean an oil stone. It is a fine stone of good grit, but it looks as if some one had used linseed oil on it and will not work well.

Some Suggestions for the Ambitious Carpenter.

From C. G. S., *Olympia, Wash.*—I have been greatly interested in the communication appearing in the January issue of the paper, under the title "Some Suggestions for the Ambitious Carpenter." I have had some little experience in the way of carpentry and have also worked at almost everything in the logging camp during a period of five years. My principal occupation was that of felling trees. Of course, there are always two men at this kind of work, and sometimes three, the latter man being what is called an "under cutter," or one who undercuts the tree in the direction it is intended it should fall. Now, with regard to the amount of work that a man can do in a day, I would say that it is not the workman who gets in and tears things upside down and is no good the next day that will succeed. A carpenter can be whatever he desires, if he will only plan his work thoroughly and then as thoroughly follow out his plan. He is the only one that will count in the long run.

A Reader's Appreciation of Carpentry and Building.

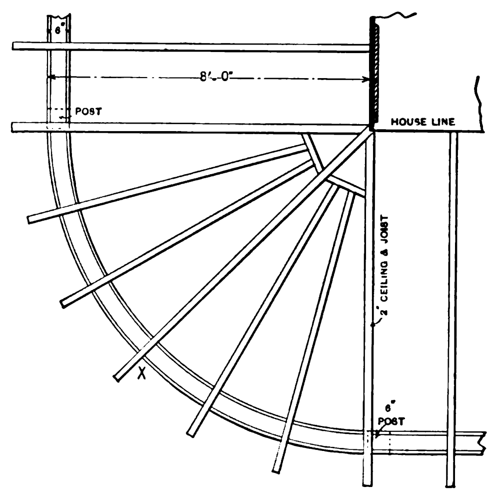
From J. J. B., *Germantown, Pa.*—I take great interest in the exceedingly bright pages of *Carpentry and Building*, and beg to say, for the benefit of the younger members in the trade, that I had it first handed to me by my boss in the first month of my apprenticeship, 16 years ago, and I have continued to read it off and on ever since that time. I can say without fear of contradiction that the paper furnished me some very valuable information, and kindled in my brain the sparks of ambition along the building line. It was always before me as my study, and through the perusal of its pages I attained what I had often wished to accomplish while reading it, and that was to become a master builder. Since the accomplishment of my aims I have had as many as 45 carpenters working steadily for me during the season. I have no doubt that my experience is not unlike that of many others who, as apprentices, have worked their way up, gaining information and inspiration from the pages of *Carpentry and Building*, and are now in business for themselves, either as architects or contracting builders, or possibly both.

Staging Bracket for Shingling a Roof.

From C. C. H., *Brookville, Pa.*—As to roof staging, I agree with "D. P. B." of Redford, N. Y., in the October number of the paper. This is what I call the simplest and most handy of all staging, as there are shingles always at hand. The 2 x 4 pieces are, as a rule, within convenient reach whenever a building is in process of erection, and 2 x 6's will answer as well, only a little heavier to handle. I would say that the method of using 2 x 4 inch stuff for staging, suggested by "W. S." of Lowell, Mass., is a very good one also.

Preventing Porch Roof from Sagging.

From C. C. H., *Brookville, Pa.*—I would like to have some of the practical readers tell me how to prevent the sagging of the circular cornice of a porch at the corner



Preventing Porch Roof from Sagging.

of a house. I see many round cornered porches where there is a post only at each end of the segment of the quarter circle and which seemed sufficient for the purpose, but in a very short time the circular portion of the cornice and roof sags, presenting a very unsatisfactory appearance. Then, again, it does not require much sagging to stop the water in the eave trough or gutter. I would like to have some of those who have had experience in this line explain how the work should be done in order to prevent the sagging. I send a sketch which will illustrate my meaning. The heavy snows which have visited this section of the country during the winter have caused the roof at the point X to sag so that the water runs over the gutter at that place, and I want to avoid, if possible, the use of a third post at this place. The position of the other posts is clearly indicated.

An Author's Method of Roof Framing Criticised.

From F. H. B., *Chicago Park, Cal.*—Being a subscriber to *Carpentry and Building*, I take the liberty of piece of common rafter running down to meet the peak of intersection. The point N shows the intersection of the square pitched roof with the main roof. Now the question I want decided is this: Which is correct, the author's diagram or mine?

The author's method of obtaining lengths and bevels in roofs of the same pitch is given in Fig. 3, and this diagram I have also changed to represent my idea of the way the work should be done, and it is shown in Fig. 4. I have proved that the diagram, Fig. 3, is wrong in so far as it relates to the measurement of the valley cripples, for I have had enough experience in roof framing to know that the cripples in a valley of a square pitched roof are no longer on one side of the valley than

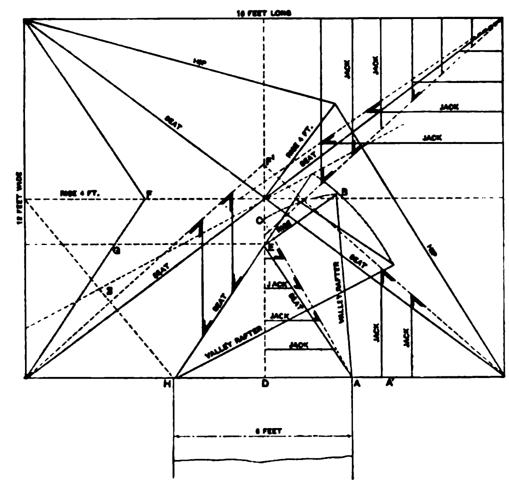


Fig. 1.

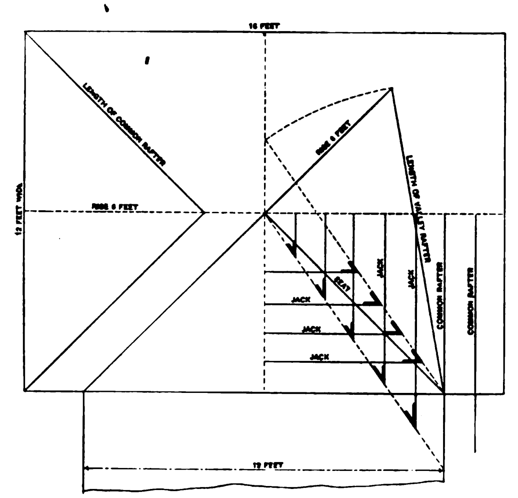


Fig. 3.

Diagrams Showing Author's Method of Obtaining Lengths and Bevels of Rafters.

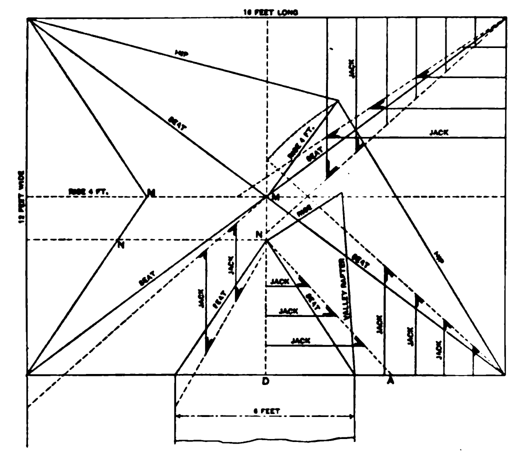


Fig. 2.

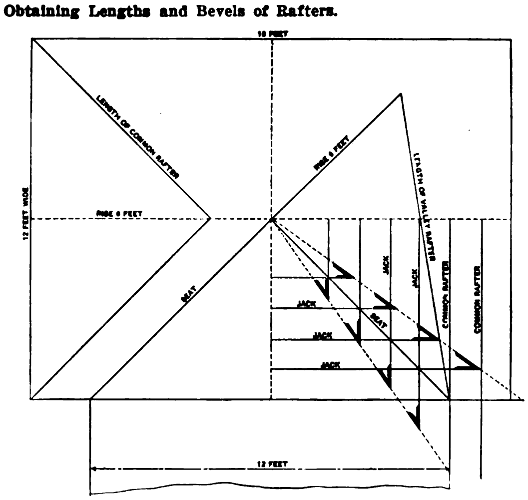


Fig. 4.

Diagrams Showing Method Determined by "F. H. B." of Chicago Park, Cal.

An Author's Method of Roof Framing Criticised.

asking you to do me the favor of correcting some diagrams on roofing which I have sent to you under separate cover. If it will take too much room in your valuable paper to illustrate the corrected diagrams, please let me know which one is the nearest to being correct. Not long ago I purchased a book on roof framing in which the method of obtaining the lengths and bevels of the jack rafters in roofs of different pitches is as shown in Fig. 1 of the diagrams. Here G shows the intersection of the square pitched roof and 2 the angle division. Now I have had no practice in framing just exactly such a roof as this, but have changed the diagram to indicate my own idea of how the work could be done, and it is presented in Fig. 2. Here M N is the length of the short they are on the other when the ridges are even. And so with the side bevel of the cripples. The side bevel on the author's diagram is more acute on one side of the valley than on the other. The first time I followed one of his diagrams I was quite badly disappointed over it, as I had to cut the material all over, so I have gone back to the steel square again, even if a correct diagram is easier to work from. I would be very much pleased to have the matter illustrated in the columns of the paper, as it is probable there are other readers interested as well as myself, and there is also a chance that some of them may have a copy of the same book, but have not yet discovered what appears to me to be a radical discrepancy or error.

Answer.—We give in the illustrations herewith presented, exact reproductions of the diagrams sent by our correspondent, and are free to say that his course of reasoning, as well as his diagrams, Figs. 2 and 4, for obtaining the lengths and bevels of the jack rafters are correct.

We are sorry to be obliged to pass adverse judgment upon any published work intended for the instruction of building mechanics, but if the methods shown in Figs. 1 and 3 are as given in the book referred to, then, beyond all doubt, the author has made a grievous error.

Our correspondent has mentioned the essential points in which he has found the diagrams taken from the book to be wrong and to which we will add, first, that in Fig. 1 one-half the true or slant width of the roof surface of the 6-foot extension is there shown to be D A, while in reality it is equal to D A of Fig. 2. All of the jack rafters coming against the valley line C A are therefore too short, as may be seen by comparison with Fig. 2. The length of the valley rafter in Fig. 1 has been correctly obtained at A B, but the error consists in having swung the compasses from A as a center, cutting the ridge line extended at C, instead of having placed one foot at the point E, swinging the other foot around to cut the eave line near A′.

Second, in obtaining the cripple rafters lying between the valley and the hip of the main roof the line of the hip rafter F′ is correctly drawn, but to obtain the valley line to correspond the distance F G of the diagram at the left should have been set off from F′, obtaining the point C, and then the line should have been drawn from C to H, which would give the correct bevels at the foot.

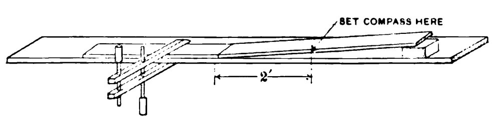
It is our opinion that the errors into which the author of the book in question has fallen are most likely the result of attempting to follow arbitrary rules, a method which, we fear, is too often employed by carpenters generally, instead of following the more reliable methods of descriptive geometry.

Laying Maple Flooring.

From W. J. S., *Oella, Md.*—I would like some information, through the paper, from various correspondents in regard to maple flooring. What I want to know especially is the kind of nails that are to be used, and if the flooring is bored for the nails. We get it, here, cut in unequal lengths, matched across the ends and marked as though it was intended to bore holes for the nails, but they are not more than ⅛ inch deep. If the holes were bored through, all would be well; but, as they are, they amount to nothing.

Rule for Finding the Distance Between Saw Kerfs.

From U. G. K., *Harlan, Iowa.*—In the last issue of *Carpentry and Building*, "J. S." of Muscotah, Kan., asks for a rule for finding the distance between saw kerfs. A good many years ago a carpenter showed me how he did it, and I have done likewise ever since. For



Rule for Finding Distance Between Saw Kerfs.

instance, if you have a circle 8 feet in diameter, the radius is 4 feet and one-half of the radius is 2 feet. Take a strip of stuff the same thickness as the piece it is desired to kerf. Make a kerf across the strip the depth you intend to make in your work; clamp one end of the strip to the bench or to a plank; raise the other end until the kerf is closed tight; measure from the kerf one-half the radius of the circle; set the compasses from the underside of the strip to the top of the bench or plank, and this will be the proper distance apart for the saw kerfs. Of course, you must use the same saw on the work that was used in making the first kerf, and all kerfs must be of equal depth. I inclose rough sketch which illustrates what I mean.

In this connection I would like to ask some of the readers to give a rule, if there is any, for kerfing crown molds in a way so the kerfs will not show through the front of the moulding.

I have been a reader of *Carpentry and Building* for the past few years and am only sorry that I have not been taking it ever since I began the carpenter's trade. Many of the numbers I have are well worth a year's subscription.

"W. S." Explains Construction of Tool Chest Lid.

From W. S., *Walcott, Iowa.*—In the January issue I notice "A. S. W.," Shawnee, W. Va., asks for further explanation of the tool chest, a description of which was

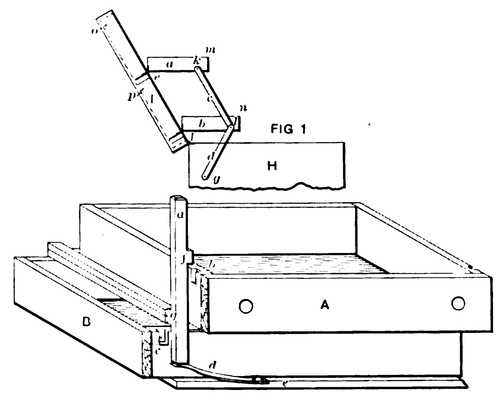


FIG 2

"*W. S.*" *Explains Construction of Tool Chest Lid.*

published in the October number of last year. Referring to Fig. 1 of the sketches, I would say that H is the box, I is the lid, *a b* the trays, which are hinged at *e* and *f*. They are put together with an iron strap, *c*, ⅛ x 1 inch iron, making a hinged joint at *k* and *l*. One of these straps on each end of the trays set so the trays are parallel to each other. Then another strap of the same size, *b*, is also hinged at *l* and *g*. At *g* it is fastened to the box. This point must be set so that the trays when the lid is closed will, with the corners *m* and *n*, just touch the bottom of the lid at *o p*.

Referring now to Fig. 2, I would state that this shows the lock for the drawers, A and B being the drawers. At *a* is the shutter or bolt; *d* is the spring fastened to the bottom of the tool chest at *e*. The shutter *a* must be made long enough so that when the lid comes down it will push the shutter down, and *f* locks the drawer A at *b*, while *g* locks the drawer B at *c*. When the lid is opened the spring *d* pushes up the shutter *a* and unlocks the drawers.

Some Questions in Furniture Construction.

From HEE H. SEE, *Belleville, Can.*—I have been very much interested in the articles, "Cabinet Work for the Carpenter," lately contributed by Paul D. Otter, and I am sure that many of my "brother chips" can say the same. The articles are so clear and simple that any one can understand them. I would like, however, to ask Mr. Otter to say which is the best kind of leather to purchase for the cushions described by him, and what is the name of it. Will he also please tell us what is used by furniture makers for staining birch a mahogany color—the celebrated "birch mahognay" so much in evidence in the catalogues?

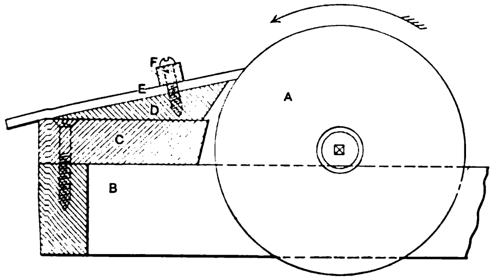
What is the Exact Diagonal of 12 by 12 Inches?

From T. J. H., *Hackensack, N. J.*—There has been no little discussion among some of the carpenters and builders as to the exact diagonal of 12 x 12 inches. Some claim that it is 17 inches, but I contend that this is not a strictly accurate result. Will the editor kindly decide for us?

Answer.—The question of our correspondent resolves itself into finding the hypotenuse of a right angled triangle, in which the base is 12 inches and the altitude 12 inches. It is well known that the square of the hypotenuse is equal to the square of the other two sides, and on this basis the result can readily be figured. The square of the base and altitude is 288, and extracting the square root of this to find the hypotenuse, or diagonal, gives 16.97059 + inches, from which it will be seen that the correspondent whose letter appears above is correct.

Arrangement for Holding and Grinding Tools.

From C. B. H., *Warren, Pa.*—I send inclosed a sketch of a simple arrangement for holding and grinding chisels and plane bits on an emery wheel. In the sketch A represents the wheel, B is the frame on which it revolves, C is a block of about 10 inches long, which is secured



Arrangement for Holding and Grinding Tools.

to the frame by screws, as shown, by means of a hand clamp; D is a wedge shaped block, which is movable, and to this is secured, by the clamp F, with screws at each end, the bit or chisel E to be ground. The thickness and bevel of the block D can be made to conform to the size of the wheel used. By running the bit further up the bevel can be adjusted or ground to suit the operator. The bit and block are moved back and forth at pleasure, and a perfect job is always done, with every tool alike, if so desired.

Poor Construction of Church Roof.

From C. E. B., *Judson, Ind.*—I inclose a rough drawing of a church roof that I erected last summer, and, as I never built one before of this style, I contended with the Building Committee that it would sag and that the walls were too small. The results have shown that my contention was correct. The roof timbers are of 2 x 5 beech, and the walls, or outside studs, 2 x 4 beech, 14 feet long. The roof was constructed as shown in the sketch, the drawings of the building being prepared by a man who was supposed to know his business. The rafters were set 2 feet apart and plastered on, with circle boards in the center and at the wall plate. What should be the proper dimensions of timbers of pine, and kindly comment upon the general construction for the benefit of others, as well as myself.

Answer.—The sketch and letter of our correspondent were submitted to Frank E. Kidder, the well-known consulting architect, for criticism, and in reply he submits the following, together with some additions to the sketch of "C. E. B.," these being indicated by dotted lines:

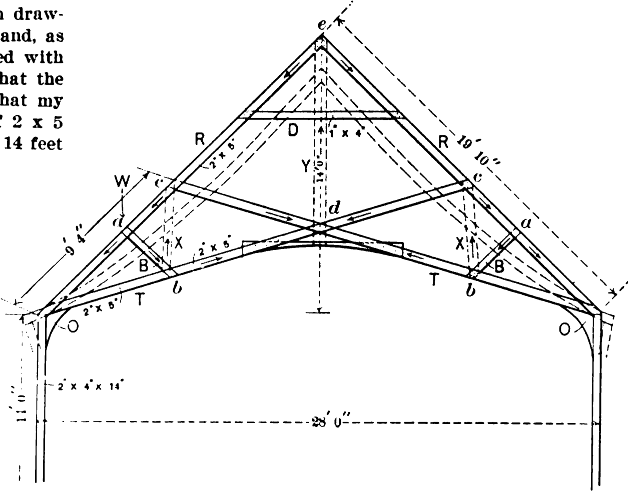
The great defect in this roof truss is that two ABSOLUTELY NECESSARY members are omitted. If the ties X and Y had been put in the truss it would probably have stood up without sagging, but omitting these members throws the whole stress on the rafters and causes them to bend, as shown by the dotted lines. If the roof is still standing when this issue of the paper reaches the correspondent it is liable to collapse at any time unless the walls have been braced. Putting in the members X and Y gives the truss the shape shown in Fig. 2, in the December (1903) number of this paper. The necessity for ties X and Y may be more clearly understood by following the strains produced by a load at *a*, which are the same as those actually produced by the weight of the roof. A load at *a* produces a thrust in the rafter and brace B. The piece X takes the thrust from *b* and carries it to *c*. At *c* part of the pull in X is taken by the rafter and part by the brace *c d*, as indicated by the arrows. The piece Y holds up the ties T at their intersection and transmits all of the stress at *d* to the apex, where it is supported by the rafters. In this way the rafters are made to carry the entire weight on the truss, and the ties T, T and Y prevent the rafters from spreading. If any one of the members with an arrow marked on it is omitted the principle of the truss is broken and a bending strain is produced, either on the rafter or tie beam, or if both X and Y are omitted a bending strain is produced on both the rafter and tie beam. The piece D does not transmit any stress, but is useful in strengthening the rafters.

As to the correct dimensions for pine, I would recommend that the rafters be made of two 2 x 6 planks, with the ties T and braces B spiked between. One 2 x 6 would do for T, T. For X, I would recommend two 1 x 6 boards; for Y, two 1 x 8 boards, and for D, a 2 x 4. There should also be one ¾-inch bolt in each of the joints *o* and *d*, and as many spikes as practicable. The boards forming the tie Y should be spiked to the rafters as strongly as possible.

In *Carpentry and Building* for November, 1900, and December, 1901, the writer contributed two articles on the scissors truss, which "C. E. B." will do well to study.

Inside or Outside Cold Air Supply.

From R. A. G., *Menlo, Ia.*—In reply to "D. B. T." of Northville, N. Y., who asked in the December issue with regard to cold air supply for dwelling houses, I would say that I consider taking the supply from the inside the best plan and the cheapest, owing to the fact that most of the houses have leaks of air around the windows, while the opening of the outside doors changes the air enough for practical purposes. I place the cold air duct, when possible, near an outside door, or to the hall door leading into the sitting room, and sometimes I put in two ducts from different parts of the house. Where I have a hall and open stairs, I put a cold air duct in the hall in order to create a circulation from the upstairs room. This I find to be a very satisfactory way. I installed a furnace two years ago, where I took the cold air from



Poor Construction of Church Roof.—Sketch of Truss Submitted by "C. E. B." with Changes Suggested by Mr. Kidder and Indicated by the Dotted Lines.

every room by carrying it down the outside wall between the studding, and it worked very well, but I do not like it in a job, as a whole.

Mill Work from the Operator's Standpoint.

From C. E. G., *Frederick, Md.*—In the January issue of the paper I notice a communication from "Apprentice Carpenter" asking what will carpenters do if the millmen keep on getting more and more careless. He further says it is certain that a reform in this line is needed, and expresses a desire to hear from others on the subject. In the February issue there is a letter from "G. J. S.," expressing the opinion that millmen are either careless or incompetent, and that work is not being turned out in a workmanlike manner. Now, it looks to me as if the millmen were being rapidly placed in a position to be criticised, and whether justly or unjustly I am not quite prepared to say. If personal observation and experience count for anything, I will say that millmen generally have a very keen desire to see their work look well after it is placed in position in a building, and when it does not, no one deprecates the fact more than does the millman himself. This, too, notwithstanding the fact that the ill appearance of the job may have been caused by a bungling carpenter.

Now, I will give just a little of my experience since I have been identified with mill work. I learned my trade as a house carpenter and worked at it until about 12 years ago. Since that time I have been with the millmen and feel that I have a practical idea as to how the work should be done. We are very often called to buildings to get special measurements, the contractor not caring to take them himself, thereby avoiding all responsibility in the matter and relieving himself of any chance of making an error. In other words, he throws the whole responsibility on the millman. On one occasion the drawings and specifications, of which the contractor had copies, called for three large dressers. I got them out very carefully and according to the specifications, which called for doors and drawers in the bottom portion and the open space above the countershelf. Above this were doors and adjustable shelving. I plowed a small groove in the top of the countershelf, the proper distance from the back edge, so as to hold in place plates or dishes that might be leaned up on edge against the rear wall, as is usual in dressers of this kind. I also sent notched corner pieces for the adjustable shelves in the top portion. Now, these dressers were shipped to the building in a "knock-down" state. They were gotten out with great care, every part exposed being nicely sanded and plainly marked where it was to be placed. The cornice was tied in a separate bundle and marked "cornice."

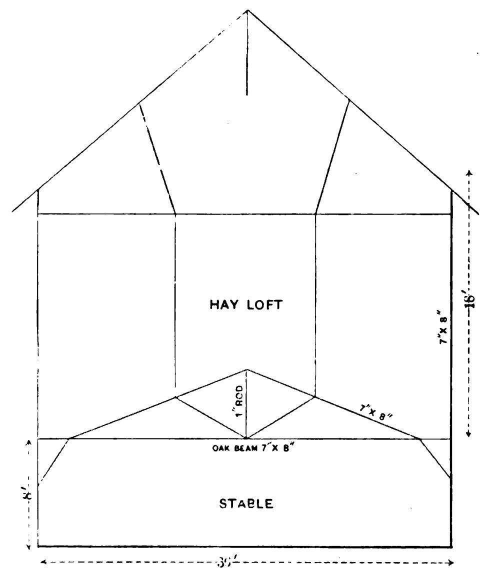
Some time later I was called to the building in question to take a special measurement, and while there I thought I would take a peek at the dressers and see how they looked. Now, there is nothing difficult at all in setting up a dresser, but these dressers were evidently as mysterious to the carpenter as a Chinese puzzle. He evidently could not see them in the right light at all, and especially could not understand the use of the little groove in the top of the countershelf. He, therefore, turned them all upside down, putting the nice sandpapered side where it could not be seen, because there was a line of drawers under it, and he exposed to view the side which was not finished at all. I opened the doors at the top to inspect the movable shelves, and I can truly say those shelves will never be adjusted unless dynamite is used, or by reason of some other unnatural cause. Instead of placing my notched corner pieces in the angles, as intended, the shelving was securely nailed and the notched pieces were nailed up outside under the crown moulding as part of the cornice, and the original cornice was lying on the floor, the carpenter evidently not knowing what else to do with it.

My experience has shown that the carpenter has more or less trouble with stair work as well as with other kinds. In my opinion, there is nothing very difficult in putting up an Eastlake stairway, especially if the posts are marked before leaving the shop. In getting out stair work I never put nails in the angle posts, and as few as possible in the newel posts. All work of this kind should be glued up before leaving the mill. I always mark where the hand and foot rails come. On the main newel I mark the ground line and the first step; on the angle newels I mark the floor line and the next step above or below, as the case may be. I always mark the bottom of the plaster line, and after cutting the angle posts to net lengths I nail on the pendants. I always send a full size drawing with stair work. I remember once getting out an oak stairway, the work of which was all scraped and sanded with the finest paper, and its general appearance when finished would have passed inspection by the most exacting architect. I happened to see this stairway after it was put up, and I will attempt to describe the main newel and first step, leaving the rest for the reader to picture, according to his imagination.

When the main newel left the mill there were no nails to be seen in the base, as it was glued on; but when I saw it in the building it looked as if it had been used as a target for a machine gun. It was nailed to the floor and carriage with all manner and sizes of nails, from 1½ inch brads to 20d nails, and instead of cutting a hole in the floor to receive the core of the post and then keying it as it should have been, the carpenter or "wood butcher" sawed it off and threw it away, hence the nailing. Unfortunately, he also forgot all about the first step. The practical reader will understand that it is an impossibility, after the newel is set, to get the step in the housing at the wall string, and also get the tongue of the step in the groove of the second riser and fit it around the newel base at the same time. Now, the post could not be moved; even Samson of old would have given it up in despair. This stair builder simply cut the step in two, about 3 inches from the post, and put it down in two parts. Of course, the professional stair builder would not have done this, but why should not any good carpenter be able to put up an ordinary stairway?

I also have in mind floors strewed with beautifully designed casings and delicately worked moldings, over which rough shod carpenters passed to and fro. Then add the number of hatchet and hammer marks they received while being nailed to the wall, and one cannot wonder that the millman holds up his hands in holy horror and exclaims, "Surely my work has fallen into the hands of the Philistines!"

I do not wish to be misunderstood in this matter. There are a great many carpenters who have the earmarks of good mechnics, but those who are not good ones seem to be on the side of the majority. "Apprentice Carpenter" and "G. J. S." may have ample room for complaining of bad mill work, but, as the correspondents intimate, they would like to have the subject thoroughly ventilated. I, for one, think the current of ventilation should flow from two sources instead of one. I should like very much to hear from others along the line of mill work.



Is the Barn Frame of Sufficient Strength?

Is the Barn Frame of Sufficient Strength?

From C. G., *Vergennes, Vt.*—I send herewith a rough sketch of bent of barn which I intend to put up in the spring. It is 30 feet wide and has 26-foot posts. What I wish to know is this: Is the truss strong enough to carry the load that will be put upon it? I would like to have the "wood butchers" take hold of it and tear it apart and tell me what to put in its place.

HOUSE MOVING.*—II.

BY O. B. MAGINNIS.

THE blocks, such as shown in Fig. 9, are manufactured in the best manner and can be obtained in the following sizes and of the stated capacities, the lists being presented so as to enable the practical house mover to properly gauge what will meet his requirements as they occur. The blocks are strong and durable and have smooth and noiseless hardened roller bushings, being adapted to heavy and continuous work. The average breaking strain, as shown by thorough tests, is as follows:

	Pounds.
Block for ½-inch rope	3,500
Block for ¾-inch rope	6,500
Block for 1-inch rope	11,000

Table Showing Style and Weight of Block, with Size of Rope.

Style.	For rope diameter. Inches.	Diameter sheaves. Inches.	Length of shell, including becket. Inches.	Weight, each. Pounds
Single sheave	½	2¾	5½	3
Double sheave	½	2¾	5½	4¼
Triple sheave	½	2¾	5½	6
Single sheave	¾	3½	7½	6
Double sheave	¾	3½	7½	8¾
Triple sheave	¾	3½	7½	12
Single sheave	1	5	9½	9¼
Double sheave	1	5	9½	14
Triple sheave	1	5	9½	18

In Fig. 10 is shown a double block, made with lignum-vitæ or iron sheaves and loose hooks, and can be obtained in the following sizes:

Inside Iron Strapped Wooden Blocks.

Size sheave.	For rope, diameter.	Size, Inches.	Size, Mortise.
1¾ x ½ x ⅜	⅜	3	9/16
2¼ x ⅝ x ⅜	½	4	11/16
3 x ¾ x ⅜	⅝	5	⅞
3½ x 1 x ½	¾	6	1
4¼ x 1 x ½	⅞	7	1⅛
4½ x 1⅛ x ⅝	1	8	1¼
5½ x 1⅛ x ⅝	1	9	1¼
6¼ x 1¼ x ¾	1⅛	10	1⅜
7¼ x 1¼ x ¾	1⅛	11	1⅜
8 x 1⅜ x ¾	1¼	12	1½
9 x 1½ x ¾	1¼	13	1½
9½ x 1⅝ x ¾	1¾	14	1¾

* Copyrighted, 1901 and 1903, by Owen B. Maginnis.

These blocks will be found of value in arranging tackle for moving the lighter frame houses, for hoisting shores and needles, hauling out timbers, &c., and should be carefully examined when purchased, in order to make sure of their reliability and safety. Their iron work should be minutely inspected to provide against flaws in the forgings, pins or bushings, as they are liable to fly apart when under strain and might cause serious accidents.

The next important consideration is the rope, which, like all other essentials enumerated, must be of the finest manufacture and absolutely free from all flaws or doubtful attributes. In fact, it might be stated on general principles that every tool or adjunct requisite to safe house moving must be first class. Therefore, the Manila rope should be made out of pure Manila hemp and of the best quality. The following estimates of weight of rope may not be without interest in this connection:

Size in diam.	¼	5/16	⅜	½	⅝	¾	⅞	1
Weight of 100 feet, pounds	3	4	5½	8	15	17	25	33
Strength of new rope, pounds	450	750	900	1,700	3,000	4,000	5,800	7,000

From these figures it will be seen that the rope is sold by weight at so much per pound, and in coils of 1000 feet or less, as desired.

We shall next consider the kind and sizes of the necessary timber. It may be well to state here that there is no golden or fixed rule given in the text books published for this class of work, nor can any be given except that derived from personal practice and experience, as the nature of the work is so varied and the exigencies so unusual that it would be impossible to give any standard list or set of timbers necessary for the needs of the house mover. His plant generally consists of all sorts and conditions of materials, ranging from the cold chisel to the hoisting engine. Generally speaking, it might be said that it requires all and every sort of timber listed, especially of the harder and heavier kinds, for bearing and carrying purposes, such as oak, yellow pine and spruce. These are the most reliable for long shores and needles, the last being most popular on account of its cheapness, toughness and lightness, although yellow pine is more adaptable for very heavy work, such as brick buildings. All timber for this work must be of the very best quality, straight grained, thoroughly seasoned and free from wens, large knots, heart shakes, cup shakes, dry or wet rot, sap, or any other agents likely to impair its strength. Second-hand building timbers have been found from experience to be the most reliable,

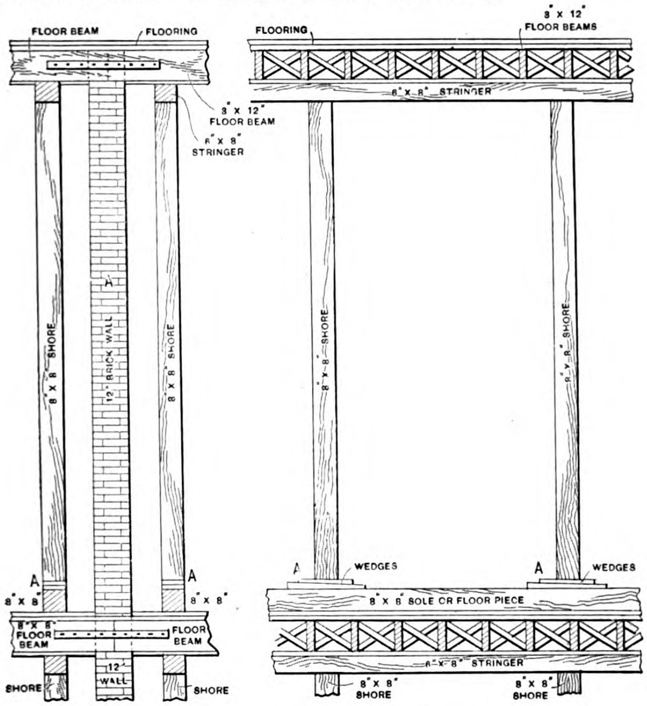


Fig. 11.—Showing Manner of Supporting Floors and the Use of Wooden Wedges.

Fig. 9.—One Style of Block Used.

Fig. 10.—A Double Block

House Moving.

as years of exposure or use have tried their qualities and guaranteed their capacities.

Regarding sizes and dimensions, I might state that for spruce they may run from 2 x 2 inch scantling to the largest sizes, yellow pine from 6 or 8 x 8 inches, also up to the largest sawn. All may be of lengths increasing in feet, sawn square, smooth and out of wind, as twisted timbers are useless not only by reason of their liability to fracture, but also by their loss of strength through distortion.

In connection with the timbering come the wedges, which are even more reliable than the pump screws heretofore mentioned. These powerful instruments for house moving are sawn out of the hardest and best seasoned oak, being 3 inches wide, 1½ inches thick at the butt and tapering to ¼ inch. Two, as shown at A A, Fig. 11, are always used, and when placed as represented, they constitute the best means of tightening or raising walls, girders, beams, &c., known to scientific builders. The most careful shorers and movers prefer them to the screws, on account of security, but they are not always applicable to horizontal timbers, in corners, or where it is not possible to deliver a blow of the hammer or maul, for it must be remembered that each wedge must be struck with the same, or, rather, an equal, percussive force, or one will be forced past its fellow and the two rendered useless. They must be accurately sawn, else their top and bottom surfaces will not be exactly parallel and at right angles to the axes of the thrusting timber which they compress or sustain. For the same reason the abutting and other ends of timbers must be sawn square, not beveled, to guard against any possibility of slipping or buckling.

In the preliminary preparations for moving, all gas, steam and water supplies must first be shut off in the street. All plumbing, connecting pipes, either water supply, sink, water closet or other connections, must be cut entirely apart at the first story tier of beams, and the house pipes properly supported from the carrying timbers placed under the sills.

Proceeding now to describe the details of the actual moving operations, we will draw attention to the fact that it will be necessary for the mover to first survey the house to be transferred and ascertain the actual conditions and difficulties of the problem, in order to provide the blocks, labor and tools requisite. The following examinations must be carefully made and details minutely noted, either mentally or on paper, to provide for all eventualities:

1. The dimensions of the house or houses.
2. The weight and construction of the house or houses.
3. Nature of the foundation and bottom.
4. Whether above or below curb level.
5. Whether to be raised or lowered to street grade.
6. Is the house, or houses, perfectly safe to move?
7. The plant necessary for the work.
8. Possible happenings or contingencies during moving.
9. New site or foundation and contemplated possible changes or alterations.
10. Tools, labor, appliances, &c.
11. Estimate of cost.
12. Approximate time which will be required to complete the operation.

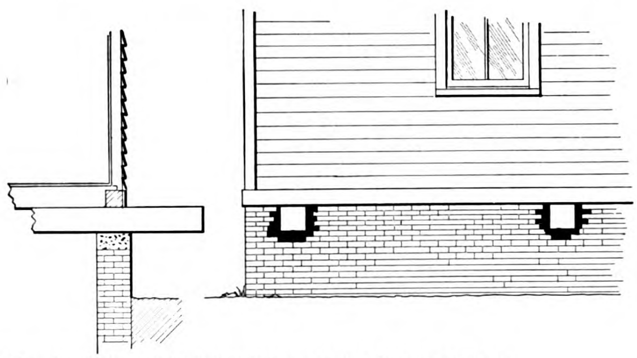


Fig. 12.—Portion of Underpinning of a House, Showing Holes in Walls and Manner in Which the Timber is Placed.

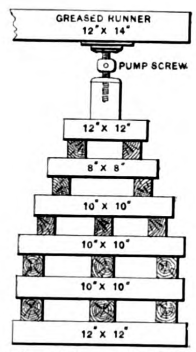


Fig. 13.—Manner of Building Up the Stacks of Blocking.

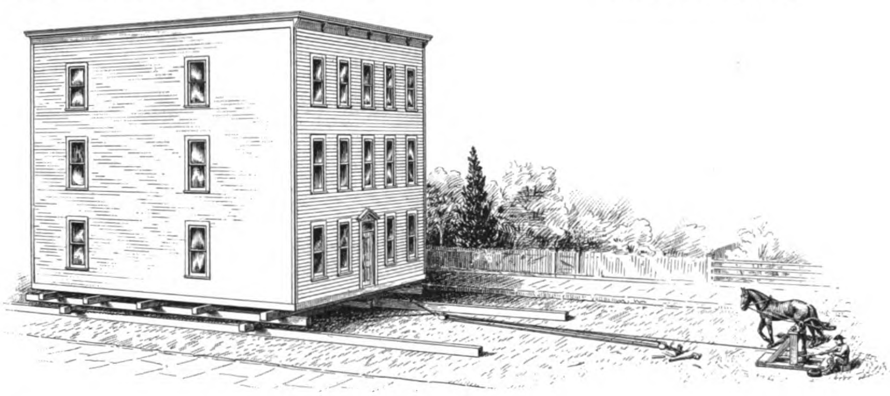


Fig. 14.—Showing Manner of Placing the Timbers for a Frame Building Moved by Means of a "Crab" and Horse Power.

House Moving.

All this must be gauged and determined before any house mover can give an owner a figure of probable cost, so that the premises will need to be inspected and scrutinized, faults located and guarded against, and methods of procedure properly arranged. House moving, raising or lowering are tasks arduous, tedious and difficult, and demand time and patience, the most critical observation and forethought, so that haste and negligence are simply impossible in this art, unless one courts failure.

It may, then, be assumed that the prospective mover has looked over his task and found, say, for a simple first example, that his work will be to lift a small frame dwelling house, measuring 25 x 40 feet, from its old foundation and transfer it to the new site, a foundation situated, say, three blocks or squares west and two south. The question naturally arises how is the work to be done? By reason of their weight it is not usual to lift or move foundations, so we will simply raise and move the timber structure with the necessary brick chimneys. To do this, timber or needle holes larger in circumference than the girth of the sticks must be cut through the foundation walls directly under the sills and heavy 12 x 12 inch timbers passed through from side to side directly under the bridging walls which support the floor beams on the first and second stories and side wall plates, as shown in Fig. 12. These must be spaced not more than 8 feet apart, with extra timbers placed under the chimney breasts, on which their brick work will be supported and carried and from which they must be blocked up and wedged so tightly as to prevent any possible strain or settlement. The center, fore and aft supporting girder under the first tier of wooden beams must also be blocked and wedged up to obviate the possible settlement and cracking of the stud plaster partitions up through the house before the cellar piers are taken down. Diagonal pieces carried on the main timbers must be placed under all bay windows or projections, and all and every part made to carry free and clear of the foundations before cutting away. Finally the 12 x 12 inch sliding timbers are set, resting on timber stacks or pyramids of blocks built at intervals of 8 feet or 10 feet, as shown in Fig. 13.

The supporting and moving frame must, then, consist of three tiers or thicknesses of timber below the sills, those on the bottom being the slides, resting with their bottom edges on the skids, the edges being heavily smeared with grease or tallow to diminish the friction generated by the weight and motion while moving. The blockings having been all set, the runners may be raised by placing short jacks or pumps under them, so that when the screws are simultaneously turned the entire mass of frame work above will be raised clean and clear from its foundations ready to start. If there be any unusual construction, safes, machinery or heavy loads of any kind, special timbering must be built up for them. It is best, however, to move these separately first and leave the building as empty in its shell as possible.

All having been prepared in the cellar and the frame clear, a heavy 3-inch chain is attached to the rear or last timber as a sling, and to the middle of this, working on a hook, the blocks and tackle are affixed, the only thing remaining being the "crab" and the horse. The mechanical work necessary is very elementary, as the horse simply walks around the crab. The rope is kept tight and coiled down, as shown in Fig. 14, and the building moves, but its motion as it goes off is closely watched in order to prevent its shearing, which it is liable to do should the tackle be unequally adjusted or the friction be greater on one side than on the other. In this case the house will either shear or swerve, or may topple off the skids or runners, unless prevented. This difficulty is obviated by readjusting the bridle or chain already described. The illustration, Fig. 14, shows the general appearance of a three-story frame structure in the process of being moved through a street. The position of the supporting timbers is clearly indicated, as well as of the chains and tackle connecting with the crab operated by horse-power. As there is never room in the width of an ordinary street to place the crab directly in front of the house, supplementary tackle blocks are set in the street, or to the opposite house, for the purpose of hauling it to the pavement, the main tackle and crab being placed down the street and the rope at right angles, thus giving a more powerful pull.

This process will be necessary for a house on an inside lot, but if a corner, the building may be slewed around as it is dragged off its foundations by a proper adjustment of the tackle and a curved laying down of the skids, which must be kept constantly greased or they will heat and possibly ignite. While the house is, to use a nautical expression, "under way," the street skids or runners must be kept out of wind, because should it strain or warp it will crack the plaster in every room in the building. Should the tackle become so shortened that the house is so close to the crab as to stop its progress, then the crab must be moved further out of the street or around the corner, and the supplementary blocks rigged as before.

When the house has arrived opposite its new site and foundations it will require to be turned, with the front toward the street. This may also be done with the tackle, and when turned the bridle is taken from the rear cross bearer and fastened to the front, so as to pull the house in backward, the main tackle block being attached to a post or house at the rear of the lot, and passing out under the building to the capstan of the crab. A comparison of the foregoing explanation with the accompanying engravings will give the reader a clear conception of the manner in which the operation is carried out, and, if a practical mechanic, he will have no difficulty in comprehending its details as described.

When the building is carried from its new foundations it must be so placed that when lowered it will come exactly as intended, with the sill faces fair with the foundation walls. The screws must not be removed until the building is thoroughly wedged up and made good with slate, brick, stone and cement mortar. Considerable attention, too, must be devoted to the proper blocking in the new cellar, which will sustain the runners on which the house moves in, because on this blocking, with its lowering screws, will depend the proper lowering of the house. It is, therefore, imperative that everything be properly arranged. The blocking in this case would be similar to that shown in Fig. 13 and sufficient in number and so spaced that the stringer and all timbers may be safely lowered, all screws being lowered simultaneously so as not to strain the house, but allow it to descend gradually to its permanent position. All inside piers, fore and aft walls, or girders, must invariably be built and set and all floor beams wedged up from them before the center moving timbers are taken out.

(To be continued.)

Wages and Cost of Living.

The official bulletin, which was recently issued by the New York State Commissioner of Labor, for the quarter ending September 30, last, shows that the increase in the cost of living since 1897 has been much less than the increase in the yearly earnings of wage earners. A comparative statement of rates of wages in New York City since 1883 reveals a very general increase in recent years, and the estimate of advance since 1897 is placed in excess of 10 per cent., while in the same interval the proportion of working time lost by organized wage workers has declined from 30.3 per cent. to 13.9 per cent. In other words, the duration of employment has increased 24 per cent., which, combined with the advance in rates of wages, yields an estimated increase in yearly earnings of 36 per cent., which, it is pointed out, is much larger than the increase in the cost of living.

During the past summer the addition of unions of excavators and rock men in New York City to the group of building and street labor, reduced the per diem earnings from $2.70 to $2.22. For similar reasons the average earnings in the skilled trades of the building industry increased only from $3.50 to $3.60 a day, notwithstanding the fact that the general advance in rates of wages was much larger. While the average per diem earnings of organized workingmen decreased from $2.77 in the summer of 1902 to $2.69 in 1903, nearly all trades in each locality report increases.

At the end of September the Bureau of Labor Statistics registered 2587 trade unions in New York State, this being an increase of 225 over the number six months previous. The total membership was 395,736, an increase of 38,634, or 11 per cent. in six months. The principal increases were in the building and transport trades, being 15,221 and 11,751 respectively. The total number of trade unionists in the State has doubled since 1898.

WHAT BUILDERS ARE DOING.

REPORTS which have reached us since our last issue went to press indicate a rather mixed situation as regards the building outlook for the spring. In some sections there are marked evidences of a slackening of operations, due in some measure to the high prices of building materials and to the uncertain labor outlook, while in other districts the feeling is almost unanimous for a good building season, some going so far as to intimate a degree of activity in excess of anything witnessed in recent years. Locally building is rather quiet, and the outlook is not altogether of an encouraging nature.

Akron, Ohio.

The second annual banquet of the Builders' Exchange of Akron, Ohio, was held on Wednesday evening, January 27, covers being laid for 130 guests. The toastmaster was J. E. Good, who, in a few happy remarks, introduced as the first speaker F. H. Weeks, formerly president of the Builders' Exchange and now president of the Ohio State Association of Builders' Exchanges. His toast had to do with the aims and purposes of builders' exchanges, which organizations he clearly pointed out were for the purpose of promoting friendly relations not only among builders and mechanics but between employers and employed. He advocated the better education of the employe and the higher intelligence of the employer, with more liberality of mind on the part of both. After stating that the object of the organization was to affiliate the local organizations, he asserted that they were not antagonistic to organized labor, but were for the betterment of general conditions. An important address of the evening was by John Eisenmann, secretary of the Building Code Committee of Cleveland, who has drafted the ordinances for enactment by the council of that city to regulate the erection and maintenance of buildings; to regulate fire protection, &c. The speaker referred to the Iroquois fire as emphasizing the necessity of a building code better than anything else which could possibly have occurred, but at a fearful cost. He showed that the building codes of cities were evolved out of necessity to prevent fires. He gave a full description of the proposed Cleveland code and the method of adapting it. Other speakers were Mayor Kempel, Dr. Ira A. Priest, J. T. Mertz, chief of the fire department, and W. H. Hunt, president of the Cleveland Builders' Exchange.

The Entertainment Committee consisted of Walter F. Kirn, W. W. Hunsicker, John M. Runyeon, Josiah Wigley and E. S. Bunnell.

Baltimore, Md.

At the recent annual meeting of the Master Builders' Association of Baltimore, Md., the old board of officers was re-elected, as follows: President, John Henry Miller; vice-president, William A. Smith; treasurer, Israel Griffith; secretary, John M. Hering.

At a meeting of the Builders' Exchange held on the afternoon of January 26 amendments presented at the special meeting held December 23, with the idea of making the Exchange a central body for all employers' associations i nthe building trades, came up for consideration. The plan was discussed and generally approved, although some modifications were made in the proposed changes to the bylaws and constitution. We understand that the modified amendments will be arranged and presented at a future meeting, when, it is thought, they will be accepted as a whole.

The building at Charles and Lexington streets, in which the rooms of the Exchange are located, was seriously menaced by the terrible fire of February 7 and 8, but fortunately it escaped; so the work of the organization can go on with renewed vigor.

Buffalo, N. Y.

At the annual election of the Builders' Exchange, held January 15, C. Burton Jameson was chosen president; James S. Stygall, Jr., was elected vice-president; James M. Carter secretary, and C. A. Criqui treasurer.

The trustees elected for three years were G. Farmer, Charles Geiger and George Hager.

The Arbitration Committee is composed of Henry Schaefer, Col. John Feist and Frank T. Coppins.

The installation of the officers occurred on Monday, January 25, in the auditorium of the Exchange, at which time the retiring officers submitted their reports. The installation was followed by a banquet.

Chicago, Ill.

Architects and builders, who make it a business to remodel buildings, are extremely busy in Chicago and the West, as a result of the rigid enforcement of rules and ordinances for fire protection. Not only theaters and halls are undergoing reconstruction, but many churches and other places of assembly will have to be completely remodeled. Every manufacturer of fire escapes and steel and iron stairways is said to be crowded with rush work. Thousands of workmen are finding employment, and it is believed that in Chicago alone $1,000,000 will be expended for rendering buildings safe that have not been sufficiently so.

The year starts out with a much more satisfactory showing than 1903, as during the month of January permits were issued for 279 operations, having a frontage of 6938 feet, and estimates to cost $2,150,870, while in January of last year permits were issued for 283 buildings having a frontage of 9379 feet and costing $1,623,950. In January, 1902, there were permits issued for 322 buildings, having a frontage of 9723 feet and costing $3,549,450.

At the annual meeting of the Builders' and Traders' Exchange, held in their rooms in the Chamber of Commerce Building on the afternoon of January 18, the election of officers resulted as follows:

President, John Dick.
First Vice-President, M. N. Kimbell.
Second Vice-President, F. B. Maconber.
Secretary, J. F. Daggett.
Treasurer, E. T. Malone.

The directors chosen for two years were J. Bodenschats, Alexander Gordon, Thomas F. O'Connell, E. B. Perkins and S. M. Randolph.

The reports presented showed the financial condition of the Exchange to be very good, and there was noted an increase in membership during the year of about 50, making the total in the neighborhood of 375.

After the business features were concluded the members were tendered a banquet in the rooms of the exchange, and this was followed by a vaudeville entertainment, which was doubly appreciated because of Chicago's closed theaters and because of the excellent unemployed talent which could be secured. An orchestra also contributed to make the evening a pleasurable one.

The new Board of Directors met January 22 and elected the following standing committees for 1904:

FINANCE.—J. A. Hogan, chairman; T. F. O'Connell, J. G. Bodenschatz, S. S. Kimbell and J. C. Deacon.

LEGISLATIVE.—S. S. Kimbell, chairman; T. F. O'Connell, Alex. Gordon, N. J. Bique and Wm. Gavin.

MEMBERSHIP.—N. J. Bique, chairman; Alex. Gordon, J. A. Hogan, J. C. Deacon and S. S. Kimbell.

ROOMS.—J. C. Deacon, chairman; E. B. Perkins, J. G. Bodenschatz, S. M. Randolph and Wm. Gavin.

ARBITRATION.—Wm. Gavin, chairman; S. M. Randolph, Alex. Gordon, E. B. Perkins and J. A. Hogan.

LIBRARY.—B. C. Evans, chairman; J. C. Kneale and A. C. Preble.

COMPLAINTS.—J. D. Corlett, chairman; Ingwald Moe and C. C. Bushnell.

Kansas City, Mo.

The local architects have a great deal of work on their boards for the ensuing year, and the feeling among them and general contractors is that it will be a much more busy year than was 1903. There are no labor troubles at present, nor are builders looking for any. The wage scale remains about the same as heretofore. Materials are about the same, excepting iron, which is somewhat lower and which will play an important part in the construction of the buildings which are to be put up in the near future.

The annual election of the officers of the Master Builders' Exchange was held in their headquarters in the Postal Telegraph Building on December 16, resulting in the selection of George W. Goodlander for president, C. R. Hunt for vice-president, and Lawrence Gilwee for secretary and treasurer. The Board of Directors for the new year consists of J. A. Ritzler, H. B. Farley, Lemuel Crosby, W. A. Bovard, W. E. Zahner and Ed. T. Groves. The exchange is in a very flourishing condition and the outlook is most encouraging.

Lincoln, Neb.

The volume of building for the year 1903, as shown by the records of the Building Inspector, was about normal, the larger portion of the expenditure being for residence buildings ranging in cost from $2000 upward. Materials continue to rule high in price, with no apparent hope of a reduction unless it should be made necessary by a decrease in the volume of building. Common building brick are steady at $8 to $9 per 1000, and common and dimension lumber of yellow pine find ready sale at $22 to $24 per 1000, according to length and sizes. It is possible that a sudden and general cessation of building might force a substantial reduction from these prices, but such a condition does not appear among the early probabilities, unless as an incident of the coming Presidential campaign.

Labor conditions are generally satisfactory in this city, and it appears probable that the agreements in force the past year will be renewed. Carpenters are drawing a minimum scale of 32½ cents per hour, with most good men getting a preference at 35 to 40 cents; while common labor receives from $20 to $2.50 for a day of eight hours.

The relations between the Contractors' Exchange and union labor have been very satisfactory during the past year, and any one who attempted to introduce any friction at this time would be likely to meet with a vigorous calling down by both parties .

These conditions prevail generally throughout Eastern Nebraska, with the possible exception of Omaha, which has not fully recovered from the labor troubles of last spring. Lincoln and its tributary territory are committed to the open shop policy, with a substantial preference for organized labor, believing that such a policy conducted along conservative lines will promote the general interest.

Los Angeles, Cal.

The total amount of the building permits issued in Los Angeles during January shows a marked falling off as compared either with the month preceding, with January, 1903, and with the monthly average for that year. The building permits issued numbered 516, of a total value of $875,744. The bulk of this represents small buildings, chiefly of wood. Only 18 brick buildings were undertaken during the month, and of these none ranged as high as $20,000 in value. There were 257 one-story frame residences undertaken, the average of cost running a little less than $1000 each. There were 52 two-story frame buildings undertaken averaging between $3000 and $4000 each. Permits were taken out for 26 frame flats of an aggregate cost of $95,600. A feature of the month was the unusually large amount expended for alterations in brick buildings. During January, 1903, the total value of the building permits taken out in the city reached the large total of $2,159,000.

Milwaukee, Wis.

A decided impetus was given to building operations in the city during the year which has just been brought to a close, and the outlook for the coming season is of a most gratifying nature. According to the figures compiled by Building Inspector Michael Dunn the new structures projected during the past year were estimated to cost $8,295,551, while in the year previous the buildings projected cost $6,534,480. Of the amount expended last year $5,604,982 went for brick and stone structures, $2,396,794 for frame buildings, and $293,775 for brick veneer buildings. There was also expended last year $1,224,690 in making alterations and additions to old structures, so that the grand total for 1903 was $9,510,241.

Minneapolis, Minn.

The past year showed comparatively little change in the amount of building operations in the city, as compared with the previous 12 months, the records of Building Inspector Houghton showing that 4149 permits were issued for building improvements costing $6,210,747, as against 3814 permits for improvements costing $6,188,218 in 1902. An interesting feature of the record is the number of permits issued for moving houses, these aggregating 104 and costing about $12,000, while in 1902 there were 292 permits issued for similar purpose, the cost of the operations aggregating a trifle over $31,000.

The outlook for building operations in the city and vicinity for the coming season is very good, and contractors and builders expect to have a volume of business which will compare favorably with previous years.

The differences which since last August have existed between the master builders in Minneapolis and their workmen were finally referred to a Board of Arbitration, consisting of T. B. Janney, Charles E. Bond, E. E. Fisher, George W. Bestor and T. W. Stevenson, who have made their report regarding the controversy. The findings of the arbitrators are as follows:

That nine hours shall constitute a day's work for such unskilled labor as is usually performed by hod carriers and laborers in and about the construction and erection of buildings.

That, in view of the prospect for building operations to be carried on in this city during the season of 1904, the minimum wages shall be 20 cents an hour.

That for all overtime and for labor on Sundays and legal holidays the wages shall be increased 50 per cent. over the above.

That there shall be no discrimination in the employment of union or nonunion laborers.

Nothing in this determination shall prevent the employer from paying more than the minimum rate fixed herein, nor the employee receiving the same.

Neither shall this determination be considered as limiting the amount of work that may be performed by individuals.

This determination shall take effect and be in force for one year from and after April 1.

The Builders' and Traders' Exchange at their recent annual meeting elected the following officers for 1904:

President, George B. Posson.
First Vice-President, Frank E. Buestrin.
Second Vice-President, Henry Schmidt.
Treasurer, A. F. Wagner.
Secretary, E. W. Hesse.

The directors for three years are P. J. Petersen, Wm. Rediske, Ed. Whitnall and Henry Danischefsky.

The directors for two years are A. P. Micbie, C. B. Kruse, John Langenberger and Joseph Skobis.

The directors for one year are Joseph A. Meyers, George Schmidt, J. J. Quinn and J. P. Maxwell.

Across the river in St. Paul there were 1443 permits taken out for building improvements last year estimated to cost $3,645,775, while in 1902 there were 1265 permits issued for building improvements estimated to cost $3,290,817.

Newark, N. J.

The Master Carpenters' Association held their annual meeting on the evening of February 5 and elected officers as follows for the ensuing year: President, George Varley; first vice-president, Fred Kilgus; second vice-president, Charles T. Day; financial secretary, E. P. Harrison; recording secretary, A. J. Crowder; treasurer, H. J. Schaedel.

The Board of Directors consists of C. M. Russell, John Austin, Alfred Tromans, Joseph Ferguson, C. T. Day, John Dickman, Harry Doremus, William G. Sharwell and Philip Gegenheimer.

New Haven, Conn.

At the annual meeting of the Builders' Exchange held in their rooms on the evening of Tuesday, January 19, various reports were presented showing the organization to be in a most flourishing condition. At present it has a membership of 113. The election of officers resulted as follows: President, Charles F. Merwin; vice-president, C. E. Coe; treasurer, S. E. Dibble, and secretary, George A. Sanford. The trustees elected to serve for a period of three years are E. H. Sperry and L. A. Mansfield.

New York City.

The local building situation is remarkably quiet just at present, as may be gathered from the fact that during the month of January there were only 24 plans filed with the Bureau of Buildings for improvements estimated to cost $1,452,400, as against 53 plans for buildings costing $3,087,700 in January of last year. The lowest January prior to 1904 was 1902, when 44 plans were filed, calling for an expenditure of $3,623,000. The opinion among architects seems to be that this shrinkage is due to the strikes of the past year, which have affected investors to no small extent. This is more strikingly shown perhaps in the fact that comparatively little important work is being projected, although it is thought that in the aggregate the total for the year may reach fair proportions.

The new Superintendent of Buildings of the Borough of Manhattan, who was appointed to succeed Henry S. Thompson, is Isaac A. Hopper, a builder of long and varied experience and well qualified to fill the position to which he has been called. The office is one of the most important in the city, and as it has to deal with the construction of all buildings erected within its borders, the requirements of the office call for a high order of practical intelligence. Mr. Hopper was president of the company bearing his name which is now erecting a power house for the subway, the foundation for the new Custom House at Bowling Green, and several large office buildings.

New London, Conn.

The meeting of the local branch of the Interstate Builders', Contractors' and Dealers' Association, held at their rooms in the Cronin Building, Tuesday evening, January 26, was a most interesting affair, combining, as it did, business, refreshments and sociability. The local branch has a membership of over 90, and at this meeting State President A. B. Burritt and General Organizer T. B. Beecher of Bridgeport were present and spoke on the work of the association.

After the business session refreshments were served and the evening devoted to general sociability. The meeting was the first under charge of the new official board, which is composed of President John F. Murray, Vice-President F. W. Hull, Recording Secretary George H. Holmes, Financial Secretary W. W. Winchester, and Treasurer John H. Root.

Norwich, Conn.

The members of the Master Builders' Association held their annual meeting on the evening of Monday, January 25, which was of a most enjoyable character. The principal business was the reception of reports of various officers and the election of officials for the ensuing year. The result of the balloting showed A. N. Carpenter to have been chosen president; Vine S. Stetson, vice-president, and H. C. Peck, secretary.

After the business meeting the members sat down to a banquet, served by MacDougald, which was followed by an hour or more of social intercourse. Music was rendered during the evening by Cilley's Orchestra. The committee having charge of the affair, which was regarded as most successful in every way, consisted of I. J. Willis, George Fellows and Arthur Brown.

Omaha, Neb.

The present outlook for building is regarded by the leading architects and contractors as very encouraging, provided, of course, labor remains quiet as at present. Prices of materials entering into the construction of buildings are considerably lower than last fall, with the possible exception of brick, which remains at $8 and $8.50 per 1000. The permits issued from the office of the Building Inspector during January covered building improvements estimated to cost $83,585, as against $22,997 for the same month last year. Summing up the situation, it may be said that a hopeful feeling exists for quite an impetus in the building line under favorable conditions.

At the annual meeting of the Builders' Exchange the following officers were elected for the ensuing year:

President, Charles J. Johnson.

Vice-President, William P. Deverell.

Secretary, John H. Tate.

Treasurer, James E. Merriam.

The directors elected include Thomas Herd, A. J. Vierling, D. M. Potter, A. C. Busk, Henry Hamann and Grant Parsons.

At a meeting of the exchange held on Saturday afternoon, January 16, it was decided unanimously to become a member of the National Building Trades Employers' Association, which was organized at a meeting held in Chicago on December 10.

Orange, N. J.

At the recent annual meeting of the Master Builders' Association of the Oranges the following officers were elected for the ensuing year: President, George T. Roberts; vice-president, Henry Woodruff; secretary, Alex. E. Pearson; financial secretary, F. M. Stuck, and treasurer, H. Carhart.

At the annual meeting of the Master Masons' Association of the Oranges, recently held, officers were elected: President, James G. Barradale; vice-president, Michael O'Connor; treasurer, Charles H. Shauger; secretary, H. C. Doremus.

Officers have been chosen as follows by the Master Painters' Association of the Oranges: President, A. Bode; vice-president, J. P. Benbrook; secretary, C. M. Coons; treasurer, H. W. Smith.

Philadelphia, Pa.

One effect of the severely cold weather which the country has been recently experiencing is the curtailing of building projects in some of the leading cities, builders having hesitated to take out permits for improvements until the weather shows signs of moderation. According to the report of the Bureau of Building Inspection for January there were 306 permits taken out, covering 324 operations and calling for an estimated outlay of $813,445. These figures compare with 315 permits, covering 500 operations, costing $1,147,705, in January of last year. The shrinkage is strikingly emphasized by the fact that there were only three permits issued for two-story dwellings, to cost $10,400, and three for three-story dwellings, costing $45,000. Alterations and additions called for an expenditure of $152,000, and three hospitals for $350,000.

At a meeting of the members of the Master Builders' Exchange, held on January 26, the following directors were selected to serve for a term of three years: George Watson, F. M. Harris, Jr., John S. Stevens, W. T. Reynolds, John R. Huhn, William B. Irvine and Cyrus Borgner.

The board held a meeting on the second Tuesday of February and organized by electing J. Lindsay Little, president; Thomas F. Armstrong, vice-president; John D. Carlile, second vice-president; Albert A. Reeves, third vice-president; William Harkness, secretary, and Henry Reeves, treasurer.

At a meeting of the Advisory Board of the Exchange, held on February 3, reports were received from the leading employers in the building line, and it was decided that no agreements should be entered into with any class of workmen unless the sympathetic strike was rendered impossible. At the conclusion of the meeting it was stated that the contracts now in force and expiring on May 1 are not to be renewed until a distinct decision on the strike question has been reached. This, the employers state with emphasis, is not a move to fight organized labor, but is intended merely to prevent a recurrence of the interruptions of last year.

Portland, Me.

The annual meeting of the Portland Builders' Exchange was held at Riverton on the evening of January 20, after which the members enjoyed their annual dinner, which was a brilliant success, reflecting much credit on the Committee of Arrangements, consisting of S. Bourne and N. E. Redlon. The result of the election showed the following choice:

President, Fred. Wheeler.

Vice-President, Frank Cunningham.

Secretary, Eugene E. Smith.

Treasurer, Sylvanus Bourne.

The directors elected were Nathan E. Redlon, Sylvanus Bourne, Frank A. Rumery, Thomas J. H. Hollivan and A. W. Higgins.

The members were summoned to the dining room at 6.30 in the evening, where a course dinner was served, the *menu* card found at each plate bearing the title:

Specifications
for the
Annual Supper, Builders' Exchange, Riverton.
Wednesday, January 20,
1904.
B. Smith, Architect, Riverton Casino.

These specifications are the property of the builder and need not be returned to the architect.

In addition to the *menu* there was printed in the specifications a clever semi-poetical skit on carpenter work in general. The table decorations were pinks and candelabra. A large number of members and representative builders were present, and after the dinner the evening was spent in social intercourse.

San Francisco, Cal.

The total of building operations for the month of January is placed at something over $1,000,000, which is not up to the average for 1903, which was approximately $1,200,000 per month. During the first half of the month building operations were quite small owing perhaps to the business uncertainty which seemed to exist in the East. The latter part of the month, however, showed a good volume of business, there being a marked improvement over the earlier weeks of the month. The building permits taken out during the month numbered 408, having a total estimated cost of $814,461, as compared with December. Seventy-four more applications were filed, but the value of the improvements called for were $59,380 less.

The Board of Supervisors of San Francisco have passed an ordinance amending the present building ordinance, which provides that light or vent shafts in all large buildings shall be built entirely of brick or other fire proof materials, and that all the light or vent shafts in wooden buildings may be built of wooden studs lined on both sides with fire proof material. All such shafts erected are hereafter to be carried at least 3 feet above the level of the roof.

The Masons' and Builders' Association of San Francisco and the suburban towns held its annual meeting on January 9. Building conditions, and more particularly brick buildings, were carefully considered. A summary showed that during 1903 the organization handled contracts aggregating almost $10,000,000, a large increase over former years. The organization decided to pay apprentices $1 per day for the first eight months and 50 cents per day additional for each succeeding eight months, except the last eight months, when the advance will be $1 per day.

The following officers were elected for the ensuing term: President, Thomas W. Butcher; first vice-president, James S. Scannell; second vice-president, M. F. Gale; secretary, J. J. Phillips, and treasurer, J. J. O'Connor.

Shreveport, La.

The amount of building done in the city during the past year makes a most creditable showing, more especially when the conditions prevailing in and out of the building trades are taken into consideration. The total value of the improvements is in excess of $1,000,000, but in this record the work commenced in 1902 and finished in 1903 is not included, only the work for which permits were issued being covered in the record of the Building Department. According to Building Inspector Paty, the total value of building improvements for the year was $1,046,286, the bulk of which was projected in January, February, March and April, this being due to the fact that two breweries and the new Charity Hospital were commenced during these months. The cost of these buildings brought the value of the building improvements projected during the first four months of the year to a total largely in excess of that for the eight remaining months. The work which has been done covered buildings of all kinds, and the city has shown a steady growth in all sections.

Washington, D. C.

The original Master Builders' Association of the District of Columbia held their twenty-ninth annual banquet at the Colonial Hotel, the event being considered one of the most memorable in the history of the organization. More than 50 prominent builders, with their guests, were present, and a number of interesting addresses were made. The tables were handsomely decorated, and the special *menu* card was a unique affair, characteristic of the builders' trade. It represented a stone arch with two wooden doors, the opening of which revealed the elaborate *menu*.

President Manley as toastmaster introduced as the first speaker of the evening Commissioner West, who, after referring to the great buildings in Washington, expressed the hope that the time would come, and come first in that city, when there would be no more strikes or lockouts, but when the disputes between employer and employee would be settled by arbitration, each side respecting the other in the disposition of the points at issue. The next speaker was Colonel Biddle, Engineer Commissioner for the district, who, among other things, stated that the builders were the men upon whom the people of the city depended for the beauty and durability of their homes and buildings. Ernest Wilkinson of the Board of Trade related several humorous incidents connected with his previous early visit to Washington, referring to the time when the original builders were wont to hold their annual meetings on the curb. Other speakers were Surveyor Looker, Building Inspector Ashford and President F. K. Raymond of the Business Men's Association. Prominent among the guests was J. S. Prescott, president of the other Master Builders' Association of the District.

The committee in charge of the banquet consisted of J. C. Yost, chairman; J. W. Thomas and G. W. Barkman.

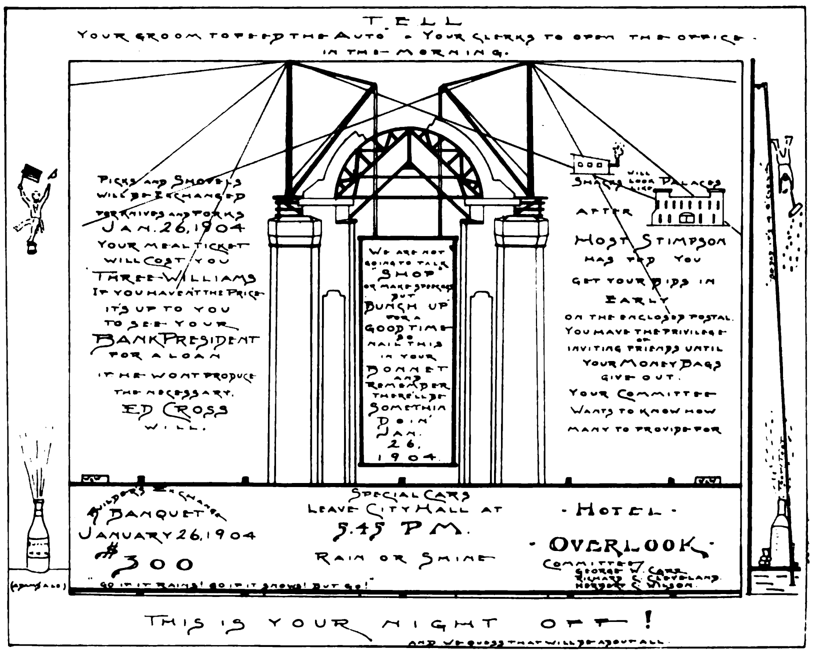
The Reception Committee was composed of D. J. McCarthy, Notley Anderson, J. W. Thomas and W. B. Holtzclaw.

Worcester, Mass.

The annual meeting of the Builders' Exchange was held on the evening of January 22, when reports of the various officers were presented, showing the association to be in a most flourishing condition and to have materially increased the membership during the past year. Charles H. Peck, ex-Superintendent of Public Buildings, was elected an honorary member. The president was authorized to appoint a committee of three to revise the bylaws of the Exchange and to report at the meeting in February.

The balloting for officers resulted in the election of William E. Griffin, president; E. J. Cross, vice-president, and George W. Carr, treasurer. The trustees elected for two years were Elwood Adams, A. P. Robbins and C. A. Colburn.

The annual banquet, for which extensive preparations had been making for some time, was held at Hotel Overlook in Charlton, Tuesday evening, January 26, the members meeting at the Exchange rooms in the afternoon and then proceeding by special cars to the destination. Unfortunately the evening was very stormy, a young blizzard being in progress, so that the members were late in reaching the hotel. This, however, did not detract in the least from the pleasure of the occasion, the storm seeming to have the effect of rendering appetites all the more keen. The menu was of a substantial character and the members did full justice to the good things that were set before them.



Fac-simile of Invitation to Banquet of the Builders' Exchange, Worcester, Mass.

The invitation to the banquet was of a unique character and was sent out in the form of a blue print, a reproduction from the original being presented in the accompanying illustration. The designer was Herbert C. Wilson of the George W. Carr Company, concrete engineers, and was executed by A. J. Wallace, their draftsman. There were no set speeches or formal toasts, but good fellowship reigned, and the short talks were interspersed with solos by Louis Kelso Brennan and music by Normand's orchestra.

When the evening's entertainment had been concluded, the members again filled the cars for the homeward trip, reaching Worcester in the wee hours of the morning, all regretting that they must wait another year before the next annual banquet of the Builders' Exchange. The committee having charge of the affair consisted of George C. Cleveland and Herbert Winslow, who are entitled to great credit for the successful manner in which the affair was carried out.

Zanesville, Ohio.

The members of the Builders' Exchange held the regular quarterly meeting and banquet in their rooms in the People's Bank Building, on the evening of January 29. President Queisser made a few remarks, in which he set forth the business and purpose of the meeting and also made some comments on the commmunication received from the National Convention. Secretary Baker presented a report showing the Exchange to be in a most flourishing condition. The principal address of the evening was by Attorney Henry P. Herdman, who discussed "Municipal Building Inspection." He referred among other things to the importance of the subject to every citizen of Zanesville and pointed out that the practical question confronting the Exchange was what could be done to better the conditions in the city.

After the subject had been discussed by several others, it was voted to appoint a committee of five to co-operate with City Attorney Pugh, in drafting an ordinance relative to the erection of buildings. The chair was instructed to ask the members of this committee to insert a clause calling for brick, stone or concrete buildings within a certain radius of the center of the city.

After Colonel F. F. Spangler had occupied a few minutes in discussing the condition of affairs in general in the city, the members adjourned to the dining room, where a luncheon was served and the remainder of the evening devoted to social mattters.

Notes.

The Builders' Association of Boston, Mass., held their annual banquet on the evening of January 28, at Rathbone Hall, Roxbury. A number of representative members of the trade were present, and among the speakers of the evening were Thomas F. Mahan, J. W. Pratt and Julius Johnson, of the Quincy Builders' Association; Charles Redman and C. C. Chisholm. The officers in charge were President T. E. Jones, Vice-President J. J. Welsh, Treasurer Herbert Decker and Secretary Carl Creber.

The Builders' Exchange League of Pittsburgh, Pa., held a meeting on January 12, when officers for the ensuing year were elected as follows: President, Samuel Francis; first vice-president, J. C. Wilson; second vice-president, Scott A. White; treasurer, T. J. Hamilton, and secretary, E. J. Dietrich.

At the annual meeting of the Builders and Traders' Exchange of Lancaster, Pa., held the last week in January, Joseph S. Zook was elected president: George Gesell, Samuel H. Bally and Andrew Kramer, vice-presidents; H. H. Moore, treasurer, and William A. Brunkman, secretary. Frank S. Evarts was elected trustee for three years, J. V. Wise for two years, and Charles Binkele for one year.

The lockout in the building trades, which for nearly a month paralyzed the industry in Paterson, N. J., was called off on January 20, after a conference between committees representing the Master Builders' Association and the United Building Trades Council. The difficulties were arranged by finally agreeing that all disputes arising in the building trades in Paterson shall be settled by arbitration, as provided for in the several agreements between the unions and their employers. No strike or lockout is to be ordered pending a decision of the arbitrators. There is plenty of work in prospect for the coming season, and both contractors and men are anxious to have matters settled so that there will be nothing to interfere with active operations.

The Rate of Wages Per Hour Paid in the Building Trades.

The accompanying table, dated January 1, 1904, which has been compiled and issued by the Building Contractors' Council, E. M. Craig, secretary, 90 La Salle street, Chicago, shows the prevailing rates of wages in the building trades of 29 leading cities of the United States. The rates given in this table are in cents per hour, with the exception of a few cases, in which the rate per day is given in dollars. This table is not only exceedingly interesting, but by reason of its comprehensiveness it will undoubtedly be of great value to many of our readers:

Name of City.	Masons.	Brick-layers.	Structural Iron Setters.	Ornamental Iron Setters.	Plasterers.	Lathers.	Hoisting Engineers.	Tile Setters.	Plumbers.	Steam Fitters.	Steam Fitters' Helpers.	Gas Fitters.	Carpenters.	Stone Cutters.	Marble Cutters.	Marble Setters.	Painters.	Sheet Metal Workers.	Electricians.	Laborers and Hod Carriers.	REMARKS.
Buffalo, N. Y.	45	50	50	50	50	$2 p. M.	43¾	50	42⅜	42⅜	15	40⅛	35	50	50	50	37½	35	37½	17 to 20	
Baltimore, Md.	55	55	43¾	...	50	...	37½	44⅜	45	31¼	...	40	37½	40⅝	...	...	...	30 and up	40	...	Slag Roofers, 28c. per hour.
Chicago, Ill.	60	60	56¼	52½	56¼	50	56¼	56¼	56¼	56¼	28⅛	56½	50	50	37½	50	40	50	56¼	30	Planermen, 42½c. per hour.
Cleveland, O.	50 to 55	50 to 55	47½ to 50	31¼ to 43¾	50	$3 to 3.75 p. day.	35	43¾	50	44	25	43¾ to 50	37½ to 40	50 to 56¼	31½ to 40	50	37½	37½	40½ p. hour $4 p. day.	25 to 30	Electrical Helpers, $1.50 to $2.50 per day.
Columbus, O.	50	55	40	...	50	45	30	55	40	35	15	37½	35	50	31¼ to 50	31¼ to 50	30	35	35	28½ to 31¼	Electrical Helpers, 15 to 20c. per hour.
Cincinnati, O.	60	60	50	50	62½	2.25 p. M.	37½	50	3.50 p. d	41½	25	43¾	37½	50	$1.50 to 2.00 per day.	$1.50 to 2.00 per day.	35	25	34¾	20 to 37½	Electricians asking increase in wages on Jan. 1, 04. Marble Setters, $3.50 per day, 9 hrs., Cutters 10 hrs.
Denver, Col.	62½ to 68¾	62½ to 68¾	50	2.50 to 3.50 p. day.	55	3¾ to 4½ p. yard.	37½	55	53⅛	53⅛	29⅜	53⅛	45	56¼	$2.50 to 3.00 per day.	$3.00 to 4.00 per day.	43¾	46⅞	46⅞	31¼ to 37½	Plumbers' Apprentices, $1 to $3 per day.
Duluth, Minn.	45	60	35	35	56¼	45	30	35	55	50	25	55	37½	50	35	35	35	37½	31¼ to 37½	25	
Detroit, Mich.	53	58	35	30	50	43⅛	30	50	44	44	...	44	35	56¼	...	...	32½	32	35	25	Plasterers work 4 hrs. Sat.
Erie, Pa.	45	50	...	...	33⅓	3c. p. y'd.	...	...	30 to 35	30 to 35	20	30 to 35	25 to 30	40	40	40	25	25 to 30	30	17 to 25	
Indianapolis, Ind	45 to 60	45 to 60	40	40	45	...	35	55	44½	45 to 50	25	30	30 to 37½	45	55	55	35	32½ to 40	35	31½	Laborers, $1.28 to 1.75 p. day
Jackson, Mich	50	50	...	...	40	2½ to 2¾ per yard.	...	...	33⅓	38	16⅔	25	28	50	...	...	26 to 28	22¼ to 30	...	22½	
Kansas City, Mo.	50 to 62½	50 to 62½	50	50	62½	4.00 p. dy	50	56¼	50	50	21⅞	50	40	62½	43¾ to 46⅞	43¾ to 46⅞	37½	42½	37½	17½ to 30	
Minneapolis, Min.	50	55	40	40	56¼	...	42½	50	50	50	25	50	37½	50	50	50	37½	40 and up	37½	20 to 25	Plumbers' Laborers, $2.50 to 2.75 per day. Hoisting Engineers, $4.00 for 9 hours work.
Milwaukee, Wis.	50	50	40	40	40	30	35	50	43¾	37½	...	37½	35	50	27½	37½	35	35	...	25 to 30	Mason Laborers, 27½c. per hr.
New York, N. Y.	56¼	65	56¼	56¼	68¾	50	62½	62½	56¼	56¼	33⅛	56¼	56¼	62½	62½	62½	50	50	50	25 to 40⅝	See note below.
Newark, N. J	57½	57½	50	...	57½	55	...	50	45	50	...	45	41	55	56¼	56¼	35	45	50	30	
Philadelphia, Pa.	60	60	50	40	50	43¾	40	45	40	37½	30	42¾	40	50	50	50	37½	40	40	35	Plumbers' Laborers, 35c. per hour.
Providence, R. I.	45	45	...	...	45	$3 p. day	27½ to 35	50	43¾	31¼	19⅛	31¼	35	37½	41	45	31¼	31¼	31¼	18¾ to 25	Tile Setters' Helpers, 25c. per hour.
Portland, Ore.	68¾	68¾	47½	...	62½	...	47½	56¼	56¼	56¼	25	47½	$3 to 3.75 per day.	62½	62½	62½	$3 to 3.50 per day.	47½	37½	$3 to 3.50 per day.	
Pittsburgh, Pa.	50	60	50	45	52½	40	37½	55	50	50	25	50	43¾	50	50	50	42½	42½	50	35	Electrical Helpers, $2 to $4 per day.
St. Louis, Mo.	60	65	55	55	75	62½	55	56¼	62½	68¾	31¼	62½	55	56¼	33⅛	56¼	45	50	62½	42½ to 45	See note below.
Scranton, Pa.	33⅓	50	45	...	37½	37½	25	50	40⅝	40	21⅛	40⅝	30	40	...	...	34	...	50	20	
S. Francisco, Cal	75	75	50	46¾	...	50	...	62½	62½	62½	...	62½	50	56¼	31¼	50	43¾	56¼	37½ to 50	50	
St. Paul, Minn.	45 to 50	50	35	40	56¼	47½	40	35 to 45	50	45	25	50	30 to 37½	50	30	35	35	40	31¼	17½ to 25	Hoisting engineers can work 59 hours per week for $20. Laborers work 10 hours.
Toledo, O.	55	55	40	40	50	45	35	30 to 45	43¾	37½	...	37½	30 to 35	50	20 to 30	20 to 30	31¼	20 to 45	50	25 to 28	
Topeka, Kan.	45	55 to 62½	...	...	50	3c. p. yd.	...	37½	40	40	22	40	0 to 37½	45	45	45	35	35	30 to 37½	18¾ to 21⅞	Lathers and Painters work 8 hours per day, all other trades work 9 hours.
Tacoma, Wash.	68¾	68¾	62½	62½	62½	...	43¾	75	56¼	56¼	...	56¼	45	50	50	50	37½	43¾	37½	25 to 28⅛	
Washington, D.C	56¼	56¼	50	31¼	56¼	37½	37½	56¼	50	43¾	20	43¾ to 50	43¾	45	45	45	37½	37½ to 40	43¾	15⅝ to 25	Electrical Helpers, $1 to $2 per day.

NOTE.—New York, water proofers, 34⅜c.; bluestone cutters, 55c.; boiler and pipe coverers, 50c.; house shorers, 34⅜c.; cement masons, 55c.; elevator constructors, 53⅛c.; floor layers, 56¼c.; stone setters, 62½c. After May 1, 1904, 68¾c.

NOTE.—St. Louis, slate roofers, 62½c.; foremen, 87½c.; composition roofers, 50c.; granitoid finishers, 50c.; granitoid laborers, 35c.; granitoid frame setters, 40c.; granitoid block men, 40c

LAYING OUT CIRCULAR ARCHES IN CIRCULAR WALLS.*—XV.

By Chas. H. Fox.

We now take up the consideration of the second method of constructing templates, &c. In the cutting of the stones by the method described in the previous issue the convex surface of the face is that first formed and to the direction given by this surface the required lines are obtained. By the method now to be explained either of the surfaces—that is, of the face, soffit or joints—may be the ones first formed. In order to accomplish this in a systematic manner templates other than those already constructed are necessary. One set of templates is necessary to form the surface of the soffit, or, if the joint surface be that first formed, templates are required to give the proper direction in which to form the cylindrical surface of the face.

When, as may often be the case in practice, the soffit surface is the greater one, that should be the surface first worked; but, owing to the twisted form of the surface in question, it has heretofore been too difficult a problem for the majority of cutters and draftsmen to successfully solve. In the construction of the templates now for the first time exhibited all rule of thumb methods have been done away with, and the templates are developed by means of some well-known geometrical principle. They are also applied to the stones in a systematic method, and to their direction the warped surface of the soffit may be as readily formed as that of the soffit of a right arch in a plane surface wall.

In Fig. 137 is shown the plan, and in A C E, Fig. 138, the directing curve of the soffit. To construct the templates required to give the direction for working the surface of the soffit we will take, for example, those required for No. 3 stone. The space occupied at the directing curve by the soffit surface of the stone in question is shown in D′ 3′ C′ at the right side of Fig. 138. This understood, divide D′ C′ into any number of equal parts, as shown in C′, 5′, 3′, &c., and from each point parallel with the center line produce lines meeting the opening line in the points C, 5, 3, &c. Through each point produce the radials C′ *l*, 5′ *k*, 3 *j*, &c. Then square with C′ *l* draw C′ D′ and *l m*. Now in Figs. 143 and 144 set off C, 5, 3, &c., equal respectively to C′, 5′, 3′, &c., and *l*, *k*, *j*, &c., of Fig. 137. Then in Fig. 138 draw the horizontal C′ 7. In Figs 143 and 144 set off 5′ 5, 3′ 3, &c., equal respectively to the corresponding projections of Fig. 138, and through the points thus obtained trace the curves, as shown.

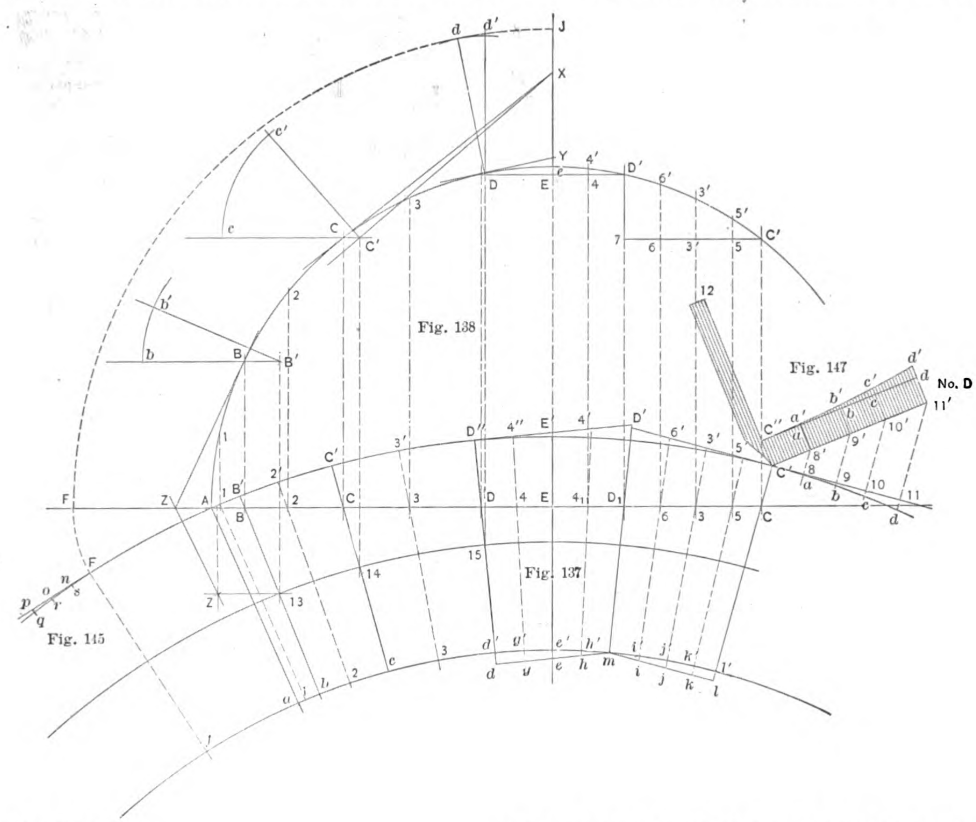


Fig. 137.—Plan View.
Fig. 138.—Directing Curve.

Fig. 145.—Template Required to Work Draft of Springer.
Fig. 147.—Template Required to Work Drafts at Oblique Lines C 8 and C 11 at Convex Face of Stones No. 2 and No. 3.

Laying Out Circular Arches in Circular Walls.

In Fig. 143 make D *b* of any length, and parallel with a chord line joining C D draw *a b*. Now in Fig. 144 set off C *a* equal with D *b* and parallel with *a b* of Fig. 143 draw *a b* of Fig. 144. In order to project the diagrams correctly the base lines of the diagrams are, of course parallel with each other. This completes the templates as required in order to work the soffit surface of No. 3 stone. In a similar manner may the templates as required for a similar purpose at the soffit surfaces of each stone be developed. Those required at the soffit of the keystone are shown in Figs. 141 and 142.

After the soffit surface is formed other templates are required to give the proper inclination or angle which the surface in question may make with the joint surface. These may be projected as follows: Transfer to Fig. 143 the angle *d′* C *d*, equal with that of *d′* D *d* of Fig. 139. This completes the template required.

Having now explained the construction of templates correctly projected, we will in a few words explain the construction of templates that for all practical purposes are sufficiently correct. The readers may readily prove the approximations by constructing the two sets and comparing one with the other. Having, as shown in Figs. 139 and 140, projected the curves of the soffit of the outer and inside face molds, draw in Fig. 139 the chord lines B C, C D, and D D. Then, the base line of Fig. 140 being parallel with that of Fig. 139, draw *b c*, *c d*, and *d d*, respectively parallel with the chord lines of Fig. 139. This gives in one operation the templates required. The angles C B *b*, D C *c*, &c., are, of course, affixed to the templates as before. At No. 1 stone, instead of drawing the chord lines, a line, as B *h*, *b h*, of Figs. 139 and 140, drawn at right angles with the base line, will give the templates desired, the construction of which will be apparent from the drawings.

In a radiant arch, which may have a rubbed or tooled face, after the joint and soffit surfaces are formed, other templates than the above are required to give the proper direction for forming the cylindrical surface of the face. If soffit molds are developed, the templates, Figs. 146 and 147 of this plate, are not required; but as they may be

Strictly speaking, the templates just projected are only approximations, as when the face molds are wrapped around the cylindrical surface of the face the right lines B *g*, &c., are projected in curves; but in practice the difference is so very small as to be hardly perceptible. We may further remark: The template, say that of Fig. 147, will also give the direction for forming the surface of the face of No. 2 stone by simply applying the template to the top joint surface and to the line C 8; for the line 8 11 makes a constant angle with the base line of the cylindrical surface; therefore, the section is similar and equal at both lines C 8 and C 11. The same remark also applies to the template of B *g;* it may be made use of to give the direction for forming the face of the springer. One template may, therefore, be made use of to give the direction for forming the face sur-

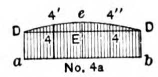


Fig. 142.—Template Required to Work Soffit of Keystone.

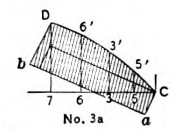


Fig. 144.—Template Required to Work Soffit of Stone No. 3.

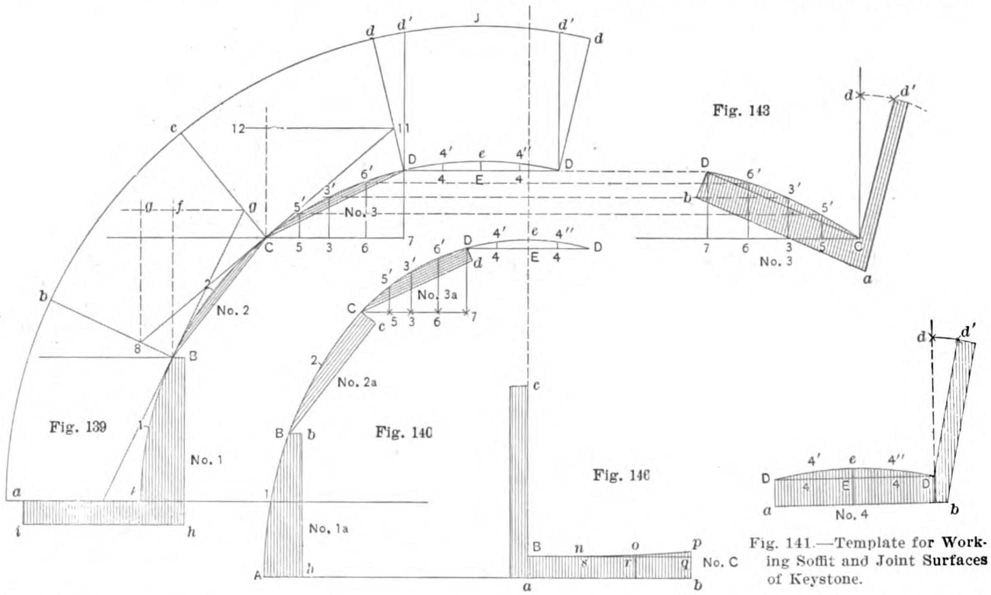


Fig. 141.—Template for Working Soffit and Joint Surfaces of Keystone.

Fig. 139.—Convex Face Molds.
Fig. 140.—Concave Face Molds.

Fig. 143.—Template Required to Work Joint Surfaces of Stone No. 3.
Fig. 146.—Template Required to Work Draft at Oblique Lines B *g* and *b* of Stone No. 2.

Laying Out Circular Arches in Circular Walls.

constructed in a less time than it may take to develop the soffit molds, it is far cheaper to project the templates of this plate.

We will here explain the construction of the template of Fig. 147, which is that required to give the direction for forming the face of No. 3 stone. In Fig. 139, square with the normal joint line C *c*, draw C 11, then parallel with the base line draw 11 12. Now in Fig. 137 set off C′ *d*, equal with 11 12 of Fig. 139, and square with C′ *l* draw the tangent C′ 11. Divide C′ *d* into any number of equal parts, and parallel with C′ *l* draw *d* 11′. Then set off C′ 11′ equal with C 11 of Fig. 139, and in the manner fully explained for the similar constructions project the ordinates and trace the curve. Then, drawing C″ 12 square with C″ *d*, the construction of the template may be completed.

In a similar manner may each template desired be projected. That required at the oblique line B *g* of Fig. 139 is shown in Fig. 146, and may be developed from the direction given in F *p*, &c., Fig. 145, equal with *g f* of Fig. 139.

faces of two adjacent stones. Do not fail to place some letter of reference upon the templates; this rule will prevent many mistakes arising when cutting the stones, if strictly followed.

A SHORT time ago there was filed with the Bureau of Buildings in the Borough of Manhattan, Greater New York, plans for a 12-story fireproof apartment house to cost $800,000 and to be erected on Broadway and 69th street in accordance with drawings made by Mulliken & Moeller. The building will have a frontage in Broadway of about 152 feet and a depth of 91 feet. The facades will be of limestone, brick and terra cotta.

THE annual meeting of the Master Builders' Association of Providence, R. I., was held February 4, at which reports were made by the officers and committees of the organization. The election of officers resulted as follows: President, Herbert L. Hemenway of Providence; vice-president, B. F. Smith of Pawtucket; secretary and treasurer, Edwin G. Penniman of Providence.

A DWELLING OF UNIQUE CONSTRUCTION.

A MOST striking example of the way in which field stone and boulders may be utilized in the construction of a dwelling house is found in the residence erected not very long ago by Charles F. Lumis, the well-known writer upon Indian life, at Los Angeles, Cal. A view of this house is presented herewith, the picture being a direct reproduction of an excellent photograph taken for our purpose. The smaller picture upon the page which follows shows the main entrance to the house, with its double doors of quaint architecture. The building was erected by Mr. Lumis, with the help of one or two Indians, and stands on a 3-acre plot which has been transformed into a rustic park. The walls are 4 feet in thickness, constructed of boulders, or what would be termed in the East "field stone," of every shape and color, placed in the wall just as they were found and held in place by cement. The low flat roof, which is used as a promenade, is supported by unhewn timbers of oak, which stretch from wall to wall. The doors are hewn out of heavy plank, no two being alike, and placed without regard to symmetry. The windows, as may be seen from an inspection of the general view of the building, are varied in shape and size.

General View of Residence of C. F. Lumis, at Los Angeles, Cal.

A Dwelling of Unique Construction.

It is, perhaps, inside the building that the most unique features are to be found. The living room, which is on the ground floor, has a collection of art works, curios and relics, with landscapes by Keith, flower pieces, Navajo blankets, &c. All is odd and original, yet homelike and suggestive of comfort. The upper floor is the author's workroom, and this is reached only by an outside stairway which does not show in the picture. It has one large room, containing a library of rare and expensive books and documents, early works and prints, while at the head of the stairs is a small anteroom containing many rare relics of the early civilization dating back to the times of the Aztecs.

Architecturally the house might properly be designated as a freak, owing to the fact that it has been constructed without any special regard to those particular points which an architect would consider necessary in order to produce a harmonious whole.

IT is stated that a man in Richfield, Wis., has completed a table 30 x 40 inches and 39 inches high, which contains 250,450 pieces of wood of different shapes and colors, gathered from all over the world, including the famous Amarand wood found only in the Philippines. It was four months from the time work was commenced on it until the table was finished. It is said it will be exhibited at the St. Louis Exposition.

Wages and Shop Rules of House Painters' Association.

We take pleasure in presenting herewith the scale of wages and shop rules recently adopted by the Master House Painters' and Decorators' Association of Pittsburgh, Pa. The scale is especially interesting at this time, more particularly in view of the situation existing in the building trades of the city.

Article I. That eight hours' work on the job shall constitute a day's work. Regular working hours shall be from 8 o'clock a. m. until 12 o'clock noon, and from 12.30 to 4.30 o'clock p. m.

Article II. Sec. I. When a workman works overtime he shall be allowed time and half time, excepting when employer desires to work double turn, and in such case the employer reserves the right to employ two sets of men, one for day turn and one set for night turn, each at single time.

Sec. 2. Workmen shall be paid double time for Sundays and the following legal holidays: July 4, Labor Day and Christmas Day.

Article III. Employers shall employ apprentices as may be determined by each association.

Article IV. Where the unions cannot provide the employers with first-class mechanics to execute their work the employer reserves the right to employ whom he pleases for the proper execution of his work.

Article V. The rate of wages for journeymen or mechanics shall be 42½ cents per hour.

Article VI. All employees shall be paid in full each week or not to exceed two weeks, but when a journeyman is discharged he shall be paid on the day of his discharge.

Article VII. All car fare over 10 cents shall be paid by the employer.

Article VIII. When men are sent from the city to work it is agreed that the employers pay one-half of married men's board and all traveling expenses.

Article IX. Any shop employing seven journeymen on an average during the year will be entitled to have a foreman, who need not be a member of the union, and who may work at any branch of the trade as the occasion requires. No shop to have more than one foreman.

Article X. This scale and shop rules to continue in force from January 1, 1904, until December 31, 1904.

Article XI. The workmen shall not order a strike on a shop or a job on any dispute or misunderstanding, but any dispute or misunderstanding shall be referred to the Executive Committee of the employers' association and the union of workmen, and in case they fail to agree, the dispute shall be settled by arbitration, the employer to select one man, the union or workmen one man, and these two a third man. The decision of these three shall be accepted as final.

Article XII. That should either party to this agreement desire any change in this scale at its expiration, three months' notice prior to the termination of this scale is to be given the employers or workmen, stating specifically, in writing, what change is desired, otherwise this agreement is to remain in full force for another year.

E. R. CLULEY, Secretary.
A. C. RAPP, Chairman.

SPECIAL ARTICLES OF AGREEMENT.

That the employees return to their respective shops as prior to the commencement of this difficulty and that the settlement shall be without prejudice to either employer or employee as at present working.

It is hereby agreed that the Painters' District Council

View of the Main Entrance to the House.

A Dwelling of Unique Construction.

of Allegheny County, Brotherhood of Painters, Decorators and Paper Hangers of America, will not support any sympathetic strike ordered by the Building Trades Council between now and the time of our withdrawal from the Building Trades Council at the expiration of the present quarter, March 31, 1904.

Master Painters' Association.	Painters' District Council, Brotherhood Painters and Decorators.
A. C. RAPP, President.	CHAS. E. KRESSLING, President.
E. R. CLULEY, Secretary.	E. A. EISEL, Secretary.
JOHN DEWAR.	D. S. OMO.
J. F. SEXANER.	HOMER SCHRECENGOST.
E. T. GRAHAM.	THOMAS LITTLE.
THOS. LANE.	JOHN ST. LEGER.
	FRANK E. SMITH.
	GEO. F. HEDWEK.

Roofing Materials in Colombia.

According to an official report of United States Consul General Alban G. Snyder of Bogota, Colombia, no tin, sheet iron or other metal roofing is used in the vicinity of Bogota, on account of the high freights and the difficulties of transportation along the rough mule tracks that serve as roads in this country. The roofing universally used is a tile, semitubular in shape, much resembling in composition and form one of the ordinary sewer pipes used in the United States, cut in half lengthways. Along the rivers and on the coast corrugated iron is much used; in Antioquia shingles are used. The tile roofing is not painted, nor is it the custom to paint the shingles or corrugated iron roofing; in fact, there is very little of what we call painting done in this section, with the exception of the woodwork of houses. Most houses are built of brick, loosely put together without mortar and then plastered over smoothly on the outside. This is frequently whitewashed and sometimes painted over with a substance similar to our calcimine. The colors used are white, dark yellow, pale blue, pink and terra cotta.

Stone, Lime and Cement Associations Meet.

Three conventions in Chicago and one in Pittsburgh, almost simultaneously, brought together all the leading producers of cut stone, quarried stone, cement and lime for a discussion of present conditions in their trade, for regulation of output and for placing themselves in a position to meet and overcome any unjust demands made by labor.

The National Cut Stone Contractors' Association was formed at a meeting held at the Grand Pacific Hotel, Chicago, January 20 and 21. At the meeting were represented 22 cities in 15 States, from Colorado to the Atlantic Coast. The objects of the organization are stated as follows: "To promote and protect the interests of its members and further the use of stone as a building material; to use our united efforts to cheapen the cost of cut stone, so that it may be used in preference to substitutes; jointly to meet labor as local conditions can be best served, always treating labor fairly, believing in arbitration and conciliation; to encourage the formation of associations of cut stone contractors, all in conformity with the laws and Constitution of the United States; but there is no intention, nor shall there be any action on the part of the association to control or in any way to deal with prices or restrict competition." The following officers were elected: President, Charles H. Isele, Peoria, Ill.; first vice-president, George Dugan, Bedford, Ind.; second vice-president, R. E. Harrsch, Chicago; secretary, Henry Struble, Chicago; treasurer, J. W. Melville, Pittsburgh; Executive Committee: S. W. Lederer, St. Louis; E. F. Giberson, Brooklyn; Fred. Andres, Milwaukee; Albert Shaw, Omaha; Peter Gray, Philadelphia.

The Central Cement Association held its meeting at the Grand Pacific January 21. It was not an annual meeting, but a special meeting called for the purpose of adjusting the business of the members of the association to present trade conditions. It was decided at the convention that no member should quote on cement for future delivery. This is understood by the trade generally to mean that prices will be advanced shortly.

The first annual meeting of the Quarry Owners' Association, which was formed a year ago, was held at the Grand Pacific on January 21. During the interval of a year the membership has grown from 50 to 125 members, representing the largest quarry interests all over the United States. No definite plans were arrived at, though general discussions were entered into as to improved methods and machinery in quarry practice, and members from various points reported trade conditions there, prices prevailing, the attitude of labor and the state of the trade generally. While it is not possible for the association to take an active hand as a body in the settlement of labor difficulties, its influence will be directed toward securing a fair and equitable solution of all troubles of this kind. It was decided that the next meeting should be held in June, although the place was left for the Board of Directors. The following officers were re-elected: President, D. McL. McKay, Chicago; first vice-president, W. H. Wallace, Bay Port, Mich.; second vice-president, F. A. Brown, Aberdeen, S. D.; third vice-president, S. M. Hall, Bucyrus, Ohio; E. H. Defebaugh, Louisville, Ky., secretary and treasurer.

The National Lime Association met in Pittsburgh January 19 and 20, working along very much the same lines as the other associations above named.

While there was no acknowledged connection between the simultaneous meeting of these four allied interests, it seems to be generally understood that they will work in harmony with each other wherever possible, particularly in the matter of coping with labor demands.

New Publications.

A Manual of Mechanical Drawing. By Philip D. Johnston. 65 pages, 9¼ x 7¼ inches, and two folding plates. Novelty Cloth Boards. 134 illustrations. Published by the David Williams Company, 232-238 William street, New York. Price, $2.

Mr. Johnston is the superintendent and mechanical engineer of the West Point Foundry, and has had the long experience both as a draftsman, engineer and instructor in mechanics to make him peculiarly well qualified to realize what is best in mechanical drawing practice, and thoroughly competent to prepare a work for the guidance of students of the subject. The aim has been to combine accuracy with modern progressive methods and approved systems, so as to place within the reach of the student a source whence he may derive a practical ground work upon which he may place dependence as to its conformity to modern drawing room practice. Starting with entirely elementary matters, such as general geometric definitions, illustrated by diagrams, the subject is progressively treated, using in all cases examples of most practical nature, and finally reaching the higher grades of work which may be expected of the mechanical draftsman. All attempts at combining with the essentials of drawing itself more than the merest rudiments of machine design are very sensibly omitted. The aim of the work is to assist, so far as is possible, the process of attainment of proficiency as a simple draftsman, leaving the matter of engineering calculations for intelligent design to be derived from independent sources.

Reinforced Concrete. By Armand Considere. Translated by Leon S. Moisseiff, C.E. 188 pages, 6 x 9 inches. Profusely illustrated. Bound in cloth boards. Published by the McGraw Publishing Company. Price, post paid, $2.

This work presents essentially a compilation of reports of experiments conducted by the author with a view to determining data from which to derive laws and formulas relative to the properties of reinforced concrete. The experiments reported cover a period of four years, and were evidently of a very exhaustive nature. The extensive use of reinforcement in concrete structures, so as to bring this material within a field of application more nearly approaching that of other building materials, has led to the derivation of various rational yet empirical formulas based quite generally upon the assumed analogy between the action of reinforcing bars in concrete to that of similar rods used in connection with timber construction. These empirical formulas, although useful and sufficiently accurate for types of construction wherein similarity in form and nature of stresses exists between the concrete and simple timber construction, do not follow when special and peculiar forms of work, to which the new material is peculiarly adapted, are entered upon. The seven publications of the author form the titles of the seven chapters in his book. The first chapter deals with "Reinforced Concrete in Bending," and discusses the various phases of the subject, including the influence of reinforcing on concrete, the resistance and elasticity of the materials used, the influence of the proportions of reinforcing used and of the quality of the materials, costs of different types of beams and their action under different kinds of loading, &c. Chapter II has for its subject, "The Deformation and Tests of Reinforced Concrete Beams," and in it the laws of deformation of concrete in compression and under tension, the effect of repeated stresses, and various other phases of the question are considered. Chapters III to VI, inclusive, deal respectively with "Effects of Changes in Volume of the Concrete," "Tensile and Compressive Resistance of Reinforced Concrete to Shearing and Sliding," "Effect of Cracks on Stresses and Deformations." In Chapter VII extended consideration is given to "The Compressive Resistance of Reinforced and Hooped Concrete." In this chapter are recorded the results of experimental research, the general properties of hooped concrete construction, with practical rules for its computation, &c.

Hendricks' Commercial Register of the United States. 1300 pages. Size, 8 x 10½ inches. Bound in heavy board covers. Published by Samuel E. Hendricks Company. Price, $6, postpaid.

This is the thirteenth annual edition of a well-known reference work devoted to the interests of the architectural profession, as well as to the building, mechanical, engineering, contracting, electrical, railroad, iron, steel, mining, mill, quarrying and kindred industries. It contains over 350,000 addresses and names, more than 12,000 classifications and full lists of architects, contractors, builders, carpenters, as well as the manufacturers of and dealers in everything employed in the manufacture of material, machinery and apparatus used in the industries indicated, from the raw ingredient to the manufactured article and from the producer to the consumer. The matter is arranged in alphabetical order, both as regards the names of individuals, cities and States. There is also an index of the contents, as well as an index of advertisers, the latter appearing at the end of the volume. The entire work is compiled with a great deal of care and attention, and constitutes a valuable buyer's reference for the architect, engineer, contractor, manufacturer, jobber, &c.

Making Concrete Walks.

Some interesting comments relative to various methods of making concrete walks are presented in an article by George H. Bragg in a late issue of the *Stone Trades Journal*. The author's remarks have such a bearing upon the subject as to warrant the reproduction of the following extracts for the perusal of our readers:

Concrete flags for footpaths are made by three methods—namely, vibratory machine, hydraulic pressing plant and hand labor in wooden molds. The latter method may be dismissed as inefficient and obsolete.

The manufacture at Threlkeld is carried on in two buildings, each 300 feet in length by 33 feet in width, comprising a cement store capable of holding 400 tons and large mixing platforms. The aggregate, consisting of ⅝-inch crushed granite with a small proportion of fine, is run in tube direct from the crushing machines into these buildings, where it is elevated in buckets into a hopper, placed above the mixing platform, to facilitate the measuring in boxes of proper dimensions. The requisite proportion of Portland cement is then added, and all is thoroughly turned over and mixed in a dry state with a three-pronged fork. This material is then introduced into a square mixer, with tubular projections, where it receives the necessary quantity of water (about 22 gallons per cubic yard of concrete). On emerging from the mixer the concrete is lifted by hand into molds placed on a vibratory table, which not only efficiently and quickly consolidates the material, but thoroughly expels any air bubbles which rise to the top and disperse. The molds, made of timber and lined with zinc, give a perfectly smooth face to the flags; and before being filled the bottoms of the molds are rubbed with an oily concoction to prevent the cement from alhering to them. After filling, the molds are transported on bogies along the floor of the building, where they are stacked in tiers and accurately leveled and troweled on the surface before the concrete has had time to set. The flags are allowed to remain, at least, four to five days before they are discharged from the molds, and place in the open air to mature for at least 12 weeks. Under the methods just described the material retains every particle of cement originally introduced into it, and owing to the well-known property of cement all superfluous moisture is thrown off after it has taken up what it requires.

When flags are made under hydraulic pressure the aggregate consists almost entirely of very fine material, and it is a well-known fact that too large a proportion of fine sand reduces the strength of the concrete. It is then more like a coarse, spongy mortar and less like an artificial stone; and it is more pervious to damp and, of course, frost. The only thing in its favor is that it is much easier to obtain an apparently better result. A certain amount of fine material is required to fill the interstices between the larger portions, or the concrete would have a honeycombed appearance. The best aggregate is that which has the largest number of angles, say from ⅜-inch mesh graduating down to pieces not larger than coarse sand; and it enables perfect bonding to take place. If the material used is all fine the matrix or cement has too many particles to join together, and the absence of larger portions prevents the bonding that they should impart to the mixture. The writer had experience with one of the first hydraulic presses introduced, and found that under pressure the water expelled from the flag carried with it the best and finest portion of the cement, which was consequently wasted.

In some works the concrete flags are immersed in a solution of silicate of soda, but it is very doubtful whether it is of the slightest benefit, as after a month's soaking the solution only penetrates to a depth of the thickness of a thin veneer. The idea is to form calcium silicate, but granite is not sufficiently porous to absorb any of the liquid, and in Portland cement the calcium is mostly in the form of calcium silicate already.

The flags are generally made of 2 feet gauge, and in lengths advancing every 3 inches from 1½ up to 4 feet. Architectural concrete in the form of window sills, heads, jambs, steps, &c., are made in a similar manner and to any design. The material weighs about 16 pounds per cubic foot, and the crushing strain of a well seasoned flag, 2 inches thick, is 389 tons on a square foot. An idea of the weight carrying strength of a flag 2⅛ inches in thickness and 2 feet square was placed with 1 inch of bearing on two sides only, and weighted with iron blocks distributed over its surface, the flag sustained a total weight of 26 cwt. before it broke.

Granite concrete flags have the following advantages over York and other stone—namely: They are more durable; the material is of the same hardness throughout, thus insuring uniformity of wear; they are of even thickness; no dressing of joints is necessary, so that there is no waste in cutting; and there are no laminations or scalings.

Practical Lessons in Electricity.

Under the above title the American School of Correspondence, at the Armour Institute of Technology, Chicago, Ill., has issued four of the 45 regular text books used in the electrical engineering course of the school, bound together in convenient form and finely printed and illustrated. These comprise "Elements of Electricity" and "The Electric Current," by L. K. Sager; "Electric Wiring," by H. C. Cushing, Jr., and "Storage Batteries," by F. B. Crocker, head of the electrical department of Columbia University. The purpose of the volume is to give the public an opportunity to judge of the standard and the scope of the instruction offered, the elementary instruction being illustrated by the first half, and the advanced instruction by the second half of the book. While issued primamily to demonstrate the character of the text books of the school, the volume has in itself enough practical information to make it a valuable addition to the library of the electrician, be he expert or beginner.

Anecdote of R. M. Hunt.

Mr. Hunt was in Paris one time on a visit, and walking with a French architect through the Louvre, when the two chanced to meet a Londoner whom his friend knew. Mr. Hunt was introduced, but the Englishman did not catch the name. After some conversation, partly in French and partly in English, Mr. Hunt chanced to speak of his New York office, when the Londoner exclaimed: "I say, but you are enterprising! So you have a New York office, too?"

"Why on earth shouldn't I?" replied Mr. Hunt with such quickness that it almost cut the Britisher short.

"Yes! yes! But isn't it a bit odd that a Frenchman should have a New York office? Don't —"

"Frenchman! Whew!" and Mr. Hunt drew in his breath, as if to whistle. "My dear fellow, I'm a Yankee, dyed in the wool, a yard wide, a full fledged, brimful, running over, from my hair down, from my soles up Yankee—an American—an American Yankee!"

The words followed each other with such cyclonic force that "it blew away the London fog," as Mr. Hunt expressed it in telling the story afterward.—*N. Y. Tribune.*

THE National Sash Weight Manufacturers' Association held their annual meeting in Philadelphia on February 2, which was followed by the annual dinner at Boothby's, Thirteenth and Chestnut streets. The election of officers for the ensuing year resulted as follows: President, Elmer E. Brown of E. E. Brown & Co., Philadelphia; vice-president, Henry Doerr of the Western Foundry & Sash Weight Company, St. Louis, Mo., and secretary-treasurer, J. C. Brainerd of the Johnson & Jennings Company, Cleveland, Ohio. After considerable deliberation, Cleveland, Ohio, was selected as the place for the next annual meeting.

THE Weber & Kranz Company of Chicago, Ill., have completed the plans for 101 new houses, to cost $300,000, which will be erected in their North Edgewater and High Ridge subdivisions. J. M. Carlson will erect 18 houses at Rogers Park, Chicago, to cost $90,000, and J. J. Barbour 8 houses in the same suburb to cost $40,000.

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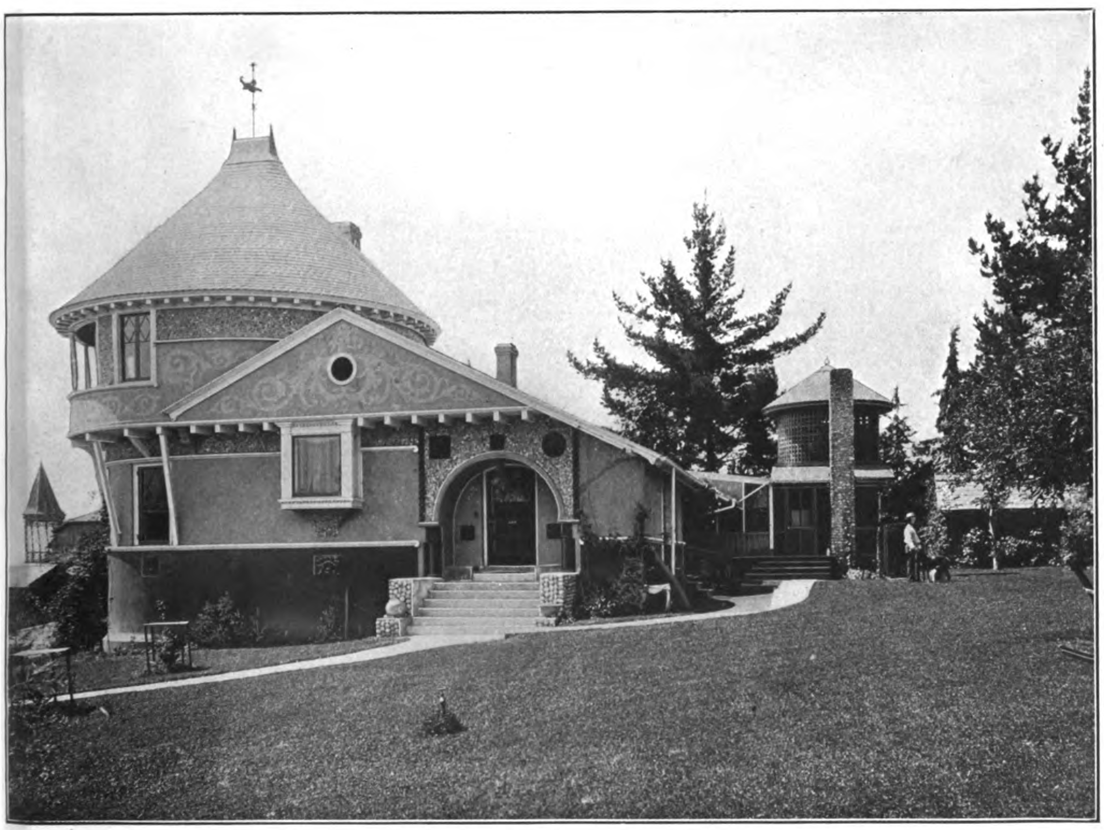


TWO DWELLINGS OF UNIQUE ARCHITECTURE IN SOUTHERN CALIFORNIA.

FRAME CARRIAGE HOUSE AND STABLE ERECTED FOR MR. GILBERT M. STRATTON, ON OCEAN PARKWAY, BROOKLYN, N. Y.

J. SARSFIELD KENNEDY, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, MARCH, 1904.

CARPENTRY AND BUILDING.

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS
232-238 WILLIAM STREET, NEW YORK.

APRIL, 1904.

In Memoriam

No truer friend than JOHN S. KING ever lived, nor a man whose integrity was more absolutely above suspicion. For forty-seven years, from boyhood to the threshold of old age, we have walked hand in hand through prosperity and adversity in uninterrupted friendship and mutual confidence. Of almost the same age, we began our business life in the same printing office in 1857, and ever since, except when his service in the Civil War or the temporary absence of either separated us, have passed our days side by side at adjoining desks.

He was able and indefatigable in business, genial and generous in every relation, modest and forgetful of self, true and absolutely just. He never countenanced or even had patience with a mean or questionable act, and was therefore universally regarded as the embodiment of honor and fairness. He will be mourned by hosts of friends and will be long remembered as a man without reproach.

To me his loss makes a void which can never be filled. I am proud to have been thought worthy of a friendship such as is seldom the good fortune of any man.

In admiration of his life and character, in thankful remembrance of what he was to me through nearly my whole life, in grief for the loss of my companion in all the vicissitudes of fortune,

I am, sadly,

DAVID WILLIAMS.

Building on a Percentage Basis.

A matter which is the cause of more or less complaint on the part of contractors is the growing practice of building on the percentage basis. The contention is that this sort of contract work has a strong tendency to encourage labor in placing too high a market value upon their work. Such an instance was the work on the residence of a very wealthy man in New York last season, where all work done by the contractors was on this basis. A monthly statement of expense was made by them and they received checks for the amount, plus the agreed upon commission, which is generally 10 per cent. This was a "rush" job, and most such contracts are placed with time as an important element. The contractors naturally pay the maximum of wages. They can afford to. In fact, they can hardly afford not to do so, because nothing must be put in the way of completing the building at the earliest possible moment. And, again, the larger the pay roll the larger the commission of the contractor. More and more, individuals and institutions are each year building on the basis that the best is the cheapest in the long run. Such men formerly had the work done by the day. The percentage basis of contract work is taking the place of the day system, and contractors who are not usually favored with this sort of work, and even some of those who accept it, regret the tendency to pay such high wages. The same contractor who pays a fancy wage on such a contract will not figure his labor nearly so high when it comes to a competition for the ordinary contract. Labor, however, fails to see the difference, and trouble is apt to follow. The fear is that, as time goes on, the percentage basis will grow in favor until it will determine the scale of wages for all classes of contract work. This season there will be less cause to worry, probably, because there is not likely to be enough work to go around among the artisans, unless present indications fail. Not that there will not be a good deal of building. The field of municipal work is quite up to the average, and perhaps better than it has been in some recent years. Considerable residential property will go up, and most cities have some business blocks planned for 1904. On the other hand, manufacturing building will be less in most lines. On the whole, the labor unions will probably regret that they caused so many strikes in the building trades last season.

Some Lessons of the Baltimore Fire.

Investigation of the results of the recent fire in Baltimore have brought out so many valuable facts in connection with the effect of fire upon modern buildings that the disaster, great as it was, may ultimately be found to have been a blessing in disguise, not only to the stricken city itself in the substitution of handsomer and safer buildings for those destroyed, but to the country at large. A large number of the most prominent engineers, architects and others interested in building have been studying the effects of the fire on the spot, and the experiences gained are likely to lead to the correction of some weaknesses which have been connected with the methods of fire proof buildings as heretofore followed. While the fire has fully demonstrated that the modern system of steel frame construction for large buildings is generally sound, there are some details of the equipment of fire proof buildings which the Baltimore experience has proved incorrect. Thus, in the many interesting pictures presented in the leading article this month, and in connection with our half-tone supplemental plates, the method of running pipes in skyscrapers is shown to be absolutely faulty. The lack of insulation of the metal pipes carried up alongside steel columns caused the pipes to expand with the heat so as to burst the external fire proof coverings and expose the steel columns to the direct action of the fire, with disastrous results. The excellent service rendered by metal or other fire proofing materials in protecting a building, or at least retarding the action of the fire upon it, as compared with the results of the fire on roofs covered with more inflammable materials, was splendidly demonstrated in Baltimore, where buildings with non-fire proof roofs were destroyed, while structures alongside them which were protected by non-inflammable coverings were saved. As a result, the architects who are making plans for new buildings in Baltimore in almost all cases are specifying metal or other fire proof roof coverings. This should mean a large increase in the demand for metal roofing not in Baltimore alone but also in other places where roofs are in danger of being ignited by flying sparks when neighboring buildings are on fire.

Wages and the Cost of Living.

The frequently repeated statement that the cost of the necessaries of life in this country has increased in the past few years in a much greater ratio than the advance in wages during the same period seems to be disproved by official statistics contained in a bulletin lately issued by Commissioner Carroll D. Wright of the United States Bureau of Labor. The statistics referred to are given in a report of the cost of living, based upon figures of income and expenditure furnished in detail by 2567 families in thirty-three States, representing the leading industrial centers, and are the result of an investigation extending over a period of several years. The figures show that while the cost of food and other necessaries, considered as a whole, reached its highest point in 1902, the average for that year was only 10.9 per cent. above the average for the ten year period, 1890 to 1899. Compared with 1896, the year of lowest prices, the cost in 1902 showed an increase of 16.1. Comparison of these figures with those recently presented in a Census Office report of average wages in the industries of the country during the past decade shows that the general advance in wages in the leading industries has fully kept pace, and in some cases has even exceeded, the increased cost of living. Since these statistics were gathered wages in many of the industries have been reduced below the high level they reached in the past two or three years; but, at the same time, the price of most of the necessaries of life has also fallen, and the general tendency continues downward. After all, it is reasonable to assume that wages and the cost of living are apt to rise or fall in pretty close correspondence. When the purchasing power of the people is large and the demand for commodities excessive, the price of such commodities has a natural tendency to rise, and *vice versa*, exception, of course, being made in the case of high prices caused by scarcity or failure of crops or other supplies which come into the category of necessaries. It is probable that a period of lower wages, accompanied by lower prices of commodities, than those ruling the past two years lies before us in 1904, and will continue until the business reaction now in progress has run its course.

An Attractive Bank Building.

One of the ornate structures which has recently been added to the banking district of the Metropolis is the building just completed and opened for business at Broadway and Fulton street, and occupied by the National Park Bank. The building is, in fact, one of the most interesting, viewed from the standpoint of engineering construction, while in form and hight it is especially noticeable by contrast in these days of towering office buildings. The new structure has been put up on the site of the old bank building, business being carried on meanwhile without interruption. There is an extension, or wing, running through to Ann street, so that the completed building will be T shape. The Broadway portion, nine stories high, contains the entrance, vestibule, waiting and reception rooms, officers' and directors' rooms, dining room, kitchen, &c. The rear portion of the structure is only the hight of the banking room itself and will be roofed by two large steel domes. The statement is made that this is the first time in this country that the bare structural steel composition has been used for interior finish. The domes are painted a yellowish green, while the walls are wainscoated with polished marble. Springing from the dome are barrel vaulted ceilings and balconies 26 feet above the floor of the banking room, which afford the visitor a fine view of what is going on below. The public space on the counting room floor is surrounded by a screen of marble and bronze, the marble being Campan Verte Malangee, imported especially for the purpose from France. The building was designed by Don Barber, and in banking circles is referred to as the "million dollar counting room." The entire front of one of the upper floors is to be taken for the dining room, kitchen and pantry service, where the bank expects to feed its 250 employees every day.

Officers of Brick and Tile Association.

At the twenty-fourth annual meeting of the Iowa Brick and Tile Association, held at Mason City, Iowa, and which is said to have been the most successful in the history of the organization, the following officers were elected for the ensuing year:

President, J. S. Raney, of Fairfield.
Vice-President, D. F. Morey, of Ottumwa.
Secretary, S. W. Denison, of Mason City.
Treasurer, C. J. Holman, of Sargeant Bluffs.

Shellac or Varnish for Oak Floors.

In replying to one of its readers asking if shellac or varnish is the better wearing finish for oak floors, and that if varnish were used would it be better to first put on a thin coat of shellac or to varnish direct on the filler, a recent issue of the *Painters' Magazine* says:

Unless three coats of varnish are to be applied to the floor we would not advise a coat of shellac on the filler, but would suggest a coat of hard drying rubbing varnish directly on the filler, which must be thoroughly hard and sandpapered smooth before the varnish is applied. The rubbing varnish should be mossed down with pumice and water, wiped up clean, allowed to stand 24 hours and the floor finished with some good hard gum floor varnish. If the price paid for the work will permit it, a coat of white or orange shellac may be applied directly on the filler and sandpapered lightly when dry, then a coat of best rubbing varnish (12-hour rubbing) given, which is either mossed or rubbed with pumice and water, and the surface finished with best grade of floor varnish, that can be lightly mossed after 48 hours and then polished with oil and rotten stone. If the varnish is made of best hard gum and well settled, a floor so prepared will neither appreciably darken, nor will it turn white from moisture, nor will it show heel marks or scratches, unless used too roughly. But it will not do to be afraid of high prices for material, and it must be taken for granted that in this, as in other things, the foundation is the most important. Every coat must be dry and hard.

THE last stone of the old Trinity Building in lower Broadway, New York City, has been removed and the foundations are now being dug for the 20-story skyscraper which is to succeed it. In no part of the city have so many of the old landmarks disappeared in the last few years as in lower Broadway. The old Stevens House is one of the few remaining. The Trinity Building had an interesting history. It was once John Claflin's dry goods store. Later it became the headquarters of real estate brokers and operators. The Sheriff's sales were held in the basement and Richard Croker had his office there. In the dusty old rooms above many of the wealthiest estates in the city were administered. The building, with its norrow, ill lighted passageways, dirt begrimed rooms and cramped, slow moving elevators, was a curious survival of the old fashioned structures in which New York used to do business. The real estate broking fraternity liked it because it was convenient and rents were cheap. Many of the brokers now make their headquarters in the old Boreel Building, next door.

IT is confidently expected that the New England Brick Company, which recently went into a receiver's hands, will be reorganized on a more substantial financial basis and will continue business.

STEEL FRAME CONSTRUCTION IN THE BALTIMORE FIRE.

IN the brief editorial comments touching the recent Baltimore fire presented in our issue for last month we referred to the very striking manner in which the modern steel skeleton form of construction, as applied to office and business buildings, emerged from what was probably the most severe test this type of structure has ever been called upon to endure. As soon as opportunity offered, a very careful examination of the surviving buildings was made by committees of experts, architects, builders and engineers interested in matters of this kind, and the results of their investigations throw some exceedingly valuable light upon a question which up to this time has never been altogether satisfactorily settled. With a view to affording our readers an idea of the admirable manner in which some of the more important of these buildings withstood the effects, in their structural parts, of the very intense heat to which they were exposed, we present herewith half-tone illustrations showing their appearance shortly after the fire was brought under control.

Referring to the folding half-tone supplemental plate which accompanies this issue of the paper, the upper picture on the left hand page represents a view on Fayette street, showing the Calvert and Equitable buildings at the right and the Herald building and the Court House on the left side of the street, with the Post Office looming up in the distance. The condition of the large and heavily constructed but non-fire proofed buildings in this vicinity, as indicated by the ruins in the foreground. The warped steel trolley pole at the left conveys a very good idea of the intense heat to which the structures were subjected.

The bottom picture on the same page is a view from Liberty street, looking East on Baltimore street, the principal thoroughfare in this section of the city. The skyscrapers shown to the left in the background served as a wall, as it were, protecting the County, Federal and City Buildings, as well as the surrounding district, until a change in the wind altered the course of the fire southward. The long stretch of ruins from the foreground to the Continental Trust Company Building, which is shown at the right in the distance, is five city blocks in length.

The upper picture on the right hand page of the folding plate is a view looking south on Calvert street and showing, at the right hand, one side of the Equitable Building, the Baltimore & Ohio Railroad Building, the roof of the building occupied by the banking house of Alexander Brown & Sons and the Maryland Trust Building, while

Fig. 1.—The Continental Trust Company's Building, Regarded as the Highest Type of Fire Proof Construction **in the City.**

Steel Frame Construction in the Baltimore Fire.

towering above the ruins at the left is the Continental Trust Company Building, regarded as one of the finest types of fire proof construction in the city.

The bottom picture on the right hand page of the folding plate is a typical view of the ruins immediately after the fire. From the point at which the camera was placed one looks into the square which was dynamited while burning, the heat being most intense and swept by the wind full against the Union Trust Company Building, which was in its path, but which, however, served as a wall, greatly protecting the section behind it. The last named building is shown in the left of the picture, while the tall structure at the right is the Calvert Building. The low construction, of which a side and rear view can be seen in the center, is the National Union Bank Building, and projecting beyond its roof is a corner of the Herald Building.

The Continental Trust Building, a near view of which is presented in Fig. 1, was one of the structures which passed through the conflagration with comparatively slight damage to the steel cage, the architect, D. H. Burnham, expressing the opinion after a careful examination that from basement to roof the frame work, such as columns, girders and joists, were as strong as the day the building was put up. A few of the apron beams between the supports of the windows of one story and the sills of windows above in the court were warped and will necessarily have to be replaced. The structural parts of the floors of the building were found unaffected, and it was thought that repairs could be made at comparatively small expense. Some of the corridor partitions, which were largely of glass, were destroyed, but the main partitions were in the majority of cases in very fair shape. While the cast iron mullions in the court were bent from the third to the twelfth story, the tile arches above the mullions were in almost perfect condition. Some idea of the intensity of the heat to which the building was subjected may be gathered from the statement that upon nearly all the floors of the Continental Trust Building the typewriting machines were fused, to accomplish which it is estimated required a heat approximating from 2000 to 3500 degrees F. The roof of the structure, as well as the floors and floor arches, withstood the flames in a most satisfactory manner, but the cinder concrete floor filling disintegrated to a greater or lesser degree.

An interesting feature in connection with the fire, and one tending to show the way in which properly fire proofed construction is calculated to withstand the flames, is illustrated in Figs. 2 and 3. The former represents an exterior view of the building occupied by the Commercial and Farmers' National Bank, the first story being completely protected by means of fire proof construction, while the upper stories were of "mill construction," surmounted by a non-fire proof roof. Fig. 3 shows the interior of the first story or banking floor of the building after the fire.

The Equitable Building, ten stories in hight, is another structure which, judging from its external appearance, withstood fairly well the effects of the flames, but its interior was in bad shape, owing to faulty construction and design of the floor arches. It is one of the oldest fire proof buildings in the city, having been erected in 1892,

Fig. 2.—The Commercial and Farmers' National Bank Building.

Fig. 3.—Interior of the First Floor of the Building Shown in the Previous Picture, as It Appeared After the Fire.

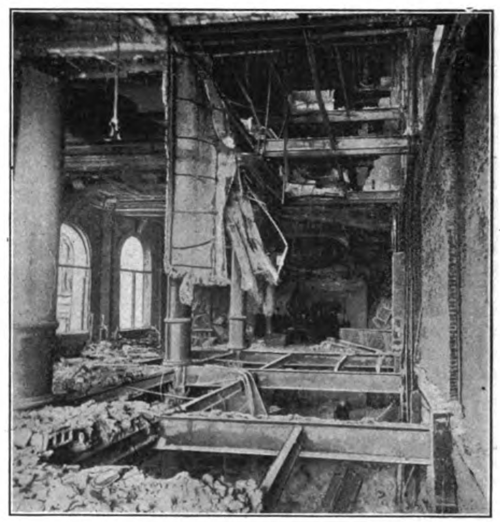


Fig. 4.—Interior View of the Equitable Building, Showing Where Floor Arches Have Fallen.

Steel Frame Construction in the Baltimore Fire.

and one in which the flanges of the beams were not covered. In Fig. 4 is shown an interior view, clearly indicating the destruction wrought. The interior frame work of the building consisted of cast iron columns, steel floor beams and shallow terra cotta arches, the latter consisting of blocks sprung from flange to flange, with the widest span being a trifle over 8 feet. During the fire the large amount of wood used in the flooring rapidly burned out, allowing the safes in the many offices on each floor to fall

Fig. 5.—Interior View of a Room on the Seventh Floor of the Calvert Building, Showing Arrangement of Piping.

Fig. 6.—Room on First Floor of the Merchants' National Bank Building, the Window Being One of Those Shown in the Taller Structure at the Right in Fig. 7.

for the purpose of imbedding electric switchboards and similar devices, and the other is the practice of running the piping between the steel column and the fire proofing. The pipes running beside this column were of fairly large diameter. They were placed close to the steel, with the fire proofing immediately outside of them. The heat of the fire in raising the temperature of the entire mass had a greater effect upon the piping, which it caused to expand considerably. As there was no room between the column and the fire proofing to allow for this, the piping steadily bulged the terra cotta as it continued to expand. The loosening of the latter admitted the heat to the piping still more readily, and further rapid expansion ensued. Finally this became so great as to knock the fire proofing away from the column, leaving it exposed to the

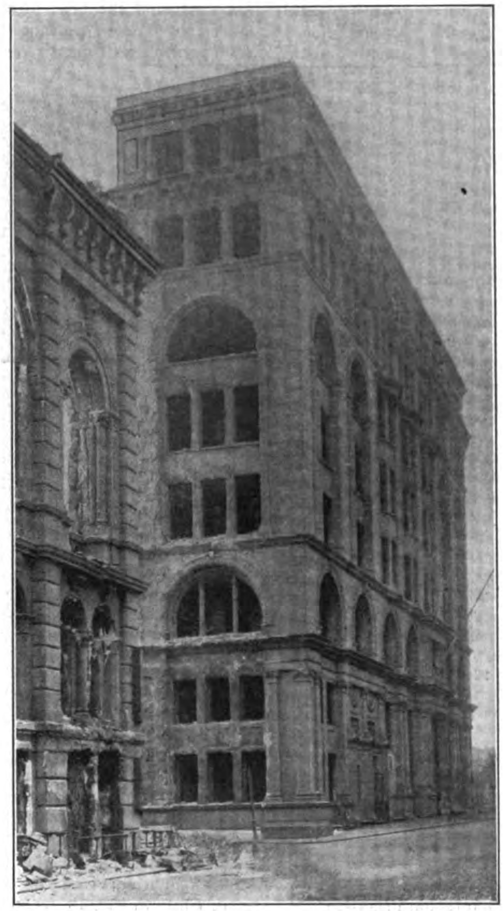


Fig. 7.—The Merchants' National Bank Building.

Steel Frame Construction in the Baltimore Fire.

to the arches, which, giving way, precipitated the safes to the basement, giving the floors the appearance shown in the illustration. The partitions, which were of a plaster composition on wire lath, were entirely destroyed. These were placed on the wooden flooring, and naturally failed when the wood burned from underneath them. The center row of cast iron columns used in supporting the floor beams are in good condition, and the steel columns in the walls were well protected.

In Fig. 5 of the illustrations is shown the interior view of a room on the seventh floor of the Calvert Building, a 13 story structure, which, with the exception of one isolated column that was buckled by the intense heat, as shown in Fig. 8, emerged from the conflagration structurally intact. The picture calls attention to two bad features of fire proofing commonly followed. One is the practice of having a portion of the column unprotected

mercy of the fire. The walls of the first two stories of the building are Indiana limestone, above which they are of brick, with heavy terra cotta trim, but about all the damage done was occasional spalling and chipping, resulting in comparatively small loss.

Another building which offers excellent contrast between the completely battered portion of it and a part which was but little damaged is illustrated in Figs. 6 and 7, and known as the Merchants' National Bank Building, standing on Water street, between South and Holliday streets. In the left hand corner of the picture Fig. 7 is the Rialto Building, of stone, but non-fire proof in its construction. This was not only an easy prey to the flames, but the burning of it ignited the fire proofed structure occupied by the Merchants' National Bank, directly opposite. All that was inflammable was completely consumed on this side of the structure, as well as on the upper floors of the entire building, an interior view of one of the rooms being shown in Fig. 6. The window indicated in that picture is one of those shown on the first floor in the taller structure at the right in Fig. 7. The rooms, however, in the lower section of the farther side of this building were saved, the banking room on the ground floor being in excellent shape. In connection with this building was a remarkable test of two wire glass windows in metal frames. The glass was cracked by the heat, but the windows kept the fire from entering the building at that point, saving from injury the contents of the room.

A group of buildings which carried a most striking lesson in regard to fire proof roofing were the three buildings of the Pratt Street Power Station. With one exception, the three were built alike, and that one had a non-fire proof roof, made of 2 inch planking covered with slate. It was completely consumed, and the heat of the burning roof buckeled the steel roof trusses, pulling the brick wall in around the machinery and putting that portion of the station out of service. The other two buildings emerged from the flames in good condition. We show in Fig. 9 details of the construction of the fire proof roofs of the two buildings which survived the conflagration practically unharmed, while in Fig. 10 we show the construction of the non-fire proof roof of the building which was totally destroyed.

There are other notable instances tending to show the value of the steel frame construction when properly encased in brick and terra cotta, but what we have given above, taken in conjunction with the pictures presented, will give the interested reader an idea of the effective manner in which this type of building has been vindicated. As showing, however, some of the conclusions which have been drawn from the fire by experts, we take from the last issue of *Fireproof* the following deductions of J. K. Freitag, derived from a careful examination of the buildings which survived the conflagration:

Fire proof buildings constitute a fire stop when not surrounded by non-fire proof buildings.

Buildings can be built and are built so as to be absolutely fire proof in their structural parts.

Good fire proofing, even if somewhat damaged by severe fire, will permit of speedy reconstruction. Poor fire proofing is apt to be a total loss. Witness the results with plaster blocks.

Buildings of steel, brick and terra cotta floors show the best results. Not a single steel-framed building protected with terra cotta but can be reused.

Stone buildings suffer great damage under fire test.

"Mill construction" or "Slow-burning" construction is no better than ordinary non-fire proof construction in a fire of any severity.

The protection of exposed openings needs more attention. Tinned shutters will not withstand a hot fire of any considerable duration.

Wire glass in metal frames showed wonderful results, notably at rear windows in the Brown Bank Building and in the Merchants' National Bank Building.

Terra cotta floor arches show best results when made of deep and substantial blocks. The porous or semi-porous material shows less scaling off of the lower webs than hard-burned material. Blocks should be made with heavy webs and partitions, and better rounded fillets. This would undoubtedly reduce much breakage under fire test, due to the internal stresses set up in the shrinkage during drying.

Terra cotta partitions should rest on the floor arches or on the beams, not on wood floors or cinder concrete. They should be laid in cement mortar, built to the ceiling, and wedged with slate chips to provide rigidity. If top lights are necessary for transmitting light, use metal frames and wire glass.

Lime of teal or plaster-block floors and partitions are worthless. Witness the Herald Building partitions, those in the Equitable Building, the floors in the First National Bank of Baltimore, and many other instances.

Vault doors and safes require special provisions in the steel framing, especially if the floor arches are of light construction.

Wire lath and plaster partitions showed very poor results.

Wire lath and plaster soffit furring and false beam construction, &c., showed very satisfactory results.

Cinder concrete is useless after exposure to severe fire.

Column casings should be built independent of partitions, so as not to be damaged by faulty partition construction. They should also be built without wood nailing strips. They should be preferably solid or backed up, so as to be capable of resisting the shock of falling material.

Concrete floor construction stood well in some examples of low buildings, but had not been employed in any high structure.

Slate and marble stair treads and platforms should be provided with metal subtreads.

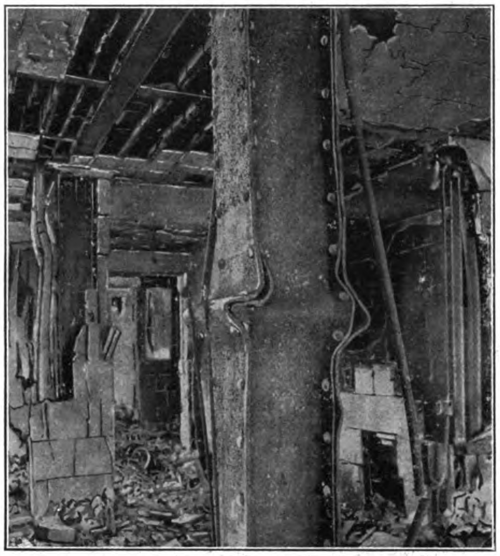


Fig. 8.—Steel Column on Seventh Floor of the Calvert Building, Buckled by Heat through the Loss of Its Protecting Covering.

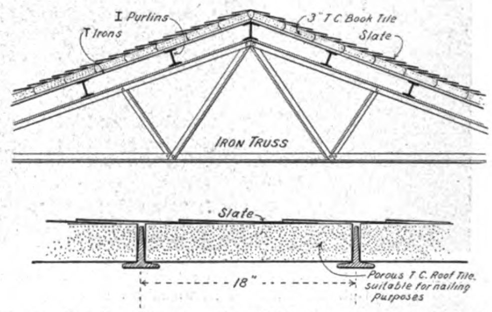


Fig. 9.—Details of Construction of the Fire Proof Roofs of Two Buildings of the Pratt Street Power Station, which Survived the Conflagration Practically Unharmed.

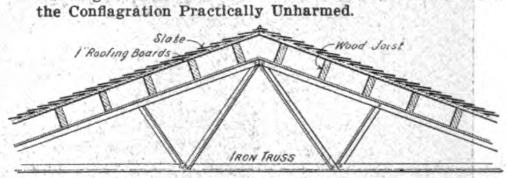
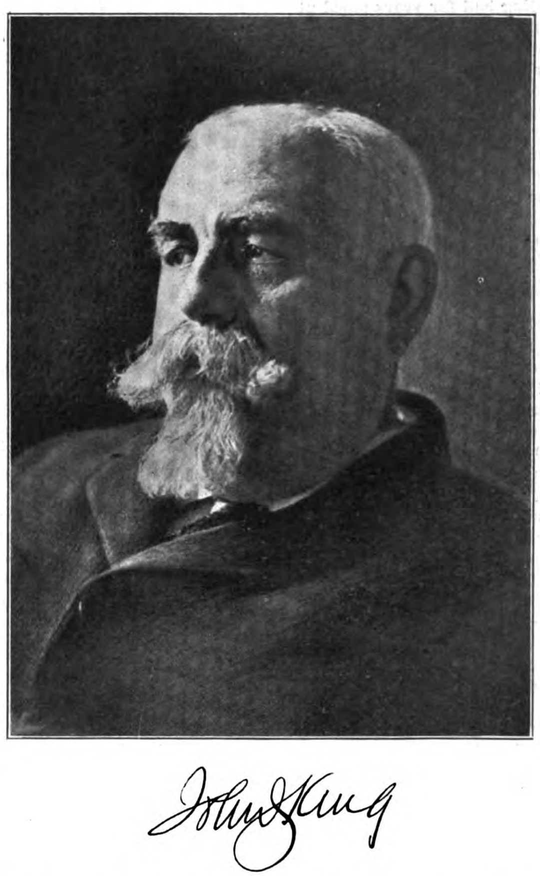


Fig. 10.—Showing the Construction of the Non-Fire Proof Roof of the Building Which Was Totally Destroyed.

Steel Frame Construction in the Baltimore Fire.

John S. King.

It is with feelings of profound sorrow that we chronicle the death of John S. King, business manager of the David Williams Company, which occurred on Friday, March 4, at his residence, 1063 Bergen street, Brooklyn, N. Y., after an intermittent illness extending over a period of a year. To a large circle of the patrons of *Carpentry and Building*, and its associated publications, Mr. King was attached by the ties of old friendship. In the selection of those who worked with him his judgment was sound, and his method of instruction the best calculated to accomplish the purpose in view. Patient with inexperience and tolerant of honest errors of judgment, he had no patience with carelessness and no toleration of sham or pretense. Any tampering with the truth was to him a danger signal and made him suspicious at once. No man had his confidence who did not deserve it; none failed to command it who had established the right to claim it. He enjoyed the respect and affection of all who worked with him or under him.



Mr. King was born October 1, 1841, at Middletown, N. Y., where his early education was acquired in the public schools. While still in his teens he decided to become a printer, and entered the office of the Middletown *Press* as a compositor and pressman. Here it was that he met David Williams, then a boy about his own age, also employed in the office as a printer. When the Civil War broke out Mr. King, fired with patriotism, responded to the first call for volunteers, and enlisted on April 10, 1861, in the Eighteenth Regiment of New York Volunteer Infantry, with the noncommissioned rank of second sergeant of Company D. The regiment engaged for a two years' term. In December, 1861, he was made first sergeant of his company, and on June 28, 1862, was commissioned first lieutenant. He was mustered out with his company and honorably discharged as first lieutenant, May 28, 1863.

Mr. King then returned to his position on the Middletown *Press* and came again into association with David Williams. But the war was still in progress, and more because of sincere patriotism than from love of military life he assisted in reinforcing the depleted 124th New York Volunteers, and was commissioned first lieutenant of a new company, K, October 28, 1864. On February 4, 1865, he was made regimental adjutant. He was continuously present with his command until March 31, 1865, when he was severely wounded in an action near Hatcher's Run, Va. The bones of his right foot were crushed by a fragment of a shell, and his recovery from this injury was never complete. He was in various military hospitals until October 28, 1865, when he was honorably discharged, his regiment meanwhile having completed its term and been mustered out of the service. During the greater part of his subsequent life this injury troubled him. For many years it was an open wound, refusing to heal. It interfered with walking to some extent, and inclined him more to a sedentary life than was consistent with the best general health or the greatest longevity in one of his habits.

In 1868 David Williams, who had succeeded his father in the proprietorship and publication of *The Iron Age*, and transferred it to New York, needing an associate with a practical knowledge of the printing business, found Mr. King and made him an offer. It was accepted, and the relation begun as boys at Middletown, and thus resumed after the interregnum of the Civil War, continued uninterrupted and with increasing respect and mutual affection until terminated by death.

In 1898, when the David Williams Company was formed, Mr. King was made treasurer and retained the business management of the publications of the concern, *The Iron Age*, *The Metal Worker* and *Carpentry and Building*. When the Williams Printing Company was organized he was also made its treasurer and general manager.

Mr. King made his home in what is now Manhattan until about 1881, when he removed to Brooklyn. While residing in Manhattan he was a member of the New York Historical and the New York Geographical societies, and took much interest in their work. He was active in Masonic affairs, being a member of Kismet Temple, Nobles of the Mystic Shrine; Hyatt Lodge, F. and A. M.; Constitution Chapter, Royal Arch Masons; Palestine Commandery, Knights Templar, and the Aurora Grata Consistory of the Scottish Rite. He was one of the founders of the Aurora Grata Masonic Club, and a member of the association of that name which controls the property of the Masonic Temple at Bedford avenue and Madison street, Brooklyn. He was also a member of the Sons of the American Revolution, the Grand Army of the Republic, the Loyal Legion, the Society of the Army of the Potomac, the Hardware Club of New York, and the Union League Club of Brooklyn. He was an attendant of Christ Episcopal Church of Brooklyn.

As a business man, Mr. King was very capable, and possessed the ability to grow with a business under his management. His methods were conservatively progressive. Never adventurous, and always insisting upon fully understanding the immediate and, as far as they could be predicted, ultimate consequences of every step, he had the courage of his business convictions and a tenacity of purpose not easily discouraged. Very systematic, he never sacrificed to routine or detail the time and talent needed for a study of the larger problems of a business policy planned for the future. Through the years devoted to the upbuilding of the properties of which he was the business executive, he was a model of industry, punctuality and devotion to duty. As the field of his work expanded he was able to relegate to others the less important details and reserve for himself the special functions for which his large experience and intimate acquaintance with every detail of the business gave him unique qualifications. What he did was always done quietly and without excite-ment. One rarely saw him ruffled or disturbed; never was he boisterously hilarious. His temperament was equable, his nerves steady and his temper under perfect control. In everything pertaining to the business of his life he was so thorough that he was rarely surprised, and never seriously disturbed.

His widow, who was Gertrude Murray of Hudson, Ohio, and six children, three of whom are married, survive him.

The funeral services were held at his home Monday evening, March 7, and the interment was at Middletown, N. Y., on the following day.

A Notable House Moving Operation.

Probably one of the most interesting examples of house moving which has recently been carried to a successful conclusion was that in which an old mansion on the banks of the Monongahela River at Brown's Station, Pa., on the Baltimore & Ohio Railway, was lifted a vertical hight of 160 feet. The building had for years stood at the foot of the lofty and precipitous bluffs which line the river at this point, and in carrying out some of the many improvements inaugurated by the railway company it was necessary to straighten the line of the road, which involved the utilization of the ground on which the mansion was located. When the railroad company finally purchased the site, the question arose as to what should be done with the old house. The present owners of it controlled a fine plot of land at the top of the bluff, and after mature consderation, and doubtless for sentimental reasons as well, it was decided to raise the house by means of extended cribbing up the face of the bluff to an elevated positon which had been selected for it 160 feet above the river banks.

Some idea of the difficulties which the task involved may be gathered from the fact that the old mansion measures 85 x 40 feet, and weighs something over 750 tons. The first operation was to insert eight large timbers, measuring 12 x 16 inches in cross section and 85 feet in length, beneath the structure, and between these and the building were placed about 200 steel needle beams. While this operation was in progress the face of the bluff was stepped out into four benches, each calling for a lift of about 30 feet. The mansion was then raised, a little at a time, by means of jack screws and the eight walls of timber crib work built up underneath it. The blocking was all carefully sized to 6 x 8 inches. The crib work was stiffened in both directions by means of 8 x 8 inch pieces and was sway-braced by ½-inch chains provided with turn buckles.

When the house had been lifted 30 feet it was drawn on to the first bench by means of two winches on top of the bluff, each driven by two horses, use being made of a 2-inch line with four-part blocks. Another lift of 30 feet was then made to the next bench, and the operation repeated until the house was landed on its elevated site, 200 feet back from the old location and 160 feet above it. An immense amount of timber was naturally required for the job and the cost was a considerable item, being placed by those competent to judge considerably in excess of the original cost of the house itself.

Novel Cold Storage Plant.

In connection with an 11-story loft and store building in course of erection on the site of the old Loomis mansion in Thirty-fourth street, and running through to Thirty-fifth street, New York City, is an arrangement of the cold storage plant, which, according to the architect, F. A. Minuth, is without a parallel in this or any other city. The building is to be occupied by a firm of furriers, and years of experience have demonstrated that metal of any kind in the construction of a cold storage vault works more or less harm to the furs in storage. This is due, no doubt, to the fact that metal is a good conductor of heat, and at the same time attracts such dampness as may be in the air, creating a condition which is obviously detrimental to the best results in a cold storage system. The architect was, therefore, requested to construct a chamber which should be free from metal of any kind.

The plans show a huge chamber occupying almost the entire floor space in the Thirty-fourth street section of the building and four stories in hight. Beginning at the third floor, this big refrigerator is planned to occupy the entire space upward for 60 feet. The floor beams and steel uprights are all to be sheathed in some nonconducting material, against which a wall of timbers is to be built. Not a nail will enter into the construction of these wooden walls, which are to be lined on the inside with a form of tar paper. Leaving room for an air space, a second wall of tightly fitting boards will furnish the interior lining of the big box. Wooden floors will next be fitted into the interior at varying hights and without reference to the floor levels of the rest of the building. The only means of communication with the outside will be through a series of air tight chambers, which will surround the big vault on all four sides on each of the four floors.

To prevent all possibility of any of the heated air of the building entering the store room, each one of these compartments will be provided with tightly fitting doors. To reach the one entrance on each floor to the refrigerator it will be necessary to pass through six of these compartments. Here a door built on the same general lines as that of a safe will open into the storage vault itself.

A complete cold storage plant in the basement of the building will make it independent of other sources of supply, and it is planned to make borings for an artesian well, the amount of water consumed in one of these plants making this course advisable where it is possible.

Church of Novel Design.

Something of a novelty in the way of church architecture will be the new house of worship which will occupy a site at the corner of Madison avenue and Twenty-fourth street, New York City, plans for which were recently filed with the Bureau of Buildings. The building will be a rarity among Presbyterian churches, in that it will have no steeple, and in place of the usual Gothic interior there will be a square auditorium surmounted by a great circular dome, at the apex of which will be a lantern or cupola similar to that which crowns Madison Square tower, two blocks away. The design of the building has been largely governed by its environment, the idea being to make the church edifice thoroughly distinctive and at the same time an ornament to the locality.

In defiance of the Scriptural injunction, the house will be built upon sand. A layer of concrete 1 foot thick and extending beyond the building walls will serve as the footings for the foundation. In the superstructure steel girders, marble, brick and terra cotta will be used in the walls, while the dome, which will rise 69 feet from the street level, will be supported entirely from the walls. There will be an ornamental cornice of terra cotta, and fronting Madison Square will be six Corinthian columns of light colored granite.

The auditorium will be 52 feet square, with narrow galleries at the sides and a deep gallery above the Madison avenue entrance. There will be a wide vestibule, with three pairs of swinging doors. Places for the choir are provided on each side of the pulpit. The organ will be specially designed and will be divided, a portion being at the west end over the entrance, while the organist's seat and the principal part will be at the east end.

Adjoining the church and connected with it will be the parish house or chapel, three stories in hight, with an entrance on Twenty-fourth street. It will contain a large lecture room, pastor's room and a session room on the first floor; on the second floor will be the main Sunday school room and two smaller meeting rooms, while on the third floor will be a parlor, sewing room and study. In the basement will be a large gymnasium.

The cost of the new church and the parish house adjoining is placed at $200,000, and the work will be executed in accordance with plans prepared by Architects McKim, Mead & White of New York City.

COMPETITION IN TWO-FAMILY HOUSES.

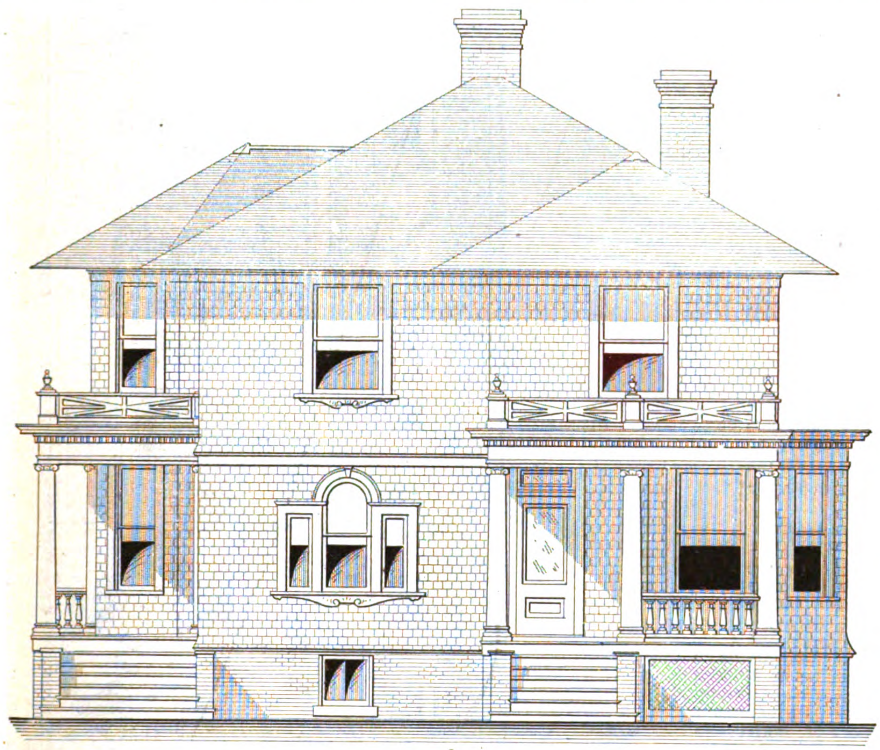
FIRST-PRIZE DESIGN.

THE committee to whom were referred the drawings submitted in the XXXVIth Competition having made their report, we take pleasure in presenting herewith their decision touching the award of prizes in the contest for Two-Family Houses. In connection with the conditions as given in the December issue of the paper, it was stated that the building was to be modern in all its appointments and finish, of attractive exterior, and divided in its interior in such a way as to give the most economical and convenient arrangement of rooms for each family. The house was to be a detached structure, and suitable for erection upon a plot of ground having a frontage of not more than 50 feet It was to have a cellar under its entire area, and the total floor space of the building, measuring from extreme outside walls, as represented by the plans, was not to exceed 3100 square feet, exclusive of cellar, veranda or porches. This floor area was to be divided into such a number and arrangement of rooms for two families as the taste and preference of the architect designing the structure might suggest. An important feature of the conditions, however, was that the building was not to be divided from front to rear by a party wall extending from the ridge of the roof to the cellar, as would be the case in what are known as "double" or "twin" houses, but the rooms for the occupants of the house were to be apportioned among the two or more floors as the case might be. It was also intimated that what was wanted were houses having "the best possible arrangement of rooms for two families and showing the best construction for the amount of money involved, so that they would prove attractive to the capitalist and comfortable for the occupants."

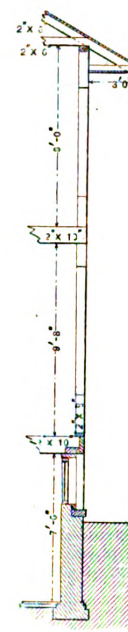
In view of the type of house forming the basis of the competition, it was natural to expect that a large proportion of the drawings would be submitted from the extreme Eastern portion of the country, where dwellings of this character are much in vogue, but while the results showed this to be the case, there were studies from Southern and Western sections, even as far west as the Pacific Coast. The studies submitted showed an interesting variety of interior arrangement, some being rather ingenious and novel in their conception. One feature, however, with which many of the contestants appeared to have trouble was the location of the bathroom. This in all dwellings is a very important consideration, and its position in a house, more especially where each floor is occupied by a family, should be such as to render it readily accessible from the principal apartments, more particularly the sleeping rooms. In several instances the bathroom was so situated as to be exceedingly inconvenient and tended to destroy what would otherwise have been a rather acceptable arrangement. The committee point out that in one design the bathroom was so placed that in order to reach it from two of the bedrooms it was necessary to first pass into the parlor, then across the entire width of the dining room, into the pantry and through this into the kitchen, where at the farther side was the door opening into the bathroom.

While in the majority of instances the flights of stairs were so arranged as to be compact and convenient for the families on the two floors, yet in one case the stairs leading to the cellar from the first floor were near the front of the house, opposite the parlor door, while the kitchen was at the extreme rear.

It is gratifying to announce that in only a few instances did contestants fail to conform to the conditions of the competition. A few studies were thrown out through lack of a detailed estimate of cost; in one instance the floor area exceeded the limitations stated, and in another the architect had his specifications written on



Front Elevation.—Scale, ⅛ Inch to the Foot.



Section.

Competition in Two-Family Houses.—First-Prize Design.—R. B. McEachern, Architect, Savannah, Ga.

his printed letter heads clearly showing his name and address.

After the studies submitted had been carefully examined with a view to ascertaining if all complied with the conditions of the contest, the merits of each were carefully considered by the committee, who report their decision as follows:

The first prize, of $100, is awarded to R. B. McEachern of 35 Drayton street, Savannah, Ga.; the second prize, of $60, is given to John P. Kingston of 518 Main street, Worcester, Mass., and the third prize, of $40, to William H. Harvey of 311 Main street, Worcester, Mass.

The contest for the third prize was exceedingly interesting, there being a number closely approximating each otner in merit, and it was only by a few points of superiority that the committee gave the prize to Mr. Harvey instead of to "Home Pride," whose elevations were worked up in much better style, but whose floor plans were lacking somewhat in features of compactness and convenience. While not entitled to receive a prize, there were several designs worthy of "Special Mention," these being the sets designated by "Three Golden Stars," "Home Pride," "Willamette," "Patmos" and "Domus," some of which we hope to be able to present to the attention of our readers in the near future.

Specifications.

We present herewith the design awarded the first prize, together with the specifications and detailed estimate of cost. In submitting the drawings the author states that his idea has been to furnish a plan which has proven very popular in his section, particular attention being given to preserve the separateness of the two families and to provide for a good class of tenants.

Excavation.

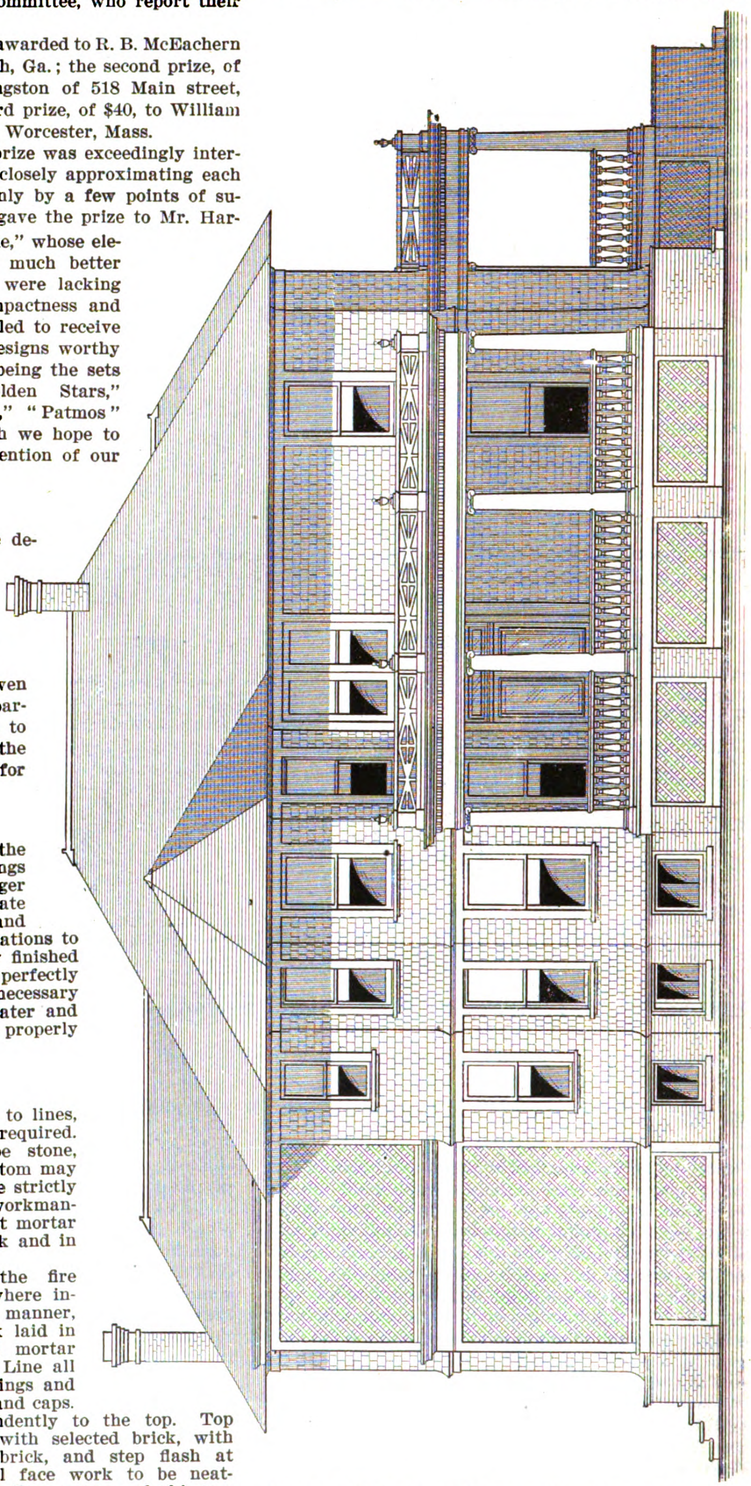
Excavate the cellar to the depth required by the drawings and 8 inches wider and longer than foundation walls. Excavate for the footings of all walls and piers, the bottom of all foundations to be not less than 4 feet below finished grade, and all bearings made perfectly solid and secure. Do all necessary excavation for tile drains, water and gas pipes, and see that all are properly filled at completion.

Foundations.

Build all foundations true to lines, levels and measurements required. Foundation material may be stone, brick or concrete, as local custom may warrant, but in any case to be strictly first class, and finished in a workmanlike manner. Portland cement mortar will be used for stone or brick and in the aggregate for concrete.

Chimneys. — Construct the fire places, flues and chimneys, where indicated on plans, in the best manner, with good, hard burned brick laid in best lime mortar, with full mortar joints and no empty spaces. Line all flues with terra cotta flue linings and provide all required thimbles and caps. Flues are to be run independently to the top. Top out as shown on elevations with selected brick, with joints colored same as the brick, and step flash at roof with 3-pound lead. All face work to be neatly pointed and cleaned down. Top courses of chimney tops to be laid in Portland cement mortar and to have cement weather washes. Fire places are to be built with rough opening for finishing after settlement. To be lined with fire brick laid in best fire clay. To have trimmer arches of brick supporting the hearths. Back hearths to be laid in fire brick and front hearths and facings to be laid in encaustic tile, furnished by the owner with the mantels. Tile to be soaked in water and set with cement in the best manner. Build in the tile frames and baskets furnished with the mantels and leave all perfect and complete.

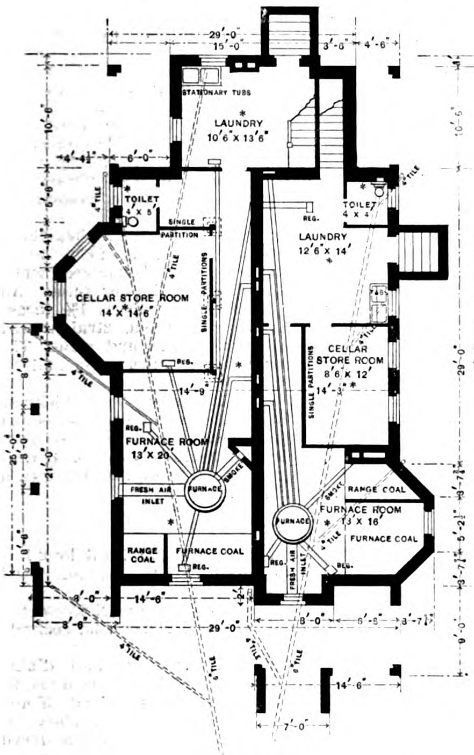
Cut Stone Work.—Furnish and set 4 x 8 inch sandstone sills with proper weatherings to all cellar windows; also 8 x 11 inch sandstone cellar steps where shown. Steps to have a slight pitch forward, to be set in cement and well supported and finished.



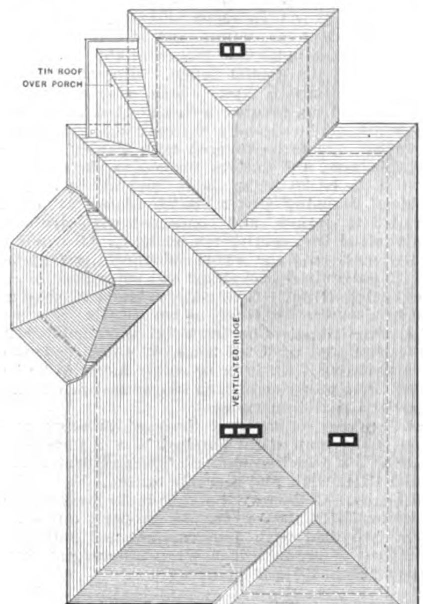
Competition in Two-Family Houses.—First-Prize Design.—Side (Left) Elevation.—Scale, 1/8 Inch to the Foot.

Concrete Floors.—Entire cellar floors to be concrete, 2 inches thick, of Portland cement and sand, one to three, and then topped out with a ½-inch top dressing before bottom has set. Top dressing to be of equal parts Portland cement and sand, well tempered and neatly troweled out. Floors to be graded slightly to a clean out basin.

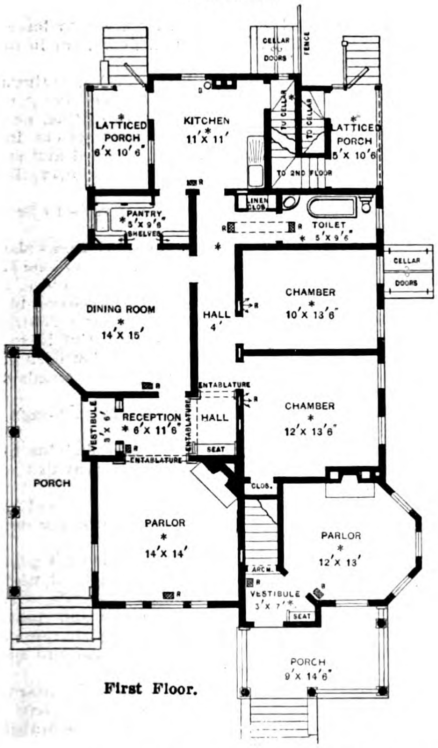
Lath and Plaster.—Cover all places to be plastered



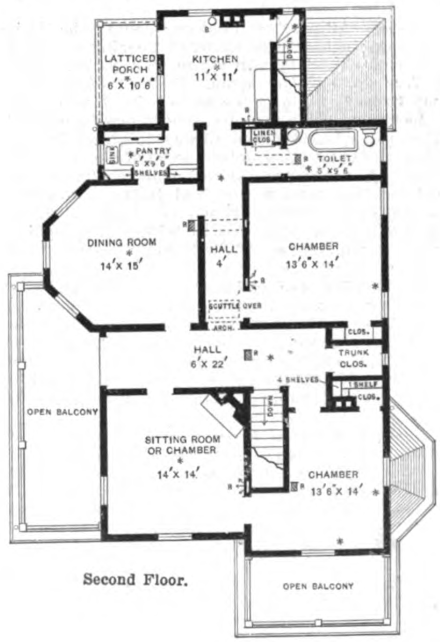
Foundation.



Roof.



First Floor.



Second Floor.

*Competition in Two-Family Houses.—**First-Prize** Design.—Floor Plans.—Scale, 1-16 Inch to the Foot.*

with sound, square edged pine or spruce lath, breaking joint in blocks of eight lath each, all securely nailed to every bearing. All angles made solid by spiking studding together every 3 feet. No lath to pass behind partitions or joints to occur immediately over door jambs. Cover lath with a good coat of mortar, made of one part lime, three parts clean, sharp sand, and well haired, tempered and applied with sufficient force to secure strong clinches. Follow immediately with a coat of browning mortar, darbied out true and even, and all angles maintained straight and sharp. After this coat is bone dry finish with King's white finish under the trowel. No laps or stains to show. Patch after other workmen and leave perfect and complete. Plastering in all cases to be carried down to subfloor.

Carpenter Work.

Framing.—To be dry No. 1 hemlock stock, sized. Sills, two pieces, 2 x 8 inches, as per details; first and second floor joists, 2 x 10 inches; ceiling joist, 2 x 6 inches; studding, 2 x 4 inches; rafter, 2 x 6 inches; hip rafters, 2 x 8 inches; valley rafters, 3 x 8 inches; porch rafters, 2 x 4 inches; porch ceiling joist, 2 x 4 inches; porch joist, 2 x 8 inches. All joist and studding behind plastering to be spaced 16-inch centers; all others, 20-inch centers. Bridging, 1 x 3 inches, cut to fit and double nailed at each end. One row of cross bridging in each room.

Sheathing.—All exterior surfaces to be sheathed with ⅞ x 8 inch No. 2 surfaced and matched boards, laid on diagonally, laid close and surface nailed on each edge to every bearing. Cover all sheathing with No. 1 Express water proof paper, well lapped and tacked. First floor joist to be covered with ⅞ x 8 inch surfaced and matched boards, laid close and nailed on each edge to each bearing. Butt joints to come over joist. Flash the edges of floors to walls with sheathing paper before laying finished floor and base.

Shingles.—Side walls and roofs to be covered with extra clear butt 16-inch cedar shingles. Those on side walls to be sized to width and laid 5 inches to the weather. Roof shingles, 4½ inches to the weather. All properly lapped and double nailed. Hips to be run with old-fashioned alternate laps. Flash wherever necessary with old method tin, painted both sides before using.

Tin Work.—The second story rear porch and decks of front porches are to be covered with Taylor's Old Style tin, IX thickness, and gutters formed as shown in plans. Valley tins to be 20 inches wide, and all to be painted both sides. Hanging gutters to be placed at all eaves and graded to outlets, and connected with drain by 3-inch galvanized iron corrugated leaders. All bends to be gracefully made and the whole substantially fastened to place with galvanized iron strips and supports.

Ventilating Ridge.—The main ridge is to have a galvanized iron ventilating ridge, as per details.

Cellar Partitions.—Construct the cellar sub-partitions of double surfaced matched hemlock, 4-inch boards on 2 x 4 inch studding. All interior cellar doors to be batten doors and hung on wrought iron hinges and provided with rim locks and porcelain knobs.

Coal Bunkers.—Construct the coal bunkers as indicated on cellar plan with matched ⅞ x 8 inch hemlock boards over 2 x 4 inch studding. The partitions dividing bins to be 4 feet high and securely braced.

Bulkheads.—Cellarway bulkheads to be constructed where shown with heavy frames properly anchored in place and provided with doubled, matched batten doors hung on heavy wrought iron strap hinges and fastened with approved hasps and padlocks.

Outside Finish.

All outside trim to be of No. 1 dry cypress, and worked to detail drawings for same in a strictly first-class manner.

Porches.—All porch and balcony floors to be 1⅛ inches thick by 2½ inches wide matched flooring of No. 1 dry Southern pine, and laid in white lead joints. The face to be free from pitchy spots. Ceilings of porches and balcony to be ¾ x 2½ inch matched dry pine or cypress. Both floors and ceilings to be well cramped up and blind nailed to every bearing, and all uneven places dressed off. Columns, rails and other details to be of No. 1 dry pine or cypress, and according to detail drawings for same, and framed together with white lead joints. Outside steps to be formed on strong, rough carriages, with ⅞-inch risers and 1¼-inch nosed treads, with scotia mold under nosings. Risers to be rabetted into treads with white lead joints.

Rear Porches and Balcony are to be latticed with ½ x 1½ inch diagonal lattice, with 1½-inch spaces. Lattice is to be primed before cut for use, and end joints laid in paint when fitted. To be bradded together every 2 feet square. Lattice panels to be formed in same manner under the porches between the piers, one panel under each porch being hung on hinges to give access under porches.

Door and Window Frames.—Cellar windows to be made of 2-inch plank rebated for 1¼-inch sash; 2-inch wood sills fitted to stone sills; 1⅛-inch staff molds. Frames properly anchored to walls. All other window frames to detail drawings, and providing the usual weight pockets, parting beads, blind stops and blind sills, channels for 1⅜-inch sash, 2-inch steel axle sash pulleys. Outside door frames to be 1¾ inches thick and rabetted for their respective doors; hard wood thresholds; outside casings to correspond to windows. Front doors and kitchen doors to have transom bars. Cellar outside door frames to have 1⅛-inch staff molds and to be firmly anchored to walls. Insde door frames to have 1¼-inch double rabetted jambs, the side jambs being housed and wedged into the head jambs. All frames to be square, true and straight, set plumb and flush with the plastering. To be solidly blocked behind the butts and locks. Jambs to be protected from injury until doors are hung.

Sash and Glass.—All sash not specially detailed are to be 1¾ inches thick, No. 1 white pine, check railed, and glazed with double thickness first quality American sheet glass, well tacked and puttied after priming. To be double hung with Silver Lake braided sash cord, and accurately balanced with cast iron weights. For sizes see drawings. Cellar sash to be same quality single sash, 1¼ inches thick, and hung at top with two 3-inch wrought butts, and provided with buttons or bolts to fasten and hooks and eyes to hold open.

Window Guards.—Cellar windows to have wire window guards of No. 12 galvanized wire, 1½-inch mesh, with metal bindings and securely fastened to place.

Blinds.—With exception of front windows, all windows are to be provided with 1⅛-inch outside blinds, upper louvres stationary and lower louvres rolling, to be hung and fastened with approved hardware. Front windows to have Venetian inside blinds to correspond to finish of rooms.

Doors.—Cellar outside doors to be 1¾ inches thick, four panels, stock pine, hung on two wrought 3-inch butts. Front and vestibule doors to be of quartered white oak, 1¾ inches thick, and as per details for same. All others to be No. 1 Gulf cypress, solid doors, 1⅜ inches thick, blind mortised, wedged and glued, straight and true; five horizontal panels, ogee stiles and rails. The 1¾-inch doors to have three 4-inch butts each, and all others two 3½-inch butts each.

Transoms.—Transom sash to be of same thickness as doors under them. Front and vestibule transoms and side lights to be of quartered white oak, to agree with the doors. Those of other doors to be of No. 1 Gulf cypress, and all to be hung at top on two 3-inch butts each and operated with transom lifts.

Interior Finish.

All interior trim to be of selected grain No. 1 long leaf Southern pine, worked to detail in best manner, hand smoothed and scraped for hard oil finish.

Grounds.—Plastering grounds sized to thickness are to be accurately run behind all interior trim and securely nailed to place.

Floors.—The vestibules, halls, parlors and dining room to have top floors of No. 1 selected kiln dried maple, ⅞ x 2½ inch matched. All uneven places dressed off and the whole sandpapered, leaving a true, even surface for finishing. All other floors to have ⅞ x 3 inch matched mill dressed standard pine flooring. All flooring to be well cramped up and blind nailed, and all butt joints nailed. To be laid crossways of sub-floors.

Carpet Strips.—All communicating doors to have ⅝-inch beveled hard wood thresholds on floors, cut in neatly between jambs.

Wainscoting.—Halls, vestibules, pantries, stairways, kitchens and baths are to be wainscoted vertically with ¾ x 3½ inch matched Southern pine wainscoting, as per details, 4 feet high, with dead wood nailings cut in at top, bottom and center. To be hand smoothed and sandpapered, well cramped up and secret nailed to every bearing. Finish with ⅝ x 3 inch molded cap.

Chair Rails.—Four-inch molded chair rails to be run around dining rooms.

Stairs.—All stairs to run between partitions, as shown on plans, and have bracketed 2-inch wall rails on one side. Use strong, rough carriages, securely fixed to place, and 1⅛-inch nosed treads and ⅞-inch risers. Risers to be rabetted into treads, and both housed into the wall strings and wedged and glued up in best manner. Cut in scotia molds under nosings. All of No. 1 selected Southern pine. Cellar stairs to be of spruce or pine, 1⅛-inch treads and ⅞-inch risers, and provided with wall rails.

Picture Moldings.—Run 2-inch picture moldings, as directed, around all main rooms and halls.

Closets.—All dressers, linen closets and shelving to be as per detail drawings for same and fully provided with hooks, as required.

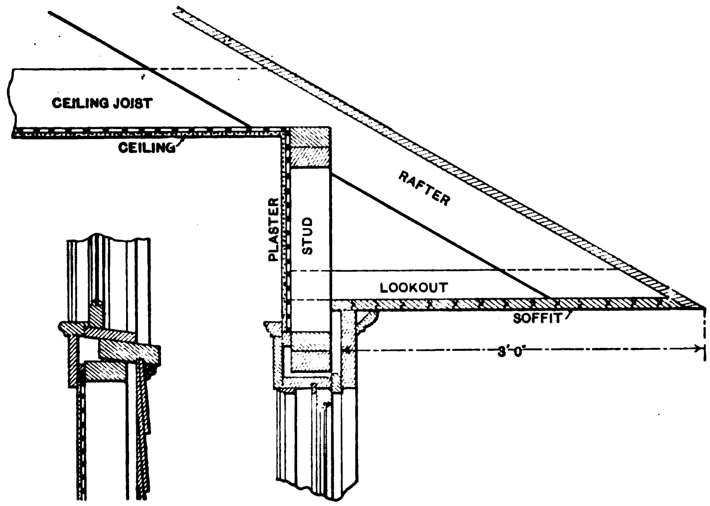
Scuttle.—Provide a scuttle hole neatly cased and trimmed and closed with a hinged batten door for access to the attic space from second story hall.

Miscellaneous.—Do all cutting of timbers for plumbing and gas fitting in such a manner as shall not unduly weaken them, and provide all required grounds, strips, centers, furring, &c., required by plumbers and masons. All undescribed finish required to fully complete the work called for by the drawings is to be furnished and be in keeping with what is described and detailed.

Mantels, &c.—Contractor will allow $80 for mantels, tiling, grates and frames, which are to be selected and bought by the owner and delivered by him at the building. Contractor to set the same in best manner.

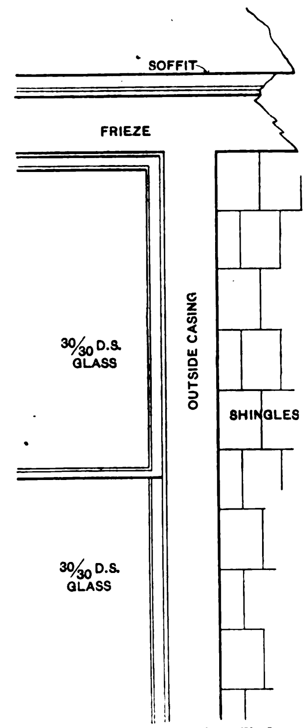
Papering.—Contractor will allow $85 for such wall papering and wall finishes which owner is to select. The contractor to see that same is properly put on in good style.

Hardware.—Contractor is to allow $70 for all butts, locks, transom lifts, bolts, pulls, bells, &c., furnished by the owner and put up by the contractor.

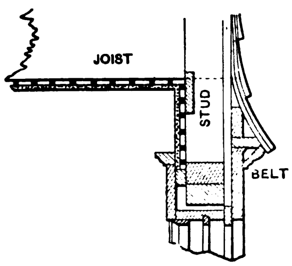


Vertical Section through Window Sill.—Scale, ¾ Inch to the Foot.

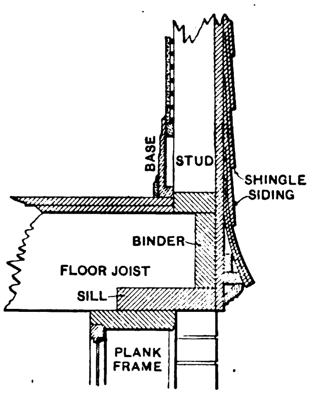
Details of Main Cornice.—Scale, ¾ Inch to the Foot.



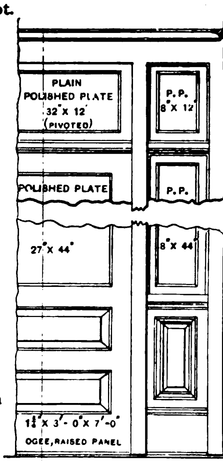
Partial Elevation of Outside Window Trim at Second Story.—Scale, ¾ Inch to the Foot.



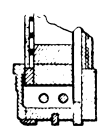
Belt Course.—Scale, ¾ Inch to the Foot.



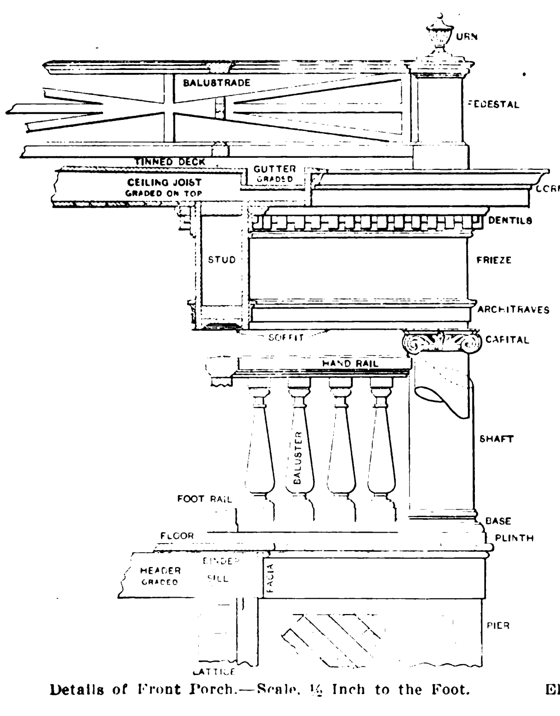
Details of Water Table.—Scale, ¾ Inch to the Foot.



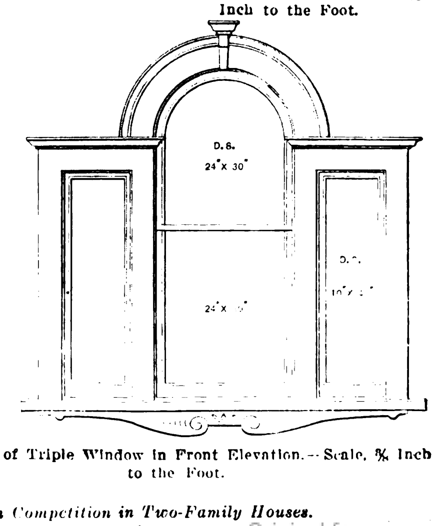
Details of Front Door.—Scale, ⅝ Inch to the Foot.



Horizontal Section through Window Frame.—Scale, ½ Inch to the Foot.



Details of Front Porch.—Scale, ½ Inch to the Foot.



Elevation of Triple Window in Front Elevation.—Scale, ¾ Inch to the Foot.

Miscellaneous Constructive Details of First-Prize Design in Competition in Two-Family Houses.

Heating.

Furnish and set substantially in place where indicated in plans two Boynton Renown No. 352 furnaces of 20,000 feet capacity. Run 10-inch IX tin hot air ducts to all registers indicated on first floor plans, and 9-inch protected risers to second floor registers. Provide all ducts with suitable dampers and furnace dampers, to be operated from first floor. Use 7-inch No. 24 galvanized iron smoke flues to connect furnaces with chimneys. Provide 9 x 12 inch cast iron clean out doors to soot pockets in chimneys. Floor registers to be 10 x 14 inches, japanned finish, in principal rooms and halls, and 9 x 12 inches in toilets and kitchens and for all wall registers. All to be erected substantially and in first-class style, with all due safeguards, and a written guarantee given the owner that the system shall be fully adequate to properly heat the house in zero weather.

Painting.

Prime all wood trim on exterior as soon as practicable after erection with best lead and pure linseed oil, and finish with two additional coats, solid white, for all trim. Shingles of both roof and sides to be dipped two-thirds their length in Cabot's creosote shingle stain before shingles are laid and given one finishing coat after being laid. Tints to suit owner. All nail holes, splits or other defects in finish to be properly puttied after priming, and all knots or pitchy places to be shellacked before priming. Outside doors to have three coats of best exterior varnish. All interior finish to be well cleaned up and filled with Berry Brothers' paste filler, well rubbed in and wiped off when dry. Putty all imperfections with putty colored to match wood as nearly as possible. Finish with two coats Berry Brothers' light hard oil finish in best manner and leave gloss finish. White pine sash to be stained to match finish. Maple floors to be well cleaned and filled and finished with Berry Brothers' floor finishes. Rear and cellar stairs are to be painted three coats best lead and oil. Partitions, doors and sash in cellar to be painted two coats. (No ceilings in cellar.) Kitchen, toilet and pantry floors to have one coat of heated linseed oil, wiped clean after drying. Tin roof, decks, leaders and valleys to have finishing coat of elastic Graphite paint.

Plumbing.

The plumbing throughout is to be in accordance with local plumbing ordinances and subject to the approval or rejection of the plumbing inspector.

Soil and Vent Pipes.—Run 6-inch glazed terra cotta main drains from the street lateral, connecting with the sewer system, back to the first branch. All branches to be 4-inch pipe and have all proper shapes for connection with main drains and the risers. All joints to be carefully made with Portland cement. Place a running trap on each main drain inside of cellar walls, with hand holes and fresh air inlets. The stack to be 4-inch standard iron pipe, with lead and oakum joints, and properly flashed at roof with 3-pound lead and carried up 2 feet above roof. To have all necessary back air and local vents connected in best manner.

Tubs.—Furnish and place in laundries where indicated on the plans two sets of two tubs each of soapstone laundry tubs, with nickel plated ½-inch Fuller patented bibbs for hot and cold water and 1½-inch lead wastes and traps.

Water Closets.—The basement closets are to be earthen ware combustion hopper closets, with unfinished flush tanks and hard wood seats, 1¼-inch lead flush pipes and ½-inch galvanized iron supply pipes. Bathroom closets to be all earthen ware siphon closets, with 6-gallon noiseless flush tanks lined with copper, oak finished tank and back and seats. Nickel plated brackets and all exposed piping nickel plated.

Wash Bowls.—Fit up where indicated on plans corner wash bowls of enameled iron, with splash backs and basins, all in one piece. Fit with improved double basin cocks, traps, supply and waste pipes, chains and plugs, complete, and all nickel plate work.

Bathtubs.—Fit up in bathrooms where indicated 5 foot 6 inch roll rim enameled iron bathtubs of guaranteed quality. Fit with No. 4 ½-inch Fuller's patent double bath cocks, with 1½-inch wastes and traps. All exposed work nickel plated.

Kitchen Sinks.—Kitchen sinks to be of enameled iron, with splash backs and drips of same, and all in one piece; size, 18 x 30 inches, set on N. P. brackets and fitted with ½-inch Fuller bibbs for hot and cold water, and 1½-inch wastes and traps. All exposed work nickel plated.

Pantry Sinks.—Pantry sinks to be of enameled iron, 18 x 24 inches, with wooden drip boards. Fit with combination goose neck cocks and 1½-inch wastes and traps. All exposed work nickel plated. Hose bibbs to be located in yards where required by owner. All to be connected with city water through galvanized iron supply pipes, and all to have stop cocks, and all to be properly trapped, vented and tested.

Hot Water Boilers to be of best copper construction on cast iron pedestals, of 30 gallons capacity, and completely fitted up and connected with the various fixtures using hot water. Sediment cocks under boilers and stop cocks under and over. Each system to be entirely separate and left perfect and complete.

Gas Piping.

Provide two systems of gas piping, in accordance with local gas light company's schedule, all properly secured to place and graded free from sags or traps, and fitted with drip cocks and cut offs. One-inch supply pipes from street main, ¾-inch risers, ½-inch branches and ⅜-inch drops. All branches to be taken from sides or tops of the running lines and all joints made in red lead. In putting up drop light nipples, screw on a long piece of pipe and plumb it, after which remove the long piece. All nipples to project 1½ inches through the plastering. All side lights to be 5 feet above floor. Lights to be located as indicated on the plans. The whole system is to be tested in presence of the superintendent and made satisfactory.

Wiring.

House to have two separate systems wired for electric lights, in accordance with the local insurance regulations, using a two-wire system on porcelain knobs, 52 volts, and not over 2 per cent. loss from entrance to furthest lamp. All room drops to be operated from wall switches, and lower hall light of the upper flat to be operated from upper hall, and *vice versa*. All outlets for gas to be wired and properly insulated. Wall switches to have flush plate push buttons. Provide proper knife switches, cut out boxes and cabinets where required. Electrical contractor to give the owner a guarantee to maintain the efficiency of the systems for one year at his own expense and making good all defects.

Light Fixtures.—The contractor will allow $100 for combination lighting fixtures, to be selected by the owner and put up in the best manner by the contractor.

Detailed Estimate of Cost.

The following is the detailed estimate of cost, showing the items under the various headings designated:

EXCAVATING.		
290 yards excavating, at 25 cents	$72.50	
Filling in and grading	8.00	
		$80.50
MASON.		
39,000 brick in cellar, at $13	$507.00	
8,000 brick in chimneys and piers, at $15	120.00	
Stone sills for cellar windows and bulkhead caps	37.00	
135 yards cement floor, at 60 cents	81.00	
Whitewashing cellars	6.00	
Fire brick, tile setting, flue linings and thimbles	38.00	
1,110 yards lath and plaster, at 27 cents	299.70	
		1,083.70
CARPENTER.		
12,800 feet framing, at $18	$230.40	
6,700 feet surfaced and matched sheathing and subfloors, at $19	127.30	
43,000 cedar shingles (in place) on walls and roof, at $5.10	219.30	
Sheathing paper	8.00	
1,000 feet outside finishing lumber	35.00	
1,300 feet matched ceiling stuff, at $22	28.60	
Materials for porches, balconies, steps and moldings	190.40	
800 feet double surfaced, matched partition stuff, at $23	18.40	
Bulkhead frames and cellar doors (in place)	16.00	
1,500 feet maple flooring, at $35.00	52.50	
1,800 feet pine flooring, at $25.00	45.00	
2,150 feet matched wainscoting, at $26	55.90	
430 lineal feet wainscoting cap, at 2 cents	8.60	
700 lineal feet picture mold, at 1 cent	7.00	
560 lineal feet base and mold, at 5 cents	28.00	
3 outside door frames and trim, complete	6.00	
2 cellar door frames and trim, complete	4.00	
26 inside door frames and trim, complete	57.20	
35 window frames and trim, complete	64.75	
14 cellar window frames, with wire guards	28.00	
1 special window frame and trim, complete	10.50	
1 front door and side light frame, veneered quartered white oak	9.50	
Door, sash and transom for same, complete	16.00	
1 front door frame, veneered quartered white oak	4.60	
Door and transom for same, complete	10.50	
1 vestibule door frame, veneered quartered white oak	4.25	
Double doors for same, veneered quartered white white oak, complete	24.00	
Doors, sash, blinds, weights and cord	248.70	
Materials for china and linen closets, shelving, cleats, &c	37.50	
Materials for stairways, complete	52.00	
Materials for reception hall finish, complete	31.20	
Mantels, tile and grates	80.00	
Papering and tinting	85.00	
Nails and rough hardware	47.00	
Finishing hardware	70.00	
Carpenter work not already counted	721.50	
		2,682.60
TIN AND SHEET METAL WORK.		
Tin roofing, gutters, leaders, valleys, flashings and ventilator		76.90
Heating apparatus, complete, in place		420.00
Painting, complete		316.00
Plumbing, piping, wiring and fixtures for same		587.50
Total		$5,247.20

It stone is used for foundation walls up to the grade line, all hard wood floors and finish replaced with pine, siding used on the walls instead of shingles and the sinks omitted from the pantries, a saving of $410 can be made without affecting durability or convenience.

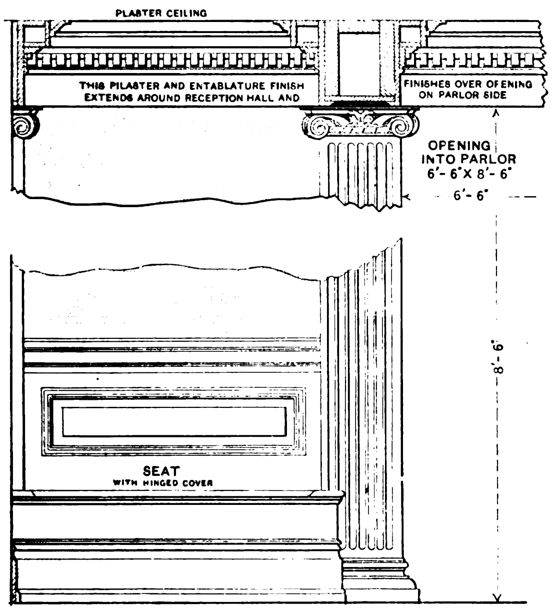
The builders' certificate was signed by George F. Steinacker, contractor and builder, 305 Congress street, Savannah, Ga.

Graining of Woods and Marbles.

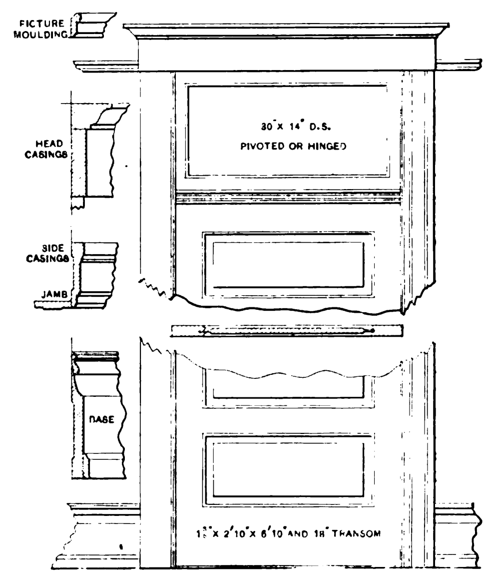
At the thirteenth annual convention of the Society of Master House Painters and Decorators of Massachusetts, held in Boston in January of the present year, one of the papers presented was that of James Mouncey, dealing with the subject of graining of woods and marbles. What he had to say is of interest to many of our readers, and we present herewith some extracts from the paper in question:

Graining of woods and marbles is done by the same methods to-day as were practiced 40 years ago, when first but more particularly for a decorative effect. Therefore, the grainers of those countries have not advanced so rapidly as the English speaking people, who tried to follow nature closely.

I would advise the rising young men that have a desire to study graining to go direct to nature for their teacher, they being sure to choose the finest of wood veneers and likewise the best samples of marbles, and if they follow them correctly they will be on the right path, providing are artistic ability appears in them, as it must be remembered that first-class grainers are born, not made. The above is quite true, although the fact is not so generally recognized in the rank and file of our trade as it should be. It is very different at the present time from the time I first learned my trade, in Scotland, where the great ambition of every boy from, I might say, the first day he entered the shop was to become a grainer, for the most successful imitator of wood and marbles was looked up to by operative house painters, and, in fact, by the patrons of the craft, as an art worker.



Partial Elevation of Finish on Reception Hall Side of Opening into Parlor.—Scale, ½ Inch to the Foot.



Details of Interior Finish, Showing Door Trim, &c.—Scale, ½ Inch to the Foot.

Competition in Two-Family Houses.—First-Prize Design.—Miscellaneous Details.

I went to my trade, and I may say many years previous to that time. My first impression of ancient graining was in the first years of my apprenticeship. Being at that time very much imbued with the desire to become a grainer made me very observing of anything in that line. In many old houses that I had worked in I saw many remnants of what I might call ancient graining, which might have been done for 50 years previous, which was generally oak or anciently termed wainscot. That was a period when all imitations were done in distemper color, generally using beer for a binder.

The reasons for work being done in that way in those times were because steel combs and other improved tools had not been introduced as they are used at present, especially for open grained woods.

Oak, or so-called wainscot, was done by laying in small sections with the distemper color, then drawing the blender through it while wet and softened to perform the grain as the combs are used now; then a wet chamois skin was used to wipe out the champs, or lights, and when done appealed to me at the time as if a hen had walked all over the work when wet, having no semblance of any imitation in particular.

I believe in many of the European countries mostly all imitations of woods and marbles were done, and are at present, in water colors, the reason for that being on actcount of the grainer not striving so much for an imitation.

Although there were very few successful ones, the apprentices had many advantages in those days, their employers generally being men of excellent ability, giving every encouragement to their boys. In the dull season they would allow them to practice, and oftentimes act as their teachers, and give prizes for the best work. Those were the benefits derived from the apprenticeship system when boys were bound for a number of years, and from that system many of the best grainers of the past century sprang and have come into prominence.

If I might assume the role of the critic I might say that some of our own grainers, and some very good ones, are rather inclined to overdo their work by doing too much, forgetting that a nice piece of plain graining in its proper place is far superior to overcrowding. There should always be one part of the work that should attract attention. That was always a custom of the most eminent grainers.

The artistic grainer always chooses the finest figure of the wood for his imitations, the same as the cabinet maker selects his veneers for the best furniture. Architects in their specifications may call for certain rooms in a building finished in quartered oak. If so, they would not allow a piece of growth to be put in. But, on the other hand, if it was to be grained oak, you invariably would find the growth would predominate, very often artistically done; yet if the growth is unfit to be used for a fine piece of cabinet work it should not be considered by the grainer.

The modern grainer in our midst is beset by many difficulties. In the first place, the want of public appreciation; then the thought of how many square yards he can cover in a given time, which means dollars and cents; then also the imperfect grounds that he has to work on, not being properly prepared for the work, oftentimes not the proper color, putting on more color on one panel than would paint one whole door side. Under such difficulties it is almost impossible for the most expert grainer to produce good work. Good grounds for graining are very essential, both for color and workmanship. There should be as much care used in preparing work for the grainer as would be used in bringing up a good piece of work for enameling.

Marble graining is the most difficult of the grainer's art, having combinations of color to deal with, striving for depths and transparencies. Each of the different kinds of marble—and they are many—have their own particular forms and colors. Take the entire range of the grainer's art: Is there any more difficult occupation to learn, when considering the whole range of woods of all kinds and the great variety of marbles, and the amount of forms and colors that have to be memorized? And yet our grainers are not recognized by our arts and crafts society as art workers. They recognize a piece of blacksmith's work, hammered brass, or a piece of cabinet work, which might be made with a hatchet.

The late John Ruskin, the eminent English author and art critic, writes on graining, stating that there is no meaner occupation for the human mind than the imitations of the stains and streaks of wood and marble.

The grainer should study nature just as perfectly as the artist who goes into the fields to paint nature as he sees it. Does the one not require just as much ability as the other? Does it require any more artistic ability to paint a landscape than it does to imitate a piece of jasper or any other valuable marble? I say, no! I have had experience in both. And, for an example, take a young man with artistic ability, give him a training by the best art teachers for a period of four years. Take a young man with equal ability studying graining in all its branches as a comparison. The artist will have acquired more knowledge in art in four years than the grainer would acquire in six, and both are imitating nature.

New York Employers' Organizations.

A federation of employers' organizations in New York City is one of the probabilities of the near future. The matter was discussed on March 1 at an informal dinner of secretaries of the various employers' associations. William K. Fertig, secretary of the Building Trades Employers' Association, presided at the dinner, and Henry C. Hunter, secretary of the New York Metal Trades Association, was the toastmaster. The largest individual organization represented was the Building Trades Employers' Association, itself a central body, with which about 100 subordinate employers' associations are affiliated. Among the other organizations represented were the Lager Beer Brewers' Board of Trade, the Shoe Manufacturers' Association, the Lithographers' Association East, the Wholesale Hat Manufacturers' Association, the Tugboat Owners' Association, the United Typothetæ, the Jewelers' Association and the Paper Box Manufacturers' Association. Messrs. Fertig and Hunter were appointed as a committee to draw up a plan of organization. It will hold the same relation to employers' associations that the Central Federated Union does to the unions, affording an opportunity to exchange views and keep posted on the general industrial situation.

"FUNDAMENTAL IDEAS OF CHURCH ARCHITECTURE" is the title of an interesting little work of 28 pages, by John Jaeger of Minneapolis, Minn., which deals with various phases of the subject indicated. The matter is divided into five parts, the first of which discusses "Commerce, Civilization and Architecture;" the second talks about "The Architect and the 'Style;'" the third deals with "Composition;" the fourth, "Construction," and the fifth with "Steel in Church Construction."

Saw Tooth Roof for Machine Shops.

A most interesting example of saw tooth roof for macrine shops, and so constructed as to afford not only the necessary light, but also provision for operating cranes, is found in connection with the new works of the American Turret Lathe Mfg. Company, at Warren, Pa. This is said to be the first saw tooth erecting shop ever built—that is, the first of any considerable size—in which there are properly arranged crane runways.

The foundations of the building are concrete, the walls are of brick and the frame work is of steel. The roof planking is 3-inch yellow pine, the skylights are of heavy ribbed glass set in metallic sash, the floor is of concrete and the construction throughout is first class in every particular. The building covers about 60,000 square feet of floor space, and costs, including 1200 feet of crane runway, ¾ mile of sewers, 80.2 cents per square foot, distributed as follows:

	Cents.
Steel work, per square foot	33.7
Floor, 6 inches concrete	11.5
Foundations and brick work	10.8
Lumber	14
Painting	1.1
Roof Covering	1.1
Sewerage	2
Miscellaneous	6.5
Total cost per square foot	80.2

This figure, it will be observed, is very low, and is said to have been obtained only by the closest economy in design and the exercise of great care in letting contracts.

All parts of the plant are heated and ventilated by the Sturtevant hot blast system, the apparatus consisting of a 9-foot fan drawing air through a heater containing several thousand feet of 1-inch pipe, the fan and pipe coils being incased in steel plate housings. The steam connections are so arranged that a part or the whole of the heater may be used as desired, thus making it possible to control the temperature of the air throughout the building and effecting a saving in the amount of steam during moderate weather, a thing that is not easy to accomplish with direct radiation. The speed of the fan may also be reduced during mild weather. The fan and heater are placed in the engine room and the fan is driven by a direct connected horizontal steam engine, which exhausts into the heater, thus costing practically nothing for operation.

The heater is so arranged that the air may be taken either from the factory or from out of doors. It is discharged from the fan directly upward into an extensive system of galvanized iron piping, by which it is distributed thoroughly and evenly throughout the building in such a manner as to avoid drafts and to prevent unevenness of temperature. In planning the piping system great care has been exercised to avoid interference with the operation of traveling cranes and other machinery.

The Largest Windowless Building.

It is stated that the Belgian national pavilion at the coming World's Fair in St. Louis is the largest building in the world without a window. The absence of windows was deliberately planned by Gustave Chartrain, the architect, to secure an even distribution of softened sunlight.

"Windows let in a blinding blaze of light and the intervals between them are dark," says Mr. Chartrain. "We have avoided this by omitting the windows and constructing the central section of the arched roof, extending the entire length of the building, of stained cathedral glass, which will let in abundant light."

The pavilion is 267 feet long and 191 feet wide. It is 55 feet high in the center of the great arched roof, and the great dome in the center is 100 feet high. The glass section in the top of the roof is 20 feet wide. It is a yellowish brown, and the soft light cast through the interior increases the beauty of the finishings and decorations.

Great arched entrances on all sides make up for the absence of windows in the exterior appearance.

SOME SUGGESTIONS FOR TURNING SPHERES.

By C. Tobyansen.

THE annual reminder that the bowling season is at hand occurred a few days ago, when a dozen or more bowling balls were sent in to be re-turned. They were badly battered and bruised, giving evidence of rough usage and hard knocks. In fact, they were a hopeless looking lot of spheres, but we tackled the job with a will, and they soon emerged under our treatment transformed into very respectable looking globes, good as new, except, of course, the necessary reduction in size. Perhaps some of the readers would like to know how to turn a true sphere, be it bowling, billiard or croquet ball. Any of these may be manufactured by means of a fair sized foot power lathe, the writer having turned dozens of full sized bowling balls on such a machine.

We will commence with the bowling alley requisite. This is always turned out of lignum vitæ, also called *guaiacum*, a very hard, dense wood. Owing to the diagonal oblique arrangement of its fibers it can scarcely be split. The sap wood or alburnum is yellow white. The hard wood, or duramen, is of a dark greenish-brown, and this part only should be used in a first-class ball. This duramen has a specific gravity of 1.333, and therefore sinks in water, on which the alburnum or sap wood floats. Despite its hardness, it is easily worked, because of the 26 per cent, resin it contains. The lignum-vitæ tree is a native of the West Indies and the north coast of South America. The balls in use vary from about 6 inches to 10 inches in diameter. We will, therefore, suppose we have stuff in hand for an 8-inch ball. This will require a block 9 inches in length or a little over, allowing about ½ inch for the centers. We place this block between the two centers of the lathe and proceed to shape it into a ball, as indicated in Fig. 1 of the illustrations. It is well to turn this as nearly spherical as we can by measurement of caliper or template, as it will save a lot of trouble later on. Trim down at the centers as far as possible, take out of the lathe, and finish off the centers with saw or chisel. We should now have a fairly true ball, but still far from perfection.

We now shove our tailstock out of the way and make ready for the second operation. For this we will need a chuck. We find a soft wood block, say 10 x 10 x 5, and fasten this on the face plate in the manner indicated in Fig. 2, using suitable screws for the purpose. Make positive that it will stay in place, as nothing is more annoying than to have the chuck shift on the face plate. Have it properly fastened, and we will now proceed to hollow it out and adapt it to receive our crude ball. Fig. 2 represents a section of the chuck and also shows the position of the ball, C-C being the original centers. It will be observed that the ball is held a little back of its largest diameter. It appears scarcely reasonable, judging from the illustration, that this ball of very considerable weight could be firmly held in the manner indicated. It will stay, however, if it fits closely at the circle of contact, and should the fit not happen to be extra good, a little chalk rubbed on the chuck will greatly increase its adhesiveness. We must now test the position of the ball in the chuck by touching it lightly with the point of a chisel, making a mark around it as shown in Fig. 3. If this mark does not cut into both centers equally we rap sharply on the chuck, thus dislodging the ball, and then turning it slightly, fasten and test again until we get it right. Then we cut a sharp groove across the centers deep enough to completely encircle the ball.

To make this more plain, we must bear in mind that our ball is more or less out of true, and the groove must be made deep enough to cut into its flattest part or smallest diameter. If our machine runs firmly and the tool is held steady it will be understood that this groove forms an absolutely true circle around the ball, and also that it

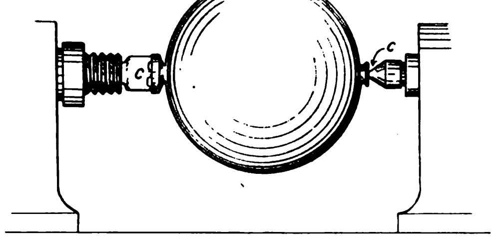


Fig. 1.—The First Operation.—Blocking Out.

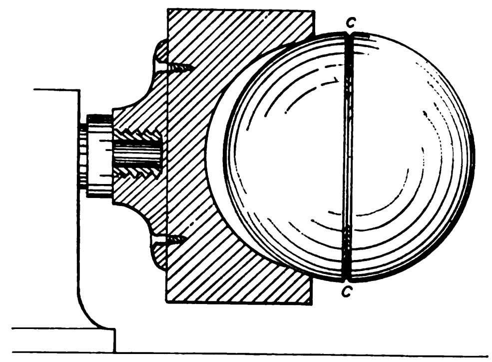


Fig. 2.—Second Operation.—Halving.

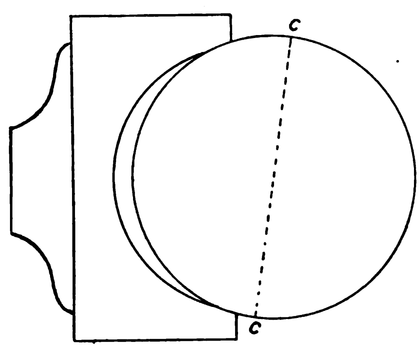


Fig. 3.—Showing Ball Incorrectly Centered.

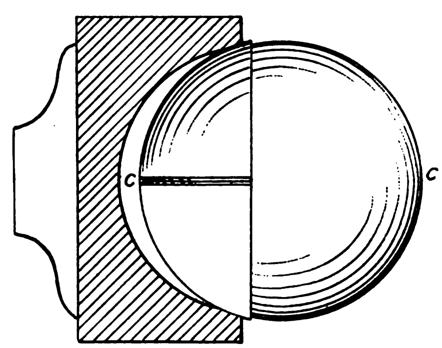


Fig. 4.—Third Operation.—Quartering and Turning First Half.

Some Suggestions for Turning Spheres.

divides it into two equal halves or hemispheres. This we call halving the ball, while the next step is to quarter it.

We again dislodge the ball and turn it around in the chuck, so that the centers are brought back to their original position as between head and tail stocks (Fig.4). Turn a groove around the ball at its largest diameter and the ball is quartered. Now proceed by turning off the surplus wood, cutting down carefully to the original groove, just merely leaving a faint even trace of it all around, taking care not to cut below it in any part. Next cut well up to the chuck. This will be readily understood by referring to the illustration.

The value of the care taken in the original blocking out will now be apparent. If the ball was turned very nearly true to the template a shallow groove only was needed in order to circle it, and consequently but very little wood has been removed in the last named operation. So when the ball is turned in the chuck, as we now must do, it will still fit, sinking in but a little deeper. If, on the other hand, we have been careless, a new chuck will be required or the old one must be refitted. Having turnd the ball end for end in the chuck, as shown in Fig. 5, we now proceed to remove the surplus wood, guided by the groove as before, and, this being done, we should have gained our ends—a true sphere. This is easily tested by

and skill. The machine must be brought to a standstill frequently in order to ascertain how things are coming on, how closely the groove is being followed, how much more wood is to be removed, and at what points. By reason of the peculiar structure of the wood the tools must be used more as scrapers than as cutters, which is to say, more at right angles to the material, as indicated in Fig. 6.

In the turning of billiard balls ivory is the material needed. Tusks very near the right size make the best ball, because of the more even shrinkage. It may not be generally known that ivory shrinks, but such is the fact. Says an encyclopedia in regard to this: "When ivory is first cut it is semi-transparent and of a warm color. In this state it is called 'green' ivory, and as it dries it becomes more opaque. This is supposed to be the result of the drying out of the oil, but ivory contains less than ½ per cent. of fatty substance, and that which dries out is water—not oil. During this drying process the ivory shrinks considerably, so that it is necessary to season it like wood. The tusks shrink much more in their width than in their length, which will be readily understood when the many concentric rings of interglobular spaces containing soft material, which dries up and leaves them empty, are remembered. It is on account of this peculiarity of structure that billiard balls are turned from tusks not greatly exceeding them in diameter, for by selection of such tusks the ivory on the opposite sides of a ball will correspond in density and in structure, and the

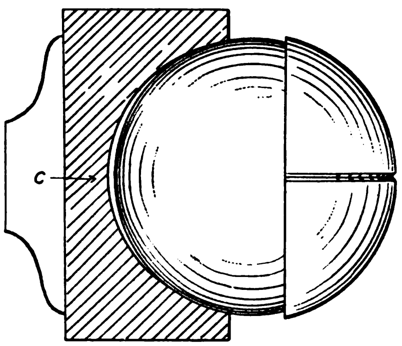


Fig. 5.—Fourth Operation.—Finishing Full Round.

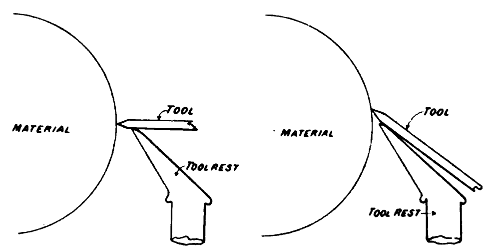


Fig. 6.—Diagram at the Left Shows Tool in Scraping Position and at the Right Tool in Cutting Position.

Some Suggestions for Turning Spheres.

shifting the ball in the chuck into any desired position. If it is true it will run around without the least play or wobble at any part, always provided our lathe and chuck run truly. If, however, any deficiency is present it will be apparent enough, rest assured, and the only effective remedy is to repeat the former operation, barring blocking out. It ought to be true, and will be if we have taken the proper care. It now only remains for us to sandpaper and finish with shellac.

In re-turning a lot of used balls it is often necessary to take off considerable wood in order to bring them out true. It is advisable then to commence with the smallest ball and turn the chuck to fit, fasten and strike the groove, then turn it about in the chuck and finish the first half. After this has been done lay it aside and fit the chuck for the next size, proceeding in this way with all of the balls up to the largest. Now procure a new chuck and again commence with the smallest size and finish it up, gradually enlarging the chuck as before. By this method two chucks will serve any number of sizes of balls, while otherwise a chuck will be required for each size, and this again would have to be refitted for the finishing operation.

In Europe, where the trade guilds have been in force since the Middle Ages, and where the apprentice must still pass an examination before becoming a journeyman, this operation of turning a perfect sphere is one of the tests of the turning trades. The prospective journeyman is given a piece of stuff of such size as to impose the most careful handling in order to produce therefrom a sphere of the required size. It is carefully tested, and if inaccurate the hapless apprentice must serve more time until another and more successful examination. It will be gathered from this and the foregoing that the art of turning a true sphere is one requiring judgment, patience

shrinkage will be uniform about its centers. They are usually turned roughly into shape and kept for some time in a warm room to shrink and then turned true."

The process of turning is identical with that of the larger balls. It is, in fact, the only accurate way of turning any size of sphere, except the machine be automatic. The ivory takes dies excellently, despite its hardness, nor does the dyeing interfere with the polishing in any way.

The croquet ball is generally turned out of hard, white well seasoned maple, as are also the clubs and mallets. When blocking out this ball it is customary to turn five or six on one stock, and then cutting down between the balls as far as one conveniently can in the lathe and parting them with a saw and finishing as before. There are turners who, by long and constant practice at this one branch of turning, become so expert of eye and judgment as to be able to turn this ball in one operation only—that is, between two centers. They are not absolutely true, of course, but near enough to serve the purpose. The bulk of them, however, are now produced by an automatic lathe of recent invention, which does the work truly and rapidly, greatly cheapening the product.

THE most remarkable and striking feature of the new Cathedral at Liverpool, England, will be the hight of the vaulting of the nave and choir. Measured in the barrel vaulting it will be 116 feet, and in the high transepts 140 feet. No cathedral in the country approaches its hight. The nearest is Westminster, the nave of which has a hight of 102 feet, while York measures 99 feet; then Salisbury 84 and Lincoln 82. Chester reaches only 78. The "whispering gallery" of St. Paul's Cathedral is 100 feet from the floor.

CORRESPONDENCE.

Tool Rest for Grindstone.

From E. V. T., *Shenandoah, Iowa.*—I send herewith a sketch (Fig. 1) of a tool rest for use in connection with a grindstone, which may possibly be found of use to some of the readers of the paper. Referring to the sketch, I would state that A is a piece of 1 x 6 inch stuff; B is a brace; C C' are cleats nailed on to the piece A, while chisel D is represented in place for sharpening. The piece A also serves as a buffer or guard to prevent the water from the grindstone being thrown on the operator while sharpening the tool. The chisel or plane iron may be held at any angle required.

From W. W. E., *Flint, Mich.*—I hereby unfold my plan of grinding chisels, it being one I have used for some time and have found entirely successful. If other carpenters' chisels are like mine they will not stand the same bevel, and my device is so made as to work on all chisels and plane irons. Although the tool rest shown is a good one, the edge of the tool is hidden from view. I take a piece of pine 3 x 4 inches wide and place it perpendicularly on the frame of the grindstone, as shown at S in the accompanying sketch (Fig. 2). Then I have a rest, R, running from the standard to the stone, or wheel, this rest being 6 inches wide and having a 1-inch slot in it. The end of the rest is held in place by a bracket, B B, on each side of the wheel on the frame. These brackets are adjustable in hight, as shown at A, according to the size of the wheel or stone. The hight of the rest is adjustable at the standard and the bevel desired, as shown at C. This device is used in truing up a wheel, which, of course, in order to do good work must be perfectly true. The rest may be cut out for the handle of the chisel if desired.

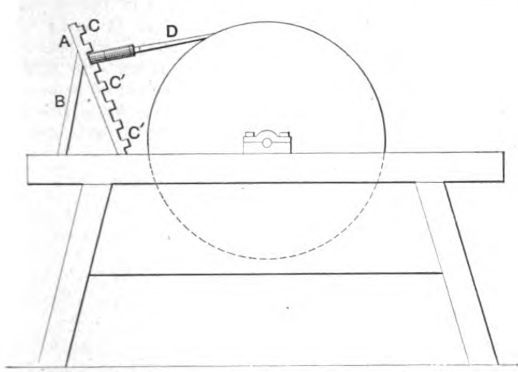


Fig. 1.—Arrangement Suggested by "E. V. T."

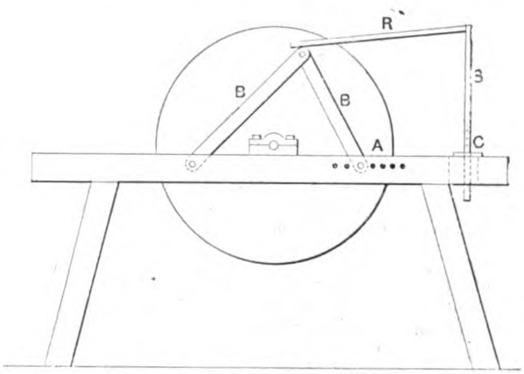


Fig. 2.—Plan Recommended by "W. W. E."

Tool Rest for Grindstone.

I am very much interested in *Carpentry and Building* and enjoy it thoroughly. I am new at the trade, having had as yet only fivé years' experience, and I therefore wish that my brother carpenters would express their views freely and fully, not only regarding this matter of tool rest for grindstone, but also on other topics, of which so many are coming up every month in the Correspondence department.

Are Mill Men Getting Careless?

From P. & N., *Loyal, Wis.*—We approve generally of what "C. E. G.," of Frederick, Md., says in the March issue, page 83, regarding mill work. We will cite one case which came under our observation, although there are plenty of others, and we could fill columns should we give them all. A man came in one day and gave us an order for some inside finish, the casings being plain side casings with cap finish. We got out the bill of materials and had the face of all the work sanded, ready to put on. After the work was in place, the owner of the building came in and did not a little grumbling about the side casings being rough, or not smoothly planed, so we went over and looked at the job, and will you believe it, the carpenter (?), a man who had worked at the trade for years, had put those casings on with the back or hollow side out, the sanded side being placed next to the plaster! There probably are cases where the mill men turn out poor work, but at the same time there are so-called carpenters who will butcher up the best and simplest mill work ever put out. It is enough to knock the sand out of a millman to see the way some of his work is put in a building. We offer these few suggestions, as we feel that the other side will be well aired. We could fill the Correspondence part of the paper with similar examples, but do not want to take up too much of the valuable space.

From APPRENTICE CARPENTER, *Fort Morgan, Colo.*—I wish to make a slight correction of the letter of mine which appeared in the January issue under the above title. I am not at all surprised that some of the readers took this to heart, but I am afraid they do not quite understand what I meant. I had no intention of hitting at any stair factory or furniture shop, but I had reference more particularly, as stated in my letter, to the matter of flooring and molding. Now if "C. E. G.," whose interesting letter appears in the March number, was laying flooring and it varied in width from 1/8 to 1/4 inch, what would he do, especially if he found some that wouldn't match, and after he had got it together or as close as he could, there were still visible cracks about 1/8 inch wide—would the millman smile when he saw it? Now I mean saw mills where flooring is made.

I do not want to be classed as a "bungling carpenter," for I have held my job as an all around carpenter wherever I have worked, nor do I want to be classed as an extremist, for we have heard from a few who wrote on the question of "What Constitutes a Day's Work for a Carpenter." Now let us reason together. Suppose one were to get some 3½ inch crown molding and it varied in size, could a fine joint be made? Then let us suppose the saw mills keep cutting down on the size of 2 x 4's and other dimension stuff, where do you think they will stop? Well, 2 x 4's vary in size, but they are not 2 x 4, but rather 1⅝ x 3½. The mill men take out the saw cut from the size of the lumber, so they say. Well, who pays for this saw cut? Getting paid for sawing the lumber does not seem to be enough; they want a little more, but as they put it they only take the saw cut. Well, I must say the saw mills must use a pretty thick saw. Don't you think so, reader?

The correspondent "C. E. G." speaks of the Philistines getting hold of some of the mill men's work and beating it up in pretty bad shape. Well if they should get hold of some flooring and drop siding that wouldn't go together, they would want someone to go after the millmen. I will say right here that if the Philistines would have to deal with that kind of mill work, they would surely send for Solomon or King David to tell them what to do with it.

Rule for Finding Distance Between Saw Kerfs.

From E. F. G., *Stamford, N. Y.*—Replying to the correspondent asking for a rule by which the distance between saw kerfs may be determined, I would say take a piece of stuff of suitable length and equal to the thickness of the piece to be bent, as *c' a'* of the accompanying sketch, Fig. 1. Let *a' b'* be equal to the radius of the curve around which it is to be bent. Make the saw

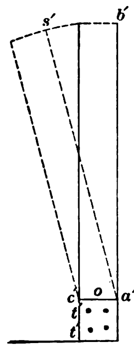


Fig. 1.

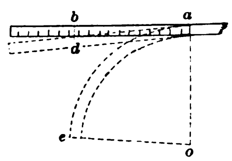


Fig. 2.

Rule for Finding Distance Between Saw Kerfs.

kerf at *c' o*, leaving the thickness unsawn at *o a'* from ⅛ to ½ inch. Nail the piece at *t' t'* and move the piece, as indicated by the dotted lines, just enough to close the saw kerf at *c'*; then *b' s'* will be the distance between the two saw kerfs. The distance *o a'* to be uncut must be gauged along each edge of the stuff to be bent. The same saw must be used to cut all the kerfs.

From W. N. M., *Fort Shaw, Mont.*—In reply to the correspondent asking for a rule for determining the distance between saw kerfs I send a sketch which shows my method of finding the distance between kerfs for the segment of a circle of given radius. Referring to the sketch, Fig. 2, cut one kerf, as at *a*, mark the distance *a b* equal to the radius *a o* and bend the board or strip to the position *a d* until the saw kerf is closed, as indicated by the dotted lines. Measure the distance between *d* and *b*, or, in other words, the deflection of the board between *a* and *b*, and the space *b d* is. therefore, the distance between kerfs. It should be remarked, however, that all kerfs must be made with the same saw.

Note.—We have a similar answer from "O. A. G." of Dresden, Tenn.

Staging Bracket for Shingling a Roof.

From W. P. C., *Wahpeton, N. Dak.*—I would like to indorse "C. C. H." of Brookville, Pa., and "D. P. B." of Redford, N. Y., in regard to shingling brackets. I think the kind described is the only one to use, as it makes no difference what may be the pitch of the roof. The material necessary is always lying around loose and costs practically nothing.

Design Wanted for Gambrel Roof for Barn.

From F. F. B., *Slippery Rock, Pa.*—Will some practical reader of *Carpentry and Building* submit for publication plans of a gambrel roof for a barn 50 feet wide, showing the location and pitch of purlin posts?

Question in Door and Window Construction.

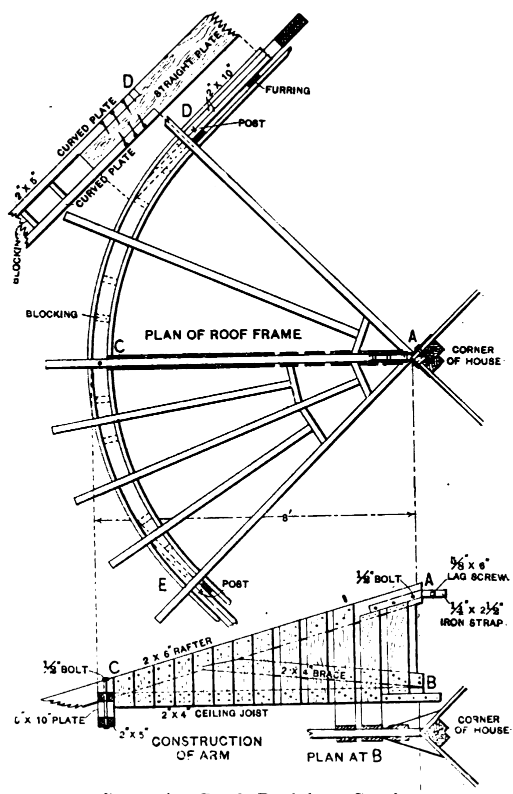
From A. F., *Toronto, Canada.*—What I understand from the letter of "A. J. B.," Waterloo, Iowa, in the February issue, is that the molding and fillet of the head should be returned on the ends and the casing butt underneath. In regard to the matter I would say the base block should always be fitted up against the base, both for appearance sake and for saving of time.

The rule we follow for placing hinges on a door is 8 inches from the bottom and the same distance from the top. The lock should be placed at the middle of the lock rail, the latter being 3 feet from the bottom of the door.

From S. P. B., *Smethport, Pa.*—Referring to the letter of "A. J. B.," Waterloo, Iowa, which appeared in a recent issue, I find that housing cabinet heads down on to the casing gives best satisfaction. I recently received a large bill of trim where the manufacturers were to do the housing, but instead they tenoned and mortised them. I had my man cut off the tenons and house down the heads.

Preventing Porch Roof from Sagging.

From J. E. R., *North Chatham, N. Y.*—I am an interested reader of *Carpentry and Building*, and noticing in the March issue the query of "C. C. H.," Brookville, Pa., concerning the tendency of round cornered porch roofs to sag, I send a drawing indicating a method of preventing the trouble which he mentions. I would state in this connection that I have used the plan here illustrated and described with entire success. The idea is to construct an arm of the middle rafter and the ceiling joist directly under it and to secure it to the corner of the house by means of iron straps and bolts so as to keep it from pulling away at the joint A of the sketch. By making a good foot on the inner end of the ceiling joist it will tend to keep the arm from jamming or splitting at B. In doing the work nail 1-inch boards on each side of the arm so as to make it perfecly rigid, and it will support any weight likely to be placed upon it. The curved plate is tied up to the arm at C by means of a ½-inch bolt, and this, with the support it gets from



Preventing Porch Roof from Sagging.

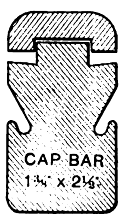
the straight plates at D and E, makes a job which will set in place and prove eminently satisfactory.

From D. P. B., *Redford, N. Y.*—In my opinion "C. C. H." has a bad job on his hands. If his porch is ceiled on the under side he can rod firmly from post to post through the ceiling joist; then bridge firmly from joist to rafters, herringbone style, after which tighten the rod. The rod should be fastened under the main rafters over each post. If it is a rafter finish he must have rolled in the form of a quarter circle a piece of band iron, such as is used for wagon tires, ½ inch thick and as wide as a plate. Have plenty of holes drilled for ⅝-inch screws, then put it on the inside of the plate, using screws 2 inches long.

Glazing Hot Bed Sash.

From C. A. W., *Port Jervis, N. Y.*—I would like to ask the readers of the paper a question with regard to hot bed sash. I favor butting the panes of glass instead of lapping them an inch or more, and my reason for it is this: In lapping glass the water will always form a suction and get in between to such an extent as to run inside more or less; then in cold weather it will freeze and break more or less glass, while by butting the glass there will be no more leakage than results from lapping and there is no breaking of the glass from freezing. I should like to have this matter well agitated by the readers of *Carpentry and Building*, as I think it one of importance, and there may be readers who have had some practical experience in regard to hot bed sash and can throw much light on the subject, while there may be others who have never thought of butting the glass and thereby saving in the first cost as well as in the long run. Perhaps some of the greenhouse men may have something to say on the subject.

Note:—In regard to the question raised by our correspondent above we have the following interesting communication from the Lord & Burnham Company, greenhouse architects and builders, of Irvington-on-Hudson, N. Y.:



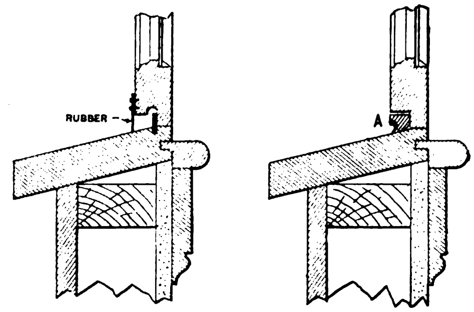
Glazing Hot Bed Sash.

"In the manufacture of our glazed hot bed sash we always use lapped glass, and our unglazed sash have the bars arranged for that method of setting the glass. Your correspondent speaks of lapping the glass an inch or so and of the liability of breakage arising from ice forming between the laps. One light should not lap over another more than ¼ inch. We have known of no trouble from breakage from the formation of ice at the laps.

"The chief objection to butted glass for either hot bed sash or greenhouse roofs is that it does not make a tight joint. The reasons are these: Almost every light of glass is somewhat bowed or curved in shape; a wooden cap has to be placed on the bar to hold the glass secure, as indicated in the cross section of a sash bar sent herewith. It will be seen that placing this straight cap against the curved surface of the glass leaves a loose joint under the cap. The joints where the lights butt against each other are also loose, because very few lights have absolutely straight edges. From the use of butted glass a leaky roof results. Furthermore, it is harder to keep a proper degree of warmth in the hot bed or greenhouse. One other disadvantage is that when a light of glass is broken it is necessary to remove an entire section of the wooden cap before that light can be replaced. We have used lapped glass for all our greenhouse work except in a very few cases, where owners have insisted on having the butted glass. We always advise, however, against the latter method."

Constructing a Swinging French Window.

From "Hee H. See," *Belleville, Canada.*—In the February issue F. J. Grodavent shows a sketch of a French casement window which is about the usual style of construction on this side of the line, and though this answers fairly well in a sheltered position, I have found to my cost that in the open country, where the wind gets a chance at it, the construction is worse than useless. The wind in the first place blows the rain against the window panes, from which it runs down to the sill. There the wind gets at it again and blows it through the wide opening in a perfect stream, as the piece of iron generally projects a half inch, and the front of the opening will necessarily have to be fully as much. I tried several things to remedy this, and one of them was a strip of

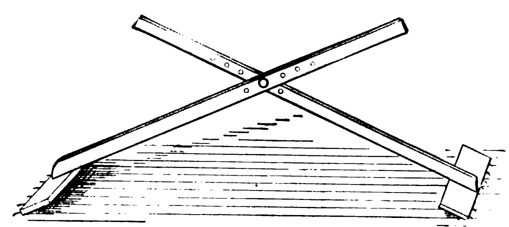


Constructing a Swinging French Window.

rubber packing fastened to the front lower edge and the sash and projecting down to the sill. This would scrape over the iron bar as you shut the window and then spring down straight again. Fig. 1 of the accompanying sketches will explain what I mean. The rain, however, came in just as badly as ever when the wind was in the right, or, rather, the wrong, quarter. The manner in which I eventually overcame the difficulty is indicated in Fig. 2. The strip of wood shown fastened to the sill must be at least 1 inch high, and the joint at A must be as close as possible, so that the rain cannot blow through it as it runs down the sash. The cove in the bottom of the strip prevents the wind blowing the water up as far as the joint, and this keeps it from running through into the room. I am certain that with careful fitting this will make a good job, because I have tried it.

Laying Canvas Deck Roofs.

From L. C. H., *Ridgetown, Ontario.*—As I have had experience in laying canvas decks, I feel justified in replying to the inquiry of "Learner" regarding this matter which appeared in a recent issue of the paper. I have laid canvas on both boat decks and veranda floors and wonder it is not more extensively used, as it is so much quicker than iron or tin, and with proper care will last just as long. The under boards should be dry and matched and all over-wood should be planed off, as any ridges are bad, and cut the canvas. Lay upon the boards

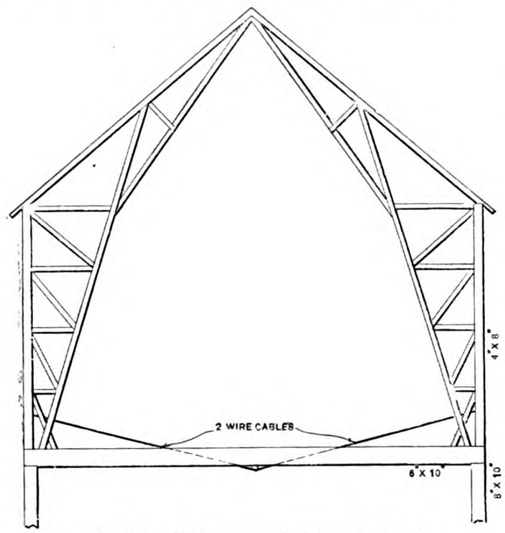


Laying Canvas Deck Roofs.

a good thick coat of any common paint and while wet stretch the canvas, lapping where the line on the canvas shows. Tack about every ¾ inch with large headed tacks. Out this way we use a stretcher similar to that shown in the sketch for the purpose of putting on the canvas and having it good and smooth. A good quality of canvas will stretch if dry 1½ to 4 inches to a yard. The best way for the learner to do is to take a yard and see just how much it will stretch, then make allowance accordingly. He should use as many coats of paint on top as he can afford, not less than two under any circumstances. Paint should be of white lead and oil, and each coat should be applied after the other is dry.

Is the Barn Frame of Sufficient Strength?

From John L. Shawver, *Bellefontaine, Ohio.*—Permit me to offer a substitute for the barn frame proposed by the correspondent "C. G." of Vergennes, Vt., in the March issue of the paper. His timber trusses take up too much room, and at the same time the timbers are too expensive for this day and age. We place a little more timber in the joist bearer and prefer it in a different shape. He



Is Barn Frame of Sufficient Strength?

suggests 7 x 8 inches, and this would be 30 feet in length. We would use three 2 x 10's, and could use any lengths to make the 30 feet; consequently our timbers could be purchased at much less cost. Instead of the 7 x 8 inch truss timbers we would use two wire cables made of galvanized wire, seven strands and doubled. While we would use a little heavier posts in the stables, the posts of the superstructure would contain only about one half as much material, but this, too, we would prefer of different shape. In place of the 7 x 8 inch we would use two 2 x 8's, and instead of the beam we would prefer the arch and the angling purlin posts, and thus have the interior entirely free from all timbers.

After 20 years' experience in building barns without the cross beams it would require peculiar conditions to induce us to use them, for they are continuously in the way, both when storing away hay or grain and when getting these out again for the thresher or for the feeding of stock. The upper portion of the frame submitted by "C. G." does not show any braces, and we are at a loss to know if there is to be none, or if these were omitted because it is not that portion of the structure that is under consideration. Let me say, however, that that is one of the most prevalent mistakes in the construction of a barn. There are too few braces, and the first baby tornado that happens to pass that way will "lay it out in fine shape." While we use plenty of braces, they are usually only 2 x 6 inches, and so do not take timber very rapidly. The geometrical triangle is the strongest figure one can secure, and it is with that idea always in mind that we do our barn work.

In this connection permit me to say that *Carpentry and Building* is brighter and better each year, and no carpenter should fail to have it on his table at all times. It is true we are sometimes so busy that we have little time for reading, but it is well to have good, wholesome reading matter always convenient at hand, and then we shall not be tempted to read the cheap trash that is so plentiful in the mails.

From D. P. B., *Redford, N. Y.*—I note the letter of "C. G.," Vergennes, Vt., in the March issue, and as that place is not far from where I am located, I am sure it has as much wind and snow. This being the case, "C. G.'s" barn frame is, in my opinion, of no account at all, being faulty or worthless in design. No one piece in the bent should be less than 10 x 10 inches. With good rafters, framed over an 8 x 8 ridge pole, there will be no need of Queen posts.

Cleaning Oil Stones.

From P. & N., *Loyal, Wis.*—As we are very much interested in *Carpentry and Building*, and owe a great deal to it, we offer a few suggestions in answer to some of the correspondents whose inquiries appeared in the March issue. In reply to "J. W. T.," in regard to cleaning oil stones, would say that we make a good strong lye and boil the stone for three to four hours. This cleans them out nicely and puts them in first class shape for doing good work.

From C. C. S., *Winchester, Ohio.*—Tell "J. W. T.," Weatherby, Mo., to give that oil stone a few applications of turpentine, or, better yet, to soak it in turpentine for a little while. As a result he will find it to be entirely free from the effects of all gummy dirt. Then if he will take turpentine and sweet oil, mixing them half and half, he will find it is an excellent oil to use on it.

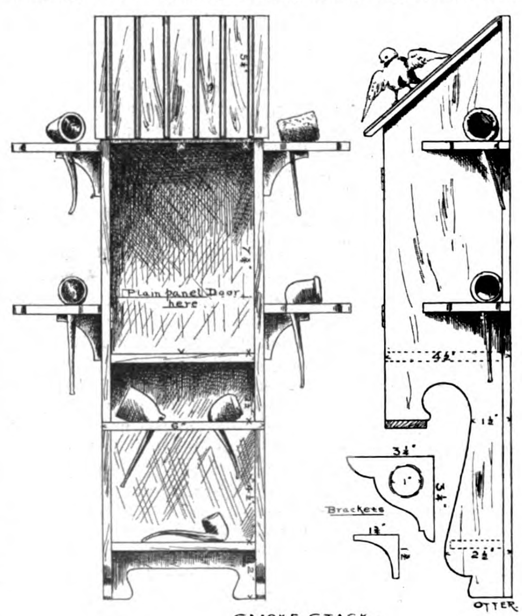
Note.—We have a reply similar to the above from "R. J. W.," Decatur, Ill.

Wearing Qualities of Cherry in Parquetry Floors.

From W. P. C., *Wahpeton, N. Dak.*—Will some of the boys give me through the Correspondence columns their experience as to the wearing qualities of cherry in parquetry floors along with oak, maple and other hard woods? I have laid some floors with it this last summer, but as it was the first that was ever laid in this town, there is some doubt about the cherry lasting as long as the harder woods. What have the experts to say on this point?

Design for Pipe Rack.

From Paul D. Otter, *Chicago, Ill.*—In reply to the correspondent signing himself "Lee," Brooklyn, N. Y., and asking in the February issue for a suggestion for a bachelor's pipe rack, I enclose a sketch which may possibly be of service to him. The rack is 22 inches in its total length, and is constructed of ⅝-inch stock throughout. The other essential measurements are noted in the drawing. The top compartment, which is provided with

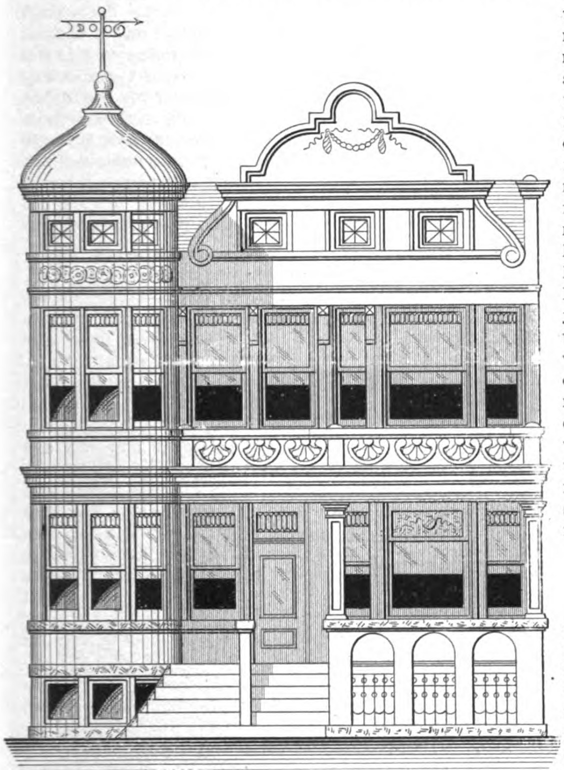


Design for Pipe Rack.

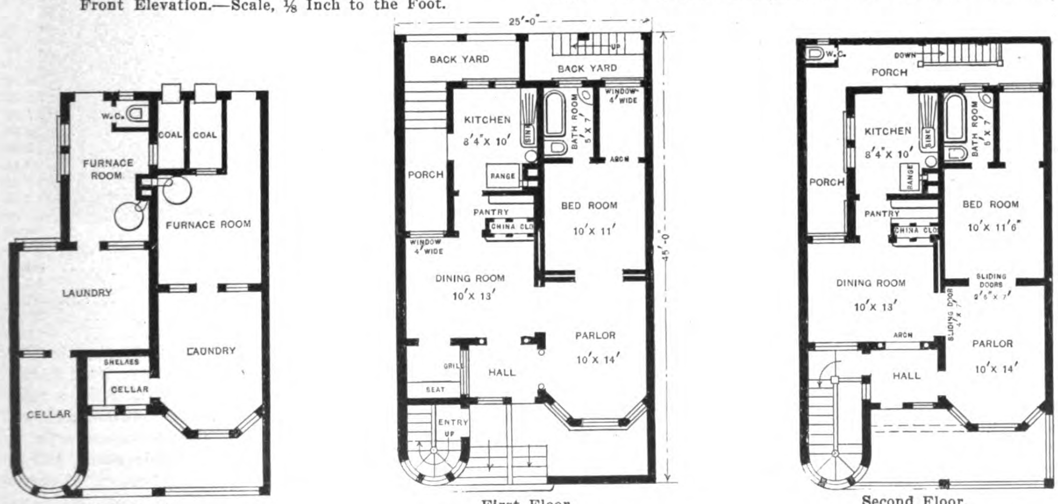
a door, may be fitted with another shelf if desired, making it still more handy for a few cigars. The outrigging brackets will, no doubt, suit the needs of an ordinary smoker's range of pipes. The bird is simply a suggestion for a stuffed sparrow, lending realism to the roof covering.

Design of Four-Room Flat Building.

From M. P. Kellogg, *Boulder, Colorado.*—In a recent issue, "C. L.," of San Francisco, Cal., called for suggestions through the Correspondence department, for a four-room flat building, or a double tenement house, to be built on a lot 25 x 45 feet, the lot having buildings on each side, which cut off the light except from the front and rear.



Front Elevation.—Scale, 1/8 Inch to the Foot.



Basement. First Floor. Second Floor.

Scale, 1-16 Inch to the Foot.

Design of Four-Room Flat Building.—M. P. Kellogg, Architect, Boulder, Col.

In answer to this request I have prepared some sketches showing an elevation and floor plans of a double tenement house for this lot. Each apartment has four nice rooms, which are arranged in such a manner that they will receive good light. Each apartment has a front entrance hall, which opens into the parlor and dining room. There is a bathroom opening off the bedroom, and there are butler's pantry, kitchen and rear porch. There is also a basement for each apartment, with cellar, laundry, coal bin and heating plant.

Radius of Hip Rafters on a Circle Roof.

From A. H. H. M., *St. Louis, Mo.*—I would like to ask, through the medium of the Correspondence Department of the paper, if some of the readers will favor me with the proper method of obtaining the radius of a hip rafter to intersect with the common rafter on a circle roof? Just at present I am having a little trouble with a roof of this kind, and in order to make the situation clear to the readers I will describe the method I use in obtaining the radius for a hip rafter. The common rafter was less than a quarter circle, with a radius of 44 feet, the segment of the circle having a rise of 6 feet 6 inches. Now, after finding the length of the hip and the straight line, or chord. I measured up from the center of the chord the 6 feet 6 inches, thus giving the hip the same rise in segment as the common rafter. I then found my radial point for the hip through these three given points, thus giving me a radius of 61 feet 1/4 inch for the hip, but I found my hip somewhat flat. Whether it was on account of the long span or not having the proper radius I cannot say. I might add that there were three other foremen on the job, as well as several other carpenters, who said that the hip rafter should be an ellipse in order to intersect with the common rafter. Now, I can't see it that way. I claim that while a common rafter is a portion of a common circle, the hip must also be a portion of a common circle, only with a greater radius, in order to intersect with the common rafter. What I would like to know is the practical working method of obtaining the correct radius for the hip. I shall consider it a great favor if some of the readers will favor me with the desired information.

Questions in Furniture Construction.

From Paul D. Otter.—Answering the Belleville, Canada, correspondent in the March issue of the paper, I would say that the all prevailing style of leather is what is known as "Spanish leather"—sheepskin tanned and colored in imitation of the leather which the early Spaniards made famous in curing and coloring, made from goat hides. The modern sheepskin is produced in many colors, and the quality soft and desirable for pillows and bags. The green-brown shades will be found to harmonize particularly well with French finished weathered, or in the dark tones.

As to the mahogany stain used by the manufacturers, and about which the correspondent inquires, I would state that the analine dyes have, of course, taken the place of the chemical concoctions and mixtures used by the exclusive maker. What is sold as seal-brown mixed with French red is used to produce the mahognay imitation. It must be a matter of experiment, after a slight quantity of the brown has been stirred into hot water, as to how much of the red powder is to be added, the red for mahogany, however, being in excess of the brown. Try the tint on a white piece of wood with a small portion as an experiment, allowing the sample tint to dry. As the analine colors are very active, little is required to bring about the desired change.

Laying Maple Flooring.

From G. A. K., *Groton, Conn.*—In the March issue of the paper I notice "W. J. S." of Oella, Md., asks for information in regard to maple flooring. As being of possible interest to this correspondent and others, I will give my experience with work of this kind, having had occasion in the past two years to lay a considerable amount of maple flooring. I might say that the flooring we get here is cut in unequal lengths and matched at the ends. There are holes started for the nails, but they are only ⅛ inch deep. I think the nails drive easier where there are no holes started. We generally use 8-penny finish wire nails, which work very well, but I think the best nail is the 8-penny floor wire nail, or, rather, an extra heavy finish nail. I enjoy reading *Carpentry and Building* very much, especially the Correspondence Department.

From P. & N., *Loyal, Wis.*—We notice that "W. J. S." complains about hard wood flooring not being bored clean through. Now, it isn't intended that it should be. It is bored sufficiently to allow for setting the nail heads, as these generally split the tongue unless bored a little. In this section of the country we use 8-penny casing nails for hard wood flooring.

From W. P. C., *Wahpeton, N. Dak.*—In answer to "W. J. S.," Oella, Md., in regard to maple flooring, I will tell how it is laid up in this section of the country. As a general thing it is used as a finishing floor over 10-inch ship or No. 3 boards, with resin paper between, as all floors up this way are double. It is nailed with 8-penny casing nails about every joist bearing, regardless of the holes punched in the flooring. The nails are afterward set with a nail-set so as to get a good joint with the next flooring, as maple will not give to the nail heads the same as pine or fir. The holes that are bored in the flooring are supposed to be for the nail heads to go down flush, but as they will not strike the joist half the time, we may pay no attention to them. Any one who can lay a good maple floor can drive an 8-penny nail through the flooring without having to bore holes for the nails. I may say here that I never use a hammer to lay any kind of matched flooring, except parquetry, as I find that a hand axe makes tighter joints, quicker and easier.

Care and Purchase of Good Tools.

From Apprentice Carpenter, *Fort Morgan, Col.*—I would like very much to have some of my brother carpenters write about buying good tools and the proper care of them. I, for one, believe the best tools are none too good. I also believe in standard makes of tools, not the "cheap John" goods generally carried by some of the stores—tools that won't take a decent cutting edge if you hone them all day. The best is by far the cheapest, for the carpenter is often judged by his tools and the shape in which he keeps them. Now, I expect some hardware man will answer me on this and swear by the great Horn Spoon that his goods are the best made, because he has sold quite a number of them. Maybe he will go so far as to call me a crank. Well, that is all right. A crank is what you run things with—sometimes. I believe, as stated before, in standard makes of tools—those that have stood the test for years, providing, of course, they still make articles. I think there are many readers of the paper who could write very interesting letters, and I would like to hear from more of them regarding trade matters, in which all of us are concerned.

Laying Hard Wood Floors.

From A. F., *Toronto, Canada.*—In answer to "I. F.," Germantown, Ohio, I would say the best way to lay the hard wood floor is to have the material grooved and tongued at the ends and blind nailed every 18 inches. I would not advise nailing through the surface, as it makes a springy job, besides giving it a bad appearance. The method to follow is to nail a strip ¼ inch thick every 18 inches. Lay the floor on top of the strips, as this makes the best job. I have followed this course in connection with work in institutions here, where we have a very good floor, the ends being tongued and grooved and bored every 18 inches. The back of the strips are hollowed in a little with a steel scraper.

From D. P. B., *Redford, N. Y.*—Replying to "I. F.," Germantown, Ohio, in the February issue, I would suggest that, instead of matching the ends of his boards, he use a fine saw and a piece of band iron ¾ inch wide for a dowel. It makes the best job. He should nail 12 to 15 inches apart and 4 inches from the joints, using 6-penny fine nails. The correspondent should distinguish between 6-penny fine and 6-penny finish.

Suggestions Regarding Prices of Materials and Labor.

From H. J. A., *Spring Valley, Minn.*—I for one am heartily in favor of the proposition presented in the February issue by "M. L. H." of Cleveland, Ohio, and I have no doubt there are many readers equally interested with myself. It would not only be of interest, but of great value to all those who have occasion to figure prices and make estimates of all kinds of building materials, to know the prevailing prices of material and labor in different sections of the country. Especially would this information be of value to those residing in the country districts and smaller towns, who are at a distance from the great centers of distribution. The information that correspondents might be pleased to give in regard to this should be in the line of a report of the actual retail or wholesale prices, as the case may be, and not how cheap or how high a price a person might have paid for something, unless such prices are the regular prevailing figure at that time and place.

The following are given as the prices of a few materials in this place, the list commencing with retail lumber prices:

Timber 6 x 8, 10 x 12, &c., 12, 14 and 16 foot lengths, per M	$28.00
Timber 6 x 8, 10 x 12, &c., 18 and 20 foot lengths, per M.	25.00
Dimension lumber, 2 x 4, 2 x 6, &c., 12 and 16 foot lengths, per M	22.00
No. 3 boards, s.i.s	21.00
No. 4 boards, s.i.s	18.00
No. 2 boards, s.i.s	26.00
No. 1 flooring, 6-inch pine, 12 and 14 foot lengths	30.00
No. 2 flooring, 6-inch pine, 12 and 14 foot lengths	27.00
Yellow pine flooring, quarter sawed, 4-inch	38.00
Ceiling, yellow pine, ⅜	25.00
Ceiling, yellow pine, ⅝	30.00
Ceiling, white pine, ¾-C	52.00
Ceiling, white pine, ¾-D	42.00
Ship lap No. 3	23.00
Ship lap No. 2	26.00
C. select 1-inch, 6 to 10 inches wide	58.00
C. select 1-inch, 12 inches wide	68.00
Lap siding cedar, 6-inch	33.00
C. siding, white pine, 6-inch	32.00
B. siding, white pine, 4-inch	35.00
E. siding. white pine, 6-inch	19.00
C. flooring, 6-inch	52.00
Lath, No. 1, W. P	5.50
Extra XAX cedar shingles	3.25
Extra XAX white pine shingles	4.00

10 per cent. off on doors and moldings, 40 per cent. on windows.

The above are the retail prices, and the material is sold in bills or to contractors for probably about 10 per cent. off.

Ordinary building brick are $12 per M, retail, shipped in from Winona.
Rubble stone, laid in foundations complete, about $10 per chord.
Brick laid in wall, $4 per M; pressed brick, $10.
Stone masons' wages, $3.50 per day.
Bricklayers' wages, $6 per day.
Carpenters' wages, $2.50 to $3 per day.
Common laborers' wages, $1.75 per day.
Lathing. per yard, 25 cents.

I hope that "M. L. H." of Cleveland will come forward with information on this subject, and I would also like to hear from some of the stone masons in regard to prices per square foot of ashler, 4 inches or so, laid in wall of Bedford stone, &c. Such information would be greatly appreciated by me, and I think it would probably prove valuable to many others.

COLLAPSE OF A STEEL SKELETON FRAME BUILDING.

AN event which has stirred the local building world to its very foundations was the recent collapse of 10 stories of the steel skeleton frame structure known as the Darlington Hotel, while in process of erection on West Forty-sixth street, New York City. The iron work was finished to the eleventh story, the brick walls at the sides and rear were up about four stories, and the stone work of the front was finished for nearly three stories, when just after noon on March 2, the entire mass suddenly crashed down, telescoping itself so to speak, instead of toppling over, burying in the ruins a number of workmen and instantly killing 21 of them. Various theories have been advanced as to the cause of the accident, some pointing out the possibility of quicksand at the rear of the structure, others intimating a faulty construction, while still others maintained that the upper floors were overloaded with constructive materials, bringing to bear upon them a much greater strain than they were originally intended to withstand.

The mass of wreckage as it appeared on the afternoon of the collapse is shown in the half tone illustration which is presented herewith. Comments of a number of engineers who noticed the work of construction while in progress were to the effect that considering the height of the building the iron and steel frame impressed them as being of a rather flimsy nature before its failure. The manner in which the steel girders and floor beams are twisted and distorted and the cast iron columns fractured, as shown in our illustration, would seem to confirm these views in some measure at least.

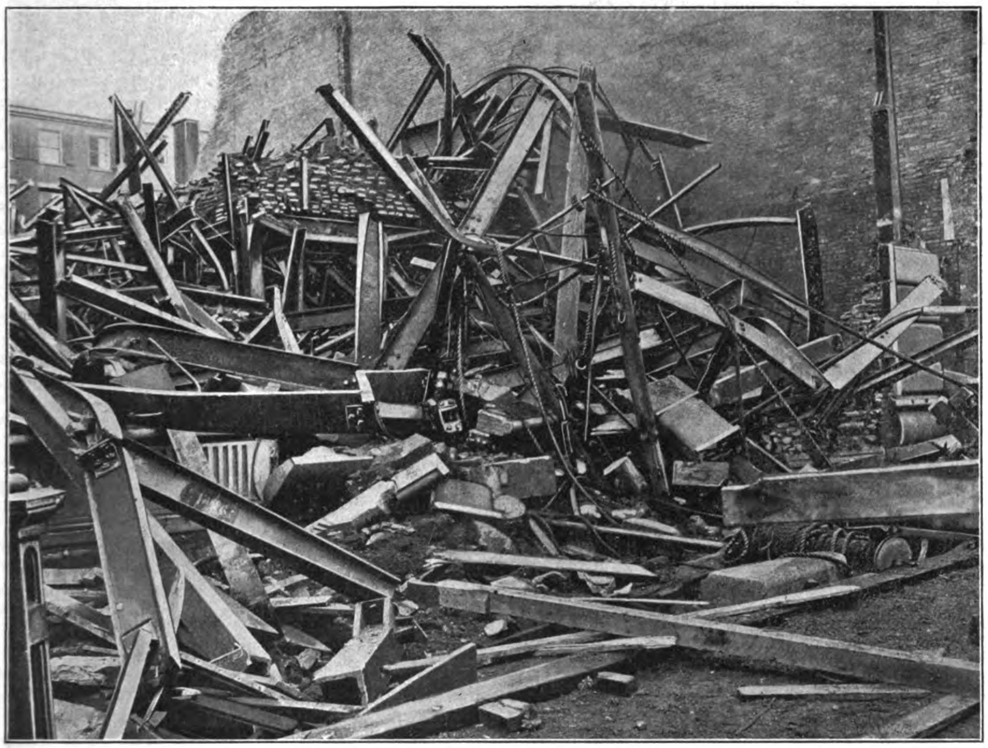
With a view to ascertaining the true reason for the collapse and those responsible for it, the Coronor immediately impaneled a jury of experts in the building business, and the District Attorney's office retained H. de B. Parsons to investigate and report upon the matter. The investigations of the latter having at the hour of going to press just been completed, and his report practically finished, we give below its main features touching the cause of the accident.

The primary causes for the failure of the structure were faulty design and carelessness and neglect in the erection of the members. The actual cause of the collapse was the lack of lateral support for the columns, which permitted them to act as "long columns"—that is, the ratio of length to least radius of gyration exceeded the limit of safety.

The building was being constructed on the "cage" system—that is, all the weight was supported on the columns. The outside walls were of brick and partly concealed the outside row of columns. The columns were of cast iron, with end flanges and with side brackets and lugs cast on near the top to carry the girders. The columns were all of rectangular section, generally varying from 9 inches square by 1 inch thick in the basement to 6 inches square by ¾ inch thick on the upper floors. Each column had top and bottom flanges cast only on the north and south sides, and each flange had two bolt holes. The girder and floor beams were of steel. The girders generally ran east and west across the building, and were supported on the brackets cast on the columns and bolted to the lugs with two bolts at each end; the beams generally ran north and south, and were bolted to the girders by double clip angles, with two or three bolts through each leg of the angles. The floor members were all of rolled sections (I's and channels) and were marked "Phœnix" and "Carnegie."

The floor arches were made of cinder concrete laid up on the Roebling system. The spans were variable, averaging from 4 feet 6 inches to over 5 feet. The thickness of the arches could not be determined, as they were all destroyed. The building was to have been 12 stories and basement in hight, with a penthouse on the roof.

On collapsing the building fell downward, with a leaning to the north—that is, toward the rear. Practically



The Ruins of the Darlington Hotel, West Forty-sixth Street, New York City, as They Appeared Immediately After Its Collapse on the Afternoon of March 2.

Collapse of a Steel Skeleton Frame Building.

all of the material fell inward except a relatively small amount, which fell over the rear wall against and into the Hotel Paterson.

The columns in the outer wall broke off with approximate uniformity between the second and third floors, although the floor systems of the stories below and the interior columns (except some in the basement) were carried away, leaving the outer columns standing from their foundations to the points of rupture. The columns showed by measurement to have variations as to thickness of metal on the opposite side of ⅛ inch or less.

In the great majority of cases the columns broke off at the flanges, leaving one or both of the flanges bolted to the corresponding flange of the adjacent story column. A few of the columns were broken at or near the center. There were no ribs cast on to stiffen the flanges, nor any for the lugs except in special cases. The column ends were plain. No shims were found between the flanges. The holes in the column flanges were drilled 13-16 and ⅞ inch in diameter. The bolts were ¾ inch, and some were loose. The holes in the lugs for the beam ends were cast about ⅞-inch diameter. The bolts were ¾ inch.

The fractures in the body of the cast iron columns exhibited fairly good metal. The flange fractures exhibited blowholes and honeycombing in many instances (about 15 per cent. were honeycombed, about 25 per cent. were defective and about 60 per cent. were fair to good). The rolled steel members of the floor systems were twisted and bent. The steel gave evidence of being good material, and the bolts held well. A number of pieces of I's and channels were taken out of the *débris* which from the appearance of the bolt holes had never been erected. Such pieces were marked for use on the tenth, eleventh and twelfth floors. They were found near the top of the ruins near the rear.

The concrete from the floor arches was weak and readily broken. It gave the appearance of lack of cement and having been frozen.

The foundations under the walls and interior columns were found true and level. The cast iron footings under the columns were in place and unbroken. The soil under the column bases was clay in every instance, where dug up both in front and back of the lot. The bases had an area of 10 feet square, or amply sufficient to have sustained the load intended. Rivets were not used. All members were bolted. There were no diagonal braces, corner braces, or any special means used to provide lateral stiffness against wind or side pressure. The columns were held in their vertical positions by the friction of the floor systems on the broken brackets.

Practically the building was pin connected. The bolts fastening the girders and beams against the column lugs were of smaller diameter than the holes, so that the columns received little or no lateral support. The column lengths were bolted together at top and bottom, and acted as continuous columns. All loads were eccentrically supported on the side brackets. In consequence, the columns were too long to carry the superimposed weight and buckled. One column situated at or near the "center of fall" broke. The upper parts of this column being deprived of its support fell, and pulled with it the floor members bolted to it. Each of these floor members pulled over the adjacent columns to which the other ends were attached, and these columns having no lateral support broke at the lower flange, as the pull had a lever arm of about 10 feet, or the length of the column. This action and reaction of the stresses affected only the structure above the level of the original fracture. In falling the mass of material from above crashed down and broke that part of the structure below the level of the original fracture.

The exterior columns did not break off as low down as the interior columns, because the mass fell away and did not crush them as it did the interior ones. The uniformity in hight at which the exterior columns broke strongly indicates that the primary fracture occurred at or about the level of the fourth floor.

The design was faulty in failing to provide any lateral stiffness. Wind bracing or its equivalent should always be provided in a structure intended to be nearly 150 feet high. As the upper end of each story column furnishes the base for the support of the next story column, each column head should have been given positive support in the design, and the design should not have trusted to the friction of floor members or to that stiffness which might have been afforded by a floor arch.

Cast iron columns having a thickness of ¾ inch should not have been designed for the basement of a 12-story building. This material is so uncertain as to blowholes and honeycombing, when delivered from the ordinary foundry, as to require a greater thickness. The design should have provided ribs for the flanges, since these flanges are apt to be weak from the collection of air bubbles as ordinarily cast.

During erection the errors in the design should have been noticed and corrected. It was carelessness and neglect that overlooked the lack of lateral stiffness, which must have made itself apparent when the parts were being framed together. Furthermore, it is hardly conceivable that in a structure so cheaply built as was the Hotel Darlington the members could have fitted so true as not to require some shims between the column flanges. As no shims were found there naturally exists a suspicion that the columns were not truly set in their places, which would account for the slackness of some of the bolts found.

The structural work on the building was being performed by Pole & Schwandtner, iron setters, of 76 William street, New York. The concrete floor arches were being put in by the Roebling Construction Company of New York. Neville & Bagge of 215-217 West 125th street, New York, were the architects, and the Allison Realty Company of 13 Park Row, New York, were the owners.

A Clock Made with Scroll Saw, Hammer and Jackknife.

A clock which is remarkable in many ways, more especially perhaps by reason of the tools with which it was constructed, has recently been completed by a one-armed man in Akron, Ohio. It is 12 feet 4 inches high, a little more than 4 feet wide, nearly 3 feet deep, and contains 4161 pieces of wood of 37 different kinds. The work was done with a scroll saw, plane, hammer and a common jackknife. The motive power consists of a water pump, having a capacity of 200 gallons per hour and ½ horse-power electric motor and other electric appliances. The clock weighs 850 pounds and is constructed in three sections. On the face of the top section are nine dials, seven of which give the time in three foreign cities and four American cities; one the local standard time, the other, the calendar dial, indicating all the changes of the moon, the month, the day and date. The weather signals are translated by signal flags on a revolving staff directly in front of the calendar dial. Thermometers, barometers and hydrometers all tell their tales, and around the dials are arranged pieces of wood from each State, Territory and foreign possession of the Union, decorated with the coat-of-arms of each.

On either side of the clock dial can be seen every man-of-war in the United States, neatly arranged, according to its class and speed, followed by the different squadrons in their official order. Underneath the navy is shown a passion history of Christ. All these pictures have their stated times of appearing, passing from view behind a screen.

The middle section is the most beautiful, this having in the extreme top a miniature Niagara Falls, over which 180 gallons of water fall every hour. At each hour, as the clock strikes, the figures of Uncle Sam and the Goddess of Liberty appear from an elevator at the right, walk in front of the American Falls, pass through a gate that opens automatically, descend a flight of steps, continue their walk around the front of the Falls, where they turn and bow to the audience. Behind the glass plates pass in review pictures of all the Presidents of the United States, and on each end a silhouette of Washington shows. The maker of this clock, Marvin Shearer, is a scenic artist, although his hobby is mechanics, and in or on the clock in question are 192 pictures which he painted.

HOUSE MOVING.*—III.

BY O. B. MAGINNIS.

WE shall next consider the moving of brick and stone buildings. This, the most unusual problem in the whole range of building operations, is one which involves the highest skill and intelligence, as well as many and varied considerations. The first is, naturally, is it necessary to move the building, and, second, will it pay to do it? The answers to these questions contain so much that it would manifestly be impossible for one to go into all the details as to whether it would be better to pull down and rebuild than to move the structures as they are. Still, nowadays, not only are brick and stone buildings moved, but they are raised and moved so economically that the information which follows will, we trust, be found useful not only by house movers, but also by architects and builders who deal with owners and real estate men.

In what condition must be a brick or stone building in order that it may be safely moved or raised? To answer this query briefly would be to say it must be well and thoroughly built, plumb, level, and have its walls free from cracks, bulges, fractures or strains. Also it must be devoid of serious settlements of floor beams or partitions, &c., and all angles should, if the house is one, say, 40 feet in hight, be plumb, free from fissures, well bonded and anchored. Should any house be defective in some of these details it will be difficult to move it, because special provision must be made to tie the weak portions together and guard against possible collapse. From this, then, it will be seen that the survey and examination must be made by a thoroughly experienced and competent brick mason builder, who from a critical inspection will be able to determine as to the feasibility and safety of the proposed operation. Should the conditions prove to be favorable, the work may be undertaken along the following lines:

The first job will necessarily have to do with the "timbering," or, as described in an earlier article, the process of building up a false work consisting of stacks or temporary wooden piers of cribbing or grillage, such as was indicated in Fig. 13, and lifting the entire structure off its foundation, or, rather, to take the weight of the brick or stone superstructure off its base. This is done by first cutting holes in opposite bearing walls of the building, spaced about 4 or 5 feet apart, or close enough to make the brick work of the walls above each hole corbel or arch itself with the next. Into these openings, and running transversely across the house, heavy 12 x 16 inch yellow pine timbers are inserted, sufficiently long to pass 4 or 5 feet outside each wall. The holes must be made in the stone or brick foundation walls directly below the first tier of floor beams and water table, and the timbers kept perfectly level across from wall to wall. Should the wall be not level, then above the top edges of the beams they must be packed solid and tight with sprawls and oak wedges. Piers and cast iron columns must have double timbers, or, first, two short longitudinal timbers, as shown in Fig. 14, March issue, and then cross timbers.

I might state in this connection that where cast iron, steel or other columns occur, which is usually on the corners or in store fronts, it is best to proceed as if the columns were absent and build up tiers of blocks to the s cond story directly from the main bearing timbers or walls below. The way that this is done will be readily comprehended by examining Fig. 15, which is a photo reproduction of an apartment house in the course of removal in the Borough of the Bronx, Greater New York, from one site on the old street to a new site prepared for its reception 25 feet further back, the change being necessary by reason of the widening of the street. It will also be understood how unprofitable it would have been to the owner had he been compelled to pull down this splendid structure and erect a new one from its component materials on the new site. Assuming, say, that the cost of this moving operation, approximately figured, was $2000, then the saving is evident when it is stated that at a low estimate the structure would cost $18,000 to $20,000 to build. But to proceed with our narrative.

Having properly and securely blocked all columns and girders in the manner indicated, the lintels and sills of

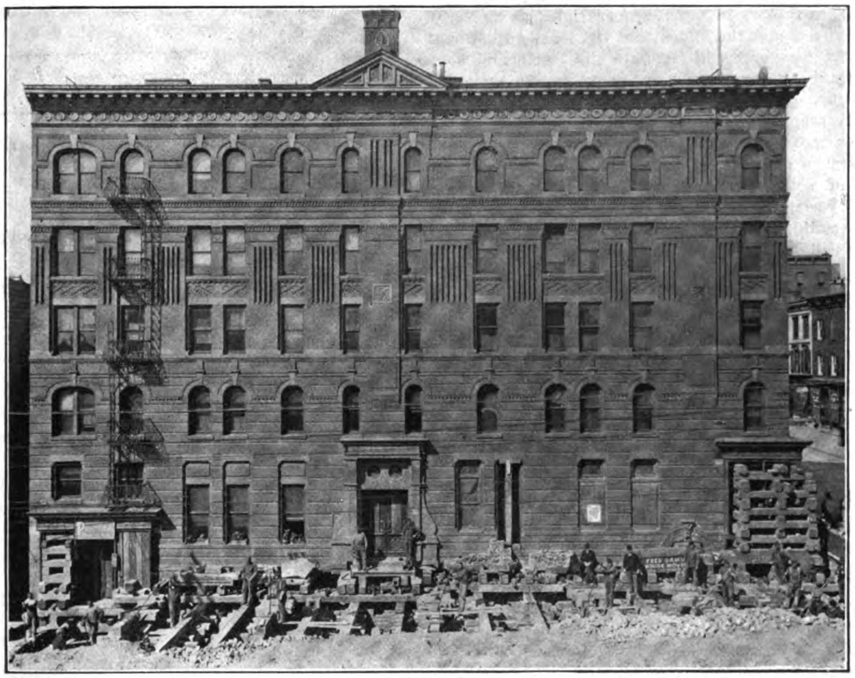


Fig. 15.—Showing Manner of Blocking for a Brick Apartment House in Preparing it for Moving.

House Moving.

* Copyrighted, 1901 and 1903, by Owen B. Maginnis.

all first-story door and window openings will need to be sustained with uprights and cross pieces, solidly wedged and braced; also all belt courses, cornices, brackets and other projecting details must be kept from falling by supports of timber or spur shores from the heavy cross timbers below. While all this is being done the men must proceed with the cellar blockings, longitudinal and transverse sliding timbers, lifting pumps, jack screws, wedges, &c., in a careful and systematic manner, properly supporting every detail which rested on the foundation or foundation pier, such as chimney breasts, elevator and dumb waiter shafts, smoke stacks, headers, trimmers, fore and aft girders, partitions, &c. In fact, each and every structural part must be supported from below, omitting none and providing for all possible happenings.

The sliding timbers are a very important part of the preparations, as on them the whole mass is to move and they must therefore be unusually well set, absolutely level and straight. Reference to Figs. 13 and 15 will illustrate to the reader the general scheme for arranging the timbers on the tiers of blocks and their respective pumps for raising, &c. It is here, also, the reader will realize the full value of these pumps, the most valuable factors in moving operations, as so many will be needed under the slides that the least adjustment or turn of the screws will regulate the levels and keep the building moving in perfect equilibrium, without strain or jar.

At this stage we will take up the matter of the proper treatment of the cellar bottom for the reception of these stacks of blocking, because if the bottom under them should settle or slip disaster may follow, so that another very serious condition confronts the mover. If the bottom be solid rock, good hard clay, shale, gravel or any other reliable substance, the blocking may safely be placed exactly at right angles to the front "string," or longitudinal timber on the front or end, and perfectly horizontal, as shown in Fig. 16, so that by the pressure exerted by the screws the timbers may be pushed slowly and safely along the slides, which are, as before, heavily smeared with heated tallow or axle grease in order to reduce the friction to a minimum. Short struts must be cut, fitted and fastened in between the longitudinal timbers before the screws are turned, all as indicated in Fig. 18. This is necessary for the simple reason that the under platform or series of timbers must move as a whole, without an inch of deviation, and when once started its progress will average from 1 to 2 feet hourly, so that 25 feet will be an excellent day's work. Haste or neglect, however, must be nullified, and the safe progress of the building on any day made the *sine qua non* of the operations. Constant stopping and inspecting will be necessary in order to guard against unforeseen developments, and provisions must be made accordingly, but the careful mover will go all over the house and examine details with a rigid scrutiny before he allows a

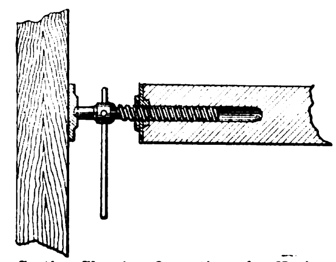


Fig. 17.—Section Showing Operation of a Horizontal Screw.

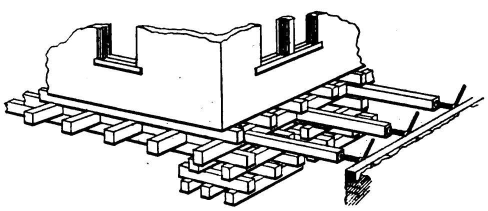


Fig. 16.—Manner of Placing Blocking and Horizontal Screws.

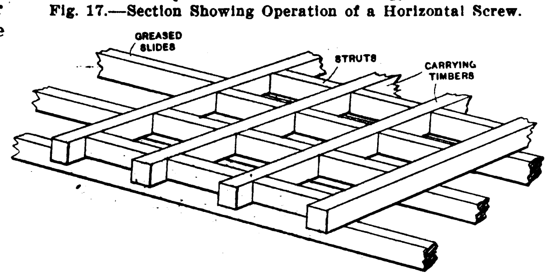


Fig 18.—Method of Bracing the Timbering.

House Moving.

laid on them, edge to edge; but if it is of soft clay, mud, quicksand or any other compressible, unreliable or insecure substance, then the problem becomes most difficult, and the expense involved in the preparation of the uncertain bottom may possibly preclude the operation altogether. The nature of the earth's crust under the foundation must, therefore, always be ascertained by borings or digging holes at regular intervals along the foundation walls to the full depth of or a little below the depth of the footings. Thus by observation the strata underneath may be definitely determined, for there must be no doubt nor uncertainty in house moving. The reader will, of course, understand that it would be simply out of the question to try to move a heavy brick house resting on piles or grillage in a mud bottom, so we will dismiss the idea, as it would be cheaper to pull down and rebuild a house with such footings than risk the increased cost of its moving, for the bearing capacity of the earth under the footings must in every case exceed the weight placed upon it to a factor of safety of at least 4, and no contract for moving should ever be undertaken unless the bottom is fit and all conditions favorable to a safe and satisfactory conclusion of the job.

When the longitudinal and transverse timbers are all set, as represented in the illustration, the horizontal pushing braces and screws must be adjusted at fixed distances apart against the front stringpiece, so as to force it steadily and regularly backward as they are uniformly turned with the lever bars. An idea of the construction of one of the horizontal screws may be gathered from an inspection of Fig. 17. These must be screw to be turned. Sometimes it may, perchance, happen that a slight bulge or strain crack may be developed, which will necessitate the stopping of the forward movement until a separate brace or spreader is inserted, but this is a simple matter and only emphasizes the need for constant vigilance. Again, a blocking may slightly subside, or a stack be too high, or some such emergency may arise but they may all be met with care and watchfulness.

(To be continued.)

A Japanese House.

A Japanese house is the simplest thing in the world, consisting as it does of a post at each corner and a roof. One may say it is all on one floor. And in the daytime it is all one room, if it is a small house. The number of bedrooms in it depends on the number of bedrooms the owner requires. They are divided by night by paper shutters fixed in grooves like the divisions of an old-fashioned workbox. There are no doors or passages. Your bedroom acts as a passage, and when you want a door you slide back the nearest panel. Two sets of shutters go around the outside. These outside shutters cannot be slid in the same promiscuous fashion as the other. Each is held in its place by the next and the last one is secured with a bolt of wood. There are plenty of Japanese houses which when secured for the night would hardly stand a drunken man leaning against them. An Englishman's house may be his castle—a Japanese's house is his bedroom, and his bedroom a passage.

LAYING OUT CIRCULAR ARCHES IN CIRCULAR WALLS.*—XVI.

By Chas. H. Fox.

IN the present issue we shall consider a second method for cutting the stones of which a radiant arch may be comprised, and in the cutting of them we shall assume the cylindrical surface of the face, first, to have been already formed by means of the "planer;" and, second, that the surface in question is "rock faced." We shall also consider the method of cutting the stones entirely out of the "rough." In order to get No. 1 stone, we first mark upon the cylindrical face the face mold of the surface in question, taking care that the plumb line of the mold is applied exactly over the vertical lines, as given with the "cutting tool of the planer." Any number of these may readily be marked upon the face at the time of the planing. Now cut the bottom joint according to the method given for the similar operation in the cutting of No. 1 stone in the diagrams, Figs. 124 to 136. Having cut the lower joint surface, mark upon it the mold developed for the surface in question. Now to the direction given to the outer face mold cut the draft A B to conform to the curvature of No. 1 template, applying it as shown in the diagram, Fig. 151. Now at the point *a'*, with the lower joint mold square with A *a'*, draw *a'* mark the mold developed for the surface in question. Square with the lower joint line, as B *b* of Fig. 149, draw B *g*. Now take No. C template of Fig. 146 and apply it, as shown in Fig. 154, to the line just drawn at B *g*, and to its direction form the lower joint surface. This cut, mark upon it the mold developed for the surface in question, which gives in B *b'* the cutting line of the soffit at the joint. Now take No. 2 and No. 2*a* templates of the diagrams, Figs. 139 and 140, and in the manner directed for the similar operation at the cutting of No. 1 stone, form to their direction the twisted surface of the soffit. If soffit molds are developed, to that which belongs to No. 2 stone, find the direction of the cutting line C *c'* of the upper joint surface. If they are not to hand, find the direction of the line in the manner the line B *b* of Fig. 151 may be obtained. To the directions already given, the stone may readily be completed. In a similar manner

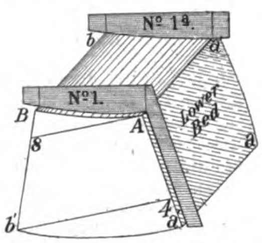


Fig. 151.—Showing Application of Templates Nos. 1 and 1a.

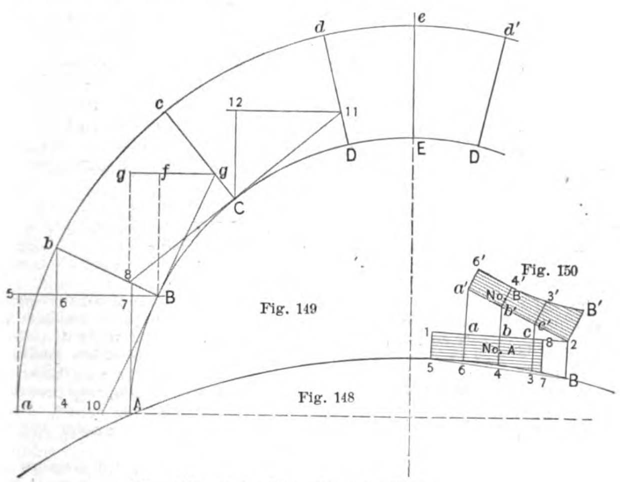


Fig. 148.—Outer Face Curve of Plan.
Fig. 149.—Outer Face Molds.
Fig. 150.—Development of Templates Nos. A and B of Fig. 153.

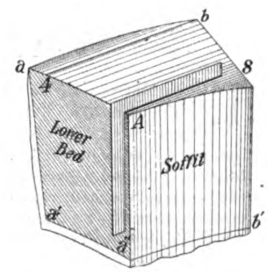


Fig. 152.—Showing Method of Applying Square to Cut Drafts.

Laying Out Circular Arches in Circular Walls.

b, which gives the direction in which to apply the template No. 1*a*. Cut a draft at *a' b* in such a manner that when the two templates shown in Fig. 151 are applied to the drafts simultaneously the draft cut at *a' b* may conform to the curvature of the template when the top edges of the two templates are out of wind. Of course, all stonecutters will know what is meant, Fig 151, being self explanatory.

Having cut the draft correctly, the winding surface of the soffit may be formed, as in Figs. 124 to 136. If soffit patterns are developed, mark the one which belongs to the surface in question upon the soffit just formed, this will give both the cutting line of the top joint surface and the direction at which to joint the stone at the back edge of the soffit. The cutting lines in question being obtained, no difficulty will be experienced in completing the stone, as before directed for the similar operations. Supposing, however, that the soffit patterns are not at hand, mark correctly upon the two templates the length, as A B, *a' b*, respectively, equal to the corresponding length of the arcs of the soffit molds of Figs. 139 and 140. Then in Fig. 151 set off A B and *a' b* to the length given by the templates. Then B *b* will give the cutting line of the upper joint surface.

Banker up No. 2, and upon the prepared outer face may No. 3 stone be formed; making use of No. D template, &c., in the manner No. C may be employed at the cutting of No. 2 stone, the direction is given for forming the lower joint surface. After this is cut the work which follows is self directing.

Now to cut the "rock face arch." Banker up No. 1, selecting a stone containing a sufficient quantity of stock for the "rock face." Upon the outer face roughly mark the face mold. This is done in order to obtain an idea of the position in which the joint lines, &c., require to be placed in order to "make" the stone. At the point A cut a straight draft through the soffit, and on it mark a hard line, which will give the cutting line of the lower joint surface. To the direction given with this line, and that of the joint line A *a* of the face mold, cut the joint. Then, making use of No. 1 template, the draft at A B may be cut; and, as described above to the direction of the Nos. 1 and 1 *a* templates, the soffit surface may be formed. This cut, apply the soffit mold, which will give the "pitch line" of the rock face, together with the cutting line of the upper joint surface.

Now to the direction given in B *b* of the soffit mold, together with that given in B *b* of the outer face mold, form the upper joint surface. Then, to the direction as given in the points A B of the soffit mold, mark upon the joint surfaces the molds developed for the surfaces in question. These give the "pitch" line at the joints. If "reverses" of the outer edge, as of *a b* of Fig. 149 of the face molds, be cut, they will give approximately the curvature of the outer edge as *a′ f′ e′ b′*, Fig. 153, of No. 1 stone. To the direction of the "reverse" cut the exterior surface.

The pitch line of the exterior surface may be found as

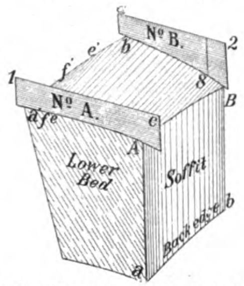


Fig. 153.—Showing Method of Applying Templates Nos. A and B.

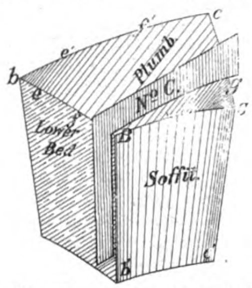


Fig. 154.—Showing Method of Applying Template No. C.

Laying Out Circular Arches in Circular Walls.

follows: In Fig. 153, square with the lower joint surface, draw *e e′*, *f f′*, &c.; placing the one blade of the square to the lower joint surface, and the other directly over the lines just drawn at the stone, the depth of the points may readily be "gauged"—that is, "gauge" the depth of a point, as *e* of the lower surface, then make the point *e′* of the exterior surface the equal depth from the edge of the square. This gives one point, and others may be found in the same manner. Or a template, similar to those developed in the diagrams, Figs. 80 to 91, may be constructed, which will give the pitch line desired. In a similar manner may Nos. 2, 3, &c., stones be formed. Cut, firstly, the soffit surfaces, then the lower joint surface, then marking on the soffit molds, the direction may be obtained at which to complete the stones.

Now to cut the stones "out of the rough" proceed as follows: First cut the soffit and lower joint surfaces as above directed. Mark upon these the molds developed for the surfaces in question. Then, with the square applied as shown in Fig. 152, cut at the plumb line A 8 a straight draft. This gives in the point 8 the direction to which to apply the twisting rules Nos. A and B, the construction of which is given in Fig. 150, and explained in the diagrams, Figs. 87 and 91. Applying these as shown in Fig. 153, the curve at the upper joint line may be obtained. Cut the face, and then mark on the face mold, which together with the line obtained in B *b* of Fig. 4 gives the direction for completing the stone.

To work No. 2 we first cut the soffit surface, then the lower joint, and upon this mark the mold developed for the surface in question. Now with the template No. 2 of Fig. 139 containing the angle B C *c*, cut the upper joint surface. To do this we proceed as follows: To the direction of the template cut a draft at the outer edge C *c* of the joint, which together with the line C *c′* drawn at the soffit gives the proper direction at which to finish the joint surface. Now applying template No. C, as shown in Fig. 154, cut a draft at the line B *g*, which gives in the point *g* the direction at which to apply the joint mold of the upper joint surface. This gives the direction at which to cut the curve draft at C *c* of the face. A template constructed as directed in the diagrams, Figs. 80 to 91, will then give the direction for cutting the draft at *c b*; cutting the draft, the stone may then be finished as directed above. In this manner may No. 3, &c., stones be formed.

WHAT BUILDERS ARE DOING.

THE continuance of the severe winter weather through the entire month of February was not without its effect upon the general business of the country and building operations in particular. It is, therefore, not surprising that the building departments of most of the leading cities of the country should report a decided curtailment of active operations in the building line. There are a few instances where the amount of new work projected in February is in excess of that of the same month last year, but it is due to unusually favoring conditions and to the fact that the enterprises, while perhaps fewer in number, were of a more costly character. As against this must be noted the heavy shrinkage in the value of contemplated improvements in such Eastern cities as New York, Philadelphia and Washington, and in the West, Detroit and St. Paul.

While the labor situation in many cities gives rise to more or less uncertainty in the immediate outlook it is hoped that all differences will be adjusted in season to permit of at least an average amount of work being done before the close of the year.

Lowell, Mass.

While the present building situation embodies no very remarkable features, prospects for the coming season are far more promising than a year ago, and local contractors and builders are looking forward to a reasonable amount of business. Plans are about completed for the rebuilding of a large Catholic church and several business blocks which were seriously damaged or destroyed by fire. The contract for the new building for the Lowell General Hospital has been awarded to C. B. Conant, and that for the new home of the Young Men's Chrictian Association to C. H. Nelson. Plans are also being prepared for several residences, and more building by some of the corporations is in immediate prospect. The contract for the Polish church was awarded to an out of town firm, but much of the work will be done by local contractors. Talk is heard of a business block which will be of cement construction.

Herbert R. White, the secretary of the Builders' Exchange, has recently severed his connection with the Lowell Coal Company, where for the past two years he has had charge of their building material department, and will now represent the interests of the Lawrence Cement Company, makers of Improved Shield and Dragon cements. Mr. White has made a study of cement construction for the past dozen years, both from an engineering and a builder's standpoint, and will look after the interests of the company named in Boston, Lowell, Lawrence and adjacent towns.

Louisville, Ky.

While trust companies report more than ordinary applications for money for small dwellings this spring, builders as a rule do not anticipate as large a volume of work as they did at this season last year. The new million dollar Seelbach's Hotel is being delayed by the strike of the structural iron workers, and while it is to be hoped that as spring progresses the situation will assume a more favorable aspect, just at the moment the immediate future does not appear very encouraging.

At the annual meeting of the Building Contractors' Exchange, held on the afternoon of February 15 at their headquarters in the Tyler Building, the newly elected officers for 1904 were installed with appropriate ceremonies. The new officers are:

President, A. N. Struck.
First Vice-President, J. B. Ohligschlager.
Second Vice-President, Henry Bickel.
Treasurer, Owen Tyler.
Secretary, E. A. Quarles.
Assistant Secretary, J. V. Beckmann.

From the above it will be seen that Mr. Struck continues at the head of the organization, the success of which is largely due to his public spirit and untiring efforts. A consolidation was effected on January 1 with the Employers' Association of Louisville, an organization composed principally of the larger manufacturing interests of the city, and which is founded along lines designed to protect its members from the encroachments of labor organizations. The consolidation has already proven of inestimable value to both organizations, and the Building Contractors' Exchange looks forward to a brighter future than it has ever had before. E. A. Quarles is also secretary of the Employers' Association.

New York City.

As the spring season opens there is more or less disappointment in building circles regarding the outlook, and it is thought that there will be much less work in the way of new enterprises than was considered probable at the beginning of the year. Matters are, just at present complicated by a strike of the masons' helpers, with whom the bricklayers have sympathized to the extent of quitting work. Attempts were made to have the matter referred for arbitration, but without success. Without bricklayers the iron workers cannot continue operations, as the building laws allow the latter to work only three stories above the fire proofing. The strike has therefore completely tied up a number of important steel frame buildings which were in process of completion. The riggers, steam fitters and inside iron workers are idle through the strike, as are also a number of electrical workers. The following statement in regard to the situation was made on March 15, on behalf of the Mason Builders' Association: The laborers, in accordance with an agreement reached between the Mason Builders' Association and a representative of the bricklayers, were to return to work pending arbitration of all differences, and their differences were to be arbitrated on March 18. Instead, they remained on strike to enforce a new demand for an agreement for a year, and the bricklayers, notwithstanding the previous action of their representative, have broken the arbitration agreement by striking in sympathy.

Arrangements were recently completed for an amalgamation of the Mason Builders' Association of the Boroughs of Brooklyn and Queens, with the Mason Builders' Association of Manhattan and the Bronx. It is stated that the amalgamation will raise the membership to more than 900.

Schenectady, N. Y.

The members of the Builders' Exchange held their annual meeting on the evening of February 25, when various matters came up for consideration. Reports from various members regarding the outlook for building in the spring were of a satisfactory tenor, and the feeling prevails that all labor troubles, excepting possibly the difficulty with the Painters' Union, will be amicably settled.

The election of officers for the ensuing year resulted as follows:

President, W. E. Underhill.

Vice-Presidents, Louis Friday, representing the plumbers; Walter Wellman, representing the masons; George L. Winstone, representing the carpenters, and W. C. Brooman, representing the tinsmiths.

Financial Secretary, J. J. Barry.

Recording Secretary, George W. Eggleston.

Treasurer, F. W. Hugo.

Sergeant-at-Arms, G. B. Bailey.

Tucson, Arizona.

Building matters in Tucson have been very quiet the past winter, since the finishing of the $200,000 hotel, but, judging from the plans which have already been prepared there will be considerable work the coming season. Bids have been invited on the Catholic orphanage, which is estimated to cost $25,000; the university has the foundation in for a $26,000 library building, which it is expected will be completed the present year, and plans are being made for a primary school, which will cost $12,000. There is more or less talk of a number of cottages being erected, but those competent to judge are of the opinion that there will not be as much done in this line as there has been for several years past. While there has been nothing like a "boom" in building, the city has shown a steady growth, and the general hope is expressed that the place will steer clear of all "booms" in the future.

Wilmington, Del.

The past year was one of unprecedented activity in the building line in Wilmington, and the outlook for the coming season is regarded as very bright and encouraging. Two operations which were counted on as likely to be carried to completion this season will probably be deferred until next year, these being the new Pennsylvania Railroad Station, with their new office building, and the contemplated 12-story office building of the E. I. du Pont Powder Company. The deferring of these operations will not, it is thought, seriously interfere with the general building industry.

The Master Builders' Association of Wilmington held their annual banquet at the Hotel Wilmington on the evening of Saturday, February 20, covers being laid for about 65 guests. The toastmaster was Lewis T. Grubb, who in a short address told of the objects and growth of the organization. The address of the evening was made by William S. Hilles, who complimented the association on the good work it is doing, and remarked that he knew of no calling which presented such an opportunity for individuality as that of a master builder. He thought the greatest monument to the builders were the comfortable homes of the present generation. He thought that the greatest problem of the twentieth century was the solution of the problem of organized labor and its relation to capital. Capital, labor, brains and brawn, he said, were governed by the laws of nature, and any organization that tried to curtail, abridge, or qualify a man's right to be a man could not endure in this country. "I have a right to work when, how or where I please," he said, "and that is a moral law that cannot be interfered with by an organization." He thought it was impossible in this country to draw the line between capital and labor, for the laborer of to-day might be the capitalist of to-morrow, and the capitalist of to-day might be the laborer of to-morrow. Another speaker was Philemma Chandler, who stated that he had been a master builder of the city since 1852, and at that time there was no mill work of any kind done in the State, and the carpenter had to make his own door and window frames, and work out his sash, shutters, doors and molding by hand. At that date there were but four master carpenters in the city. He thought that at the present date competition was too strong in the business, reducing the margin of profit to a minimum. He suggested that the members be more liberal with each other, and hold prices so that all could make a living and do work that will be a credit to the business.

Notes.

Indications point to an active season in the building line in South Lorain, Ohio, and steps are being taken which, it is expected, will result in the erection of a large number of houses. We understand that a contract has just been concluded with White Brothers of Warren, Ohio, for the erection in South Lorain of 100 dwelling houses, work to be commenced at once. The houses will be two stories in hight, and will cost in the neighborhood of $1600 to $1800 each.

At a meeting, February 19, of the Builders' Exchange of Ann Arbor, Mich., at which representatives of nearly 40 firms were present, it was unanimously decided to operate what are known as "open" shops, making, however, no discrimination against union men.

At a meeting of the Massachusetts State Association of Master Builders, held February 17, in the rooms of the Builders' Exchange, 518 Main street, Worcester, Mass., the president, H. C. Wood, gave an interesting talk on the doings of the National Building Trades' Association, which was organized in Chicago in December, and announced that the organization was now an established fact. Reports from delegates of the local bodies connected with the State Association were read, and it was voted that the Massachusetts Association become affiliated with the new National Association.

It is thought that East Moline, Ill., will be the scene of considerable building activity the coming summer, as plans are already under way for something like 300 new houses. The contracts for the erection of 165 have already been awarded, and active operations will be commenced as soon as the weather will permit.

Leading builders and contractors in Binghamton, N. Y., intimate a growing belief in an exceedingly busy season in the building line this year. A number of improvements have already been projected and several costly residences, is is thought, will be erected. The winter season has been busier than usual, and the opinion prevails that between $1,000,000 and $2,000,000 will be expended the present year in building operations.

Architects and builders in Toledo, Ohio, are almost a unit in their opinion that there will be a large increase in the building of apartment and flat houses in the city the coming spring. A number of improvements in connection with warehouse and business structures are contemplated, and the general feeling is one that the season will show a fair volume in the aggregate.

The New Orleans Employers' Association recently organized at New Orleans, adopted a constitution and by-laws and fully considered the attitude which they will assume with regard to the labor situation. The year is opening with fine prospects for building, and it is hoped that such a course may be pursued with regard to labor that there will be less friction and strikes than marked the year just past.

In the opinion of architects, builders and contractors, matters are so shaping as to indicate an unusual degree of activity in the building line in Scranton, Pa., this spring. Some seem to feel that the amount of work will be the greatest in the history of the city, it being pointed out that in the Twenty-first Ward alone about 400 houses will be erected. This increased activity is said to be due almost entirely to the erection of the mammoth shops of the Lackawanna Railroad in Keyser Valley. About 2500 hands will be employed at the shops and a large portion of the men are said to be contemplating new homes for themselves in the vicinity of the works. It is also stated that the Railroad Company will build about 100 inexpensive houses near the car shops and give their employes an opportunity to purchase them on easy terms.

At a recent meeting of the Board of Directors of the Galveston Builders' Exchange, Galveston, Tex., Robert Palliser was elected President; C. W. Arnold, vice-president; Ed. F. Drewa, secretary; Harry Devlin treasurer, and George P. Werner, sergeant-at-arms.

One of the matters considered at the recent convention of the Bricklayers and Masons' International Union at Trenton, N. J., was a form which will tend to bring about uniform indenture of apprentices throughout the United States. As matters now stand, there are mixed conditions in various parts of the country, and these often lead to petty complications which it is thought can be avoided by adopting a uniform card.

At a recent meeting of the Master Builders' Association of South Norwalk, Conn., H. W. Mather was elected president for the ensuing year, Frank McKeon, vice-president; F. B. Gregory, secretary; E. K. Lockwood, treasurer, and M. J. Riordan, financial secretary.

The Master Builders' Association of New Britain, Conn., held their annual meeting on February 2, electing officers for the ensuing year, as follows: President, C. W. Holmes; vice-president, Andrew Carlson, and secretary, John Pinches.

New Publication.

The Square Root Delineator in the Art of Framing. By A. E. Woods. 40 pages. Size, 4½ x 6 inches. Bound in flexible leather covers with flap. Published by C. M. Osborn. Price, $1.50, postpaid.

This is the second edition of a work which was first brought out about ten years ago by the author, with a chart illustrating roof pitches, for the use of classes in the Haisch Mechanical Institute. The present edition has been rewritten, simplifying the language somewhat and rearranging the subject matter. New drawings have also been made tending to more fully illustrate the text. The "Delineator" is in effect a chart, 18 x 28 inches in size, printed in two colors on parchment bond paper, folded and securely fastened in a supplementary book on carpenter work. The chart is a diagram of a full sized carpenter's square, in connection with pitches for braces and common rafters, with their corresponding hips and valleys for even and uneven pitches, with their lengths; also that of the jacks, runs, rises, cuts and bevels, contents in board measure and the degree of pitch. The lengths of all rafters are given to less than 1-32 inch. All figures on the square that give the same cut or bevel are stated. The book is of convenient size to carry in the pocket and is issued only in the style described.

Planning a College Building.

At the dedication of Rockefeller Hall, Brown University, Providence, R. I., one of the speakers, in referring to the phase of building construction indicated by the above title, said:

Such a building as this to be satisfactory should be beautiful—that is, pleasing to the eye—and practical—that is, adapted to daily use. To help us determine whether it is beautiful or not let us ask ourselves some definite questions. Is the building appropriate to its location? Does it fill the proper amount of space in the campus composition? Does it harmonize with nearby buildings in style, color, material, cornice line, &c.? Will it contribute to the effect of the university buildings as a whole or will it attract attention to conspicuous features of its own? Does it by its exterior make plain the purpose for which it was erected and the use to which it is put? Do its outer walls correspond with its inner anatomy? Are its proportions good—that is, the relative dimensions of its various members? Finally, is it economical? Economy in art is a quality to which many of us are apt to give slight consideration. That unnecessary expenditure of effort or material is not only wasteful but inartistic is true of every art. In literature superfluous adjectives and verbal pyrotechnics which do not advance the current of the thought are positive detriments, and a straightforward, simple speech like that of President Lincoln at Gettysburg is a masterpiece. So, in painting, the suppression of trivial detail and the rendering of only the essential appearances help to create a good work of art like Rembrandt's "Lesson in Anatomy." The grandeur of Beethoven's "Funeral March" would be lost if it was overladen with elaborate variations and a complicated score. And this truth applies especially to architecture and the industrial arts, because economy of material counts as well as economy of effort. The questions as to this building which I have put relate to æsthetics, and, therefore, will be answered differently by different individuals, but this (building) committee believes that the discerning will be justified in answering them favorably. This hall, however, was built primarily not to look at, but to use, so that an even more important question is whether its arrangements are convenient and provisions adequate. This can be determined definitely only by actual experiment, but careful thought has been given to the most minute details so far as they could be foreseen.

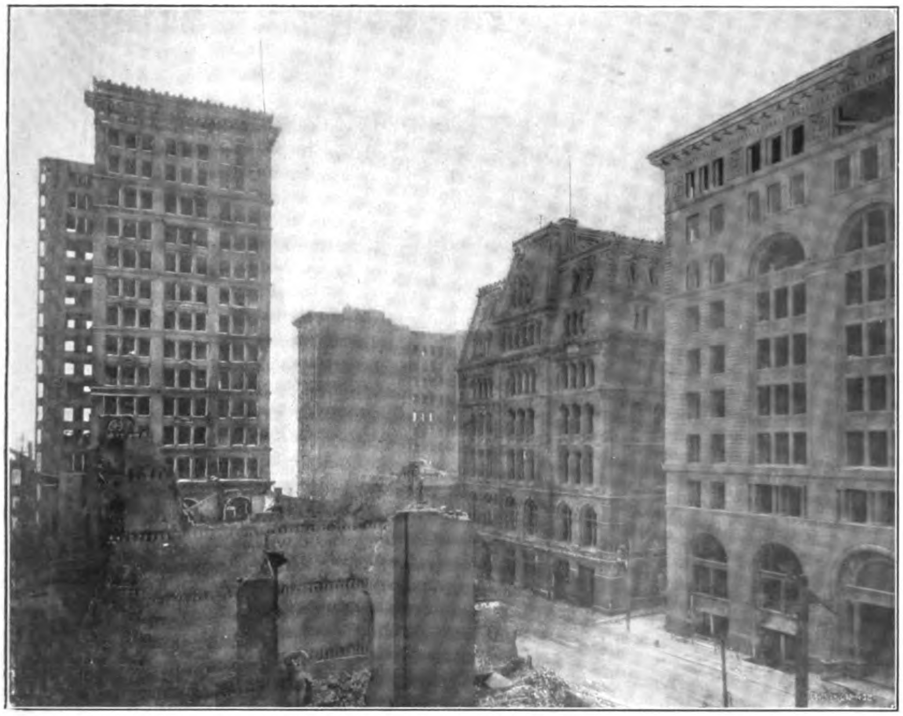
THE manufacture and shipment of houses is an important industry in Scandinavia. Near Stockholm are enormous timber mills at which wooden houses are made by the hundred for all parts of the world. They are not mere shanties, but elegant residences, even public buildings, constructed in sections easily put together.

Hanging Sash.

A writer in offering some suggestions for hanging sash says the weights should be so adjusted that the lower sash will just balance the weights nicely, then use the same number of pounds for weighting the upper sash, and, as the upper sash is always lighter than the lower one, owing to the fact that the bottom rail is invariably wider than the top rail of the upper sash, the weights attached to the upper sash will hold it tight against the top of the frame, and yet will not prevent the sash from remaining where placed when in use. If the weighting of the upper sash is not done properly, it will drop below the meeting rail, or, if locked, will throw all the weight an the sash lock, a very undesirable condition, as it will, in many cases, be almost impossible for delicate fingers to open the window when wanted. Sashes, to work nicely, should be fitted snug in their runways, not so tight, however, that paint or moisture will prevent their working. Good cotton cord is better to use for hanging than hemp or manila, as it works smoother, and, if lightly coated with hard mutton tallow when put in place, will last a long time and run quite smoothly.

CONTENTS.

VIEWS SHOWING SOME OF THE MORE IMPORTANT STEEL SKELETON FRAME BU



IS THEY APPEARED AMID THE RUINS OF THE RECENT BALTIMORE FIRE.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS
232-238 WILLIAM STREET, NEW YORK.

MAY, 1904.

New York's Latest Hotels.

The section just east of Fifth avenue and extending from Twenty-sixth to Twenty-eighth streets, New York City, is likely to be the scene of considerable building activity during the ensuing year or more, especially if all the work now contemplated is carried to a successful conclusion. The building operations will be largely in the nature of new hotels, plans for some of which have already been prepared. One of these, designed by Augustus N. Allen, will probably rank among the handsomest transient hotels constructed in the city for some time past, and will occupy Nos. 4, 6 and 8 East Twenty-eighth street. The building will be 12½ stories high, of steel frame construction, and with a facade chiefly of Indiana limestone and gray brick, the architecture being a rather free treatment of what is known as the Neo-Grecian style. The foundations, which are now in progress, will be carried to bed rock. On each floor above the first will be 21 rooms and 12 baths. The ground floor will be given over to a large entrance hall, reception room, ladies' parlor, palm garden and dining room. The latter will be finished in teak wood in old English style. The cost of the building will approximate $450,000, and it is hoped to have it completed before the end of the year. F. G. Hodson has been associated with Mr. Allen in the preparation of the plans. This structure, as intimated above, will be one important link in a chain of hotels. Another is to be erected in its rear, at Nos. 3, 5 and 7 East Twenty-seventh street, and on a large plot adjoining the two structures, running from Twenty-seventh to Twenty-eighth street, and numbered 10, 12 and 14 on the latter thoroughfare, a 12-story hotel is being put up by C. F. Rogers, to cost about $975,000, all three buildings to have floor levels of equal hight, so that they can be easily connected should it ever become feasible to lease them to a single tenant. Space has been set aside for an interior court, which provides ample light for each of them.

The Apprenticeship Question.

Some of the comment which has appeared in the daily press indicates the feelings with which the labor unions of Indiana have received the decision of the master plumbers and the master steam fitters of that State in their recent conventions to deal in future with the question of apprentices in their shops entirely independently of the journeymen's unions. Of late years the apprentice has received consideration only through self-interest. His employer has looked upon the apprentice as a means of securing a cheap workman for a period of years. It is only too true that the employer has paid very little attention to the physical welfare of the apprentice or to his knowledge of his trade or proficiency in it, unless he should have proved more than ordinarily stupid, when the apprentice would be reprimanded accordingly. The present system of conducting mechanical shops places a man at a disadvantage who is responsible, after signing the apprentices' papers, to conscientiously carry out his part of the agreement. This brings to view the grounds which the journeymen's unions have for claiming some right as to the number of apprentices employed in a shop. It is truly said that apprentices are turned over to work as helpers for the journeymen until they have picked up a sufficient knowledge to be advanced, and that they receive all, or at least the most important, of their instructions at the hands of the journeymen. The journeymen feel that, inasmuch as they have borne this portion of the burden, they are a very important factor in the apprentices' trade education, and that they have some discretion as to how far they shall be utilized for teaching apprentices. With this end in view, they have had recourse to the limitation of the number of apprentices that may be taken into a shop. The selfish position taken by the journeymen is that if few workmen are recruited in their trade those who are already engaged in it are more likely to secure employment. The rights and interests of the apprentice and those depending upon him, and the welfare of the public to some extent, have in the past largely been ignored by both the employer and the journeyman.

Shorter Time for Apprentices.

In these days of excellent school facilities a boy can secure a very good education before he has to go out to work for himself. If he starts in at the age of 16 years he is mentally better instructed and equipped than many workmen of former years have been on completing their apprenticeship. Under these circumstances he is capable, if properly instructed, of acquiring a thorough knowledge of all the principles underlying the practice of his trade in a much shorter time than was the case with the long apprenticeship of former days. In those early days the apprentice was imposed upon and an immense amount of drudgery was put upon him—which the intelligent boy of to-day, and all who have interest in his welfare, realize should not be expected of him—to the waste of his time, without any corresponding advantage in adding to the knowledge he would need as a first-class workman. These facts should make it clear that there is no occasion for an apprentice to serve as long as in former years; that he is capable of receiving better instruction than was given in the best shops in the palmy days of the apprenticeship system, and that those who wish to enjoy the benefits of apprentices must deal with them in a manner more in keeping with the progress of the age.

Good Workmen Good Citizens.

It is in opposition to our progressive spirit to say that any young man may not have freedom to select the trade at which he desires to work, and through his application to the study and practice of it become a useful citizen. If the public in general are willing to have restrictions placed around useful occupations, so that ambitious young men cannot become qualified to engage in them, it is a step toward undermining the fabric of the country. If these young men are not properly trained and steps are not taken to remove restrictions from their opportunities to secure training, when they reach manhood, with no means of supporting themselves, they not only suffer a hardship themselves, but are likely to resort to practices that will make them a menace to the public welfare. Under prevailing conditions the two sides of the question are receiving selfish consideration, the one at the hands of the employers and the other at the hands of the journeymen;

and it is time that the friends of the American boy look after his interests and see that all young men who are old enough to take up some useful calling have the unhindered opportunity to do so, and to receive intelligent consideration and instruction, such as will not impair their self-respect or interfere with their becoming good workmen and a source of pride to the nation.

Fire Insurance.

The recent heavy losses by fire in various part of the country should suggest to business men the absolute necessity, not only in their own interest, but also in that of their families and their creditors, of being properly protected by insurance against fire loss. Too many contractors and builders, as well as owners of wood working shops, are apt to neglect this very important matter. Where the income from a business is not large, and in order to make a decent living out of it the paring down of expenses wherever possible seems necessary, the outlay for insurance is often dropped as a nonproductive expenditure. No course could be more erroneous, for fire insurance and the means of protection against fire are really among the most important things to which any business man or property owner should give his attention. Moreover, the fact that a business man carries an adequate amount of insurance on his plant goes a long way to secure him the credit from manufacturers and wholesalers that is necessary in the conduct of any profitable business. But particularly is this protection essential in the case of men who have others dependent upon them, for an unprotected establishment, suddenly consumed by fire, often entails the wiping out of the means of subsistence, and possibly irretrievable ruin. Business men would do well to pay attention to this matter and take steps without delay to adequately protect themselves in the matter of fire insurance. Furthermore, those who carry insufficient insurance should increase the amount in correspondence with the growth of their business and of their stock since their insurance was last placed. Another important thing to which attention should be paid is the placing of insurance through responsible brokers and with substantial concerns.

Officers of the Brick Manufacturers' Association.

At the eighteenth annual convention of the National Brick Manufacturers' Association, recently held in Cincinnati, Ohio, the following officers were elected for the ensuing year:

President, Will S. Purington of Galesburg, Ill.

First Vice-President, J. M. Blair of Cincinnati, Ohio.

Second Vice-President, W. P. Blair of Terre Haute, Ind.

Third Vice-President, A. R. Root of Princeton, N. J.

Secretary, Theodore A. Randall of Indianapolis, Ind.

Treasurer, John W. Sibley of Birmingham, Ala.

A number of very interesting papers were presented, and discussions ensued which were of a most valuable and instructive nature, pertaining as they did to vital features of the clay working industry.

Officers of the American Ceramic Society,

At the sixth annual meeting of the American Ceramic Society, recently held in Cincinnati, the following officers were selected for the ensuing year: President, F. W. Walker of the Beaver Falls Art Tile Company, Beaver Falls, Pa.; vice-president, Albert V. Bleininger, instructor in Ceramics, Ohio State University, Columbus, Ohio; secretary, Edward Orton, Jr., Columbus, Ohio, and treasurer, Shanley G. Burt, Cincinnati, Ohio.

Decision in the Thirty-seventh Competition.

It was our expectation to have been able to publish in this issue of the paper the names of the winners of the prizes in the thirty-seventh competition, being that for what is known as "double" or "twin" houses; but the committee to which was referred the drawings submitted in the contest not having completed their labors at the hour of going to press, we are perforce compelled to defer the announcement until the June number. At that time we shall also present for the consideration of our readers the first prize design, with specifications and detailed estimate of cost.

Novel Method of Excavating for Foundations.

Excavations of foundations for two or three large buildings in the downtown district of Chicago will be made in a novel way. The downtown streets of the city, as now generally known, are paralleled 46 feet below the surface with tunnels corresponding to the streets above. In order to get rid of the earth from the foundations of the buildings the Illinois Tunnel Company, owning the underground tunnels, will extend spurs from their main tunnels to a point about the center of the lots to be excavated, and wells will be dug connecting these spurs with the surface. Steel cars holding about 20,000 pounds capacity are being built, which will be run to a point at the bottom of the wells, and earth from the foundations will be shot down the well into these cars. An outlet for the earth thus sent below ground will be provided on the lake front, where the cars with their loads of dirt will be raised in a well and run on tracks to the dump.

L'Art Nouveau in San Francisco.

The Harvey H. Dana Building, being constructed on the southeast corner of Stockton street and Union Square avenue, San Francisco, is to be the first example of *l'art nouveau* in that city. The Dana building will be an eight-story semifire proof structure and occupy a lot 44 x 77 feet in area. It will be of brick, with cemented exterior and with terra cotta ornamentation, the color effect being a deep cream. The seven upper floors will be divided into 70 offices for the use of physicians and dentists. Special provision will be made for electric apparatus, while hot and cold water pipes and drains will run through all the floors. The halls will be floored in mosaic tiling and the wainscoting will be faced with marble. The remainder of the interior finish will be in hard wood. The cost of the new building will be $110,000. It is expected that it will be completed before the end of the year.

Death of a Noted Church Architect.

Probably one of the best known builders of churches was George Riker, who died at his home in Bloomfield, N. J., on March 20, at the age of 86. Among the houses of worship which he built were the Madison Square Presbyterian, All Souls' Unitarian at Twentieth street and Fourth avenue, the Church of St. Vincent de Paul in West Twenty-third street, St. Thomas', Trinity Chapel and St. Augustine's Chapel, all in New York city. Others are St. James' at New London, Conn.; St. Paul's at Buffalo, St. Peter's at Albany, N. Y.; St. Stephen's and the Cranston Street Baptist Church of Providence, R. I.; St. Paul's and St. George's in Brooklyn, and St. Vincent Chapel at Yonkers, N. Y. He also built the National Bank Building in Bloomfield and a number of residences in all parts of New Jersey, as well as in several other States.

THE latter part of March Mayor McLane of Baltimore, Md., appointed a special commission of seven to revise the building laws of the city. The commission includes Edward B. Preston, Inspector of Buildings; City Engineer B. T. Fendall, John E. Greiner, an expert in structural iron work; Paul Turner, chairman of the General Loss Committee of the Insurance Companies; John Waters, a contractor and builder, and J. E. Sperry and W. G. Nolting, architects.

COMPETITION IN TWO-FAMILY HOUSES.

SECOND-PRIZE DESIGN.

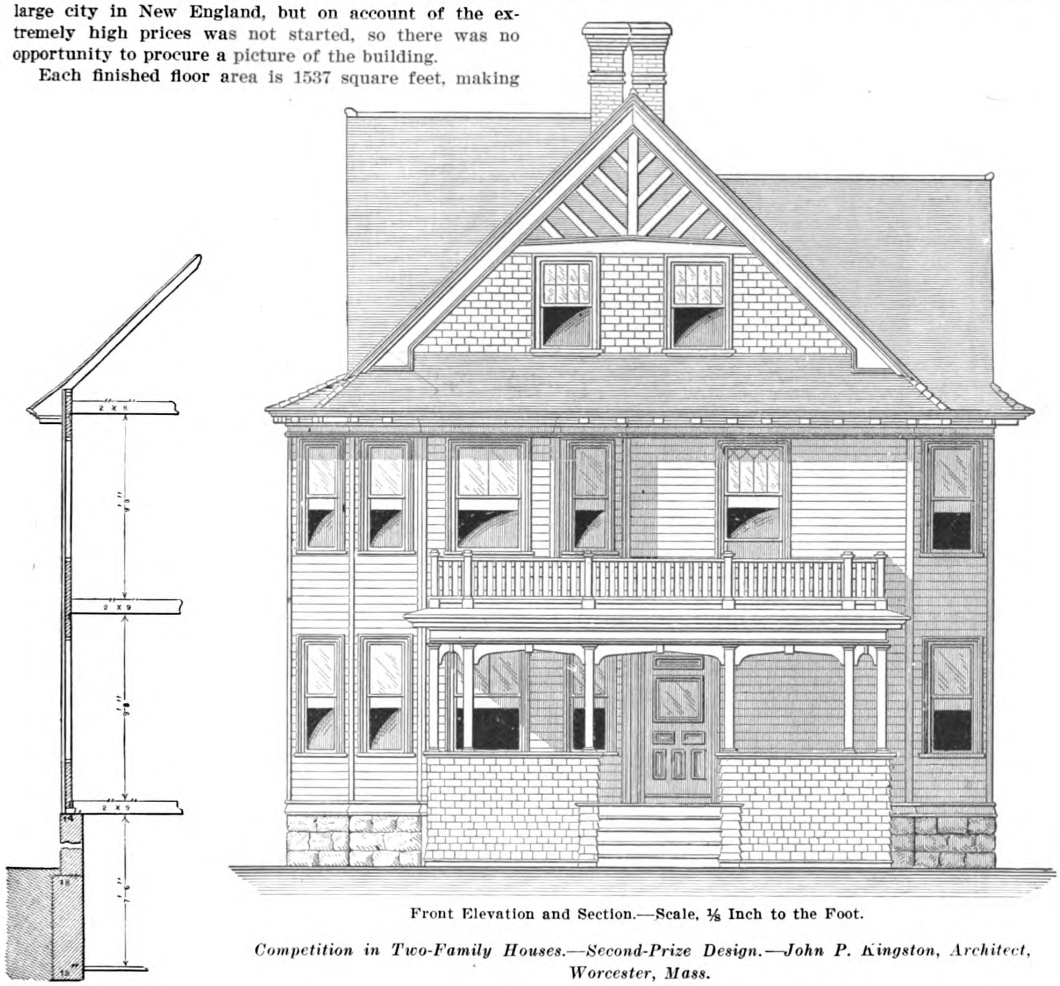
As announced in our last issue, the committee having charge of the drawings submitted in the XXXVIth Competition, being that for Two-Family Houses, awarded the second prize, of $60, to John P. Kingston of 518 Main street, Worcester, Mass., and we have pleasure in presenting the drawings herewith, together with the following comments of the author regarding some of the leading features:

The apartments are entirely separated, but still connected. The drawing are copies of plans that were made for a house to be built last season in the suburbs of a large city in New England, but on account of the extremely high prices was not started, so there was no opportunity to procure a picture of the building.

Each finished floor area is 1537 square feet, making a total of 3074 square feet, which precludes all possibility of finishing any part of the attic, although there is space enough to finish six rooms. The original house did not have any part of the attic finished.

As the drawings show, this is not laid out for the lowest cost apartments, but more for a higher class of tenants. These houses are in great demand near large cities and command good prices.

I will not attempt to describe the whole minutely, as the drawings plainly show and specifications describe the several parts, but I will call attention to a few special features. The first is the arrangement of the passage, from which all living rooms and bathroom can be reached without going through any other, and the practical and convenient manner of rear entries, from which tenants can reach either cellar from first, second or third floor without coming in contact with each other. Each has its own separate cellar, with boiler, coal bins and a room for vegetables and fruit. Each cellar has a small sink, which will be found very convenient.



Front Elevation and Section.—Scale, ⅛ Inch to the Foot.

Competition in Two-Family Houses.—Second-Prize Design.—John P. Kingston, Architect, Worcester, Mass.

Specifications.

The specifications accompanying the drawings are as follows:

Foundations.

Construct the foundation, footings, pier stones, &c., according to sizes shown on drawings. All stone to be of approved local quarried junk stone, laid up in best manner in mortar composed of half lime and half cement and the proper amount of sand. To be well bonded and laid to a line. The outside and inside walls must be trowel pointed. The bottom of all walls to be sunk at least 6 inches below cellar bottom. That part of walls showing above grade as underpinning to be laid up in cement mortar of good, shapely stone. The style to be broken ashlar, with beds and build cut. To be jointed in Portland cement, with large round jointer and straight edge, in such colors as the owner directs. Walls to be left level on top ready for sills, which must be bedded in mortar.

Filling.—Fill back of all walls with gravel from bottom to within 1 foot of finished grade, well tamping the whole in place.

Brick Mason Work.

Furnish and lay all brick about the work in a thorough manner. Chimneys to be made as shown, and to have sheet lead flashing built in at connection of roof. Flues to be built as shown, with joints thoroughly filled, and chimney to be plastered on outside to roof boards. To have fire clay flue lining, as per plans, and clean out doors at bottom of each flue. Each kitchen to have a

6-inch cast iron thimble and cap, and each cellar one 8-inch cast iron thimble for heaters. The cap of chimneys to be made of brownstone 6 inches thick, all in one piece, all crandled work.

The wall inclosing ash pit to be 8 inches thick, with a 2-inch wood frame 2 feet 4 inches wide and 3 feet high, the bottom up about 2 feet from floor. The piers to be 8 x 12 inches, and where they connect to chimney 8 x 8 inches, all well laid in cement mortar.

The brick used about the work to be good, hard burnt merchantable quality. Those for exterior to be selected of a uniform color. All mortar for the work to be the best quality, made with half cement, half lime and proper amount of sand. That above to be made of lime and sand, with all exposed parts colored dark red.

Remove all rubbish from time to time as required, and leave work clean and complete.

The brick mason is to assist the other mechanics employed in the building wherever his help is necessary, and is to do all cutting and jobbing required without extra charge and leave all perfect.

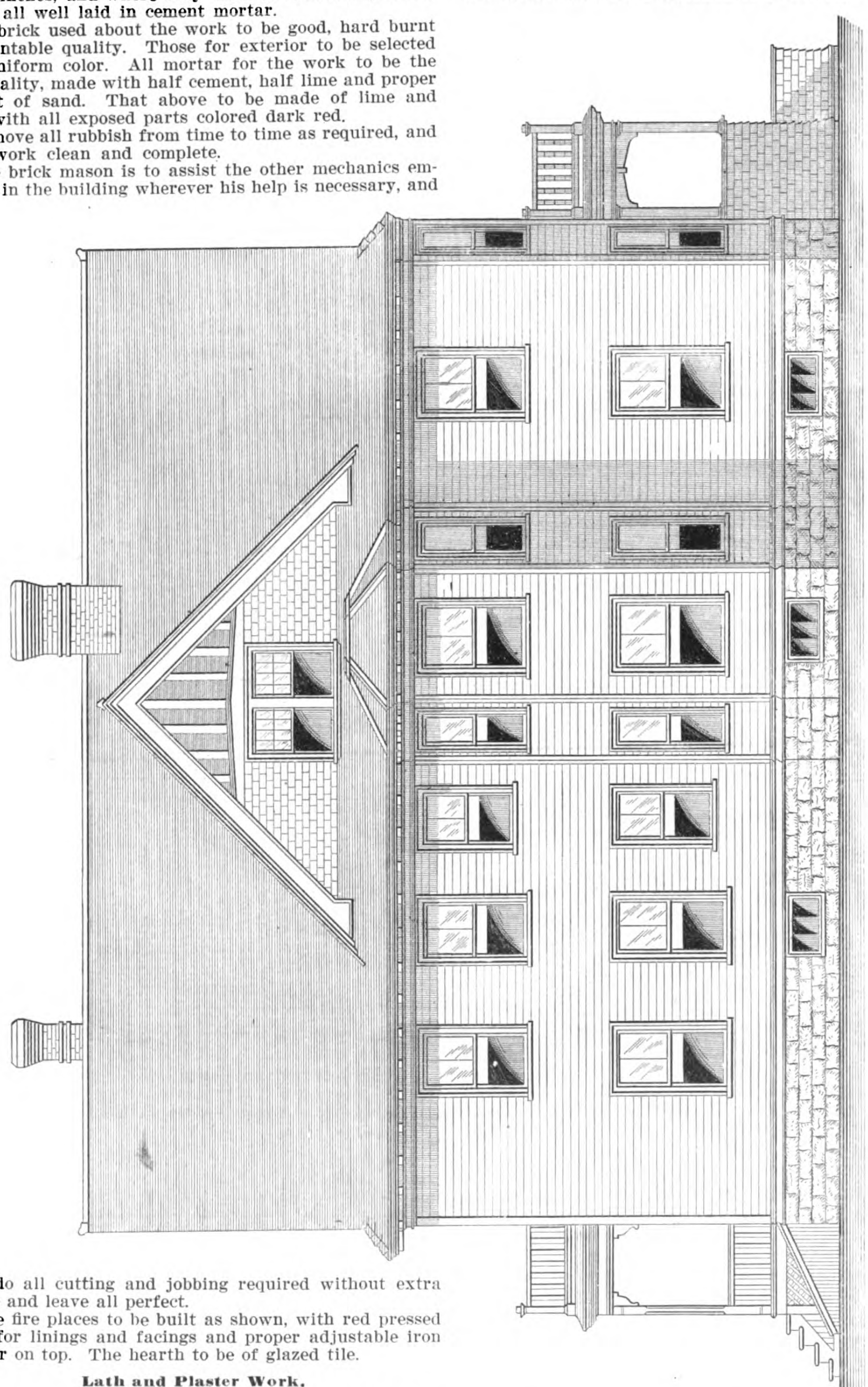
The fire places to be built as shown, with red pressed brick for linings and facings and proper adjustable iron damper on top. The hearth to be of glazed tile.

Lath and Plaster Work.

Lathing.—Lath all finished parts of the building where plastered with best clear, sound, dry spruce lath. To be well nailed with at least four nailings to every whole lath and joints broken at least every eighth lath. All lathing to continue down to floors on exterior walls.

Plastering.—Plaster all parts of the entire building where finished with two coats of best plastering mortar, the last coat to be a hard finish. Back plastering will have only one coat. The mortar is to be made with best long hair, lime and clean sharp sand. To be thoroughly run, mixed and manipulated, and to be made at least seven days before putting on. All work must be made true, even and straight, and left perfect. As soon as possible after work is completed the building must be cleaned of all dirt and rubbish occasioned by this work.

Heating.—Furnish all stoves (if heaters are not in), fuel and labor to keep the building properly warmed during and until the completion of this work. Whitewash with two coats all exposed parts of brick and stone work in cellar.



Competition in Two-Family Houses.—Second-Prize Design.—Side (Left) Elevation.—Scale, 1/8 inch to the Foot.

Cementing.—The whole of cellar floor is to be leveled off, rolled and settled thoroughly. Over that cover flush and smooth with concrete 2 inches deep, composed of one part Portland cement and three parts coarse sand, floated off true and even while fresh. Form gutter around walls to carry water to outlet.

The plaster mason is to assist the other mechanics employed in the building wherever his help is necessary, and is to do all cutting and jobbing required without extra charge and leave all perfect.

Tinners' Work.

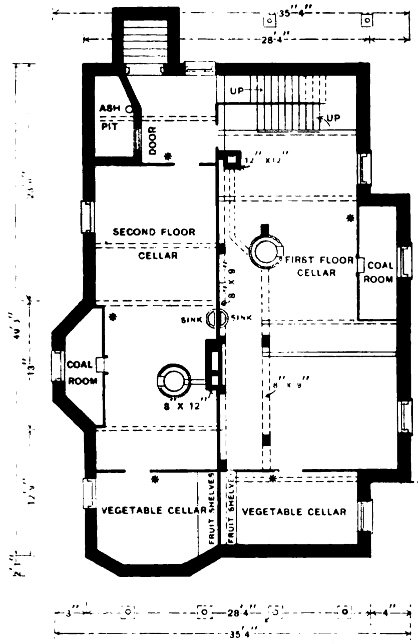
Furnish and cover the balcony floors over front veranda and rear porch, also space between two gables

To be four lines of 2½-inch galvanized iron corrugated conductors from balconies to near ground.

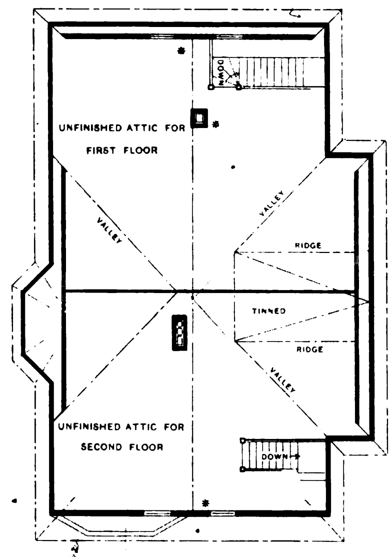
Ash Chutes.—Put in each storeroom, where shown, a good galvanized iron sliding ash sifter, connecting to an 8-inch galvanized iron chute extending from top sifter to the cellar. The chute must run an angle from top sifter to connect to bottom one. All work to be well fitted, stayed, braced and fastened in best manner.

Carpenter Work and Materials.

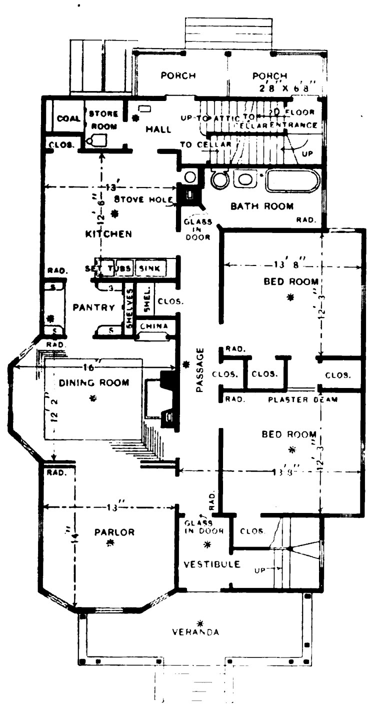
Furnish all materials of every description and perform all labor of every kind as hereinafter described or shown. Do all cutting, fitting and flashing to make all parts complete and water tight.



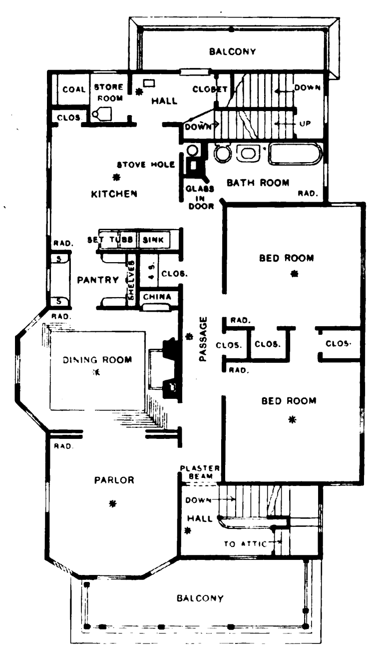
Foundation.



Attic, with Roof Lines.



First Floor.



Second Floor.

Scale. 1-16 Inch to the Foot.

Competition in Two-Family Houses.—Second-Prize Design.

of main roof, with tin, using best quality M. F. or Taylor's Old Style roofing tin, all joints well fastened and soldered. Form gutter around both balconies, with a 2½-inch outlet. Do all tinning necessary to make the job complete. All tin work to be one thickness of paper under.

The framing work is to be done in balloon framing style. All to be done in a thorough manner, placing joist, rafters and girders crowning edge up.

All partitions to have a sill and cap same size as studding, to be double where practicable. The cap of one to form the sill of the other, the studding extending down between joist. All studding caps and sills, except otherwise specified, to be mill jointed.

Truss over all openings at right angles to joist. All door studs will be double to hight of header, which will be double, and rest on inside stud. Put 3 x 4 braces at all corners and other places where practicable.

All ceilings where finished to be cross furred or strapped with ⅞ x 3 inch planed spruce strips, put on 16 inches on centers, well nailed and well straightened.

All joist to be bridged with 1¼ x 3 inch spruce strips, cut to fit at both ends and fastened with two nails at each end. Bridge all main partitions with 2-inch stock same width as partitions. All bridging to be cut in tight and well nailed.

All corners and angles to be made solid. Cut in all blocks for wainscoting, stairs, fire stops and other places necessary to make the job complete.

Roof Framing.—The roof to be framed as per drawings. The part between two gables to be boarded with matched spruced boards, papered and tinned. The hips, valleys, jacks and common rafters to fit close at both ends, and all well nailed and spiked.

Timber.—All the framing and dimension timber to be of good merchantable square edged sawed spruce. All studding, posts and braces to be jointed to corresponding thickness, and to be of the following sizes:

	Spruce.		Spruce.
First-floor girder	8 x 10	Braces	3 x 4
Sills	4 x 7	Wall studs	2 x 4
First-floor joist	2 x 9	Main partitions	2 x 4
Second-floor joist	2 x 9	Minor partitions	2 x 3
Third-floor joist	2 x 8	Piazza sills	6 x 6
Collar beams	1 x 7	Piazza joist	2 x 6
Rafters	2 x 6	Piazza rafters	2 x 6
Hips and valleys	2 x 9	Wall plates double	2 x 4
Posts	4 x 7		

All joist, studding and furring to be placed not more than 16 inches apart on centers, with rafters and collar beams 24 inches on centers, except front piazza and rear porch rafters, which are to be 16 inches on centers.

Put ¾-inch grounds around all openings and at bottom of all partitions, and beads on corners to plaster against.

The sliding door pockets to be sheathed up with ½-inch sheathing, with runs and boxes for hangers put up straight and level and well fastened in place before plastering.

Wall Boarding.—All outside walls and gables and tin roofs to be done with No. 2 ⅞-inch matched spruce boards, laid breaking joints and well nailed to each bearing.

Bottom Floors.—To be done with ⅞-inch matched hemlock boards, all put on close together and well nailed in place. This will include the whole of attic.

Roof Boards.—The roofs, except otherwise specified, to be covered with sound ⅞-inch planed, square edge spruce or hemlock boards, well filled and fitted out to openings, hips, valleys, ridges and cornices, and all well nailed. To be laid about 2½ inches apart.

Clapboards.—All the outside wall surface between water table and main cornice to be covered with second best quality pine clapboards, 6 inches wide. To be laid not more than 4½ inches exposed, nailed at least once in a foot and each end.

Gable Shingles.—The gables, base of front veranda and buttresses of steps to be covered with smooth pine cut shingles, put on not more than 5 inches exposed.

Roof Shingles.—The roofs not tinned to be shingled with extra sawed 16-inch cedar shingles, put on not more than 4¾ inches exposed. All to be double nailed and joints well broken. The hips to be covered with a braided course. Valleys to be laid open about in usual manner over tin 14 inches wide, soldered in one continuous piece. All tin and flashing to be painted two coats both sides. Flash up tight against all chimneys and other places necessary. Put on all ridges pine saddle boards with a roll on top.

Sheathing Paper.—To have good quality of rosin sized paper, well lapped, under all finish, clapboards and side wall shingling, and good sheathing paper under all top floors.

Clothes Dryers.—Put up where directed two improved patent clothes dryers complete.

Cellar Partitions.—Put up cellar partitions of 2 x 3 studs, and covered with matched spruce boards well filled up to ceilings. To have door made of pine boards with three cleats, hung with two 10-inch T hinges and have thumb latch and rim lock. Put in each vegetable cellar two fruit shelves 1 foot 6 inches wide.

Coal Rooms.—Build places in cellar, as shown, for heater coal of 2 x 4 studs and matched spruce boards. To have loose boards inside to keep coal from opening. Partition to be about 6 feet high.

Put up all strips, shelves and other fixtures in cellar for plumbing, water, electric and other apparatus as directed.

Ash pit to have a cleat door, with loose pieces across inside.

Rear Storerooms.—Fit up rooms, as shown, to be sheathed 4 feet high with matched spruce boards and plastered above. Coal bins to be made of matched spruce boards, with cover hung with two hinges. To have slide to open in front. Over bin put up two shelves 18 inches wide. To have a galvanized iron ash sifter connected to a 7-inch pipe which runs to pit in cellar.

Attic Work.—This is not finished, but to have a single floor and a matched board partition 8 feet high, making storage place for each family. There is ample space for one, two or three rooms additional for each family if necessary, but they are not planned as the floor area allowed would not permit.

Exterior Finish, Floors, Moldings, &c.

To be made and worked out from good quality, smoothly planed rift grain cypress or pine lumber, free from shakes, pitch, sap or knots that will show. The whole to be worked out to drawings, well fitted and nailed in place. All joints where practicable to be put together in paint.

Verandas, Balconies and Porch.—To have floors of 1⅛ x 5 inch square edge rift grain Southern yellow pine. The ceilings to be of clear cypress sheathing, with bed molding. The balustrades on front veranda to be formed with pine shingles on outside. Inside to be sheathed vertical with cypress. Other parts of veranda and balcony as per details. Roof to be tinned. The rear porches to have 6 x 6 square chamfered posts, 3 x 4 rails and 1¼-inch round balusters set into rails 1 inch at each end. The railing over balcony the same. The cornice and soffit same as front veranda.

Outside Steps.—To be built on 2-inch plank stringers, 1¾-inch treads and ⅞-inch risers. Treads to have round nosing and scotia molding under. Outside of steps to be supported on chestnut or cedar posts, set back of stringers and risers and well fastened.

Door and Window Frames.—Door frames to be 2 inches thick, rabbeted to fit to thickness of doors, 1¾-inch hard wood thresholds, and ⅞-inch casings, with molding around outside.

Window frames to be made to fit their several positions. Cellar frames to be made of 2-inch plank, rabbeted for 1⅜-inch sash. Sills to be wide enough to project by stone work ½ inch. To have 1-inch staff bead around sides and top. Other frames to be made in usual manner, except otherwise shown or mentioned. To have 1⅛-inch white or yellow pine pulley stiles, grooved for 1½-inch lip sash. Other parts to be cypress stools 2 inches thick, casings ⅞ inch thick, set over boarding, and have a ⅞ x 2 inch molding around outer edge. All double sliding frames to be fitted with 2-inch steel bronze finish face axle pulleys, well fitted in place. Frames for stationary sash same as above, but to have no pulleys.

Sash and Glass.—All frames not otherwise specified to be fitted with best pine double sliding lip sash 1½ inches thick, glazed with first quality American sheet glass, double thick for one and two light sash and single thick for smaller lights. To be hung and evenly balanced with cast iron weights, best quality sash cords. Windows in cellar to be hung at top with two 3-inch wrought butts. To have button fastener, and hook and eye to hold open. To be glazed with good quality glass.

Shutters.—All sliding windows to be fitted with best quality 1⅛-inch pine blinds, with lower half rolling slats, hung with approved hinges and fasteners. Where necessary blinds are to be made in two folds, with hinges and fasteners best adapted to their position.

Doors.—The front door to be best quartered oak, 1¾ inches thick, flush molded inside and raised molding outside. To have raised panels and clear bevel edge plate glass in top.

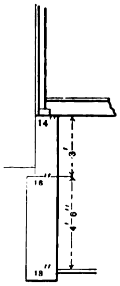
The rear doors to be best cypress, 1¾ inches thick, flush molded, and No. 1 double thick glass in top. Cellar to have No. 2 cypress stock doors, 1½ inches thick.

Interior Work and Trimmings.

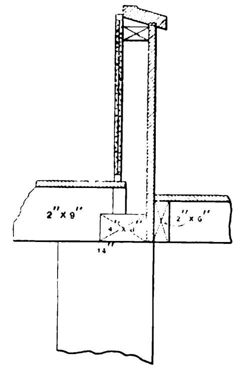
All the stock for interior finish of every kind to be of the best quality, thoroughly seasoned, and of good grain and well smoothed up, sandpapered and kiln dried before putting in place. To be put up by careful workmen, with all joints close and well smoothed over.

Top Floors.—The vestibule, front halls, passages, kitchens, pantries, bathrooms and rear entries to have a finished or top floor of best selected grainway, planed and matched, ⅞ x 3½ inch Southern yellow hard pine flooring, blind nailed, laid close with running joints and well smoothed up. The dining rooms are to have a border of same stock, with corners slip jointed. These floors are to be laid after finish is put on, covered with sheathing paper, and delivered clean and in good order to the painter. The remaining finished floors to be well seasoned ⅞ square edge pine flooring, not more than 7 inches wide.

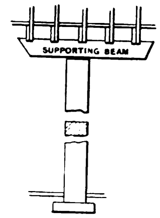
Finish.—The finish in the several parts to be as follows: Vestibule, front halls, passages, parlors, dining rooms and bedrooms to be finished with best cypress, with all doors cypress.



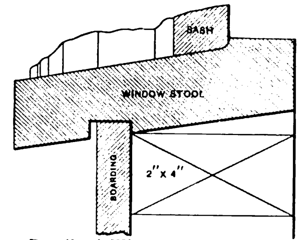
Section through Foundation Walls.—Scale, ⅛ Inch to the Foot.



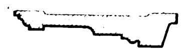
Construction of Front Veranda Floor at Line of House.—Scale, ½ Inch to the Foot.



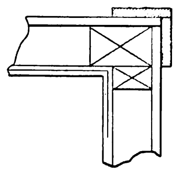
Section Showing Floor Framing and Brick Piers in Cellar.—Scale, ⅛ Inch to the Foot.



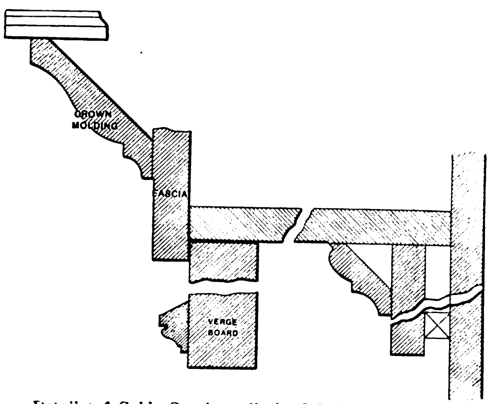
Detail of Window Sill.—Scale, 3 Inches to the Foot.



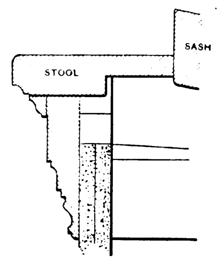
Chair Rail.—Scale, 3 Inches to the Foot.



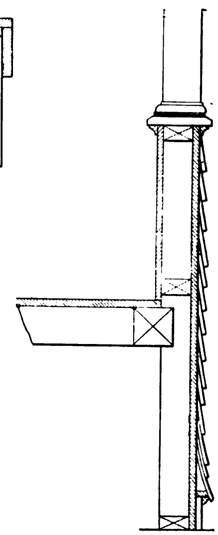
Corner Boards.—Scale, ¾ Inch to the Foot.



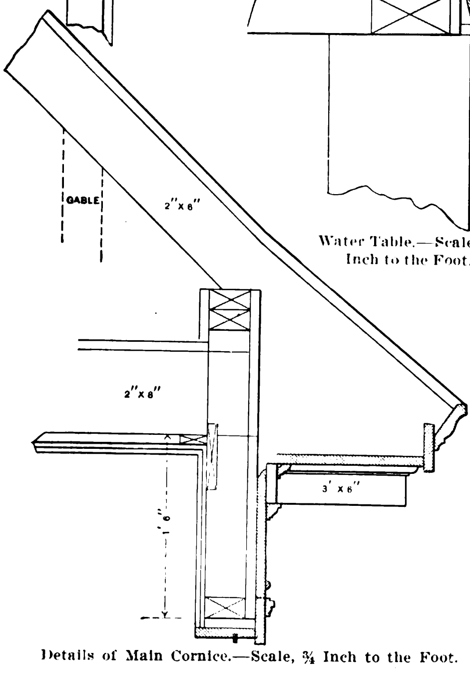
Details of Gable Cornice.—Scale, 3 Inches to the Foot.



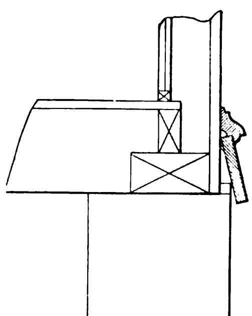
Vertical Section through Window Stool and Apron.—Scale, 3 Inches to the Foot.



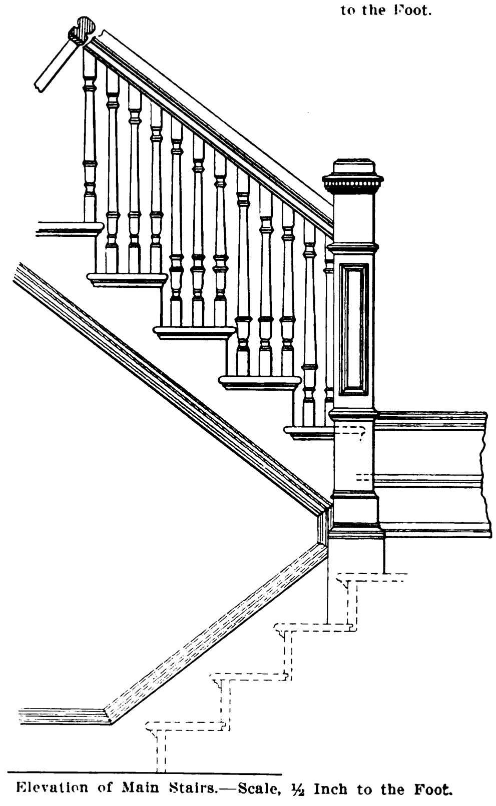
Section through Shingled Base of Veranda.—Scale, ½ Inch to the Foot.



Details of Main Cornice.—Scale, ¾ Inch to the Foot.



Water Table.—Scale, ¾ Inch to the Foot.



Elevation of Main Stairs.—Scale, ½ Inch to the Foot.

Competition in Two-Family Houses.—Second-Prize Design.—Miscellaneous Details.

The kitchens, pantries, bathrooms and rear entries to be finished with Southern hard pine, with all doors cypress.

Door Frames or Jambs.—To be 1½ inches thick, double rabbeted and beaded edges. The sliding door jambs to be ⅞ inch thick, all set perfectly level, plumb and true.

Doors.—The vestibule doors to be 1½ inches thick, same style as front door, with No. 1 double thick glass in upper part. All other doors on first and second floors to be 1½ inches thick, five raised panels and 1-inch molding. Doors to bathrooms to have top panels of ground glass.

Door and Window Trimmings.—The vestibule, front halls, passages, parlors and dining rooms to have ⅞ x 4 inch side casings, with back band around and plinth blocks. All other rooms to have ⅞ x 4½ inch side casings, 1⅛ x 5 inch header and plinth blocks. Windows to have stools 1 inch thick and 4-inch aprons. Stop beads to be ½ inch thick, tops nailed in and sides fastened in with flat head brass screws, four to a side. Doors to have thresholds.

Base and Molding.—To be a base 9 inches wide and molding 2 inches wide in all rooms not wainscoted.

Wainscoting.—The kitchens and rear entries to be wainscoted 3 feet 6 inches high, bathrooms 4 feet high and pantries 2 feet 8 inches high, with narrow beaded sheathing put on vertical, blind nailed, and have a ⅝ x 3 inch molded cap.

Chair Rail.—Put a chair rail 4½ inches wide around dining rooms and vestibule.

Closets.—The closets to have a 6-inch bevel base and 4-inch plain casings. Clothes closets to have two rows of beaded strips, with wardrobe hooks on each strip. To have a shelf above top strip.

Pantries.—To have broad counter shelf, with case of three drawers 2 feet 8 inches wide under, remaining part closed in with beaded sheathing having three cleat doors, hung with wrought butts and cupboard catch fasteners. To have barrel swing in one closet. Over broad shelf to be four 12-inch shelves, all resting on rabbeted cleats. Part of shelves shown to be closed in from bottom of lower 12-inch shelf to ceiling and have two panel doors.

China Closets.—To have broad shelf 2 feet 8 inches from floor. Under to be a case of three long and three short drawers. Over to be three shelves wide enough to fill space between walls on each side. To have two sash doors, 1⅛ inches by 1 foot 6 inches by hight that space will allow, glazed with No. 1 double thick glass. The space between counter shelf and next one to be open.

Linen Closet.—Fit up linen closet with four 20-inch shelves.

Sinks.—To be of soapstone, sheathed under, with a cleat door and have a case of three drawers. The back over to be soapstone, with wood shelf 5 inches wide and ½ x 4 inch base over.

Wash Trays.—To be soapstone, fitted up and properly supported on wood frame, sheathed under, with a cleat door. Back of tubs to be finished over to conform to sink. To have 1⅛-inch covers framed together, with two panels flush on top.

Bathrooms.—To be fitted up in usual manner for open work. The plumber will furnish seats, tank and brackets, but carpenter will put all wood work in place.

Tank.—To be a plank tank, made and set in attic, of pine stock. To be well secured and set on plank frame. The plumber to line the same.

Plumbing Fixtures.—Put up all necessary strips, cleats, shelves, &c., to run pipes on and covers to close in fixtures, of material to correspond to finish of rooms, in a neat and substantial manner.

Kitchen Shelf.—To be a clock shelf, about 3 feet long, 6 inches wide, on ornamental bronze brackets in kitchens where directed.

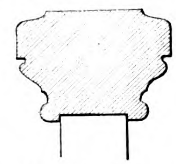
Mantels.—The contractor is to figure on $25 for a mantel for each tenement.

Stairs.—The several flights of stairs to be built, as shown, on spruce plank stringers, accurately cut to the dimensions for risers and treads and firmly secured in place. To have 1⅛-inch treads, ⅞-inch risers and scotia, risers and treads grooved together and base into risers. Front stairs to have newel and angle posts, molded rails and turned balusters. Back stairs to be of hard pine, with hand rail hung on bronze brackets. Attic stairs to have 4-inch turned angle posts, 1½-inch turned balusters around well hole and 2½ x 3¼ inch hand rail. To be a hanging rail on side of stairs, with return end at top against post. Cellar stairs to be of spruce or hard pine, closed in with matched boards and grooved rail.

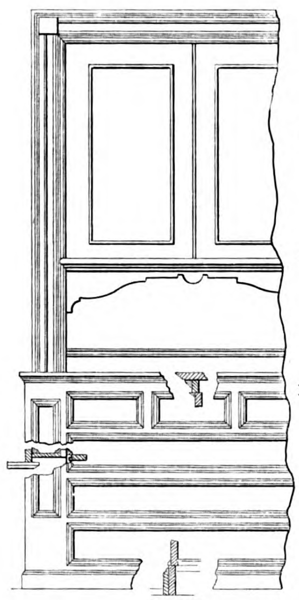
Hardware.—The contractor is to figure in $100 for purchasing the hardware for door and window trimmings, drawer pulls, cupboard catches, hinges, base knobs, wardrobe hooks, screws for stops, hinges for coal bins, cellar doors, sliding door hangers, hinges and hooks for cellar windows, shelf brackets and screws for the above. The contractor is to carefully and neatly fit the whole in place. The owner will have credit for all less and pay for all over the amount, and will select the hardware. The contractor is to furnish all other not mentioned, including weights, cords, nails, spikes, screws, &c.

Electric Work, Bells, Tubes, &c.—Put up in passages, or where directed, for each tenement a 3-inch nickel plated gong bell, wired to connect to front door. To be 1-inch tin speaking tube for each tenement from front door to passage. To be a positive electric apparatus on front door, wired to open from each passage. To have all

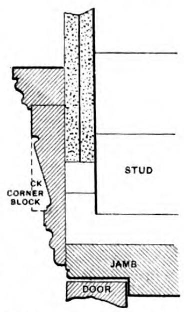
Section through Window Trim.



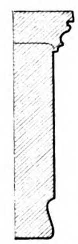
Handrail of Veranda Balustrade.



Partial Elevation with Details of China Closet.—Scale, ½ Inch to the Foot.

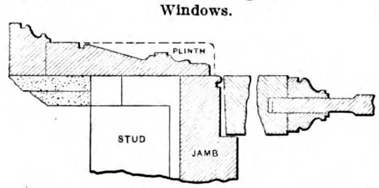


Details of Head Casing of Doors.

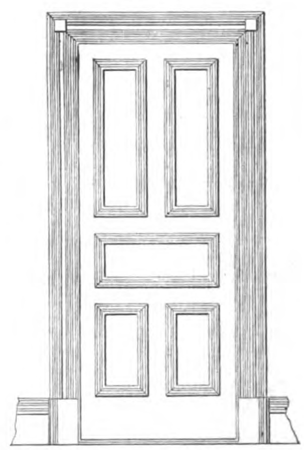


Section through Head Casing of Windows.

Base Mold.



Section through Door Frame, Showing Finish. Scale, 3 Inches to the Foot.



Elevation of Doors.—Scale, ⅜ Inch to the Foot.

Competition in Two-Family Houses.—Second-Prize Design.—Miscellaneous Details of Construction.

necessary buttons, mouthpieces, wires and other fixtures to complete the work in best manner.

Painting and Finishing.

The painter is to furnish all materials and labor for the painting and finishing of the entire work about the building, all to be of the best of their several kinds. The painter is to consult the carpenter's specification for a more detailed description of work.

Outside Work.—All the exterior work of wood, iron, tin and galvanized iron to be painted with two coats of approved lead mixed with pure linseed oil, all colors to please owner. Putty stop all nail holes in finish, cracks or other imperfections, and shellac all sap, knots, &c., before painting. The sash are to have two coats besides priming. Outside of exterior doors to have three coats of paint or best exterior varnish, as directed.

Inside Work.—All interior work must be well cleaned up before any finish is put on. All nail holes and other imperfections well puttied, matching wood as near as possible.

Floors.—The hard wood floors and treads of stairs to have two coats of approved floor varnish.

Finish Work.—The vestibule, front halls, parlors and dining rooms to have one coat of pure orange shellac and three coats of approved varnish. The parlor and dining rooms rubbed to a dull finish, the others left in a gloss.

The passages and bedrooms to have one coat of orange shellac and two coats of approved varnish, put on even and smooth and left in a gloss.

The hard pine work in kitchens, pantries, bathrooms, entries, &c., to have a coat of best liquid filler and two coats of approved varnish, left in a gloss. All closets to have one coat of filler and varnish.

Painted Work.—The floors of closets, cellar stairs, cellar doors and sash to be painted two coats of paint. Inside sash in finished parts to be painted or stained one coat, besides priming, and have a coat of varnish.

Painted Walls.—The plastered walls of kitchens, pantries, bathrooms and rear entries and stairways to have a coat of sizing and two coats of paint of colors as directed.

Heating Apparatus.

Provide and fit up in cellar two approved steam heating boilers, one for each tenement, with all necessary steam pipe and radiators, with valves, to properly heat the several parts to 70 degrees at zero weather. Connect boiler to water pipe left by plumber and to chimney with properly heavy galvanized iron smoke pipe, having all necessary dampers, chains, &c., to work automatically. To allow each to figure alike and owner to have his choice of boilers, there will be an allowance made of $520 for the above, which is intended to complete the work in every detail.

Papering and Picture Molding.

The contractor is to figure in $80 for purchasing material and properly fitting in place the paper and picture molding for the completion of the work in best manner. The walls of kitchens, bathrooms, pantries and rear entries are to be painted and are included in painter's contract. The owner is to select materials and have credit for all less than and pay for all over the above specified amount for this work.

Gas Piping Work.

Provide and fit up in a thorough, workmanlike manner all the gas pipe necessary to carry gas to the several outlet marked on drawings (thus ⊕). All pipe to be sizes and quality to conform to the gas company's rules and regulations. The main pipe is to continue through cellar and connect to street service. All pipes and outlets to be properly graded and fastened in place with plumbers' iron clips and screws.

Plumbing Work.

The work is to be done and finished in every part so as not to delay any other workmen, in a good, substantial and workmanlike manner.

To be a sewer pipe connected to street sewer and continued to cellar of best tile 6-inch soil pipe, with joints made with Portland cement. From this run a 4-inch iron soil pipe, with house trap and fresh air inlet just inside wall. Continue soil pipe through cellar to kitchen and bathroom fixtures, then up through building and out through roof 2 feet, all flashed tight. The pipe for bathroom to be 4 inches and the one for kitchen to be 2-inch pipe, leaving out the proper Y's to connect the several branches onto. All traps and fixtures to have proper backover pipe connected to main soil pipe above the highest fixture connection. All joints to be made in proper manner with brass ferrules, oakum and molten lead.

Kitchens.

Provide and fit up, where shown, one Alberene soapstone sink, 22 x 40 x 8 inches deep, with shelf and soap cup. The back and end to be 12 inches high. To have brass outlet and two nickel plated compression bib cocks. The front of sinks to flare to correspond to trays.

Provide and fit up at end of sink one set of two-part soapstone wash trays, with soap cups and back 12 inches high. To have brass outlets and two nickel plated bib cocks, plugs, chains and stays complete.

Provide and fit up in closet off kitchen one regular 40-gallon copper hot water boiler, set on a cast iron painted stand. To have all couplings, cocks and expansion pipes complete. To be supplied with water from attic tank through ½-inch brass pipe.

Bathrooms.

Provide and fit up in each bathroom one Record low down combination water closet, with siphon jet hopper bowl. Wood work for tank and seats to be quartered oak, with polish finish.

Provide and fit up one oval earthen ware wash bowl, connected to an Italian marble slab 1⅛ inches thick with dished top. To have O G edges and corners cut to a 9-inch radius. Back to be 10 inches high. Slab to be supported on N. P. brass brackets. To be fitted with china Index compression basin cocks and brass waste.

Provide and fit up one Standard make 2½-inch roll rim iron bathtub, porcelain enameled inside and on roll. To have compression double bath cocks, overflows, waste, chain, rubber stopper and soap cup. All exposed fittings, pipe and fixtures not otherwise mentioned to be nickel plated.

Attic.

Provide and fit up near rear chimney one 16-ounce copper lined wood tank to hold 40 gallons of water. To be supplied with water through ¾-inch galvanized iron water pipe, with ball cock and float. To have an overflow pipe run to nearest sink.

Outside.

Provide and fit up, where directed, two nickel plated compression hose bib sill cocks for watering outside. To be connected to ¾-inch galvanized iron pipe in cellar.

Cellar.

Provide and fit up, where directed or shown, in each cellar one 24 x 14 x 6 inch plain iron half-circle sink, supported on two iron brackets. To have one good hose bib cock for cold water only. Leave out a branch with shut off for each boiler.

Branch Pipes and Wastes.

Each sink, tray, bowl and bathtub, except otherwise specified, to be provided with hot and cold water through ½-inch iron size American Tube Company seamless drawn brass pipe branches, and waste through 1¼-inch lead pipe connecting to a 4-inch round trap with cover.

Supplies.—Each kitchen and bathroom to have its own separate supply of ½-inch iron size brass pipe, with shut off in cellar.

Cellar Pipes.—The main pipes in cellar to be best ¾-inch galvanized iron water pipe. This will connect to main street supply, and continue along into cellar and connect to the several risers going up through and the two sinks in cellar.

Refrigerator Waste.—To be a coppered drip pan set into floor in rear hall to receive waste from refrigerator. This to continue down and drip into ash pit.

Detailed Estimate of Cost.

The estimate of cost, as submitted in detail by the winner of the second prize, is as follows:

CELLAR WORK.	
227 yards excavating, at 25 cents	$56.75
91 perch foundation walls, at $2.75	250.25
35 perch rubble wall, at $4.50	157.50
Total	$464.50
MASON WORK.	
5,800 common brick for basement, at $17	$98.60
2,810 common brick for basement piers and partitions, at $17	39.27
Flashings, caps, thimbles and flue linings	39.00
2 fire places, at $17	34.00
20 M lath, at $4 per M	80.00
Labor on lath, at $2 per M	40.00
1,250 yards plastering, at 18 cents	225.00
Whitewashing cellar	7.00
153 yards concreting, at 65 cents	99.45
Total	$662.32
TINNING, CONDUCTORS, ETC.	
Ash chutes and sifters	$12.00
400 feet tinning, at 8 cents	32.00
Conductors	11.00
Flashings	16.00
Total	$71.00

ROUGH CARPENTER WORK.

17 M. spruce timber, at $20.50	$348.50
2,264 feet square edge boards, at $17	38.49
4,747 feet ⅞-inch matched spruce, at $20.50, for walls, attic and cellar partitions	97.31
5,381 feet ¾-inch matched hemlock, at $18.50	99.55
Plaster grounds and beads	9.00
250 feet sliding door sheathing, at $32	8.00
2 sets sliding door rails, at $4	8.00
2 clothes dryers, at $6.50	13.00
8,500 feet sheathing paper, at $2	17.00
18 M. shingle, at $4	72.00
4,500 side shingle, at $4.50	20.25
2,875 feet clapboards, at 5 cents a foot	143.75
Piazza supports	15.00
Bulkhead covers, steps and door	14.00
Total	$902.85

EXTERIOR FINISH, FRAMES AND SASH.

1,300 feet of lumber for cornices, corner boards, &c., at 4½ cents	$58.50
350 feet lumber for brackets, at 3 cents	10.50
332 feet 4½-inch crown molding	8.96
332 feet 2½-inch bed molding	4.98
176 feet 2-inch bed molding	2.11
126 feet 3-inch water table cap	2.26
332 feet 1-inch half round	1.99
162 feet 1¼-inch molding	1.21
275 feet 1½-inch molded brackets	2.47
4 outside door frames, at $2.50	10.00
1 outside front door, oak	10.00
3 outside rear doors, cypress, $4.25	12.75
8 cellar frames, at 85 cents	6.80
8 cellar sash, at 65 cents	5.20
8 cellar guards, at 75 cents	6.00
44 window frames, at $1.50	66.00
1 window frame	1.75
4 window frames, at $1.25	5.00
44 sash and glass, at $2.25	99.00
1 set sash	2.75
2 sets sash, at $2	4.00
2 sets sash, at $1.50	3.00
Weights and cords	27.00
44 shutters, at $1.05	46.20
2 sets outside steps	15.00
Total	$413.43

FRONT VERANDA FINISH.

134 feet matched 1⅛-inch flooring, at $35	$4.69
192 feet ¾-inch sheathing, at $30	5.76
422 feet lumber for cornice, posts, &c., at 4½ cents	18.99
31 feet balustrade for balcony, at 20 cents	6.20
35 feet 4-inch molding	.84
35 feet 3-inch bed molding	.63
55 feet 2½-inch bed molding	.82
35 feet 1¼-inch molding	.26
78 feet molding for caps	.93
Total	$38.82

REAR PORCH FINISH.

239 feet lumber for cornice, posts, lattice, &c., at 4½ cents	$11.76
35 feet 4-inch molding	.84
62 feet 2½-inch molding	.93
32 feet 1-inch molding	.19
32 feet 1-inch molding	.19
25 feet 2-inch molding	.30
52 feet balustrade rail, at 20 cents	10.40
Total	$24.61

INTERIOR FINISH.

1,582 feet pine flooring, at $25	$39.55
1,416 feet hard wood flooring, at $45	63.72
1,312 feet sheathing for wainscoting, at 4 cents	52.48
320 feet wainscoting cap, at 2c	6.40
384 feet floor molding, at ¾ cent	2.88
50 feet chair rail for dining room, at 2½ cents	1.25
512 feet 9-inch base, at 4½ cents	23.04
512 feet 2-inch base molding, at 1½ cents	7.68
102 feet closet base, at 3½ cents	3.57
44 door jambs, at 80 cents	35.20
46 cypress side finish for doors, at $1	46.00
30 hard pine side finish for doors, at 85 cents	25.50
13 whitewood side finish for doors of closets, at 40 cents	5.20
25 cypress side finish for windows, at 95 cents	23.75
12 hard pine side finish for windows at 80 cents	9.60
Work in connection with plumbing, electric and other fixtures	27.00
2 vestibule doors, at $4	8.00
2 sets slide doors, at $7	14.00
40 cypress doors, at $2.75	110.00
2 china cabinets, at $10.50	21.00
2 pantries, at $8.50	17.00
Closet shelving and cleats	6.00
Stair work	91.00
2 mantels, at $25	50.00
Total	$689.82

RECAPITULATION.

Cellar work	$464.50
Mason work	662.32
Tinning, conductors, &c	71.00
Rough carpenter work	902.85
Exterior finish, frames and sash	413.43
Front veranda finish	38.82
Rear porch finish	24.61
Interior finish	689.82
Electric work	19.00
Plumbing work	565.00
Gas piping	35.00
Painting and finishing	295.00
Heating apparatus	520.00
Wall papering and picture molding	80.00
Carpenter work	1,025.00
Hardware	100.00
Nails	38.80
Carting	42.00
Miscellaneous work	50.00
Total	$6,037.15

A Concrete-Steel Office Building.

More or less has appeared in the trade and daily press regarding the Ingalls Building, in course of erection in Cincinnati, Ohio, the notable feature being found in the fact that, while 16 stories in hight, it is constructed entirely of concrete-steel. Some interesting particulars regarding the building are contained in a paper recently read before the Indiana Engineering Society by H. C. Brubaker of Indianapolis, and from which we take the following:

This committee was instructed to investigate and report on the bold project of building a sky scraper, 16 stories high, entirely of reinforced concrete, and without a structural steel member. The ambitious plans of the promoters are no less striking, now that their plans have been carried out with success.

A monolithic mass, 100 x 50 feet in plan—21 feet below grade and 210 above grade—in which the footings, columns, walls, girders, beams and floors are all one and the same, differing only in shape and position, and continuous, without a joint or break, from the foundation to the cornice, and built of particles, so to speak, all of which could pass through a 1-inch screen, with no member larger than 3½ inches in diameter, is a marvel which rivals the pyramids.

The system used throughout the building is the Ransome system, which consists of twisted bars embedded in concrete. The columns are from 12 x 12 to 34 x 38 inches, and carry as high as 750 tons at the footings. The column stools are built of cast iron embedded in concrete, and are particularly interesting in design. The sizes of the columns were limited by the architectural design, and the deficiency in strength was made up by the iron bars, there being from four to eight 3½-inch bars to each column, bound together by hoops of wire each 12 inches in hight. The girders have as large spans as 33 feet and are from 27 to 36 inches deep, including thickness of floor, which is from 5 to 7 inches. The columns are spaced 16 and 33 feet. Intermediate beams make the floor panels 16 x 16 feet.

The loads on the floors were figured at 60 to 80 pounds per square foot for the upper floors, and 300 pounds for the first floor. The exterior walls between piers are 8 inches thick, and some walls next to adjoining buildings are as little as 3 inches thick. Of course, these walls carry no loads.

The first to third stories are veneered with marble, which is supported by projections from the concrete fitting into grooves in the marble. The upper stories are veneered with brick, which is supported at each story hight by a ledge of concrete.

The general features are strikingly similar to steel cage construction; in fact, the design is the same, and the loads, strains and stresses are figured in the same manner.

It is hardly our province to predict the weathering of this structure. Time only will prove its durability. But the large amount of money was expended and the enormous responsibility was assumed by men who evidently were thoroughly convinced of the success of their undertaking.

The same contractors (the Ferro-Concrete Construction Company) are building a factory building for the American Book Company in Cincinnati five stories high, with a floor load of 400 pounds per square foot. An interesting incident in this connection is the fact that they bid for this building in competition with mill construction and were only 4 per cent. higher than the bids for mill construction. The writer is at a loss to understand this small difference in cost between the two constructions, and is inclined to believe that they took the contract at little or no profit.

AMONG the improvements contemplated in the city of Memphis, Tenn, is a 15-story office building of skeleton frame construction, with incasing masonry of brick and terra cotta. The new structure is intended for the Memphis Trust Company and contracts, we understand, will soon be awarded.

REPORT OF AN EXPERT ON THE BALTIMORE FIRE.

AMONG the many reports compiled by prominent engineers and architects as a result of their investigations of the fire proofed steel structures within the fire zone of Baltimore's recent conflagration, the one which has perhaps been most eagerly awaited is that prepared by E. C. Shankland of Chicago. While his deductions from the scientific data furnished by the fire were accompanied by photographs, &c., we are reproducing herewith only such as show features of interest, in addition to those presented in our issue for last month. In summarizing his conclusions Mr. Shankland in part says:

It seems to me the most important lesson this fire teaches is the necessity for better workmanship and more improved methods on the lines already laid down. A few years ago it was common practice to put only a 1-inch thick plate of hollow tile on the bottom of the floor, and this plate, on account of its thinness, had to be fastened to the beams with metal clips. Within the last four or five years, however, the best practice has increased this thickness to 2 inches. The superiority of the latter is shown in the Continental as compared with some of the older buildings where the thin soffit covering was used. Then, in order to reduce the dead weight, the architects have insisted on, and the manufacturers have furnished, tile having the minimum weight per square foot. This necessitated ribs which are too thin and which easily break at the fillets. The ribs should be made thicker and fillets made stronger.

More care should be used in setting the tile. The webs and flanges of all beams should be first plastered before tile is set in place.

View of Rear of Continental Trust Company's Building, showing the brick wall which was so seriously damaged that it will have to be taken down. The cause of the injury was the method of construction; metal ties being used for bonding the bricks.

Report of an Expert on the Baltimore Fire.

Above all, the steel columns should be fire proofed first, and all pipes, tubes for wires, &c., should be placed outside of the fire proofing.

Means should also be devised to so run pipes, &c., as to do away with the necessity of cutting and mutilating the fire proofing by the electricians, plumbers and others. This is very important, as there is always more or less cutting of the fire proofing, and in some cases the damage is considerable.

Cast iron and steel mullions should be discarded, but brick mullions of sufficient size to allow them to be properly backed up with brick should be used. This will reduce the size of the windows, but in most cases this can be done without serious damage to the building.

Granite and other stone will continue to be used for lower stories, but should not be put in any stories above the second or third.

Ornamental terra cotta has shown itself to be much inferior to brick, and the latter should be used as far as possible. Where enameled or press brick is used for facing it should be bonded into the brick backing by using headers, and not depending on the metal clips. When terra cotta is called for it should be solidly backed up with concrete, and all hollow spaces completely filled with same.

It has been said a great many times since this fire that the use of all wood, including the floors, should be discontinued.

It is certain that wire glass and metal sash in smaller frames than are now in buildings should be used, and wood trim avoided or made as small as can be done. As to wood floors, architects have tried many times to put mosaic or concrete floors in the offices, but the tenants will not have it, and the architect has had to abandon the scheme in every case I know of.

That the fire proof buildings acted as a fire stop to a greater or less extent is shown on the St. Paul street front of the Court House.

Opposite the *Herald* Building the front is all right, but north of that, opposite a brick building on the corner of St. Paul and Lexington streets, which was entirely destroyed, the cornice and upper part of the Court House are badly cracked and spalled.

Overhead wires are a menace and should not be allowed in a district like this. It was a live wire that cost Baltimore the services of its fire chief at the very beginning of the fire, and overhead wires have proved a serious obstacle to fighting fire in many cases.

Continental Trust Building,

Southeast corner of Calvert and Baltimore streets.

This is a 16-story building of skeleton construction. Exterior walls are granite in the two lower stories, and brick with terra cotta mullions above. The court has face brick with no headers, the brick being fastened to the backing by metal binders. The fire proofing is flat hollow tile arches and hollow tile partitions, the tile being semiporous. The fire seemed to hit this building on three sides, first striking the west face, then going north, then east, and getting into the court on the east side. The flames seemed to be most severe in from eighth to eleventh floors. The steel frame in this building is in perfect shape, as good as when first erected. I saw one or more columns on every floor from second to sixteenth, where the column covering had gone, leaving column exposed from floor to ceiling, showing column and floor beam, connections and column splices. Where the column fire proofing failed it was in almost every case on the corridor side. One column had a piece of wood wedged in between the angles to fasten pipes or electric wires to. I cut it with a knife and found it was not even scorched. However, every column that was so exposed had pipes and wire conduits running alongside the column inside the fire proofing. This will be referred to later in the summing up. The upper floors of this building are now practically lofts, all the partitions being gone. Every bit of wood in this building above the two or three lower floors is gone. The floor strips imbedded in the concrete to which is nailed the wood in floor, the nailing strips in the joints of the brick and tile for fastening the trim, are all completely destroyed; not even a piece of charred wood can be found. The tile floors are in very good shape for the most part, although in some cases the tile covering the lower soffits of the floor beams has fallen, exposing the beams. The contents of the book tile vaults throughout the building were in many cases entirely destroyed. The safety vault in the basement, however, was uninjured, and this is true of all safety deposit vaults in the burned district. The exterior granite is badly cracked and will have to be replaced. The brick above is in good shape, but the terra cotta is in many instances badly warped and cracked; this is noticeably true of the north face. The exterior of the court is destroyed and will have to be replaced. The face brick has fallen off in large areas, due to lack of headers. [See the accompanying illustration.] The cast spandrels are twisted all out of shape and have forced the spandrels away from the steel frame as much as a foot in some cases. The result as far as this building is concerned is that all the exterior granite, a great deal of the terra cotta, and all the court walls will have to be taken down and rebuilt. The steel frame is intact. A large percentage of the floor and column fire proofing is also apparently uninjured, although it will require an exhaustive examination of all the fire proofing to determine how much of it can be allowed to remain in place. This applies to the fire proofing of all the buildings examined. The balance of the interior is entirely destroyed.

Calvert Building,

Southeast corner St. Paul and Fayette streets.

Thirteen stories, skeleton construction. Exterior walls are granite first two stories; above, brick and terra cotta. Hard burned tile was used for floor arches, column covering and corridor partitions. Interior partitions for the most part were mackolite. The stone, especially on the west face, is badly cracked, and the terra cotta in the court is so spalled off and cracked that much of it will have to be replaced. Had terra cotta been omitted from the court walls the first cost would have been less, and the court would have been intact to-day. A column in the eighth story of this building buckled on all four sides about half way from floor to ceiling. The column is made of two channels and two plates. The plates buckled about 4½ inches, and the channels about one-half as much. This floor was used by the auditor of the Baltimore & Ohio Railroad, and it was said the old tissue paper copies had been piled around the column. Fine paper ashes are in some places 2 feet deep on this floor. The buckling of this column has settled all the floors above, but, aside from this, the whole steel frame is in perfect condition. Where the buckling took place the fire proofing of the column was defective, perhaps from being cut when electric wires or plumbing and gas pipes were put in place. In this building, as in the Continental, one or more columns in every story were exposed, allowing a careful examination of the steel work and the connections to be made. The tile floors are in fair condition, although the tile did not stand as well as in the Continental, and the bottom of the beams is exposed in many cases. The corridor partitions are mostly down and the mackolite partitions completely destroyed. In the basement there was a pile of these mackolite blocks which had been water soaked, and a stick could with ease be pushed several feet into the mass.

Equitable Building,

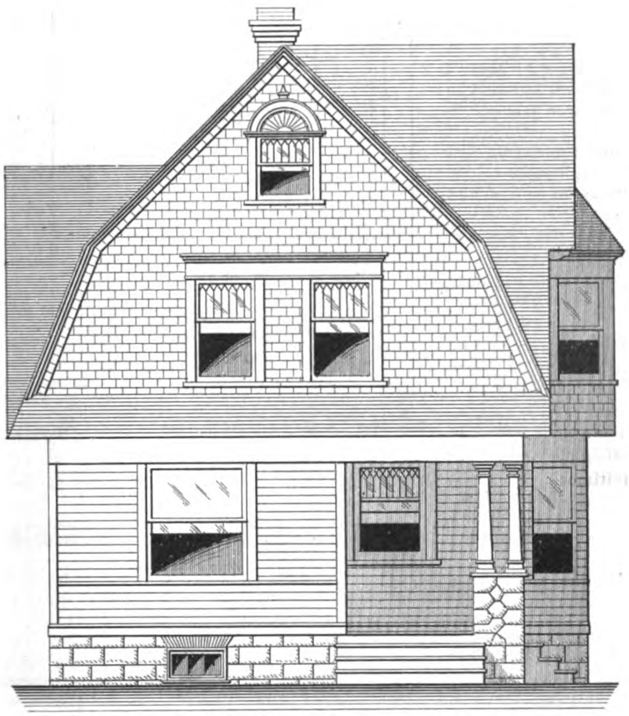
Southwest corner Fayette and Calvert streets.

Nine stories. Outside walls are of granite, brick and terra cotta, and are self supporting; on court side columns are placed next the walls to carry the floors. Cast iron columns and iron beams are used. The floors are 6-inch segmental hollow tile arches, 8-feet span, with 4-inch rise. There is no cinder or other filling on top of these arches, but wood strips were placed on the beams and the floor nailed to them. There was thus an open space between the tops of the arches and the floor, which became a regular flue in the fire. It was the burning of these strips and floor that allowed so many safes to fall through the floor arches and down into the basement. The exterior walls are in fairly good condition, except the granite, which is badly cracked, especially on the west face. The bottoms of most of the beams are badly twisted and bellied and will have to be replaced. The columns are in better condition, although their covering is off in most cases. This column covering was, I am informed, made of lime and cinders, a composition called "Limeateal." The concrete block partitions are destroyed. This building is in much worse condition as regards the frame and floors than any other of the fire proof buildings. The floor beams and girders are very light, and, judging from the way the beams are deflected and twisted, the iron work must have been cut to the last pound when it was designed.

A FRAME COTTAGE AT SCHENECTADY, N. Y.

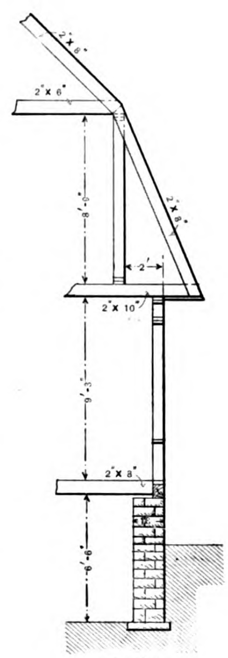
THE drawings reproduced upon the pages which immediately follow relate to an eight-room frame house, with four rooms on the main floor and four sleeping rooms and bath on the second floor. It was erected for R. F. McCord, and is pleasantly located on Union street in the city of Schenectady, N. Y. The house is of balloon frame and in the construction hemlock timber was employed.

According to the specifications of the architect, all trimmers and headers are doubled, as are all floor timbers under partitions. The first-floor and attic joists are 2 x 8 inches; the second-floor joist 2 x 10 inches, the plates are 4 x 4 inches; the sills, 6 x 8 inches; the girders, 8 x 10 inches; the common rafters, 2 x 6 inches; the hips and valleys, 2 x 8 inches; the corner posts, 4 x 6 inches, and the collar beams, 4 x 6 inches. The floor joist are placed 16 inches from centers and the rafters 24 inches from centers. The studding is 2 x 4 inches, placed 16 inches on centers, there being three studs in all angles and all have one row of bridging. The outside frame of the house is covered with sheathing boards, over which is laid two thicknesses of building paper, this in turn being covered for the first story with 6-inch beveled pine siding laid 3 inches to the weather, while the second story, gables and roofs are covered with pine shingles dipped in Cabot's shingle stain and laid 5½ inches to the weather.



Front Elevation.--Scale, ⅛ Inch to the Foot.

A Frame Cottage at Schenectady, N. Y.—G. H. Abrams, Architect, Schenectady.



Section.

The floors are double, the under one of both stories being ⅞ x 9 inch ship lap hemlock. The finishing floors of the first story are of comb grained Georgia pine, while those of the second story are of North Carolina pine. Each floor has three rows of 1¼ x 3 inch spruce bridging.

The interior finish on the first floor is cypress and on the second floor is of pine. The front stairs are of oak, having 6 x 6 inch square newels and turned balusters. The attic stairs are of pine. The front door is of oak. The kitchen is wainscoted 3 feet high and the bathroom 4 feet high, with ⅜ x 2½ inch beaded North Carolina pine. All ceilings and walls throughout the house are plastered with two coats of lime and hair mortar. The last coat is a skin coat of plaster of paris and putty, and is left smooth for papering. The house is wired for electric bells and electric lighting.

The exterior of the first story is treated with two coats of paint, while the second story and roofs, as already stated, are covered with shingles dipped in Cabot's shingle stain. All natural wood interior finish has one coat of filler and two coats of Pratt & Lambert's No. 38 Preservative. All pine wood work of the second story has three coats of paint, while the metal work has two coats of metallic paint. There is a cellar under the entire house 6 feet 6 inches in the clear and the foundation walls are laid with local bluestone in good cement mortar. The walls above the grade are pointed with black cement mortar.

The house here shown was designed by G. H. Abrams of 12 and 13 Gazette Building, Schenectady, N. Y., and cost to build something like two years ago $2000, divided about as follows: Excavating, stone work, brick work, lathing and plastering, $425; carpentry work, including tin work, roofing, hardware or materials, $1371; painting, $175; plumbing, $25. The contractor who executed the work was A. B. Williams, of the city named. Probably at the present time the cost would show something of an advance on these figures owing to the increased cost of labor and materials.

A Mammoth Power House.

A power house which will be notable among structures of its class is the building which is now under way in Long Island City for the Pennsylvania and Long Island railroad companies. The building will cover an area 195 x 265 feet, will be two and one-half stories in hight, and will cost in the neighborhood of $450,000. One-half of the foundations are at present being prepared, sufficient for the western half of the structure which is to be erected at once, as the present building will be only one of three units which it is expected to put up during the ensuing year. The excavation of this section is from 12 to 15 feet, and owing to the swampy nature of the soil over 8000 yellow pine piles have been driven. Over the tops of these piles is a layer of concrete 6 feet thick, and as it was spread at the rate of something like 300 cubic yards a day, the foundations were completed about April 1. The main building will be of brick, with an iron frame; will measure 200 x 500 feet in plan, and have an altitude of 125 feet measured from the floor. The boiler house adjoining will be of brick, two stories in hight, while the stacks of steel, cement lined, will number six, each rising 300 feet above the roof.

Working Rules and Wage Scale of Chicago Painters.

At a meeting held on March 15 the Chicago Master Painters' and Decorators' Association adopted the following wage scale, which had been drafted by a committee appointed at the previous meeting:

Resolved, That the following rules and wage scale will form the basis of all dealings with our employees:

1. That we, as employers, reserve the right to hire and discharge whomsoever we see fit.

2. That eight hours shall constitute a day's work, which will be between the hours of 8 a. m. and 5 p. m.

3. That 40 cents per hours shall be the minimum rate of wages.

4. All overtime on regular working days shall be paid for at the rate of time and one-half. All work done on Sunday, Christmas, New Year's Day, Thanksgiving, Decoration Day, Fourth of July and Labor Day shall be paid for at the rate of double time.

5. That the foreman shall be the agent of the employer and that no person shall have the right to interfere with workmen during working hours.

6. That all workmen are at liberty to work for whomsoever they see fit.

7. All car fare over 10 cents per day shall be paid for by the employer.

8. When journeymen are sent out of city and cannot return to their respective homes each evening their board shall be paid by the employer.

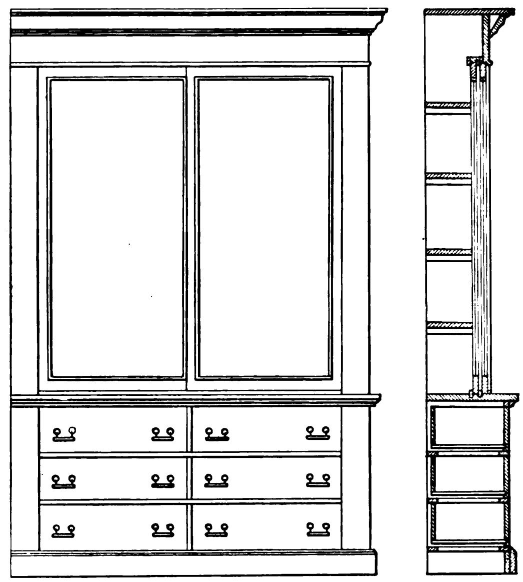
9. Any man going to work leaving the shop before 8 o'clock in the morning shall stand no loss of time if not able to get to work on time on account of distance or accident.

10. Under no circumstances shall there be a sympathetic strike.

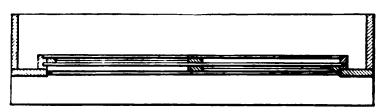
Builders Wages in Australia.

According to a late issue of one of the Australian papers, the Builders' Laborers' Union of Sydney has adopted the following revised schedule of rates and conditions of labor which may prove interesting to mechanics in this country. The equivalent in our money may readily be found by considering an English shilling as 24 cents:

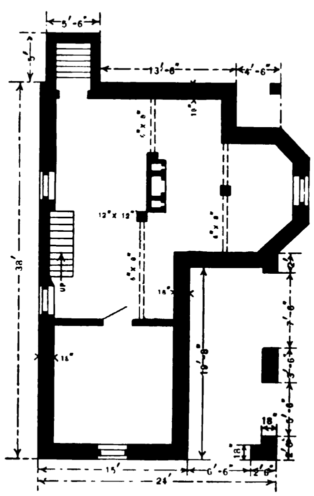
This union recognizes the hour system as the basis upon which all payments are to be made, and the minimum rates of wages shall be as follows: Bricklayers' laborers, when working for subcontractors (piece work jobs), 1 shilling 3 pence per hour; day work or *bona-fide* contract jobs, 1 shilling 1 penny per hour; gear and



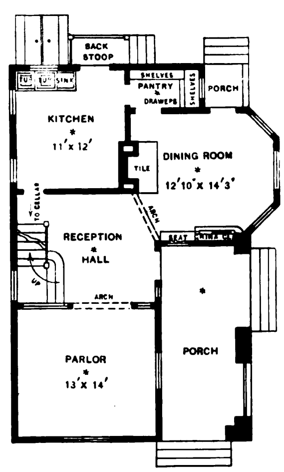
Elevation and Section of China Closet.



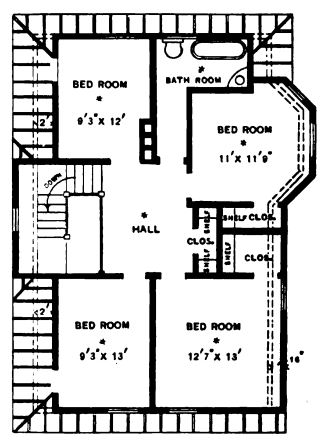
Plan.—Scale, ½ Inch to the Foot.



Foundation.



First Floor.



Second Floor.

Scale, 1-16 Inch to the Foot.

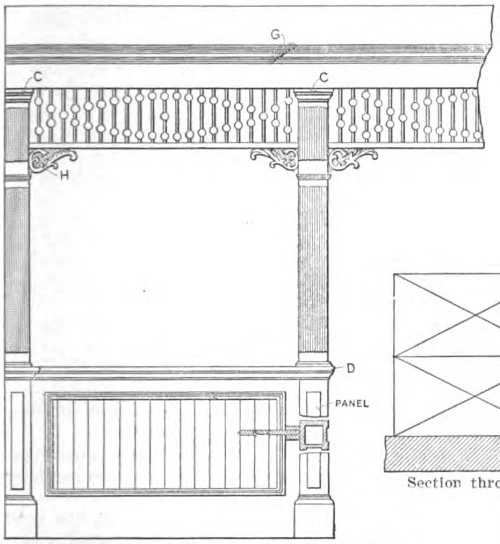
A Frame Cottage at Schenectady, N. Y.

scaffold hands, 1 shilling $1\frac{1}{2}$ pence per hour; dogmen, 1 shilling $1\frac{1}{2}$ pence per hour; plasterers' laborers, 1 shilling 1 penny per hour; masons' laborers, 1 shilling 1 penny per hour.

The hours of labor shall be 48 per week, working time

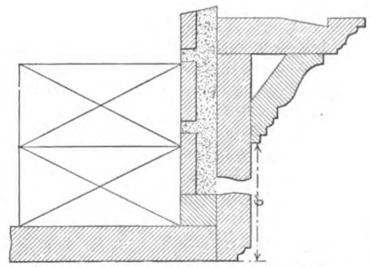
All time worked over eight and three-quarters hours on the first five days and four and one-half hours on each Saturday shall be classed as overtime.

No member shall carry more than 12 bricks on a hod, nor shall he wheel more than 45 bricks in a barrow.



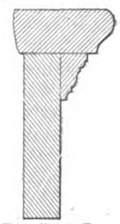
Partial Elevation of Grille and Arch Between Parlor and Reception Hall.—Scale, ⅜ Inch to the Foot.

Detail of Ornament at H.



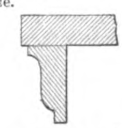
Section through Inside Cornice at G.

Section of 10-Inch Base.

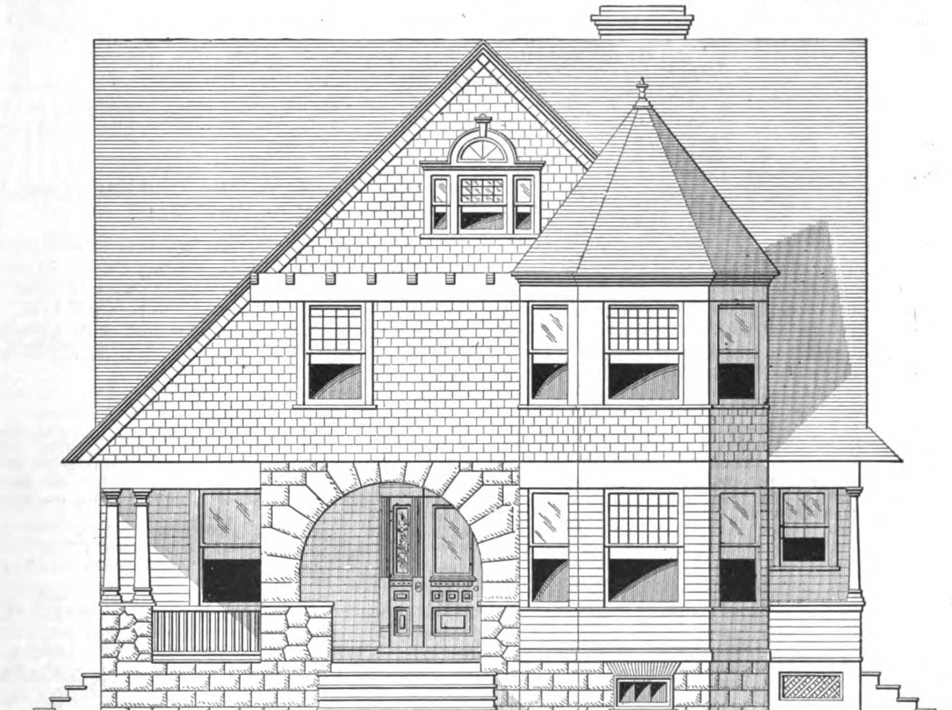


Detail at D.

Detail of Door Casing.
Scale, 3 Inches to the Foot.



Section at C.



Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

A Frame Cottage at Schenectady, N. Y.

not to exceed eight and three-quarters hours on each of the first five days of the week and four and one-half hours on Saturday.

All overtime to be paid for at the rate of time and a quarter for the first four hours, and time and a half for every hour after the specified time; Eight-Hours Day, Christmas Day, Sunday and Good Friday to be paid double time.

No members shall be allowed to take work by contract in the following departments: Bricklayers, plasterers, masons, laborers, dogmen, gear and scaffold hands.

Any member incapable, through old age or infirmity, of doing an ordinary day's work shall be allowed to make the best terms possible with the employer, provided he lays his case before the union. A majority of votes shall decide whether he be eligible under this rule.

Cost of Building Trades Strike Last Year.

In view of the recent situation in the building trades in New York City which resulted in tying up building operations for some time, the seventeenth annual report of the State Board of Mediation and Arbitration, transmitted to the Legislature a few weeks ago, cannot fail to prove of more than ordinary interest to all those engaged in industrial pursuits. According to this report, the fiscal year ending September 30, 1903, was marked in New York State by greater industrial disturbances in the way of strikes, lockouts and labor disputes than any previous year except 1886. That these disturbances have been costly both to the employers and the employed goes without saying, but the extent of the losses will doubtless be read with surprise.

The number of strikes and lockouts during the year under review exceed those of 1892 by 50, there being 192 in 1903. The statement is made that the strike in the building trades and of the excavators and rockmen of New York City caused more lost time than all of the 142 labor disputes the previous year.

The report admits that the strikes for the recognition of the union were, as a whole, unsuccessful, and says that the demand for the recognition of the walking delegate in New York City, which was lost, was the cause of the labor unions losing the recognition of their union demand. In the majority of cases the report says that where strikes were for increases of wages the men were victorious, but in the strike of the 22,000 excavators and rockmen in New York City, which proved a failure, the number of employees who won no advance in wages far exceeds the number of employees who did. Of the 30 important disputes in the State 20 were in New York City, the following table showing the effect in those industries in which our readers are more particularly interested:

Trade.	Employees concerned.	Duration. Weeks.	Estimated days of work lost.
Building trades	25,834	22	1,707,019
Excavators and rockmen	22,000	6 1-3	836,000
Carpenters	7,000	8 2-3	322,000
Steam fitters and helpers	1,175	9	64,625
Truck drivers	2,400	6 1-3	63,200
Boiler makers and iron ship builders	3,000	17	52,200
Plasterers and laborers	2,600	2	31,200
Inside structural iron workers	900	5	27,900

The report deals at considerable length with the strike in the building trades in New York City, and says:

One great dispute overshadows all others in the record of strikes and lockouts for 1903. The conflict between associated capital and organized labor, which brought building operations in New York City practically to a standstill for several months, was without doubt, in point of numbers concerned and losses sustained, the greatest industrial dispute in the history of the State.

Outside the general building dispute in New York City, 73,871 work people were directly concerned in this year's disputes, and they lost in the struggles over 2,000,000 days' work. Besides these there were at least 7000 others who, though not participants, were thrown out of work and lost more than 200,000 days' time. If to these be added 25,834 who were directly, and 11,203 who were indirectly involved in the metropolitan dispute, with a loss of over 1,700,000 days, the aggregate mounts up to over 117,000 employees concerned and 3,900,000 work days lost. These figures, even without any allowance for the incompleteness of the record, indicate that 1903 was marked by a greater disturbance of industrial relations in disputes than any previous year, with the possible exception of 1886.

More than one-half of the 1903 disputes were in the building and metal and machinery industries, with 59 in the former and 48 in the latter.

With the exception of the Greater New York Building Trades Employers' Association, the general tendency of employers' associations appears to be to insist on what is termed "the open shop" principle, or, in other words, attempting to eliminate the labor union as an essential factor in making contracts or trade agreements, and especially to eradicate the power or authority of the union's business agent or delegate, as applied to the relation between employer and employed. The union, on the other hand, claims the right to regulate the employees' interests, and in many trades the right to exact conditions which provide for employment of union workmen only.

The board recommends the adoption of the five following principles as means to establish peaceful relations between employer and employee:

The right of either party to organize and present to the other any proposition, petition or request affecting their relations as employer and employed.

To give at all times consideration to any proposition, petition or request relating to relations between employer and employed.

The right of the employer to enforce discipline must always be conceded, and the right to employees' representatives to protest against discrimination must be granted.

Every possible general condition and contingency of employment should be provided for by schedule or contract. Those not so provided for should be subject to arbitration by an impartial tribunal.

Employers or employees who prefer to act as individuals rather than as part of an association are given that right under the law and must be allowed to exercise it.

Rates of Wages in the Building Trades in New York State.

As being of general interest to a large class of readers, we present herewith a table showing the wages paid in the building trades in the leading cities in New York State, the scale being based on the rate per hour. The figures were compiled for the New York State Association of Builders, and have been revised up to March 15 of the present year:

	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	50	31-36¼	50	37½	....	25	45	34⅝	50	43¾	50	45	43¾	..	50
Bath	30-35	25-30	..	..	....	15	$1.50 M.	25	35	..	35	..	..	..	..
Binghamton	50	25	40	25	$12 week.	20	$1.50 M.	25	45	37½	43¾	43¾	$26\frac{7}{9}$	..	$26\frac{7}{9}$
Buffalo	50	35	45	37½	$21 week.	17-22	$2.00 M.	37½	50	43½	45	50	43½	50	35
Ithaca	40	31¼	..	..	....	..	....	..	40	37⅜	40	40	37½	..	28⅛
Jamestown	50	$30\frac{5}{9}$	..	..	$2.25 day.	20	....	$27\frac{7}{9}$	40	36	45	45	36	..	$27\frac{7}{9}$
New York	65	56¼	..	50	62½	25	50	50	68¾	56¼	56¼	62½	56¼	56¼	50
Niagara Falls	50	35	50	37½	30	20	3c. yard.	30	45	37½	50	50	37½	50	35
Olean	50	27½	40	..	27½	20	3c. yard.	25	40	30½	39	40	30½	..	30½
Rochester	50	35	31¼	37½	$2.50 day.	21-23	$2.00 M.	30	50	40	50	43	40	40	..
Troy	50	35	30	$30\frac{5}{9}$	....	15-25	35	32	50	38	50	35	38	45	30-40
Utica	45	31¼	45	25	31¼	20	30	34⅜	45	34⅜	45	43¾	34⅜	..	31¼
Watertown	45	27½	45	45	25	22½	$1.50 M.	28	45	40	45	45	30	25	40

How these figures compare with the rates of wages prevailing the first of the year in some of the more important cities of the country may be seen from an examination of the table which we present on page 92 of the issue of *Carpentry and Building* for March of the current volume.

REAL ESTATE men in Chicago seem to be of the opinion that more up to date apartment houses are to be erected in the city this spring and summer than for many years past. The South Side is taking the lead, and probably will have more new buildings of this character than any other section of the city.

OUT-DOOR FURNITURE.*

BY PAUL D. OTTER.

THERE are few seats made entirely of tree limbs which are comfortable, unless by a rare combination of parts and considerable care given to whittling off the bumps. From observation relative to the durability of any kind of open frame work the carpenter is well experienced, and should use rustic work in a restrictive way, knowing well that material which has been milled and surfaced will, like the duck's back, shed water freely when it has been treated with oil and paint. With this thought in mind, tree limbs should be used in a subordinate way, and a structure for strength made up of framed parts with joints should, before being brought together, be freely coated with white lead or coal tar. Neither should broad surfaces be brought in close contact to absorb and retain moisture, but rather relish out, if possible, leaving sufficient stock for a good bearing. Then, as in the case of many pieces illustrated which are portable, they may be put under cover of the barn or outbuilding at the close of the summer. The pieces shown in Figs. 2, 3, 7 and 8 may be considered as fixtures, as Fig. 9 and particularly Fig. 7 are intended as a support to the rose or the honeysuckle vine. There is a certain charm in making nature still more eccentric by rustic work. If it is used, as at the end of Fig. 8, as a lattice for vines and creepers, it is more in conformity than using smooth lath arranged in conventional shapes.

The writing desk pictured in Fig. 9 will no doubt be conducive to a flow of thought, and—and—ink likewise, should one happen, which is very often the case, to have two trees standing about 6 or 7 feet apart. A board, reinforced underneath with cleats, can then be fitted between the trunks at the proper hight and angle for a swivel chair, which may be easily constructed, as shown, to set over the post. A heavy bolt welded to the iron plate secured to the bottom of the seat may be dropped into the hole in the post, having several wrought iron washers to intervene, so as to allow the chair to swing around underneath the desk, while at the proper hight is placed a rest for the feet.

The swinging settee shown in Fig. 10 will be a source of genuine comfort on a hot afternoon, when reading is the intention, but sleep the usual ending. Devoid of padding on the arms, there is no especial attraction for an afternoon nap. It is predicted, though, many fancy pillows will be found there. This, with the swinging motion from the chains, will make a more desirable resting place than the hammock. The chains hang from hooks in the rafters of the porch, or heavy limb of a tree, are secured by plates bolted to the ends of the settee, the front chain secured to the seat frame, while the rear chain is adjusted at the proper balancing point near the arm or back post. Heavy No. 000 German chain should be used. The size of the seat should not be less than 23 x 72 inches, the framing consisting of 1¾ x 5 inch stock, the inner edge rabbeted out to receive slats ⅝ x 1¼ inch, to be nailed at intervals of ¾ inch. The upper face of these slats should be slightly ground. Another form of seat may be put in, like an old time sack bottom bedstead, and heavy duck, with seam and eyelets, worked in along the edge, through which rope is inserted in and out and around slots cut into the framing, stretching the material as the rope is pulled through the eyelets. The front and back legs are extended 12 inches below the top of the seat, in so doing making the settee useful in the dining or smoking room as a general lounging couch.

In Fig. 11 is seen a very readily constructed bench for the driveway or along a hedge. The settee, Fig. 12, will be convenient when located along the edge of the water or other place where the ground remains damp, the footboard being placed on a slight angle convenient for comfort. Should one possess a lake or river frontage, benches and other seat forms should be plentifully provided and located at positions giving the best view. Where the view-point is at an elevation toward the west, the greatest amount of pleasure is to be had watching the setting sun. This is a sentiment appreciated by all. A comfortable seat in nature's theater will remind one that the last act of the day is the best and most beautiful of all.

(*To be continued.*)

Fig. 7.—Rustic Support for Rose or Honeysuckle Vines.

Fig. 8.—Seat with End Serving as a Lattice for Vines or Creepers

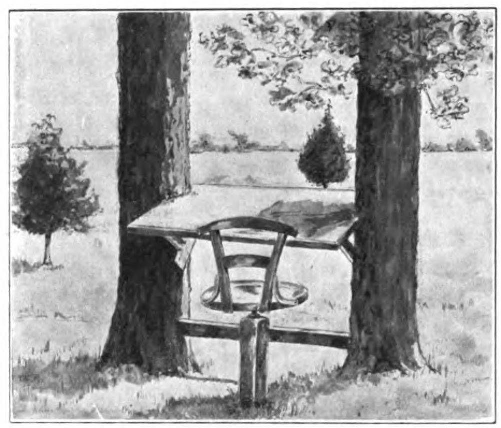


Fig. 9.—The Rustic Writing Desk.

Out-Door Furniture.

* Continued from page 76 of the March issue.

Test of a Concrete Floor.

Architects, builders and others interested in concrete construction witnessed a test recently made in Cincinnati, Ohio, of the concrete floor of the factory portion of the plant of the American Book Company, located at Third and Pike streets. Sacks of cement were used for the load of 680 pounds to the square foot to which the floor was subjected. The deflection of the beams after two days' test is said to have been only about 5-16 of an inch. The floor is to carry a live load of 350 pounds to the square foot.

The factory is a three-story structure, each floor having an area of 20,000 square feet. The business portion is a five-story building and on each of these floors there will be 9500 square feet of area. All the windows of the buildings will be sealed, the heating and ventilation being accomplished by bringing in the air through openings and purifying it by passing through a charcoal screen and a spray of water. A concrete reservoir on the roof will have a capacity for 100,000 gallons and will be connected with a sprinkler system for fire protection. There will be a 160-foot concrete and steel stack for use in connection with ventilation purposes.

Brick in Its Relation to Architectural Design.

One of the papers read at the eighteenth annual convention of the National Brick Manufacturers' Association, held in Cincinnati, Ohio, in February of the current year, was that by William B. Ittner of St. Louis, Mo., on the use of brick, in which the author considered the material in its relation to architectural design rather than from its constructive use. What he had to say is of such interest to our readers that we present the following extracts:

I am sure we will all concede the fact that for wall and foundation there is nothing quite as good as well burned brick. It will withstand the ravages of the elements better than any now known building material, and its strength has been equal to all the requirements of modern or ancient times. Crushed or broken to the proper dimensions, it forms an aggregate for concrete floor construction having every advantage over the material commonly used for this purpose. In fact, I know of no material to equal it as a fire resister.

It seems useless, therefore, to discuss this phase of the question. I will accept these facts as a truism, and endeavor to show that brick has an equally valuable quality from the standpoint of the artist, and record my modest but sincere plea for its more intelligent and general use in this direction.

In these days of plenty and variety in the market of the building trades, for the exteriors or facings of our buildings, and the public demand for it, it is only natural that the architect is fast losing that cunning in the legitimate use of brick for exterior effect which was characteristic of his brother practitioners of colonial days. Again, the introduction of the steel frame and concrete construction, necessitated through the demand of the present day, seems to be crowding brick from its most natural function—masonry wall construction—as well as to discourage its use for exterior effects.

The resources of this vast country, with its storehouses of granite, marbles and building stones, give the architect an excuse for variety and effect in some instances far beyond his ability to grasp; and the abuse of good material is evidenced in the façades or street fronts of most of our large cities.

The architect is not altogether to blame, however. The eternal striving for something new on the part of the owner, his desire to do something different and outshine his neighbors, must come in for its share of the blame. The final responsibility, however, must rest with the architect.

Then, again, there seems to have been a carefully planned conspiracy on the part of the brick maker to give us a material so artificial and perfect that it is almost a hopeless task to build a really beautiful wall.

These are, to my mind, some of the principal reasons why brick has been steadily losing ground as a material of architectural expression, if I may be permitted to use the term.

I dare say there are still those among you who insist that brick should be of a uniform size and color, that its faces should be as smooth as polished glass, and its angles and edges just as sharp—a perfect brick, it is true, from the maker's standpoint; but does it give the architect the material which may be handled with any degree of success? To meet the demand for variety, the brick makers have entered the field of color and molding. Brick is now obtainable in almost any desired shade, and, according to your catalogues, a variety of molded shapes can be obtained (until you actually need them) to please the heart of the most fastidious designer.

I know from experience that it is absolutely impossible to convince the brick maker that there is any beauty in a plain red brick wall; yet, do we not all admire the beautiful brickwork of the mother country, and the early work in America executed under its influence?

An analysis of the brickwork of the Continent shows that its prominent place in the decorative treatment of the buildings is due to the fact that, first of all, the brick are good and honest, being made of burnt clay. It matters not if in the burning they are slightly warped; it is natural that they should be; and why should they be exactly the same shade? Will not some of them burn harder than others, even with the same fire? Is it not natural, then, that when laid into the wall with a perfect bond the blending shades will produce the effects which we are trying so hard to obliterate?

In conclusion, my plea to you as the makers of the most honorable and ancient material with which it is our pleasure to deal would be for less attention to molded shapes and colors; a closer study of size with reference to scale and bond, rather than uniformity in size or color, and for a material which is thoroughly honest in make, but not so good as to make the exterior of our buildings an uninteresting monotony.

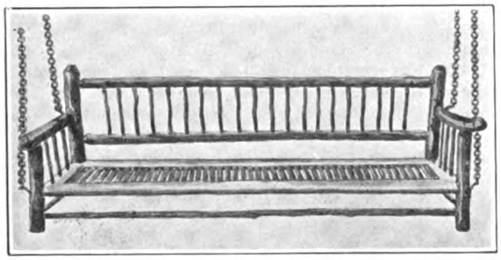


Fig. 10.—A Swinging Settee.

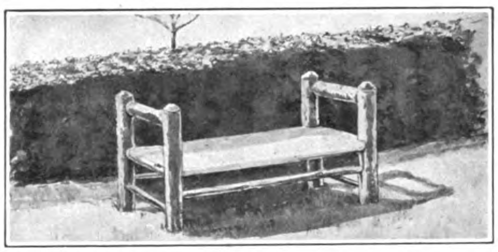


Fig. 11.—Bench for Driveway or Along a Hedge.

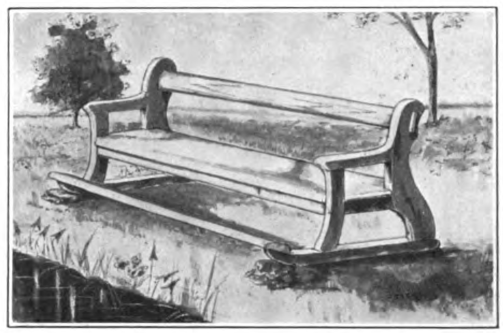


Fig. 12.—Settee for Borders of a Lake or River.

Out-Door Furniture.

IN connection with the recently formed Carpenters' Relief and Beneficial Association at Reading, Pa., it is intended to establish classes in drawing for the benefit of ambitious carpenters. The classes will be held nightly for the benefit of those desirous of better equipping themselves in the trade by acquiring a knowledge of blue print reading, drawing, &c.

CORRESPONDENCE.

Comments on First-Prize Design in Two-Family House Competition.

From A. E. C., *Vancouver, B. C.*—I have been favorably impressed with the First Prize Design in the Two-Family House Competition, published in the April issue, but am rather surprised to find that the main gutter is not shown on either the elevations, section or details. I notice that no deafening is supplied by the specifications. This I would consider necessary in a two-family house of this kind.

Preventing Porch Roof from Sagging.

From O. N., *Atkinson, Ill.*—I inclose herewith sketches showing my method of building round cornered porch roofs where there is a post only at each end of the quarter circle. The bottom of the timber is placed flush with the ceiling joist, as shown in Fig. 1; then I would use 2 x 8 or 2 x 10 inch stuff doubled, depending on the pitch of the roof. The rafter that comes in the center of the circular portion should be a 2 x 6, or two 2 x 4's, well fastened to the house and the cornice tied up to the rafters. The rafters near the end of the beam should be cut against the beam, and the ends of the beam will have to be hewn down to the roof level. Fig. 2 shows a plan view of that portion of the porch roof.

From L. L. H., *Glenwood, Ill.*—Replying to "C. C. H.," Brookville, Pa., I would say let his drawing as published in the March number represent the rafters instead of ceiling joist to the circular porch roof. Throw a spiked trussed beam, as shown in the accompanying sketch, Fig. 3, diagonally across under these rafters from post to post, and block each rafter firmly on this truss. The ceiling joist may be framed into this trussed beam or may be framed in line with it, securely footed and spiked to the ceiling joist running square from the corner of the house.

From W. B., *New Haven, Conn.*—Replying to "C. C. H.," Brookville, Pa., in the issue of the paper for March, I inclose herewith a sketch, Fig. 4, showing how to prevent the sagging of the circular cornice of the porch, which I hope will interest you. The distance from post to post appears to be about 11 feet, and a purlin 6 x 8 resting on each post supporting the rafters will carry the weight and leave the circular effect desired.

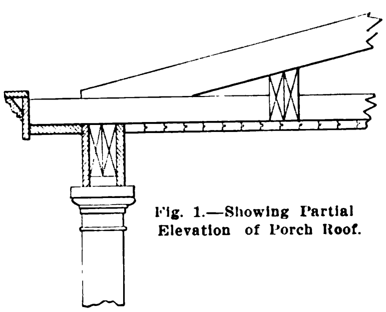


Fig. 1.—Showing Partial Elevation of Porch Roof.

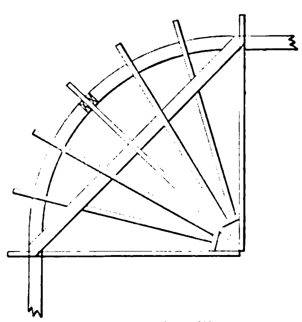


Fig. 2.—Plan View.

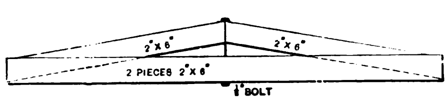


Fig. 3.—Method Suggested by "L. L. H."

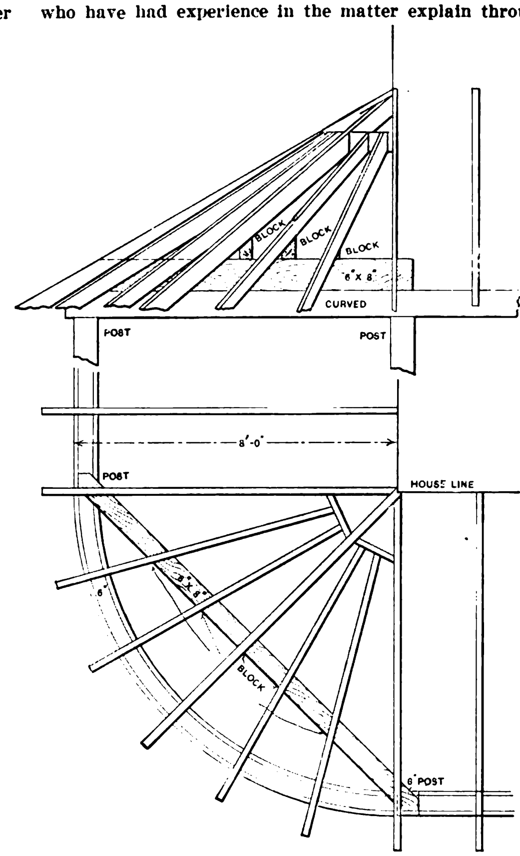


Fig. 4.—Drawings Submitted by "W. B."

Preventing Porch Roof from Sagging.

Securing Wood Trim to Brick and Stone Walls.

From H. R., *Joplin, Mo.*—Will some of the readers who have had experience in the matter explain through the Correspondence columns the methods they have used for fastening wood trim to brick and stone walls without the use of wooden plugs or blocks? Some of the architects are now specifying that all wood shall be fastened without the use of wooden plugs or blocks, and any information which might be forthcoming along this line would, I think, interest many of the readers.

Plank Frame Construction.

From F. K., *Cazenovia, Wis.*—I have read the reply of Mr. Shawver, in the January issue, on plank barn framing with a great deal of pleasure, for I am interested in barn building, as are no doubt many others. The barns we build out here are made of 6 x 8 and 8 x 8 oak timbers, but the timber will soon be exhausted. I would like to ask the editor if he could induce Mr. Shawver to describe his system of plank frame construction in a brief yet clear way, so that it could be easily understood for framing and raising plank barn buildings? I am one who would be very thankful to see it published in *Carpentry* *and Building*, and probably there are others who are situated like myself.

Note.—For the benefit of the correspondent, as well as others who may be interested, we would state that the construction of plank frame barns was very thoroughly covered in its various details in the serial article by Mr. Shawver which appeared in the issues of *Carpentry and Building* for January, February and March, 1898. If our correspondent has access to the volume of the paper for that year he can readily obtain a good idea of the method of construction advocated by Mr. Shawver. We, however, place the letter of our correspondent before the readers, and shall be glad to have him ask any questions concerning special features of the plank frame construction about which he may desire information. We will give the queries a place in the Correspondence department, and have no doubt that Mr. Shawver will take pleasure in affording full information regarding them.

Laying Hard Wood Floors.

From L. C. H., *Ridgetown.*—In the hope that what I may say will be of some use to "I. F.," Germantown, Ohio, or possibly to some others who may have had trouble in laying double floors of any kind, I will describe my method of doing the work, as suggested by long experience. If I want a good job I lay the upper or lower floor diagonally across the other, and if over an old floor, I place the new one more nearly at right angles than would otherwise be the case. In this way, if one marks the joist so as to make sure and nail into them, there is overcome any inequality in the lower floor. So convinced have I become of the advantage of this method that wherever a double floor is called for I invariably lay the lower one diagonally. Coming now to the question of "I. F.," I would say that if he would lay the floor diagonally, it would not hurt to take out an under board here and there, as it would stop the sweating. If he wants to nail near the ends, it will be necessary to bore holes, as hard wood will split if nailed too close to the ends. As for grooving both ends, I would say that there are lots of floors matched at the ends and bored every 8 inches. I see no use, however, of grooving both ends without putting in a false tongue. If I had the floor to lay and could not lay it diagonally, I should try and strip it with ½-inch strips.

Planed or Saw Joint in Finish Work.

From CURIOUS, *Newport, Ky.*—Will the readers of the paper give me their opinion as to whether in interior work the saw or the planed joint is the more satisfactory in the long run?

Squaring Up a Large Drawing Board.

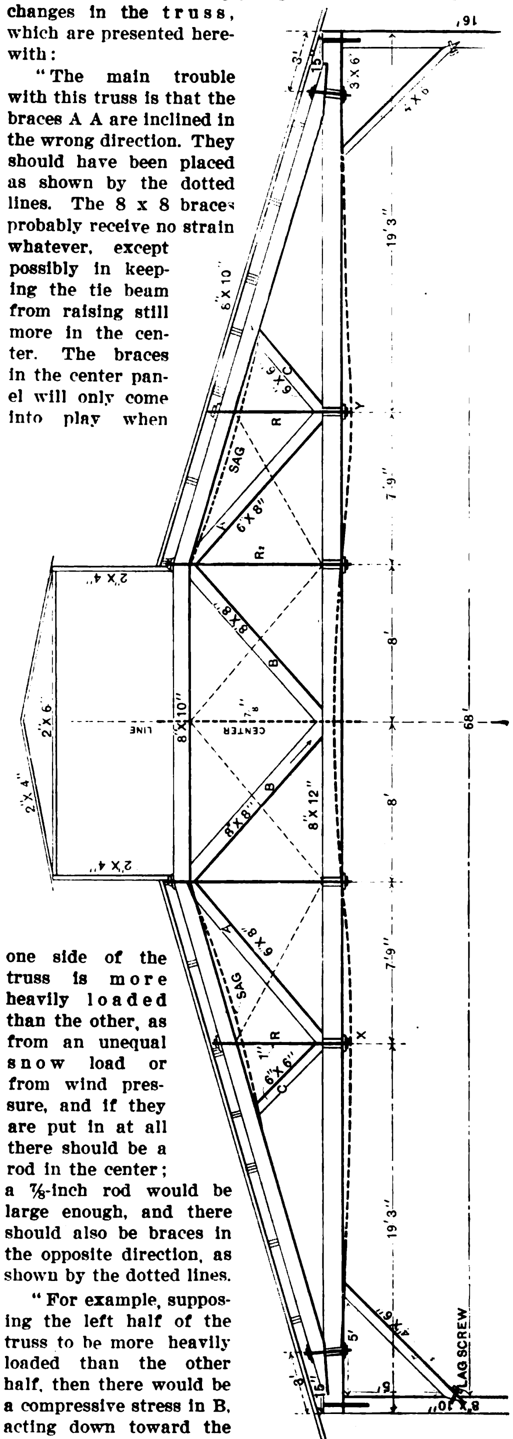
From A. L. W., *Carbondale, Pa.*—I would like to ask Mr. Kidder, or any of the readers who may be interested, how to square up a drawing board with trammel points, the sides of the board being perfectly parallel, but the size too large to make true with the steel square? The board, for example, is 36 inches one way and 30 inches the other.

Note.—There are various methods of accomplishing what our correspondent desires, but in order to draw out as many expressions of opinion as possible, we refer his inquiry to the readers for their consideration.

Truss Construction for an Annealing Plant.

From G. H. R., *Fairfield, Iowa.*—I am sending a blue print of a truss that was used in an annealing building 120 feet long by 70 feet wide. The structure has stood the storms for the last three months, and the lower girder is up in the center. The material is white pine, and the total weight of the roof and trusses is 19 tons, allowing 2500 pounds per 1000 feet of lumber. There are seven trusses used in the building. The director of the company which owns the building claims that the truss is not strong enough, and directs that a truss or brace be placed on top of the center portion, being that within the monitor top, and with a 1-inch rod running down through the center of the truss corresponding to the center line of the drawing. This, to my mind, is unnecessary, because the truss is now bowing up. Will some of the experts tell an old reader where this truss is weak and what would be the advantage, if any, of an added truss or brace on top?

Answer.—We submitted the drawing of our correspondent, together with his questions, to Frank E. Kidder, the well-known consulting architect, who furnishes the following comments in reply, together with some suggested changes in the truss, which are presented herewith:



Truss Construction for an Annealing Building.—Scale, ⅛ Inch to the Foot.—Dotted Lines Indicate Mr. Kidder's Suggested Changes.

"The main trouble with this truss is that the braces A A are inclined in the wrong direction. They should have been placed as shown by the dotted lines. The 8 x 8 braces probably receive no strain whatever, except possibly in keeping the tie beam from raising still more in the center. The braces in the center panel will only come into play when one side of the truss is more heavily loaded than the other, as from an unequal snow load or from wind pressure, and if they are put in at all there should be a rod in the center; a ⅞-inch rod would be large enough, and there should also be braces in the opposite direction, as shown by the dotted lines.

"For example, supposing the left half of the truss to be more heavily loaded than the other half, then there would be a compressive stress in B, acting down toward the center. The center rod will transfer the vertical component of this stress to the top chord, and B' will take it down to the bottom of R_1, which again will transfer it to the top, where it is taken by the main rafter and straining beam to the supports.

"With the other side of truss more heavily loaded, the other set of braces would be brought into action. If there was no possibility of unequal loading, the center rod and braces might just as well be omitted.

"The reason the tie beam is up in the center is probably because of there being no brace to support the upper end of rods R R.

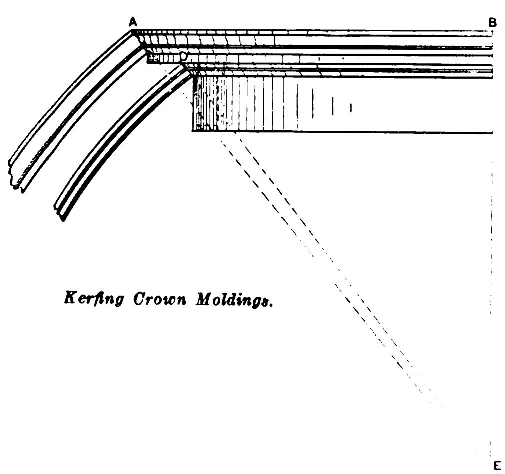
"The load from braces C must be supported by the tie beam and rafter, each acting as a beam; the tie beam, therefore, probably sags at X and Y, and is consequently bowed up in the center, as shown by the heavy broken line. If the tie beam and rafters had not been amply strong they would have broken and let the truss down. Braces A A could be cut out entirely for all the good they do now.

"I advise shoring up the truss at X and Y to bring the tie beam a little crowning at those points, taking out the braces A A and fitting them in as shown by dotted lines. They should be gained into rafter and tie beam. I would also put a ⅞-inch rod in center of truss, and an additional set of 4 x 6 braces, as shown by dotted lines, cut above and below the 8 x 8 braces. This will be better than bracing the straining beam. A good rule to remember, when designing trusses, is that *no rod or brace should be used in such a way as to cause a bending moment in the tie beam, rafters or straining beam.*"

Kerfing Crown Moldings.

From D. C. H., *Buckhanna, W. Va.*—In the March issue of the paper "U.G. K." of Harlan, Iowa, gives the rule for getting the distance between saw kerfs so that a piece of wood can be sprung around a given circle and the kerfs closed. If he had used the radius of circle 4 feet, in place of half the radius, in getting the distance from the trial kerf to the point at which he took his measurement for the distance between kerfs, he would have used the principle given by different authors of works on joinery. Should it be desirable to leave a straight end attached to the curved portion, the kerf next to it will have to be made with a saw only about half the thickness of the one used to make the kerfs in the circular part, as it springs only half as much as at the kerfs in the circular portion.

In answer to the correspondent's inquiry relative to kerfing crown moldings so that they can be sprung around circular work, I would say that a straight piece of sprung crown mold cannot be kerfed and used as he suggests without the kerfs showing through the face of the mold. The moldings, however, can be made as shown in the sketch which I enclose. Referring to it, A B is the radius

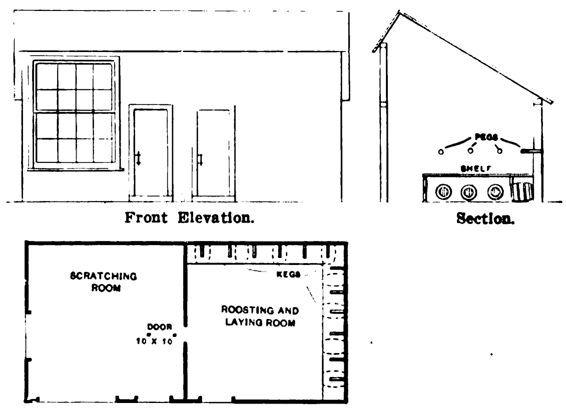


Kerfing Crown Moldings.

of the circle and B E C is a perpendicular line drawn square to A B. Now draw a line through the center of the crown mold and extend it until it cuts the line B C at the point C. Use A C as radius to lay out stock for moldings, as shown in the sketch. Draw a line through the bed molding or any other splayed molding that may be used around the circular part of the work, as shown at D, making use of D E as the radius. After the stock for molding is cut out on a band or jig saw, the mold can be worked on any jointer or universal wood worker which has the head arranged to receive or use extra cutters. The mold can also be worked on some makes of molders. Either kind of machine will need a form against which to run stock in order to keep it in proper position for working. The springing of back of molding will have to be done on a shaper or by hand. The kerfs must be cut to the back to uniform depth, close together, and point toward the center from which the lines of the stock were struck. The sketch which I send shows the method of working moldings to be used on convex surfaces, but the same stock can be used to make moldings for concave surfaces by reversing the mold so that the part of it shown on the convex edge will be on the concave edge. If the kerfing is carefully done to a uniform depth and close together, the molding will spring into place very easily and make a neat looking job.

Design for a Hennery.

From I. H. W., *Detroit, Mich.*—The correspondent in Melrose, Mass., signing his letter "W. B. W." asks for a



Front Elevation. Section.

Floor Plan.

Design for a Hennery.

design of a hennery to accommodate 50 fowl, but in reply I would say that my little experience in raising poultry teaches that it is not best to have over ten or a dozen fowl in the same building. If the correspondent wants 50, let him put up, say, four small buildings, a plan and elevations of one of which are presented herewith. The laying and roosting room requires but very little light; in fact, enough will steal through the little door to obviate the necessity of putting a window in this room. It is fitted up with a shelf about 16 or 18 inches wide, and placed about a foot or so from the ground to catch the droppings from the hens on the pegs above. These pegs are 1½ inches round by 8 to 10 inches long, placed about a foot or two above the shelf, as indicated in the cross section of the hennery. This allows only one fowl on each roost. It will be found that after a time each fowl will own its own peg and go to it each night, just as horses or cattle do to their own stalls. Place a little straw in a few old nail kegs and the correspondent will have a perfect room for the hens to lay, as it is dark and the nests are close to the ground, which is just what the hens want. In the other room, which is designated on the plan as the scratching room, the correspondent can put in all the windows he wants to, as that will be the place where the fowl will spend their time scratching, singing, cackling, crowing and fighting. I hope that my comments and sketches may prove of as much value to other readers of these columns as what other readers of *Carpentry and Building* have had to say has been to me.

Retaining Walls of Concrete or Stone.

From G. A. C., *East Boston, Mass.*—Can any of the readers of *Carpentry and Building* give methods of designing retaining walls of concrete or stone? I would like to hear about reinforced concrete walls, as well as the ordinary form. I hope this inquiry will start a good discussion of the subject, for many builders have to do with retaining walls at one time or another, and the fact that few of them know anything about the matter is evident from the results. I know of one wall 5 feet high that was rebuilt three times within about as many years.

Laying Maple Flooring.

From C. A. W., *Port Jervis, N. Y.*—I will say, in answer to "W. J. S.," Oella, Md., that I have laid numerous maple floors of bored and butted or end matched material, and have had no trouble whatever, either as to nails or splitting. If the correspondent will obtain the proper floor nails, which are flat one way, he will, I think, change his views as to the holes being useless. They are bored only ⅛ inch deep, merely to receive the heads of the nails, as the head is always the part of the nail that will split the flooring if the latter is not countersunk for it. I should not favor the boring of the holes all the way through, as I know it would not result in as good a job nor as firm a job as if only partially bored. In case the holes were bored all the way through the head of the nail would split the flooring just the same unless countersunk in proper form. In regard to nails, I have used on ½-inch flooring 4-penny brads, on ⅝-inch and ¾-inch I have used 6-penny brads, and on ⅞-inch the common ordinary 8-penny finishing nail, and had good results, but there is a flat "oval" flooring nail which is on the market for just such work as laying hard wood floors, and if "W. J. S." will in his next job employ these nails I think he will change his tune.

From D. P. B., *Redford, N. Y.*—The letter of "W. J. S.," on page 82 of the March issue, provokes a smile. His flooring is gotten out all right, and lucky he is to have it bored. Use 8-penny finish nails and set the heads into the ⅛-inch holes till they draw the board down. If the holes were bored through all would be wrong, as that particular size nail must be used, and no getting rid of the head without splitting the lumber.

Suggestions Regarding Prices of Materials and Labor.

From M. L. H., *Benton Harbor, Mich.*—As you have kindly published in the February issue my letter from Cleveland, Ohio, I will try, in part at least, to keep my word regarding prices of materials and labor. My idea was to get the prices of lumber, brick, &c., in the building, believing that will be the way architects, contractors and others will estimate before many years; even now many are doing so, and find it preferable to the old way of estimating material and labor separately.

Yellow pine, such as is used in factory construction, but not smaller than 10 x 10 inches, is worth in the building from \$40 to \$45 per M. in Chicago; that means mill or slow burning construction.

Brick—common—are worth \$12 to \$14 per M., actual count, while bricks have been laid in that city within two years for about \$8.50 per M., measured, no openings deducted, counting 21 bricks to a cubic foot, when it really takes only about 19 Chicago bricks for a cubic foot of wall.

First quality maple flooring is worth, laid, \$45 per M.; second quality, \$5 less.

Yellow pine quarter sawed flooring is worth about the same price, while plain sawed yellow pine would be worth \$4 less.

Hemlock studding is worth about \$30, and 2 x 10 and 2 x 12 inch, also 3 inches thick, same width of Georgia pine floor joist, will cost very nearly \$35 per M.

Hemlock sheathing and roof lining, \$28 per M.

Tar and gravel, 3-ply roof, \$4.50 per square.

Tin roof, \$7.50, and slate \$8 to \$10 per square.

Excavating costs from 40 cents to 75 cents per cubic yard.

Window and door sills, bluestone, 30 to 65 cents and \$1.10 to \$2 per lineal foot, respectively, depending on the size.

Door sills, 6 x 12 inches in the first instance and 10 x 18 inches in the latter instance.

Water tables, bluestone, 7 x 14 inches, 90 cents, and 8 x 12 inches, \$1.10 per lineal foot.

Quincy granite will cost about 25 per cent. more, and limestone 25 to 30 per cent. less.

Rubble stone costs about \$16 per cord of 100 cubic feet, or \$4 per wall perch.

I am not as well prepared to furnish the prices now as when I suggested the scheme, but I hope other readers are, and that they will tell us what they know about prices connected with the erection of buildings in their own localities, the materials either delivered on the ground or installed.

I ought perhaps to state that the prices I have given are those prevailing in Chicago the past season. I thank the editor sincerely for publishing my first letter, and hope it may merit the attention which he so kindly requests.

Laying Hard Wood Floors.

From J. M. D., *Columbia, S. C.*—I note several answers to inquiries in the paper relative to the subject of laying hard wood floors. Some of the readers mention tongue and groove across the end of the stuff. Permit me to ask, Why is this necessary? Hard wood flooring is only 2 inches wide, and generally planed with hollow back, and we see flooring 3 inches wide, and even wider, which is neither tongued nor grooved on the end and which remains smooth when put in place. It would seem to the writer that if the hard wood flooring is tongued and grooved on the ends, and every joint required to be thus fitted, the material would cut very much to waste, as this must be done at the mill, and unless the room was of such a size that regular jointing could be done waste would follow in laying. I ask again, Why are the tongue and groove necessary?

Are Mill Men Getting Careless?

From G. J. S., *Millersburg, Iowa.*—If the editor will allow me space, I wish to again say a few words in regard to the question of mill work, but at the outset I wish it understood that I am not upholding any such bungling carpenters as those referred to in the March number by "C. E. G." The latter, however, does not refer to any bungling mill men, but goes on to tell how his mill work was botched when set in place by a bungling carpenter, who, indeed, must have been a veritable wood butcher and not entitled to the name of carpenter. I do not wish to be classed with that sort of workman, neither do I wish to class "C. E. G." with the kind of mill men I had in mind. Judging from what he has to say regarding the stair work, I believe that he is fully qualified for his position, and I wish he was employed in some of the large mills along the Mississippi River in Iowa. He would then have occasion to visit some of my buildings while in the course of erection, and if he should I could assure him he would not find his mill work botched up in the way alluded to; neither would he find the floor strewn with "beautifully designed casings," &c., for I keep all such work properly stored away until it is put in position.

In my previous communication I did not allude to the manner in which mill work was done as the sole warrant for my saying what I did in the February issue, but as "C. E. G." has told us how those dressers and stairs were bungled, I am compelled to tell how the mill work I have in mind arrived at the building, although I wish again to say I have nothing against the mills that do good work. I have used lots of good mill work coming from mills along the Mississippi River in Iowa, and I do wish they would get more of the contracts that are given to some of the "cheap John" mills east of the river. Now, as every one connected with the building trade knows, there have sprung up in the last ten years quite a lot of mail order houses selling direct to the consumer, and while a few of them turn out good work, the majority turn out an inferior grade, and it was just this kind of a concern that furnished the mill work of which I speak.

When we got out the cornices (the material was supposed to be ¾-inch stuff) the boards varied in thickness all the way from ⅞ to ⅝ inch and were milled very rough, having large oval creases crosswise, and corrugations were so close together that the boards could not be smoothly planed and a good job made without removing a lot of lumber at the thick places. Now imagine how the

1⅛-inch stuff worked in for casings when milled in that way, especially where they were to receive the window screens and make a tight joint on the blind stop. None of the blind stops was square, or, in other words, the side was not at a right angle with the edge, hence had to be worked over, and the parting strips were no better. In regard to the sash, they were ordered 1⅜ inches thick, but of course this measurement varied some in different mills. Usually all the sash ordered at the same time from a mill would be alike—that is, practically so, for if a little shy, or a little full, one could plow all his jambs

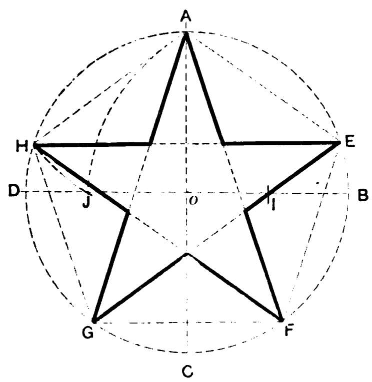


Fig. 1.—One Method of Making the Star.

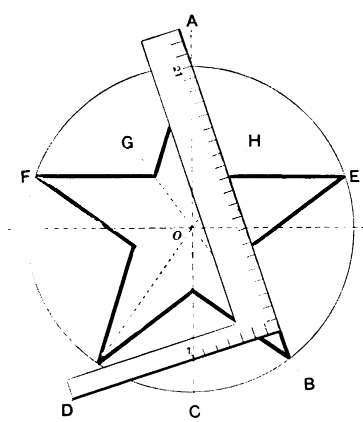


Fig. 2.—Method of Using the Square.

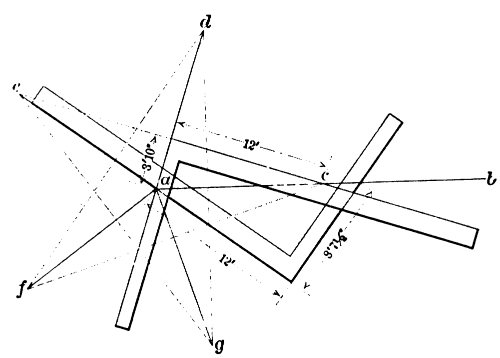


Fig. 3.—Method of Making Five-Pointed Star as Suggested by "L. L. H."

Making a Five-Pointed Star with the Steel Square.

accordingly, and thus get a fairly good job, but the sash received with this particular order varied all the way from 1-16 to 3-16 inch, and some of them even more, and in the siding it was almost impossible to get two boards the same thickness, which, of course, was necessary in making long runs. The flooring was very poorly milled, some of it being tight on the under side and open on the face side. In width it varied all the way from 1-16 to ¼ inch, and there was a marked variation in thickness as well.

Although the interior finish was ordered to be prepared for oil, it was very rough and uneven, with the marks of the saw and molder plainly visible, while the back side was rough on the edges, where it should have been smooth, so as to fit it tight against the jambs and plastering. The plinth blocks were rough, and it was necessary to go over the entire lot before it was in shape to use. Just imagine 150 to 200 base blocks, the sides of which had to be straightened, both ends squared and the saw marks sandpapered out of the curved parts. This made a lot of extra work for the carpenter, and if he wanted to do a good job he could not if he nailed on the blocks just as they came from the mill. I might say that the same conditions apply to brackets, columns, &c., but what I have referred to came under my personal observation. I hope that other carpenters will relate their experience for the benefit of the trade at large.

Making a Five-Pointed Star With the Steel Square.

From I. H. W., *Detroit, Mich.*—I send herewith a couple of sketches for a five-pointed star which may meet the wants of "C. V. F.," Knightstown, Ind. Referring to Fig. 1, draw the two diameters A C and B D at right angles to each other. Bisect one of the radii, as *o* B, at I. Now with I as center and I A as radius describe an arc, A J, cutting D *o* at J. With A as center and A J as radius describe an arc, cutting the circumference at H. Draw the chord A H, and it will form one side of the pentagon. Finish the pentagon by spacing around the circumference, and then draw the lines A F, H E, E G and G A, completing the star. As the applicant, however, demands a way to perform this feat with the steel square, we will consider the operation in connection with Fig. 2. Here draw the diameter A C and then the line A B, and by reversing the square draw A D. Next draw B G and D H, after which B F and D E can be drawn, completing the figure by connecting F with E. I might say that the angles are all obtained by using the 7.21 on the square.

From L. L. H., *Glenwood, Ill.*—I send herewith a sketch, Fig. 3, in reply to "C. V. F.," who asks about making a five-pointed star with the steel square, and which may be explained as follows: Draw indefinitely the line *a b* and establish the point *a*, which is the center of the star. Take 3 10-12 inches (3 feet 10 inches) on the tongue of the square and 12 inches (12 feet) on the blade. Apply the square to the line *a b*, as shown, with the measurement 3 feet 10 inches at *a*. Then with a straight edge produce the line *a d*. Reverse the square and produce the line *a g*. Next take 12 inches (12 feet) on the blade of the square and 8 15-24 inches (8 feet 7½ inches) on the tongue. Then, with the figure 12 at *a*, produce the line *a e*. Reverse the square and produce the line *a f*. Now lay off on the lines thus established the radius of the star points, which is one-half the diameter of the star, this operation locating the points *c, d, e, f, g*. Connect these points with the dotted lines *c e, c f, d g, e f* and *e g*, and the star is complete.

From G. H., *Narrowsburgh, N. Y.*—In reply to "C. V. F.," I would say describe a circle of the given diameter, divide it into five equal parts and draw chords connecting every other point.

Details of Framing for Slate Roof.

From C. C. F., *St. Joseph, Ill.*—I have no doubt it would be interesting to others as well as to myself to see published plans and the necessary details of roof timbers to support a slate roof on a building 30 x 80 feet in size. The ceiling is to be level and space is to be free—that is, without columns. How should the water at the eaves be disposed of, the building coming to the line of the lot at both sides?

Causes of the Darlington Hotel Collapse.

In our issue for last month we printed an advance copy of practically the entire report of H. de B. Parsons, who had been retained by the District Attorney's office of New York City to investigate and report upon the causes of the recent collapse of the Hotel Darlington structure, in West Forty-sixth street, this city. This report has since been submitted to the District Attorney, together with drawings and models illustrating the points brought to light by Mr. Parsons.

The report, it will be recalled, stated that "the primary causes for the failure of the structure were faulty design and carelessness and neglect in the erection of the members. The actual cause of the collapse was the lack of lateral support for the columns, which permitted them to act as 'long columns'—that is, the ratio of length to least radius of gyration exceeded the limit of safety."

Supplementary to our description of the construction of the structure Mr. Parsons states:

"Each floor was lettered and the columns varied in size on the same floor, a specimen schedule being as follows:"

		Column.			
		Side.	Thickness.	Hight.	
Floors.	Letter.	Inches.	Inch.	Ft.	In.
Basement	A	9	1	10	6
Ground	B	9	¾	14	6
2	C	8	¾	10	10
3	D	8	¾	10	10
4	E	7	¾	10	10
5	F	7	¾	10	10
6	G	6	¾	10	10
7	H	6	¾	10	10
8	J	6	¾	10	10
9	K	6	¾	10	10
10	L	6	¾	10	10
11	M	6	¾	10	10
12	N	6	¾	10	10
Hight to under side of roof beams				144	2

In describing the cause and action of the collapse, the latter being excellently illustrated in Fig. 1, Mr. Parsons says:

"Practically the building was pin connected. The bolts fastening the girders and beams against the column lugs were of smaller diameter than the holes, so that the columns received little or no lateral support. The column lengths were bolted together at top and bottom, and acted as continuous columns. All loads were eccentrically supported on the side brackets. In consequence, the columns were too long to carry the superimposed weight and buckled. One column situated at or near the 'center of fall' broke. The upper part of this column being deprived of its support fell, and pulled with it the floor members bolted to it. Each of these floor members pulled over the adjacent columns to which the other ends were attached, and these columns having no lateral support broke at the lower flange, as the pull had a lever arm of about 10 feet, or the length of the column. This action and reaction of the stresses affected only the structure above the level of the original fracture. In fall, the mass of material from above crashed down and broke that part of the structure below the level of the original fracture.

"The exterior columns did not break off as low down as the interior columns, because the mass fell away and did not crush them as it did the interior ones. The uniformity in hight at which the exterior columns broke strongly indicates that the primary fracture occurred at or about the level of the fourth floor.

"As proof that the top fell into and toward the 'center of fall' before the lower part of the structure collapsed, columns G 11 and K 11 were taken out of the *débris* near the 'center of fall' and from beneath other members, which originally were connected at points lower down in the building. Near the same spot column D 36 was found standing in a nearly upright position. Of these columns, the first was broken at the center and the other two at the flanges. Furthermore, as more of the structure was south of the 'center of fall' than north of it, the northern, or rear, portion was forced outward against the Hotel Paterson."

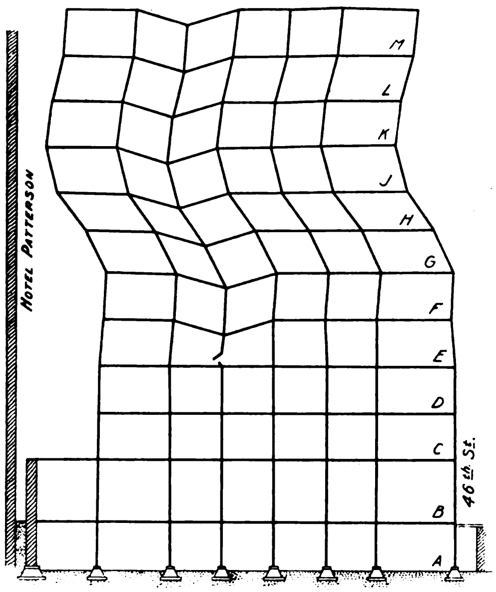


Fig. 1.—Side Elevation of the Steel Frame, showing in slightly exaggerated form the failure of the column on the fourth floor, resulting in the collapse of the structure above it, which crashed through the lower portion of the building. The break occurring just back of the center of the floor, the structure had a natural tendency to fall toward its center, the greater amount of metal in the front, however, pushing the rear portion backward.

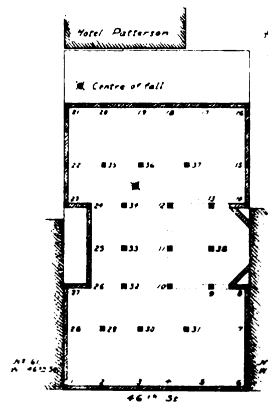


Fig. 2.—Floor Plan, showing the location of the cast iron columns according to their proper numbers, and indicating the "center of fall" slightly to the rear and left of the center of the building.

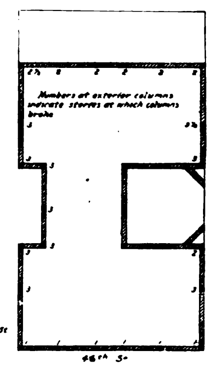


Fig. 3.—Floor Plan, showing the location of the cast iron columns in the outer walls, and indicating the stories at which these columns broke. The inside columns were practically all broken off at their bases.

Causes of the Darlington Hotel Collapse.

As shown in Fig. 3, the columns in the outer wall broke off with approximate uniformity between the second and third floors, although the floor systems of the stories below and the interior columns (except some in the basement) were carried away, leaving the outer columns standing from their foundations to the points of rupture. The columns showed by measurement to have variations as to thickness of metal on the opposite side of ⅛ inch or less.

In this connection it is interesting to present the verdict of the Coroner's jury covering the case, which reads as follows:

"We find that Eugene E. Allison (the head of the company which owned the building) and the firm of Pole & Schwandtner (the iron contractors) were grossly and criminally negligent in the methods adopted and followed by them in the erection of the building.

"We recommend that the practice of the erection of buildings without the superintendence of the original architect or a competent builder of at least five years' experience be prohibited by law.

"We further recommend that the Building Department of the city of New York have a corps of competent engineers to inspect the erection of all buildings requiring engineering skill and that a copy of the approved plans of each building be kept on the premises during construction."

This verdict was signed by all of the twelve jurors. An additional recommendation was signed by only four of the jurors. This was as follows:

"We recommend that all architects, engineers and contractors engaged in the structural work on all buildings in this city be experienced in their several lines and be licensed by law."

On March 31 the Grand Jury handed down a presentment of the collapse of the building, in which it censured the Building Department and recommended that Inspector French, whose duty it was to inspect the steel and iron work of the Darlington, be dismissed. The responsibility, says the Grand Jury, rests with the owner, and not with Pole & Schwandtner, the subcontractors. The document further says in part:

"We recommend that the erection of steel or iron buildings without the immediate supervision of the original architects or a competent expert in such construction, licensed by the city of New York for that purpose, be prohibited by law, and we deprecate the practice of some architects in selling their plans without supervision.

"We recommend that the inspectors employed by the Building Department be required to be competent engineers of experience, who shall receive adequate compensation.

"We recommend that copies of all plans for buildings in process of erection filed with the Building Department shall be kept upon the premises during construction, plainly marked with the action of the department thereon, and that inspectors be required to determine whether the work is being actually carried on in conformity therewith, and to report accordingly.

"We further recommend that a system be devised whereby when violations are reported by an inspector, he shall be required to report daily what steps are taken toward the removal thereof.

"We further recommend that the requisite authority be given to the Superintendent of Buildings of the city of New York, or in his absence to the acting superintendent, to summarily stop work upon any buildings in process of erection, where, in his personal judgment, a failure to suspend work would endanger the public safety, pending the application for an injunction for that purpose and the action of a competent tribunal thereon."

Roofing Reminiscences.

The value of the different materials for roofing purposes is often determined by the manner of using them and the climate in which they are to be used. In an experience of something over a quarter of a century some peculiar happenings have come under my notice, says a correspondent of *The Metal Worker*. In one instance, it was the intention of a Western city to have its municipal building covered with the most substantial materials in the best possible manner. As a result, it was decided that the roof should be covered with slate, and the order given to the roofer was that the slate must be dressed smooth on both sides and be ⅝ inch thick when finished. This was greatly in excess of the ordinary weight of a slate roof, and it eventually proved to be entirely too heavy for the roof structure. The first trouble experienced, however, was that this roof failed to prove tight. It seemed as though the water crept up under the slates, owing to the dressed surfaces, and the moisture found its way to the ceiling, giving every impression of a leaky roof, when it was the material and the application of it that were faulty.

The gutters of this roof were covered with lead, and while the work was done very much in the same manner as is done on old buildings on the other side of the ocean, the excessive heat and rapid changes of temperature caused the lead to rise in ridges and flatten down on cooling, until, eventually, the tops of the ridges were quite thin and broken. Although this lead was heavy, it failed to meet the requirements; but, fortunately, when taken off, the lead helped to pay for new copper gutters when a copper roof was put on the entire building. Here, again, trouble would have resulted had it not been for the method of allowing for expansion and contraction. Wherever it was necessary to fasten the copper to the roof, it was done by means of screws and washers. In the copper proper, a long, narrow slot was cut so that the copper could move under the washers, held somewhat loosely by the screws. In order to prevent leaks, caps were soldered over these slots in such a way as to allow a free movement and yet prevent water from finding its way through the holes.

At one time, there was a marked disposition to use zinc as a roof covering material, and all of the older sheet metal roofers made experiments to ascertain the lasting qualities of zinc. In some instanecs, a string or wire was run through a hole in a sheet of zinc, which was either laid on the roof or hung on the side of a building, where it would be subject to the same conditions that it would be required to meet as a roof covering. Invariably, the result was that a new sheet of zinc would soon be covered with a white powder, and if it was not removed the entire piece of zinc would eventually turn to a white oxide, become brittle and utterly impracticable as a roofing material. This fact is hardly credited by many roofers, who have seen buildings in Germany and other countries whose zinc roofs have stood the test for years.

A tremendous business has been done in the Central West with sheet iron in corrugated and other forms as a roof covering. The earlier roofs were covered with sheet iron, and examples of its lasting quality are in evidence that are hardly believed by those who have used the steel sheets of later years. In one instance, a roundhouse of a railroad company, used for storing locomotives, was covered with sheet iron, without any sheathing beneath it. The rafters to which the sheet iron was attached were finished so as to have a ridge of right angle pitch on the top. These rafters were placed such a distance apart as to allow sheet iron of standard widths to be used, the sheets being bent at a proper angle along each edge to fit on the rafters to which they were fastened with nails. The top was made water tight by means of a small ridge cap fastened in place with cleats. The sheets sagged slightly between the rafters. In cold weather the sagging was reduced by the contraction, while it was increased by expansion when the summer sun beat upon it. Notwithstanding the fact that the sulphurous gas and smoke from the locomotives rose against the underside of this roof, it stood the test for 25 years, until the building was replaced. Sheet steel is being applied for roofing purposes in many ways, and apparently has passed the probationary period, notwithstanding that the durability of the material by no means compares with that of the iron of former years.

Filler for White Ash.

In commenting upon the subject indicated by the above title, one of our exchanges remarks that, as white ash is a very porous wood, it should be treated with an extra light mineral paste wood filler made from clean silex mixed with 2 parts bleached linseed oil, 3 parts pale japan gold size and 1 part turps. to stiff paste and thinned for use with turpentine to the consistency of medium bodied varnish. When dry and hard the surface should be smooth sandpapered and given a coat of white shellac varnish, after which it may be finished with rubbing varnish, that may be rubbed and polished in the ordinary way.

THE painters and decorators of Superior, Wis., have returned to work after a short strike. They had been receiving $3 for nine hours, and wanted the same pay for eight hours. A settlement was made on the basis of 35 cents an hour for nine hours until July 1, and 35 cents an hour thereafter for eight hours.

Commencement Exercises of the New York Trade School.

A large and enthusiastic audience filled the spacious Assembly Hall of the New York Trade School, First avenue, Sixty-seventh and Sixty-eighth streets, New York City, on the evening of April 6 to witness the twenty-third commencement exercises of the institution. The walls and pillars of the hall were brightly and tastefully decorated with flags and streamers of the national colors, and the wide platform was backed by a handsome drapery of green with hangings of red and gold, producing a very rich effect. In addition to the graduates and the other students of the Trade School, a large number of their friends and those of the institution were present. All seemed to thoroughly enter into the spirit of the occasion, judging by the enthusiastic applause which greeted the speakers, the officials and the favorite members of the graduating class as they went up to receive their diplomas.

The platform was occupied by the officials and trustees of the school, members of the various trade school committees, and other visitors. Several ladies who were of the party brought by President Cutting added their gracious presence to the assembly. Among the prominent visitors present were: R. Fulton Cutting, president of the Board of Trustees, and F. Augustus Schermerhorn, Archibald K. Mackay, J. Pierpont Morgan, Jr., and Francis C. Huntington, trustees; Edward Murphy, Frank Reynolds, John Mitchell and James Muir of the New York Master Plumbers' Association; J. Barton Allan and John Beattie of the Master Painters' and Decorators' Association; William Gaskell of the General Society of Mechanics and Tradesmen; Patrick Tierney of Providence, R. I., ex-president of the National Association of Master Plumbers, and H. V. Brill, superintendent of the Trade School.

The total number of students who took instruction in the classes for plumbing, steam fitting, bricklaying, plastering, pattern making, house, sign and fresco painting, blacksmith work, printing, carpentry, electrical work, sheet metal work and drawing in the season just closed was 777. In addition, 178 journeymen attended the lectures for steam engineers and electrical workers, making a total enrollment of 955, or 31 more than in the previous season. These pupils came from all parts of the country, from Maine to Florida, and from New York to California, as well as a considerable number from the Dominion of Canada. A survey of the faces of the young men as they sat in the Assembly Hall facing the platform must have impressed the observer with the fact that they represented an unusually high type of intelligence and manly vigor.

President R. Fulton Cutting opened the exercises with one of the crisp and inspiring addresses which are always so appreciated by the New York Trade School boys. In congratulating the young men who had graduated upon their success, Mr. Cutting took occasion to give them a few words of counsel and encouragement, pointing out that something more than knowledge and skill in their trade was needed in order to secure real success in life. Mere skill is but a small part of what goes to make true success. The prime constituent is *character*. The great corporations and industrial establishments nowadays are looking to character in their employees more than in the past. They insist upon sobriety and decency of life, as well as upon efficiency. "Let your ambition be," said Mr. Cutting, "to be the best in your line. Aim high, and 'do what your hand finds to do with all your might' will be found a safe and good maxim."

The chairman introduced John Beattie of the Master Painters' and Decorators' Association, and president of the General Society of Mechanics and Tradesmen of New York, as the next speaker. Mr. Beattie is always a favorite with the Trade School boys, and his breezy and humorous style caught the attention of the audience at once and secured it throughout the whole of the speech, which, at the close, contained solid, stimulating counsel, which no doubt sunk into the minds and hearts of his hearers.

Certificates to the graduates were then presented by Edward Murphy of the New York Master Plumbers' Association and ex-National President Patrick Tierney of Providence, R. I.

One hundred and ninety-one young men stepped up to receive their diplomas, many of the more popular students being given a loud ovation by their schoolmates. Certificates to 32 pupils who had won distinction on the roll of honor were subsequently presented by Trustee J. Pierpont Morgan, Jr.

Special Prizes.

The prize for the best all around student of the day carpentry class, a set of technical books, presented by the Industrial Publication Company of New York City, was tied for by two young men, whose work was so uniformly good that the examiners found it impossible to differentiate between them. Consequently, the donors generously decided to give two sets of books on this occasion. These prizes were presented to the winners—Charles L. Thomsen of Wausau, Wis., and Wallace A. Heidtmann of New York City—by Trustee F. Augustus Schermerhorn.

The medal for the day painting class, which is awarded annually by the *Painters' Magazine*, was presented by J. Barton Allan to George E. Rowe of Brooklyn, N. Y., who took the highest place in his class.

The gold medal presented to the most proficient student in the day class in steam fitting, contributed annually by the Association of Master Steam Fitters of New York City, was presented by Superintendent H. V. Brill to John B. James of New York City, who acknowledged the honor in a few grateful words.

The graduates for the season of 1903-1904 were divided as follows: Plumbing, 99; steam fitting, 17; cornice work, 6; carpentry, 9; bricklaying, 12; painting, 8.

Dr. Humphreys' Commencement Speech.

President Cutting introduced Dr. Alexander C. Humphreys, president of the Stevens Institute of Technology, who, in opening his remarks, said that in looking into the faces of the young men before him he felt that he was speaking as a worker to fellow workers. He himself had begun on the lower rungs of the ladder and had had the same problems to solve as the young tradesmen were now solving, and would have to solve in their business life; had passed through the same experiences, troubles, failures and succcesses that all must go through who strive to reach success. Continuing, he paid a tribute to the foresight and unselfishness of the founder of the New York Trade School, Colonel Richard Auchmuty, who, in the institution, had builded himself a lasting monument. Dr. Humphreys recommended the young men not to be content to learn merely the theory and practice of their particular trades, but to master, if possible, the elements of physics, chemistry, &c., a knowledge of which would help them to solve many of the difficulties met with in their daily work. He also advised them to read the trade and technical journals, but not to confine their reading thereto. History and biography should be studied in order to broaden the mind and enable them to become good citizens and better workmen. He impressed upon the boys the responsibility that lay upon them of resisting the tendency to those abuses of trades unionism which are seen to be working out to-day so unfortunately in some directions. "Do not interfere," he said, "with the rights of others. Be true to yourselves, your work and your country, and hold fast to your ideals."

THE March issue of the *Bulletin* of the American School of Correspondence of Armour Institute of Technology, Chicago, which has just been issued, gives the latest information regarding the work of the school and the various subjects in which instruction is furnished, together with samples of the instruction papers and a number of fine half-tone engravings showing views of the school building and its various departments. A list of the recent graduates, which is a feature of the present issue, shows that the operations of the institution cover a very wide field, not only in subjects in which instruction is furnished, but in the locations of the students.

WHAT BUILDERS ARE DOING.

REPORTS just received from many sections of the country clearly demonstrate to what extent the severe winter weather was a check upon building operations, not only as regards projected improvements, but in completing work which was in progress when the winter opened. Many of the larger cities show a heavy shrinkage in the estimated cost of improvements, although in one or two instances a gain is noticeable. From many of the smaller places, however, come reports of promised activity in the building line, the work running very largely to dwellings, of which there seems to be in many localities a most unusual scarcity. Here and there the labor situation is more or less unsettled, and is not without its influence upon prospective new enterprises. After May 1, however, it is to be hoped that existing conditions will be adjusted, and work progress smoothly through the remainder of the year.

Buffalo, N. Y.

While the severe winter weather delayed the completion of many buildings under construction, the spring has given the situation a different aspect, and the outlook is for a busy season for the building industries. The figures issued from the office of Deputy Building Commissioner Henry Rumrill, Jr., show a marked increase both for the month of March and for the first quarter of the year, as compared with corresponding periods of 1903. In the month just closed there were issued 184 permits for building improvements costing $564,271, as against 143 permits for improvements costing $261,050 in March of last year. For the first three months of 1904 there were 408 permits issued, calling for an estimated outlay of $1,152,658, while in the first quarter of last year there were 322 permits issued for building improvements costing $627,828. From these figures it will be seen that the increase for the first quarter of the current year is nearly 50 per cent., as compared with a year ago, which would indicate an active season. The volume of business is about equally distributed between dwellings and buildings intended for business purposes. The prices of building material declined a trifle during the month of March, the price of brick having been reduced 50 cents per 1000, and cement 15 and 20 cents a barrel.

Labor conditions are a trifle unsettled, the Bricklayers' Union having served notice on the Master Masons that on May 1 they will demand an advance in their wage scale of 5 cents per hour. The bricklayers are now paid 50 cents per hour, and the stone masons 45 cents per hour. The carpenters are now getting 35 cents, and ask for 37½ cents after May 1. The sheet metal workers are earning 35 cents per hour, and want 40 cents after May 1. After the electricians had been on a strike for ten weeks, owing to the fact that the employers would no longer tolerate the arbitrary methods of the Electricians' Union, a settlement was reached. The journeymen also demanded an advance in their wage scale of $3 to $4 per day of eight hours. According to the terms of the agreement, the wage scale of $3 per day was accepted, to continue in force until January 1, 1905. Future grievances are to be settled by an Arbitration Committee composed of two members from each party to the agreement. The office of the walking delegate of the union is abolished, and the union deposits $500 in cash as a bond to respect the requirements of the contract.

Brooklyn, N. Y.

While some sections of the country have been complaining of the check which the severe winter weather gave to building operations, Brooklyn seems to have been the exception in this respect, for, according to the report of Superintendent P. J. Collins of the Bureau of Buildings, for the first quarter of the year, a very gratifying situation exists. The figures show a striking increase over the first quarter of 1903, and the present outlook is regarded as very bright for a record year. According to the report, permits were issued for the erection of 2570 new buildings, estimated to cost $7,765,381, as against 2271 permits, covering building improvements estimated to cost $5,871,198 for the first three months of last year. It is thought that the report for the second quarter will be very much better than that just issued, as it will cover what is regarded as the active building season of the year.

Chicago, Ill.

The low temperatures which prevailed during the past winter had a very pronounced effect upon building operations in the "Windy City," and there was a shrinkage of more than 50 per cent. in the estimated cost of building improvements in March, as compared with the same month last year. According to the figures of the Building Department, there were issued in March permits for 600 buildings, having a frontage of 17,638 feet, and involving an estimated outlay of $2,037,830, as against permits for 569 buildings, covering a frontage of 16,409 feet, and estimated to cost $4,531,500 in March of 1903.

For the first three months of the current year permits were taken out for 1092 buildings, having a frontage of 29,938 feet, and estimated to cost $5,459,010, while for the first three months of last year permits were issued for 1142 buildings, having a frontage of 33,899 feet, and involving an estimated outlay of $7,381,125.

A considerable amount of new work is in prospect, and if labor troubles do not intervene it is likely that the volume of business for the new year will make a showing fully up to the average, at least. Among the important enterprises under way may be mentioned the new home of the Chicago & Northwestern Railway Company, at the corner of Franklin street and Jackson Boulevard. It will be a 14-story structure of steel skeleton frame type, and cost in the neighborhood of $1,000,000. The plans were drawn by Frost & Granger, and the general architecture will be severely plain. Work has already been commenced on the concrete foundations. Other important projects include the office building at Wabash avenue and Madison street, estimated to cost $1,500,000; one at State and Adams streets, to cost about $1,000,000, and the second section of the First National Bank Building, to cost about $1,500,000.

Cincinnati, Ohio.

The feeling among architects and builders as to the immediate future of the building business is very hopeful, but while the prospects at present are very bright there is more or less uneasiness as to the attitude of the labor unions. There is much new work contemplated in the way of new dwellings, office buildings, factories, &c., and there will probably be erected one or two power houses. The prices of building materials do not at present seem to cut much of a figure in the way of checking contemplated operations.

According to the figures of the Building Department, the value of new enterprises projected during the month of March aggregated $752,540, as against $324,645 for the same month last year. The record for the first quarter of the year also shows an increase over the corresponding period of 1903, although it is not so striking as that for the month of March, owing to the fact that the amount of building projected in February, last year, was far in excess of that undertaken in February the current year, but this may, in a large measure, be explained by the severity of the winter just past. For the first quarter of 1904 the value of the building improvements projected was $1,030,335, as against $897,665 in the first three months of last year.

Active preparations are being made for considerable work in the suburban districts, this consisting very largely of attractive dwellings of moderate cost.

Los Angeles, Cal.

The report of the Building Superintendent shows that during March 578 per mits were issued for building improvements valued at $951,029, as compared with 503 permits, aggregating $911,817 in March, 1903. Building is running more toward small residences than heretofore, though a number of really fine structures are also under way. It is noticeable that the permits for one-story frame buildings average in value a little less than $1000 each. The rains which have fallen in Southern California during the past two months have done much to uphold the building record, and have contributed greatly to the upbuilding of the city and suburbs.

The Pacific Electric Company, who own most of the street railways in Los Angeles as well as most of the interurban lines connecting that city with surrounding towns, are preparing to put in some artistic station buildings at various transfer points on the system. The first of these stations now being built at the junction of the Pasadena and Monrovia lines is a one-story structure in the Mission style, and from the outside presents the appearance of a succession of arches. The buildings is constructed entirely of concrete, and is amply provided with seats both inside and outside. It is the intention of the company to put similar stations at all the principal transfer points on the system.

Another important improvement contemplated is a three-story pressed brick and marble restaurant for A. Levy, to cost something over $225,000. The building will cover a ground area 115 x 156 feet, and on the first floor will be a café, 75 x 120 feet. Marble will be used on all the stairways, at the entrances and for the facing of all counters, as well as in kitchens and pantries. The second floor will be devoted to private dining rooms, and on the third floor will be several banquet halls, one of which is to be so arranged as to comfortably seat 600 people.

Important legislation affecting the building interests of Los Angeles is pending in the City Council. An attempt is to be made to pass an ordinance covering all kinds of structural work, the present provisions in regard to which are somewhat confusing and ambiguous. A movement is under way to secure an amendment to the ordinance as it affects theaters, as there is considerable confusion as to the bearing of the present ordinance.

Minneapolis, Minn.

Much the same conditions in the building line prevail here as across the river, the season being something like three weeks' late, owing to the inclement weather, and builders are somewhat slow to engage in new enterprises until the outlook is a little clearer. The amount of work projected during the first three months shows comparatively little change from a year ago. According to the figures of Inspector of Buildings James G. Houghton, there were issued during January, February and March of this year 586 permits for building improvements, calling for an estimated outlay of $1,000,165, as against 697 permits for improvements involving an outlay of $1,015,687 in the corresponding period of 1903. There were also issued from the same office permits for plumbing and electrical work, calling for an expenditure of over $300,000, so that the total figures for the first quarter of this year were $1,328,970, and for the corresponding period of last year $1,154,120.

New York City.

Since our last issue the local building situation has commenced to assume more normal conditions, owing to the fact that the strike of the laborers and bricklayers, which continued for a month and grew out of the announcement that overtime would not be paid the laborers for the hours between 7 and 8 a.m. and 5 and 6 p.m., was settled the first week in April on the basis that the men return to work, pending an adjustment of their grievances by arbitration. The strike of the laborers threw the bricklayers out on all contracts of the Mason Builders' Association, because of their sympathetic action, but the first involuntary victims of the strike were the structural iron workers, although some of the teamsters had been rendered idle at the outset. Then the hosting engineers, derrick men and stone masons were made idle, so that in this way building operations in the city were for a time pretty well tied up. The situation illustrates the loss to workmen growing out of strikes, and while only seven trades were directly affected, the figures compiled show that the loss in wages was something over $1,000,000. Other trades were indirectly affected, as there was less work for the building material drivers and handlers, the lumber handlers and for several minor trades which depend on building.

Taking the value of the building improvements projected thus far the present year, there is comparatively little change from the corresponding period a year ago. For the first quarter of 1903, the amount of capital involved was about $22,000,000, while for the first quarter of the present year the improvements projected are estimated to involve an expenditure of a trifle over $21,000,000, these figures not including cost of alterations.

A most interesting affair was the annual banquet of the Employers' Association of Architectural Iron Workers held at the Building Trades' Club on February 11. The *menu* cards were of cast iron, and during the evening wrought iron gavels were presented to Charles L. and Otto M. Eidlitz. In fact, the affair was in the nature of a complimentary dinner to these gentlemen, and in appreciation of their work for the Building Trades Employers' Association. The toastmaster of the evening was Andrew M. Petersen, president of the Whale Creek Iron Works.

Shortly after the above event, the Brooklyn Builders' Association held their annual dinner at the Montauk Club, at which former Superintendent of Buildings William M. Calder presided. Mr. Calder was recently elected president of the association, the other officers being: Frederick W. Rowe, first vice-president; Frank Singer, second vice-president; Thomas Martin, treasurer, and John McGilligan, secretary.

Philadelphia, Pa.

The notable feature of current building operations in the city is the demand for dwelling houses, more especially in West Philadelphia, which embraces the Twenty-fourth, Twenty-seventh, Thirty-fourth and Fortieth wards. During the month of March the Bureau of Building Inspection issued 744 permits, covering 1745 operations, estimated to cost $3,704,300. Of this amount more than 50 per cent. is represented by work projected in West Philadelphia. The total estimated outlay for the month, however, is considerably less than for March last year, as the figures for that month included the new $5,000,000 Wanamaker store.

Taking the figures for the first three months of the year, the shrinkage is heavy, but it is in some measure attributed to the fact that in addition to this being Presidential year January and February were months of extreme cold weather which tended to check building operations. During the first three months there 1434 permits issued, covering 2659 operations, costing $5,425,630, as against 1378 permits, covering 2633 operations, and estimated to cost $12,556,240 for the first quarter of last year. From these figures it will be seen that there is a falling off of over $7,000,000 in the estimated cost of the contemplated building improvements, and even eliminating the $5,000,000 Wanamaker store, there is still a shrinkage of $2,130,610 from last year's figures.

Pittsburgh, Pa.

Considerable new work in the building line is contemplated this year in the Pittsburgh district, but from present indications there seems to be more or less doubt as to how large a proportion of it will be actually undertaken. Capital still appears to be somewhat timid about embarking in large building projects, owing to the high cost of labor and materials, and particularly on account of the uncertain attitude of labor. The scales of wages among the workmen in the Pittsburgh district have, we understand, been signed in each line of trade to December 31, 1904. In these scales the various unions have agreed not to go out on strike under any circumstances, but to refer all disputes for final settlement to a Board of Arbitrators. This being the case, it should have the effect of helping to establish industrial peace and prove a guarantee to the architect and prospective builder that when plans are drawn and the contracts let work can be carried forward until the structures are completed without interruption by strikes or other causes.

Some idea of the extent to which operations are likely to be restricted, as compared with a year ago, may be gained from a study of the figures of the Bureau of Building Inspection. According to Superintendent S. A. Dies, there were issued in March of the present year for new buildings, additions and alterations, 330 permits, calling for an estimated expenditure of $468,238, while in March of last year there were 547 permits issued for building improvements, estimated to cost $2,573,748. Taking the figures for the first quarter, the comparison is fully as striking. In the first three months of this year the total number of permits issued for new buildings, additions and alterations was 597, involving an estimated outlay of $1,101,647, and in the first quarter of last year there were 959 permits issued for new buildings, alterations and additions, estimated to cost $4,571,242.

The work of razing the cathedral on Fifth avenue is now in progress, and while reports in the past were to the effect that Mr. Frick would utilize the site for the erection of a large hotel, we are now informed that it will be used as a downtown park, for which the site is ideal, being right in the heart of the city. The largest building that will certainly be erected in the city in the immediate future is the bank and office building to be put up by the Diamond National Bank at Fifth avenue and Liberty street. This structure will be ultimately 18 stories in hight, although for the present only two stories will be put up. The first three stories will be of light colored grante, above which it will be of gray brick, with the top story and cornice of terra cotta, carrying an ornamental copper cheneau. The building has been designed to furnish a permanent home for the Diamond National Bank and the Diamond Savings Bank, which will occupy the first and second floors. The third floor and all above will be devoted to offices.

The Builders' Exchange League is at present working on organization lines, and is increasing its membership rapidly. Before the summer months are over the officials expect to have in the membership at least 90 per cent. of the leading contractors, supply firms and others connected with the building trades of the city. The work of revising the constitution and by-laws is in progress, those portions which have been found defective, or not to the best interests of the organization being stricken out. We understand that the members of the league are also considering the advisability of adopting the plan in vogue in Albany, where the Builders' Association has agreed upon the "open shop," each member giving a guarantee to the person having a building erected that work shall not be interrupted on account of labor disputes. The guarantee attached to all contracts reads as follows:

"That only good, first-class mechanics will be employed; that only good, first-class material will be used; that the work will always be under the direction and immediate supervision of competent, reliable men; that all contracts will be promptly and satisfactorily completed without annoyance. We run open shops, and are consequently not hampered by union rules or our work impeded by walking delegates, both of which have been the cause of so much annoyance and delay during the past year or more. We hire our employees as individuals, each on his own merit and capability, regardless whether they belong to a union or not."

Another step which is said to be under consideration by the Builders' Exchange League is the incorporation of all its subsidiary associations, and to demand that all labor unions with which they deal shall be incorporated. The object is to make the building contractors and the builders' unions subject to damages for violation to contract between each other.

The Master Builders' Association held their annual meeting at the rooms of the Builders' Exchange on the evening of April 6, and the following officers were elected: President, J. Charles Wilson; vice-president, R. J. Graham; secretary, Robert K. Cochrane, and treasurer, John S. Elliott.

These officials, with Charles Reif, William T. Powell and T. J. Hamilton, constitute the Board of Directors. The reports of the president and secretary showed the association to be in a most flourishing condition, with something like 200 names on the roll of membership. A large gain during the past year is said to be largely due to the efforts of P. K. Stephenson, whose services were secured to obtain the information and support of all master builders throughout Allegheny County. Arrangements have been completed for the annual banquet of the association, to be held at the Colonial Hotel, April 22.

Portland, Ore.

Building in the business district is as lively now as it was at any time last year, and the prospects are good for a continuation through the summer and fall. There has been a general advance in rents during the past few months, and as a result builders are anticipating a considerable increase in the building of stores and offices.

On March 23 the Lewis & Clark Safe Commission awarded a number of contracts for buildings for the Lewis & Clark Exposition. The total of contracts awarded amounted to $225,127. These included the festival hall, $53,745; the liberal arts building, $51,720; the administration building and four adjoining structures, $26,000; the State's building, $69,130, and the forestry building, $14,515.

The new building ordinance which has been under consideration for some time is not yet completed. The matters still under discussion, however, are minor points. The vital section of the new law provides that building materials hereafter brought to Portland, shall be subjected to such tests to determine character and quality as the board shall deem necessary: that all brick, stone, iron or frame buildings shall have a permanent means of access to the roof from the inside: that the roofs of all buildings hereafter erected within the fire limits and the roofs of all brick and stone buildings except residences, wherever erected, shall be covered with metal, slate, tiles or other fire proof matrial, and that no temporary wood staging shall be erected on any roof.

Quincy, Mass.

The annual meeting of the Master Builders' Association was held in their rooms in the Adams Building, the second week in February, when the following officers for the ensuing year were elected: President, Edward J. Sandberg; vice-president, William H. Teasdale; secretary, Arthur W. Stetson, and treasurer, John O. Hall.

The Board of Directors consists of the above officials, with T. L. Williams, Julius Johnson, Charles C. Foster, J. W. Pratt and W. T. Spargo.

After the business meeting a collation was served, and there were brief addresses on business topics by several of the members.

Rochester, N. Y.

The serious conflagration which recently occurred in the city will, it is thought, have a tendency to stimulate building operations, to some extent at least, and that with the rebuilding of the burned district the volume of business for architects and builders will make a most gratifying showing for the year. The report of Fire Marshal Walters, covering building operations for the first three months, shows that the year is starting out well, for the estimated value of the buildings projected exceeds the figures for the corresponding quarter of last year by something over $100,000. The valuations for the first three months of this year are increased very largely by the commencement of work on the new building of the Rochester Trust & Safe Deposit Company; the addition to the German Insurance Company's Building and the new store for the Sibley, Lindsay & Curr Company. It is expected that the figures for the month of April will show a decided increase, as the old Sibley Block on Main street, East, will be replaced by a new structure, and several other business blocks will be enlarged, while scores of dwellings will be commenced. It is also thought that the owners of several factories will put up additions to present buildings or erect new ones.

St. Louis, Mo.

There is a pretty well defined feeling among architects and contractors that if labor and material were considered reasonable there would be much more building, with the tendency, perhaps, more in the direction of dwelling houses and flats than toward buildings intended for business purposes. There seems to be an inclination to await more settled and substantial labor and material conditions, and possibly reduction in the cost of both before engaging in important new enterprises. The attitude of labor no doubt seriously interferes with contemplated building improvements, and the prices of materials are altogether too high.

According to the records of Commissioner of Public Buildings G. U. Heimburger, the amount of building projected the first quarter of the year aggregates a close approximation to the figures of the first three months of last year. During March, however, there was quite an appreciable shrinkage, the number of permits issued being 580, covering improvements estimated to cost $1,617,809, as against 377 permits for improvements costing $2,023,899 in March of last year. Taking the figures for the three months, we find that 1172 permits were issued, covering improvements estimated to cost $3,373,574, while in the first quarter of last year there were 941 permits issued for building improvements costing $3,405,200.

St. Paul, Minn.

The building season is rather late this year in opening, owing to the very backward spring weather which has prevailed. The indications, however, are that the building business will prove about the same as last year. The month of March shows a slight increase in the amount of new work projected, as compared with the same month last year, there having been 134 permits issued for buildings, estimated to cost $239,360, as against 116 permits for improvements, costing $210,467 in March of 1902.

Comparing the figures for the first quarter of the year, the advantage is still with 1904, as during the period named there were 231 permits issued for building improvements, estimated to cost $382,832, while in the first quarter of last year 230 permits were issued for building improvements involving an estimated outlay of $361,192.

San Francisco, Cal.

Building operations during March showed an increase over February, there having been issued 503 permits, showing a total valuation of $1,507,000, as compared with 366 permits for improvements, valued at $1,146,633, the month before. These figures do not include buildings to the value of $39,655, for which permits were issued free of charge. Contractors report the outlook for the summer fully up to that of last year, and there is a great deal of figuring being done in the offices of the architects on large buildings for the near future. M. H. de Young, proprietor of the San Francisco *Chronicle*, is preparing to erect a building on Kearny street adjoining the *Chronicle* building, to cost $350,000, and be modeled quite closely after the Exchange Court Building of New York City.

Several propositions for amending the San Francisco Building ordinance are now before the Board of Supervisors. One of these which will probably be adopted provides that, when semi fire proof buildings are to be erected with two frontages, abutting the building lines at the intersections of streets having a width of not less than 35 feet, said buildings may be erected to a hight not to exceed 120 feet, instead of 100 feet, as at present. A committee from the San Francisco Chapter of Architects is working to secure a number of amendments to the Building Ordinance, but these have not yet been submitted in definite form.

Salt Lake City, Utah.

In spite of the fact that the season so far has been unusually favorable for building, there has, according to builders, never been a time when residence building at this season of the year was so extensive as at present. This is partly due to the cheapness of building materials, which is a characteristic of the present year, and partly to the increase in rents and the scarcity of good modern dwellings. Aside from the building of frame residences, the outlook is good for the construction of a large number of large office and business buildings. Among the buildings which are projected for the spring and summer are the Packard Library building, to cost $80,000; the Bishop Leonard Memorial Building, to cost $40,000; the agricultural fair building, to cost $40,000; the Walker Bros.' Block, to cost $200,000; the Westminister Presbyterian Church, to cost $30,000; the Baumgarten Terris buildings, to cost $100,000, and the Bransford Terris buildings, to cost $500,000.

Scranton, Pa.

The present high prices of all materials entering into building construction, together with the unsettled conditions of affairs existing between employers and workmen in various branches of the trade make it almost impossible to foretell just what the season promises, although there was more work in an incompleted state when the cold weather set in last year than usual. Operations are now being commenced on this work, and the men are pretty generally employed. It is hoped that enough new work will develop to keep them steadily engaged during the year.

According to the figures of the Bureau of Building Inspection, the value of the improvements projected during the first quarter of the present year is far in excess of that for the corresponding period of last year, the figures being $308,507 and $132,069, respectively. The number of permits issued, however, and the estimated value of the contemplated improvements for the first three months are not to be considered as a true criterion of what the year promises in the way of activity, owing to the large amount of work that was carried over from last fall.

Spokane, Wash.

The building permits issued in Spokane during March, 1904, called for structures valued at $427,349, which is the highest amount ever taken out in the city since records have been kept, and it is over twice as high as for any previous March. The gain over March, 1903, amounts to 129 per cent. The permits issued numbered 227, 180 of which were for dwellings and apartment houses; 15 permits were for business blocks and 22 were for alterations for old buildings. Figures have just been issued which show the total value of the construction work in this city during 1903 to have been $3,755,965. This is the largest amount ever spent in building in any one year in this city, but is believed by builders that the present year will probably exceed last year's figures by 25 per cent.

Toledo, Ohio.

There is a noticeable degree of activity in the building line at the present time, and the outlook for the summer is regarded as very promising, owing to the fact that a great deal of new work is contemplated. The only disturbing factor is the strike of the tinners and sheet metal workers, who have been out now for more than six weeks, but there seem to be plenty of men available to take the places of the strikers.

At the annual meeting of the Builders' Exchange of the city of Toledo, held at their rooms in the Gardner Building on March 7, the following officers were elected for the ensuing year: President, P. H. Degnan; first vice-president, Joseph Jackson; second vice-president, Henry Bender; secretary, W. J. Albrecht; assistant secretary, C. T. Lawton, and treasurer, J. H. Lee.

Utica, N. Y.

While the outlook in Utica is not of the most encouraging nature, there is considerable building in progress, and it is hoped that the year will in the aggregate show a fair volume. Among the important work under way may be mentioned two hospitals, a library, several schoolhouses, a fire engine house, three or four factories, as well as a number of new dwellings and flats. Building materials are high, especially lumber, and this may have some effect upon prospective operations.

A factor which is not without its influence upon the future is the understanding which has been reached between the Master Carpenters' Association and Union No. 125. The trouble began in April of last year, when the men made a demand for an increase in wages. After being idle for 15 weeks they returned to work at the old rate, but an agreement was made whereby all disputes were to be referred to a Committee of Six, consisting of three representatives from both organizations, and in case they could not agree the matter was to be referred to a third committee of three persons. The board of six has completed its labors and granted Union No. 125 an increase in wages of 25 cents a day. The union on its part agrees not to work for any one for less wages per hour or day than the standard price charged by the Master Carpenters' Association, there being a heavy penalty for violation of this agreement. In case any member of the union wishes to take contracts, he must apply to the union for a contractor's card, paying $10 for the same, the card to be good for six months, the union having made some new by-laws in order to carry out these features. If, after 48 hours' notice to the business manager of the union that the employers desire a number of mechanics and he is unable to furnish them, the employers are at liberty to hire any one they please, and those so hired are to be retained until the job is finished. It may be interesting in this connection to state that the Arbitration Board is permanent, the members being elected every year.

Warren, Ohio.

A movement which had been on foot for some little time among leading contractors and builders of Warren looking to the formation of a Builders' Exchange assumed tangible shape at a meeting on March 10, when a temporary organization was effected. The local builders were greatly assisted in their efforts by members of the Ohio State Association of Builders' Exchanges, prominent among them being F. H. Weeks of the Akron Builders' Exchange, Edward A. Roberts, secretary Cleveland Builders' Exchange; C. W. McCormick of Cleveland, and F. C. Kasch and John Crisp of Akron. At the initial meeting a Committee on Constitution was appointed, and addresses were made by President Weeks of the State Association and Secretary Roberts, both of whom spoke of the benefits of organization and the general method of procedure in carrying such associations to a successful issue. After the business of the evening had been concluded a course dinner was served in honor of the new Exchange.

On the evening of March 15 the members completed the organization of their new Exchange by electing the following officers for the ensuing year: President, C. L. Wood; vice-president, George W. Angstadt; treasurer, H. S. Pew, and secretary, B. T. Sidells. The quarters for the Exchange are on the second floor of the new Gilmer-Wallace Block, where rooms have been fitted up to meet the special requirements of the organization.

Worcester, Mass.

Very little building has been done in and about the city during the past winter, and the general feeling among contractors and builders as to the outlook for the coming season is not altogether of the most encouraging nature. While prices of materials doubtless have some bearing upon prospective work, the labor problem is a more important factor, as its cost is an unknown quantity in determining the execution of new enterprises.

The annual meeting of the Central Contractors' Association was held April 4 in their offices in the Knowles Building, 518 Main street. The officers elected for the ensuing year were: James I. Elliott, president; Charles A. Vaughn, vice-president, and H. W. Sweetser, secretary and treasurer. The trustees include B. C. Fiske, E. J. Cross, E. D. Ward, A. P. Robbins, F. W. Mark, S. I. Howard, C. A. Peters, C. A Colburn and Walter Mellon

After the regular business of the evening had been transacted Charles E. Hildreth of the city named gave a talk upon the Worcester Metal Trade Association Labor Bureau, explaining its objects and its benefits to employers and employees. What the speaker had to say was listened to with close attention, and his remarks proved very interesting and instructive.

Notes.

While the building situation in Detroit, Mich., has developed considerable uncertainty by reason of the attitude of labor, the figures compiled in the office of the Fire Marshal, covering operations for the first quarter of the year, show 483 permits to have been issued for building improvements, estimated to cost $788,800. This, however, is a falling off from the first quarter of last year, when 658 permits were issued for improvements involving an estimated outlay of $1,100,400.

The builders and contractors of Lorain, Ohio, are agitating the question of a Builders' Exchange, and a request for information as to the method of procedure was recently received by Secretary Roberts of the Ohio State Association of Builders' Exchanges.

The Master Carpenters' and Builders' Association of Hackensack, N. J., held their annual meeting on the evening of March 29, and elected the following officers for the ensuing year: President, Jeremiah Voorhis; vice-president, George Birley; secretary, John Spotholz, and treasurer, John C. Hoth. The association is now said to include all the prominent builders in the county, and is in a flourishing condition.

It is stated that the union carpenters of Muskegon, Mich., have agreed with the local contractors to arbitrate all differences in the future. The wage scale is to be 32½ cents an hour, with eight hours to constitute a day.

A large amount of building is expected in Dunkirk, N. Y., this season, and architects, builders and mechanics generally are much gratified at the thoughts of plenty of work. A large number of new structures are already projected, including an Odd Fellows' temple, a Masonic temple, several churches, a bank building, a large apartment house and numberless dwellings.

The Master Builders' Association of Fall River, Mass., decided at a meeting held on April 6 to refuse the demand of the Bricklayers' and Masons' Union for an increase in wages. The employers took the ground that the conditions of business and the outlook for the year did not warant an increased rate.

The contractors and the Bricklayers' and Masons' Union of Fitchburg and Leominster, Mass., have reached an agreement whereby the rate of wages from March 1 is to be $3.50 per day for building work, with the understanding that there shall be an increase next year should the business outlook warrant it.

Contracts have already been awarded for such a number of improvements in the building line in Indiana Harbor, Ind., as to indicate a very active season. The new work runs largely to stores, flats and dwelling houses, and in addition to those already planned many others are expected to be erected before the building season closes.

Architects and builders of East Liverpool, Ohio, are looking forward to a fairly active building season, some of the former having sufficient work in hand to keep them busy for some time to come. The tendency seems to be toward a better grade of houses, but this may, perhaps, be explained in part by the fact that labor and materials are more costly than was the case a few years ago. The only thing that is likely to interfere with the promising outlook is a general slackening of trade in the potteries, but this contingency is not at present expected to materialize.

Considerable activity is developing in the building line in Youngstown, Ohio, and contractors and builders report the prospects fully as good as a year ago at this time. From present indications they will have plenty of work the coming summer, as thus far the building permits taken out have exceeded the number issued during the corresponding period of last year. With each permit the Building Department issues a card which the law provides must be put up in a conspicuous place until the house is completed.

The Master Builders' Association of Washington, D. C., desire the District Commissioners to require all builders to take out licenses, and to provide that the building inspector shall not issue a permit to any one who does not possess a builders' license. The corporation counsel has been asked to render his opinion in regard to the legality of the proposed regulations.

The first of April witnessed a series of tie-ups in the way of building operations in New Orleans, La., which, it is feared, will seriously interrupt what was likely to prove a banner year in the building business. It is stated that during the first three months of the year contracts aggregating $6,000,000 had already been awarded.

HOUSE MOVING.*—IV.

By O. B. Maginnis.

IN concluding this series of articles, it might not be without interest to describe a rather novel house moving operation in which the ebb and flow of the tide was utilized to good advantage. The operation was carried out on the east bank of the Hudson River, in the city of New York, the building consisting of a large boat house, measuring 50 feet front by 75 feet deep, and having a hight of 35 feet. The structure having been sold to a yacht club up the river, it became necessary to provide some means by which it could be transported to the site selected by the purchasers and this requirement provoked the operations which will now be described.

The house was built of wood on the framed and braced principle of heavy planed yellow pine timber and weighed about 200 tons approximately, so that all that was required was to obtain boats of sufficient capacity to carry this load. Two Erie canal boats, each 100 feet

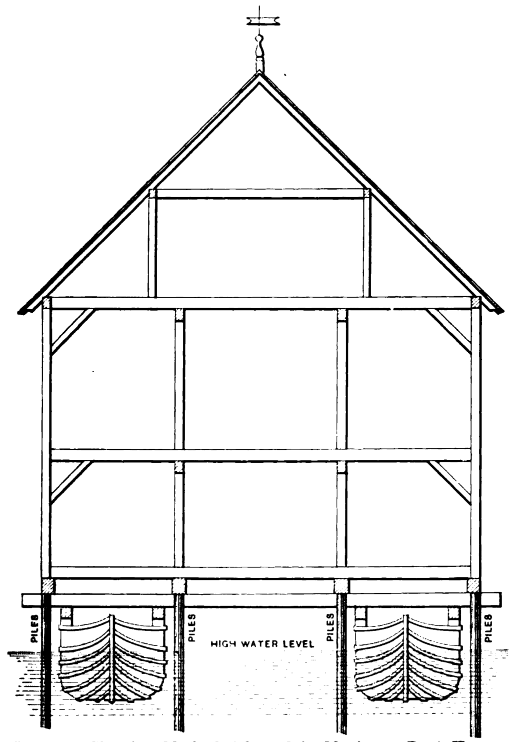


Fig. 19.—Showing Method Adopted in Moving a Boat House.

House Moving.

long, were chartered and towed to the pile foundation on which the superstructure rested, and provisions were made at once for placing them directly under the main sills, which had to be prepared so the house might be lifted without straining. After a careful examination of the lower timbers it was decided to float the canal boats beneath the house between the rows of piles with the sterns toward the shore, so that the building would be carried longitudinally and the boats be far enough apart to provide against any possible danger of the house capsizing when afloat and in transit on the river.

A fuller comprehension of the way in which they were positioned may be obtained by referring to Fig. 19, which gives a transverse section of the boat house, showing the positions of the canal boats and how they acted as hydraulic jacks to raise the mass from its resting place.

When moored beneath the structure, heavy 12 x 14 inch timbers were passed through from side to side, these being long enough to project outside the north and south gable sills and spaced 6 feet apart in the length of the building. This being done, all the intervening timbers were blocked up from the upper deck with stringers, pump or builders' screws, blocks and wedges. Longitudinal fore and aft string pieces were also laid along the decks, and the deck beams, where deemed weak, were strengthened in the holds with vertical and diagonal timbers and struts to stiffen the vessels and preserve their rigidity.

I might state here that the boats were kept at a stationary level by means of water ballast pumped in or out of the bilges as required, according to the variations of the rise and fall of the tides, during the time preparations were being made for the removal, and no upward pressure was exerted until ready for it.

When the piles to which the main four lines of longitudinal string pieces, or girders, were spiked had been sawn through, the pump screws were applied at the time when the tide had very little further to rise, so that the building was raised sufficiently high to permit the free passage of the cross cut saws through the timber of the piles. As the reader perhaps knows, there is a period of time at high and low water in which the water is comparatively stationary, approximating half an hour, which gave the workmen a chance to complete this operation, though the whole job occupied four days, or the ebb and flow of eight tides.

The spirit level was employed continuously, verifying and regulating the equilibrium of the floor, especially when the raising commenced, in order to insure the house being equally carried by both boats and guard against the possibility of its tipping, nor was the house moved out from its safe position over the piles until this had been made positive.

All work having been safely done and everything in readiness, heavy rope hawsers were fastened to the prows of the boats from a powerful tugboat, which slowly pulled the floated structure into midstream and headed northward. The voyage was commenced and terminated without accident, though the unusual spectacle of a house sailing up the Hudson River in tow of a tug caused much comment among the passengers on the railroads and steamboats at that time. I need hardly add that the same operation was followed when lowering the house to its new foundation, which was previously prepared from measured drawings of the old pile foundation and bottom timbers.

It may therefore naturally be concluded from the foregoing that the task of house moving is both tedious and arduous, and an infinite tax on the patience and ingenuity of him who undertakes it. Still, if what we have described serves as an aid to the tyro in this modern and novel feature of building practice, we shall feel that our work has not been in vain.

New Publications.

Compendium of Drawing. Compiled from the course of the American School of Correspondence of Armour Institute of Technology, Chicago, Ill. Two volumes or parts. Size 7 x 9¾ inches. Part I contains 425 pages, and Part II contains 500 pages. Uniformly bound in heavy board covers.

The publishers state that the chief aim of this work is to acquaint the public with the standard, scope and practical value of the instruction papers of the American School of Correspondence. These instruction papers are prepared exclusively for the use of the students by men of acknowledged professional standing, and represent years of special preparation necessary to adapt them to the needs of persons obliged to study without the direct assistance of a personal teacher. The purpose of this publication has been to divide the subject of drawing into two general heads, devoting Part I to the architectural or artistic side and Part II to the mechanical or practical side.

Part I consists of seven of the 45 regular instruction papers in the architectural course of the school, indexed and bound together in convenient form for ready reference, but not in the order usually studied. The subjects treated in this volume are as follows: Mechanical Drawing, by Ervin Kenison, instructor in mechanical drawing, Massachusetts Institute of Technology; Shades and Shadows, by Harry W. Gardner, assistant professor of architecture, Massachusetts Institute of Technology; Perspective Drawing, by William H. Lawrence, associate professor of architecture, Massachusetts Institute of Technology; Pen and Ink Rendering, by D. A. Gregg, lecturer in pen and ink drawing, Massachusetts Institute of Technology; Architectural Lettering, by Frank C. Brown, architect, Boston.

Part II presents five of the 44 regular instruction papers in the mechanical engineering and sheet metal pattern drafting courses. The subjects treated are the following: Working Drawings, by Charles L. Griffin, mechanical engineer of the Semet-Solvay Company, formerly of the Pennsylvania State College; Mechanism, by Walter H. James, instructor in mechanical engineering, Massachusetts Institute of Technology; Machine Design, by Charles L. Griffin; Sheet Metal Pattern Drafting, Tinsmithing, by William Neubecker, instructor in the sheet metal department, New York Trade School.

Following each section are the questions or plates which constitute the regular examination of the American School of Correspondence. They offer the reader a means of testing his knowledge of the subjects treated. Although these volumes are published primarily to show the character of the instruction offered by this school and representing only a small portion of the complete course, the publishers believe that each volume has in itself enough condensed practical information to make it of immediate value to the draftsman, student or teacher. A special price is made of $3 per volume, or $5 per set, delivered, until June 1, for introductory purpose.

Easy Lessons or Stepping Stones to Architecture. By Thomas Mitchell. 92 pages. Size 5 x 7½ inches. 80 illustrations. Bound in board covers. Published by the Industrial Publication Company. Price, 50 cents, postpaid.

This little work is made up of a series of questions and answers, explaining in simple language the principles and progress of architecture from the earliest times. In this, the second edition, several typographical errors which occurred in the first have been corrected, a number of illustrations have been re-engraved and there has been added new matter relating to a number of fine architectural examples, thus lending an additional historic interest to the subject. In compiling the matter the idea of the author was to create a taste in the mind of the younger element for architecture, and various sources have been drawn upon for the material which has been presented. It is divided into ten chapters, the first four of which deal with early mediæval Grecian and Roman Architecture. Chapter IV considers plans, foundations and arches, while others deal with the development of different styles from Ancient Greek down to the modern styles of architecture.

Ludlow's Carpenters' and Builders' Estimate Book. By Matthew Ludlow. Size 11 x 17 inches. Bound in board covers, with reinforced back and corners. Published by the author. Price, $3, postpaid.

This work contains in book form 101 complete blanks for taking off bills of materials and extending prices. Each set of blanks consists of two facing pages, thus enabling the figures for each job to be readily seen without the necessity of turning the page. The first section is devoted to timber and lumber, this covering both exterior and interior materials, while the next division is intended for mason work, plumbing, tin work, painting, &c. The final division gives the total estimate under the heads of carpenter work, masonry, plumbing, painting, heating, slate, labor, grading and carting. A number of pages at the commencement of the work are intended for an index, the letters of the alphabet being printed on the outer edges of the leaves, which are properly cut for the purpose.

The summer term of the School of Mechanics Institute at Rochester, N. Y., which opens July 5, affords opportunity for those desiring it to obtain practical instruction in a wide range of subjects and which are now included in the curriculum of most schools. While the courses are of special value to teachers, the training is adapted to all classes of pupils. A certain amount of individual instruction is a feature of the summer work, which appeals to those desirous of making rapid advancement.

In the Department of Industrial Arts instruction is given in mechanical and teachers' drawing, in architectural drawing and in plane surveying. In mechanical drawing the courses will include projection, mechanical motions, drawing of machinery, tracing and blue printing, while in architectural drawing the courses will include drawing and study of details of frame, brick and stone construction, plans and elevations of buildings, tracing and blue printing. This class is intended for those who wish to start in architectural drawing as a preparation for entering an office or further study at a future time.

In the Department of Manual Training there will be a summer course in forging, covering instruction in the handling of the forge, heating, drawing, bending, twisting, punching, upsetting, &c., as well as the treatment of tool steel, annealing, hardening and tempering; also bench work in wood, including instruction in knife work, cardboard construction, the study of materials, tools, equipment of schools and problems with which the manual training teacher has to deal.

The Eastman Building, with its large, well ventilated rooms, offers unusual advantages for the industrial and domestic arts, while the manual training building is thoroughly equipped for instruction in wood and iron work. In order to accommodate out of town pupils and others who wish to complete a course in as short a time as possible lessons will be given five days a week, thus condensing the entire term of 24 lessons into one month.

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RESIDENCE ERECTED FOR MR. R. F. McCORD ON UNION STREET, SCHENECTADY, N. Y.

G. H. ABRAMS, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, MAY, 1904.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS
232-238 WILLIAM STREET, NEW YORK.

JUNE, 1904.

Carpentry and Building at St. Louis Fair.

A few days before the opening of the Louisiana Purchase Exposition there was completed the installation of the exhibit of the David Williams Company, publishers of *Carpentry and Building*, *The Iron Age* and *The Metal Worker, Plumber and Steam Fitter*. The exhibit is located in Section 72 in the Palace of Mines and Metallurgy, at the southwestern entrance of the building. A conspicuous landmark in its immediate vicinity is the huge statue of Vulcan, which is the crowning feature of the mineral and metallurgical exhibit of Alabama.

We invite our friends to avail themselves of the facilities which we have provided. There will be an attendant at the exhibit at all times, who will be glad to be of service. Files and current issues of the publications of the David Williams Company will be at the disposal of visitors, and arrangements are perfected for handling mail and for extending any courtesies to the friends of *Carpentry and Building* who may call.

The Local Building Outlook.

The first of May has passed this year with an unusually small and comparatively insignificant record of labor troubles. A few small sporadic strikes were reported in different parts of the country, none of which involved any large number of persons, the only strike of any importance being that the carriage and wagon makers. It is gratifying to note the exceptionally peaceful condition of the building trades generally, and especially in New York City, which heretofore has been too often a storm center of trouble at this time of the year. The return to work of the bricklayers' laborers in April, pending an adjustment of the existing differences by arbitration, would seem to have brushed away the last impediment to a season of peace and activity in this important industry in New York City. The absence of any serious industrial troubles at this time is to be attributed in part to the fact that the wage scales for the new industrial year in nearly all cases had been agreed upon before the time of their expiration on May 1, while many of them now run from January to January. The tendency is quite apparent on the part of labor to be less radical in its demands than was the case two or three years ago, when business was booming and the unions seemed desirous of grasping from the employers every possible pecuniary advantage, regardless of whether the conditions justified their demands or not. The long months of idleness experienced by large numbers of men engaged in the building trades last year and the privations and losses involved in former strikes have apparently convinced the labor unions of the folly of precipitating trouble at a time when the men should be earning good and steady wages. It is to be hoped that the present more reasonable attitude on the part of the labor unions may be lasting. Except for the fact that capital is still timid, the prospects are now favorable for a season of prosperity in the building industry in this vicinity which should mean an opportunty for those connected more or less directly with the trades that cater to that industry to recoup themselves to some extent for the losses involved in the long tie-up in local building operations last year.

New York State Ventilation Law.

For many years those who have had the public welfare at heart have been laboring in different States to secure a law compelling the ventilation of public buildings, especially school houses, and New York is to be congratulated upon being the first State in the Union to place such a law upon its statute books, although Massachusetts has enjoyed a set of regulations which provide that each occupant of school buildings be furnished with 30 cubic feet of air per minute, and that Commonwealth is really entitled to considerable credit for educating the public up to the need of legislation to compel the ventilation of schools, churches, halls, and other buildings where large numbers of people congregate. The New York State law is the result of ten years of persistent effort on the part of the American Society of Heating and Ventilating Engineers, and the statute just enacted was drawn by one of its members, C. B. J. Snyder, who is the architect of the Board of Education of New York City, the measure prepared by him representing the views of the New York State school officials. In its original form only modest provisions were made, with the hope that the law would be enacted, and that, as its value became known, amendments to bring it up to the highest possible standard would be adopted. By the persistent efforts of the Heating Engineers' Society, however, many members of the Legislature were made conversant with the best practice in ventilation, and the law, as now enacted, is much more satisfactory in its requirements than was the bill originally presented to the Legislature. The American Society of Heating and Ventilating Engineers has also had bills before the legislatures of New Jersey, Pennsylvania, Illinois and some other States for a number of years, and is entitled to the gratitude of the public for the consummation of its work in New York State. Doubtless the success of the society's efforts in that State will be an incentive to increased energy in securing the enactment of similar legislation in other States, and the work will be considerably facilitated by the fact that the New York Legislature has enacted the satisfactory law the substance of which we present in another column.

Reading and Study for Mechanics.

In his recent stimulating and thoughtful address to the students of the New York Trade School, President Humphreys of the Stevens Institute of Technology made an excellent point in urging upon young tradesmen the importance of reading and study as a means of attaining success in the trades they have chosen for their life work. He strongly advised them not only to absorb all the available trade and technical literature bearing upon their own particular craft, but also to acquaint themselves with the elements of physics, chemistry, electricity, &c., a knowledge of which would help them in the solution of many of the problems that would confront them in their daily work. It is not enough in these advancing times to be a skillful workman. The young tradesman who aims to rise above his fellows cannot confine himself to a knowledge, however complete, of the theory and practice of his own craft. He must acquaint himself, to some extent at least, with the wider subjects that affect the public welfare, a knowledge of which will tend to make him an intelligent member of society and a useful citizen, as well as a prosperous business man. To do this, reading and study are essential. In no country and in no other time in history have the facilities for reading and study been so great as they are to-day in America. Free libraries dot the land from the Atlantic to the Pacific, and educational advantages are almost thrown at the public in all our large cities. Newspapers and periodicals without number place information of all kinds at the disposal of every one, and instruction in any field of knowledge is to be had almost for the asking. Dr. Humphreys especially recommended the reading of history and biography as a means of broadening the mind and enabling the young man to grasp more readily the large public questions which every one who is interested in the welfare of his community and his country should understand. It was Addison, in one of his *Spectator* essays, who truly said: "Reading is to the mind what exercise is to the body. By the one, the physical health is preserved, strengthened and invigorated; by the other, the health of the mind is kept alive, cherished and confirmed." If the old proverb is true that the greatest thing to be desired is "a sound mind in a sound body"—and there is no doubt that it is true—the exercise of the mind by reading, supplemented by exercise of the body in regular daily work, should be the practice of all young men who are desirous of obtaining success in life and reaching the higher ranks in their trade or calling. The mechanic who adds reading and study to his manual skill is by the nature of things bound to come to the front. It is no excuse for any man in business to say that he has no time for reading. If he has time for recreation, he must have time for study. If not, he should make it.

Some Large Chicago Buildings.

The need for greater office building facilities in the congested downtown district of Chicago is being met by the construction of five large buildings which will require a vast amount of structural material. Some idea of the work involved may be gained from the statement that for four out of the five buildings the requirements are as follows: The Ryerson Building, Adams street and the Chicago River, 1300 tons of structural steel; the Adams Building, at Adams and State streets, 2500 tons; the Chicago Savings Bank, also known as the Otis and the Madison Building, at Madison and State streets, 1400 tons, and the building being erected by Otto Young at the corner of Madison street and Wabash avenue, on the old St. Mary's Block, which will require 4000 tons. The contracts for these buildings have been secured by Wells Brothers, while the George A. Fuller Company have placed the contract for 4500 tons of structural steel for the office building to be erected by the Chicago & Northwestern Railroad at Franklin street and Jackson boulevard. Altogether these five buildings require over 13,000 tons of structural steel, besides a very large tonnage of castings and other iron and steel, and their construction is giving an impetus to the building interests of the city of Chicago that is welcome at the present period of comparative depression.

AMONG the chief exhibits of Honduras will be a collection of hardwoods which are found in such numerous varieties that they have never been classified. About 170 specimens of these woods will be displayed. Specimens of bananas, cocoanuts, tobacco, coffee and rubber, the chief products of the country, will be displayed in the exhibit in the Agricultural Building.

Residence in Mission Style of Architecture.

(*With Supplemental Plate.*)

We present as the basis of one of our supplemental plates this month, a picture of a residence erected in the "Mission style" of architecture, which is proving so popular just at the present time on the Pacific Slope. The residence is located in Pasadena, Cal., and was built in accordance with drawings prepared by F. L. Roehrig, architect, of the place named.

Master Sheet Metal Workers' Associations.

It would seem that the proposal to form State and national associations in their trade appeals favorably to the master sheet metal workers throughout the United States. We have received communications on the subject from members of the trade in widely separated sections of the country, and in no case is the proposal received otherwise than with pronounced favor. Apparently, the trade is only waiting for some one to take the lead in the matter and call a meeting at some central point, for the purpose of discussing the practicability of a national organization. When such a leader is found there is no doubt that he will find many fellow tradesmen ready to rally to his standard. Meanwhile the local organizations of master sheet metal workers, which exist in various parts of the country, would do well to organize themselves into State bodies. This would greatly facilitate the ultimate formation of a national association. We thoroughly appreciate the fact that an undertaking of this kind would involve very great expenditure of time, thought and labor on the part of those who are self-sacrificing enough to take it upon their shoulders. But this has been equally true of similar organizations which have been successfully formed in other trades, and there is no reason to suppose that the master sheet metal workers of the United States, who are, as a body, an unusually intelligent and energetic type of men, should be unable to accomplish what otner tradesmen have done in the past.

As a sample of the letters that we have received from distant points we give the following from a concern in Kansas City:

We desire to say that we are heartily in favor of any movement for the organization of a Master Sheet Metal Workers' Association in the United States. We realize the need of such an organization here, for it seems as though the sheet metal workers have less protection than any other trade. We have tried to organize a local association, but without success, because it was only local and our territory is too small. However, we stand ready to help push the movement along, and would cheerfully co-operate with any others to further the undertaking.

AN unusual piece of repairing is being done on an old fashioned brown stone building in Warren street, New York. Workmen began to tear out some of the masonry recently, removing the stone from the ground upward instead of the roof down. When the front of the first floor had been laid open workmen began to remove the old wooden beams. As fast as a beam was taken out an iron girder was put in its place. All the beams in the first floor have been replaced by steel, bolted together just as any other steel structure would be. When the five floors are done, the remarkable change will have been effected with little difference in the building, yet the structure will be a modern steel frame office building instead of an old fashioned wooden one.

PACIFIC COAST mill men are represented at the World's Fair, at St. Louis, by an immense fir log 11 feet in diameter. The log had to be split into eight pieces in order to haul it from South Bend, Wash., to St. Louis, where it was put together again, and now appears just as it came from the great forest of Washington.

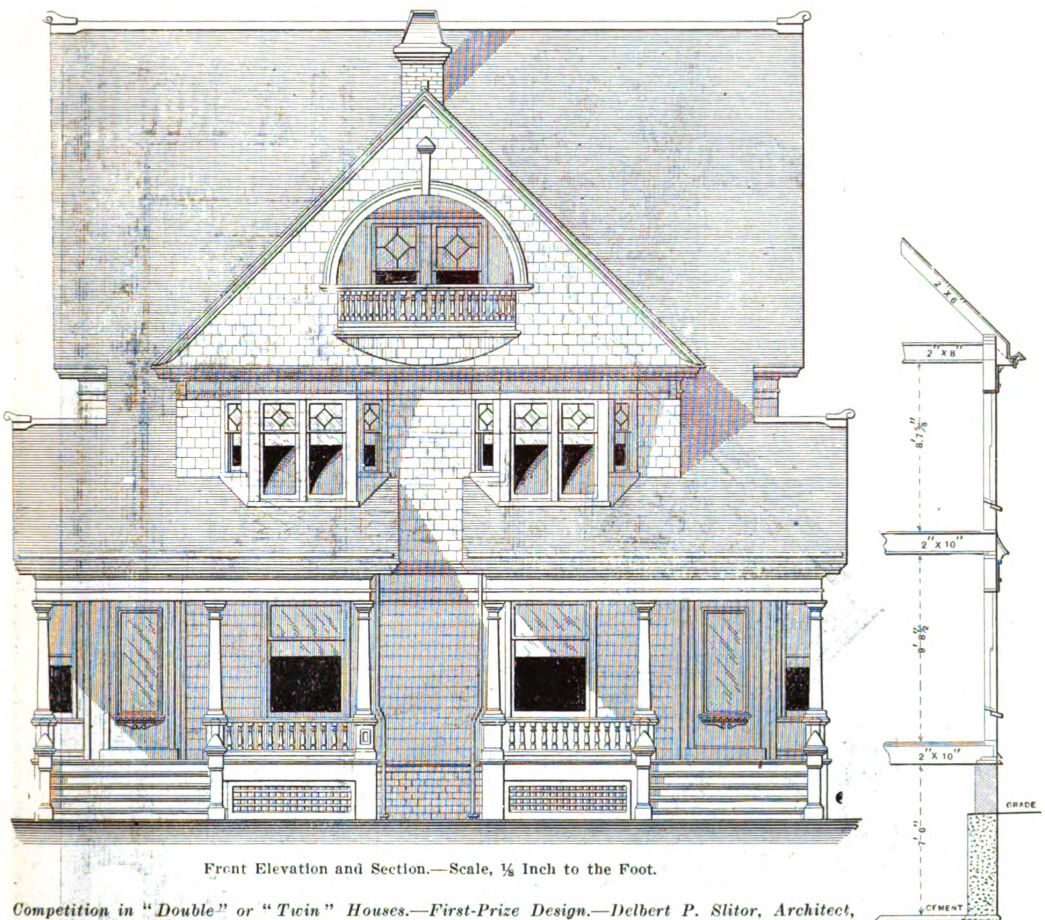
AMONG the building improvements recently projected in New York City is the 10-story annex to the Manhattan Storage and Warehouse Company's building on Seventh avenue, extending from Fifty-second to Fifth-third streets. The cost is placed at $150,000.

COMPETITION IN "DOUBLE" OR "TWIN" HOUSES.

FIRST-PRIZE DESIGN.

WE have pleasure in laying before our readers at this time the decision of the Committee of Award to which was referred the drawings submitted in the thirty-seventh competition, being that for "double" or "twin" houses. It was our original intention to have announced the results of this contest in the May issue, but the labor involved in reaching an award of prizes was of such magnitude as to prevent the committee from completing their labors in season for it. The studies submitted represented, as might naturally be supposed, a wide range of walls of the structure, as represented by the plans, was not to exceed 3200 square feet, "exclusive of cellars, verandas or porches." Notwithstanding this specific statement, there were instances where the architects submitted drawings showing more than 5000 square feet of floor space.

In one case the name and address of the architect appeared upon the drawings, and, in addition, there was no detailed estimate of cost. The latter fault appeared to be more common, perhaps, than any other which might be specified, and from what was submitted it would seem



Front Elevation and Section.—Scale, ⅛ Inch to the Foot.

Competition in "Double" or "Twin" Houses.—First-Prize Design.—Delbert P. Slitor, Architect, Penn Yan, N. Y.

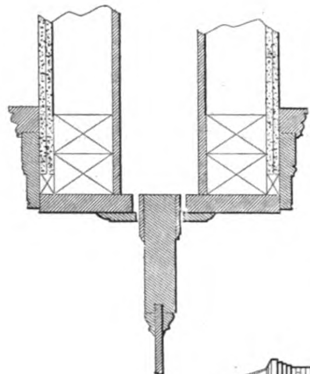
territory, the limitations being Massachusetts on the east and Colorado on the west.

The conditions governing the contest were practically the same as those announced in connection with the thirty-sixth competition, which was that for two-family houses, except that in the present instance the building was to be divided vertically by a party wall in such a way that each of the two families should occupy one-half of the structure from cellar to attic. In this, as in other competitions conducted under the auspices of *Carpentry and Building*, there were contestants who failed to fully observe the conditions stipulated, and as a consequence the committee were forced to throw out their drawings as not entitled to consideration. It was specifically stated that the building must be modern in all respects as regards style and finish, and must be suitable for erection upon a plot having a frontage or not more than 50 feet, while the number and arrangement of the various rooms were to be at the option of the architect. The total floor area, however, as measured from the extreme outside

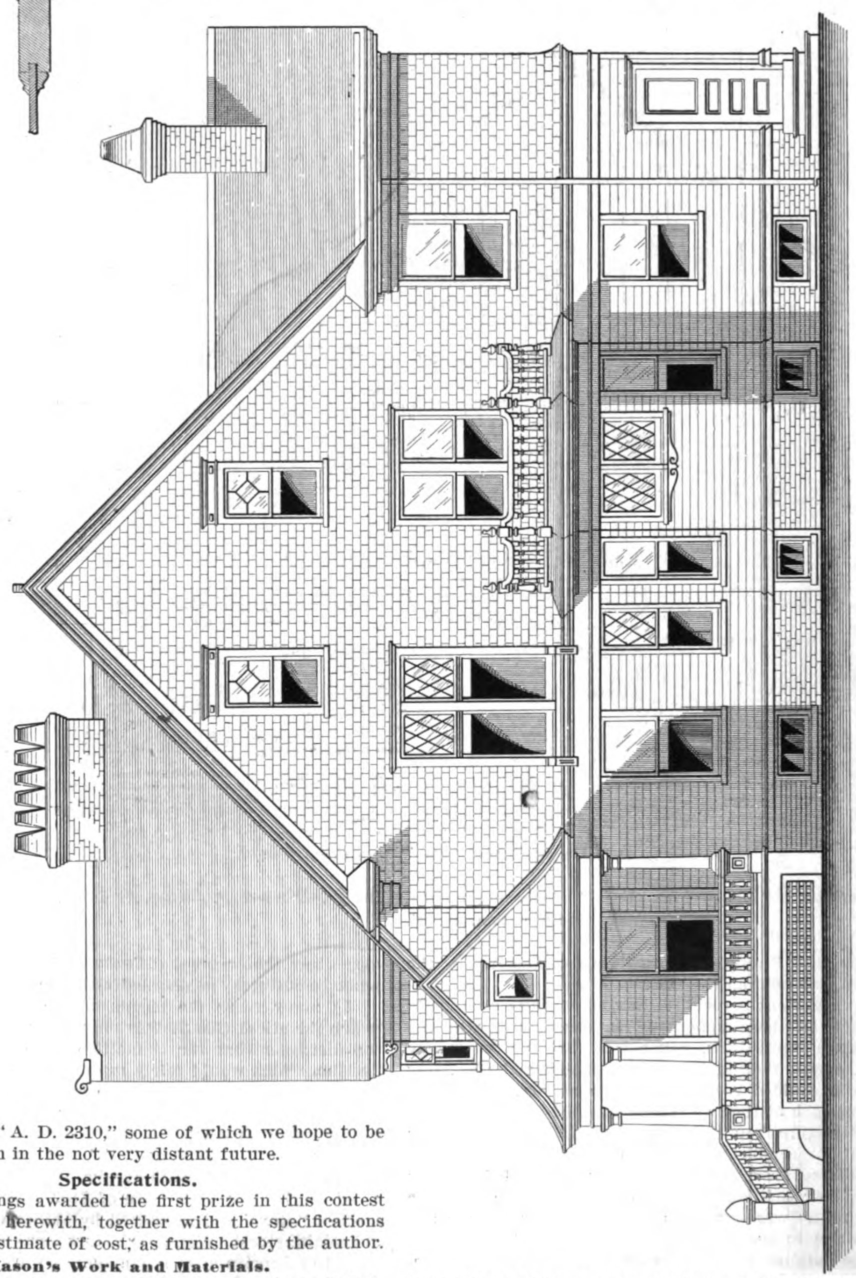
very clear that a great difference of opinion exists as to what constitutes "a detailed estimate of cost."

In many cases the merits of the drawings were so nearly identical that it was only after long and careful consideration that the committee were able to reach a decision which would fairly represent the true worth, architecturally considered, of the studies involved. Bearing in mind the conditions governing the contest, the committee announce that the set of drawings bearing the *nom de plume* "Who-Can-Tell," and submitted by Delbert P. Slitor of 133 South avenue, Penn Yan, N. Y., is entitled to the first cash prize of $100; that the drawings marked "Rex," and submitted by William H. Harvey of 311 Main street, Worcester, Mass., are entitled to the second cash prize of $60, and that the drawings stamped "Adificere," and submitted by John P. Kingston of 518 Main street, Worcester, Mass., are entitled to the third cash prize of $40.

While not entitled to a prize, there were several designs submitted that are entitled to "Special Mention," these including "A. D.," the author of which shows an attractive exterior to be constructed of hollow building blocks, so much in vogue just now in certain sections of the country; the design bearing a "W" in a circle;



Section of Sliding Doors and Frame.—Scale, 1½ Inches to the Foot.



Competition in "Double" or "Twin" Houses.—First-Prize Design.—Side (Right) Elevation.—Scale, ⅛ inch to the Foot.

"Nello" and "A. D. 2310," some of which we hope to be able to publish in the not very distant future.

Specifications.

The drawings awarded the first prize in this contest are presented herewith, together with the specifications and detailed estimate of cost, as furnished by the author.

Mason's Work and Materials.

Foundations.—On outside of main trench lay 3-inch round tile, to connect with main 5-inch tile at point where it leaves cellar. Fill all trenches with concrete to level with cellar bottom, and porch supports to grade. On this build foundation walls of good, sound stone to level with grade, all stone laid in Portland cement mortar and to a line on each side; all to be flush pointed outside and neatly pointed inside. After pointing is dry on outside, earth to be filled in and tamped down even with grade.

Stone Sills.—Furnish and set 4 x 8 inch sandstone sills to all cellar window frames, well bedded in cement.

Brick Work.—Build foundation wall and center partition in cellar from grade to sill line with good, hard burned standard size brick. All exposed brick of even color, and laid in red mortar, with ¼-inch beaded joints bonded every seventh course.

Build chimneys where shown on plans of same brick as specified for wall, all to be carried up true and plumb. Build in fireplaces where shown, with arch to support tile hearth, all to be carried up and finished with terra cotta caps at top, as shown. All above roof to be laid with red mortar; ¼-inch beaded joints, all to be plastered inside smooth their entire length; all above roof to be laid in cement. Provide all necessary thimbles and covers.

Concrete Floor.—Level off cellar bottom 3½ inches below finished floor level, and tamp down even and hard at all points, and lay a Rosendale cement concrete bottom 3 inches thick, and finish with ½-inch top dressing composed of Portland cement and sand in equal parts. Form in cellar bottom along foundation wall a channel, all to be graded to outlet before mentioned and connected with same. Build in bottom of cellar cold air box and cover with flagstone.

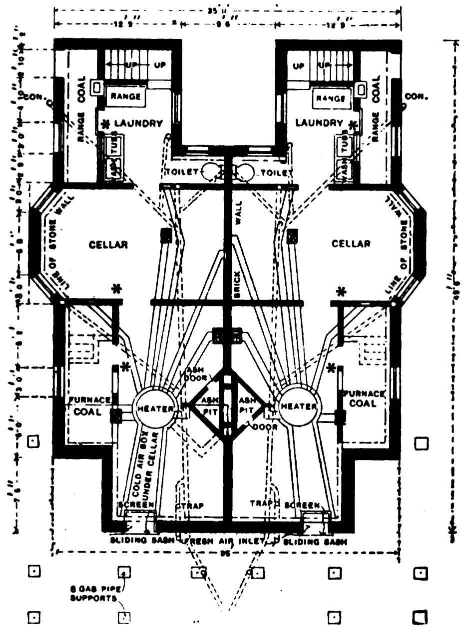
Lath and Plastering.—Cover all walls and ceilings of first and second stories and center partition in attic with No. 1 pine or spruce lath, joints broken every seventh lath on ceilings, and ninth on side walls. All angles and corners to be furrowed solid and firmly nailed. Cover same with one coat sand, lime and hair mortar, one of lime to three of sand and one-half of hair. Immediately follow with one coat of Browning mortar flush with grounds, and left under darby true, even and straight. All angles and corners put on to straight edge. After dry and hard lay on one coat of King's white finish, troweled down smooth and even, no laps to show. Back plaster behind all wainscotings that come to outside walls. Center partition in attic to be finished with Browning coat.

Carpenter Work.

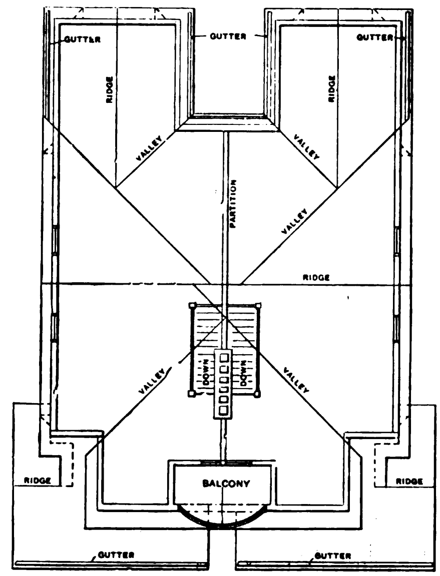
All framing materials to be of No. 1 hemlock, and as nearly dry as can be found in the market. Sills formed of one piece, 2 x 12, laid flat on wall and bedded in cement; one, 2 x 8 inches, set edgewise and outside even with outer edge of first piece. Back this up with one, 2 x 8, laid flat on first piece; all well spiked together and at angles. First floor joists framed into sills thus formed, as shown on section.

First and second floor joists, 2 x 10 inches; third floor joists, 2 x 8 inches. Outside walls and partitions, 2 x 4 inches. All set 16 inches on centers. Main rafters, 2 x 6 inches, set 18 inches on center. Valley rafter, 4 x 10 inches, with one running to ridge. Ridge, 2 x 8 inches. All joists bridged once in their length if over 12 feet; span twice with 1½ x 2 inch sawed bridging; corner posts, 4 x 6 inches; porch joists, 2 x 8 inches, set 16 inches on center; sills, 4 x 8 inches; soffit beam, 4 x 12 inches. All materials sized.

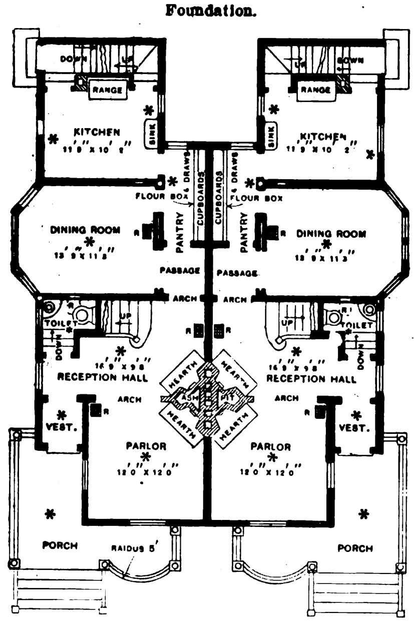
Partition shown in cellar to have 2 x 4 inch studding 16 inches on centers; all to be covered with ⅞ matched



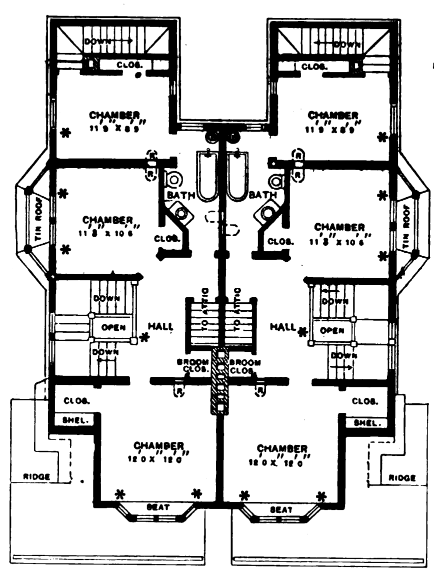
Foundation.



Attic, with Outline of Roof.



Main Floor.



Second Floor.

Scale, 1-16 Inch to the Foot.

Competition in "Double" or "Twin" Houses.—First-Prize Design.

hemlock lumber, not over 4-inch face, all firmly nailed, and No. 1 stock.

Sheathing.—Cover all exterior surfaces with ⅞ x 8 inch surfaced and jointed dry hemlock boards, strained up tight, and surface nailed with three nails in each bearing.

Papering.—Cover all sheathing with best grade of waterproof express sheathing paper, to lap at least 2 inches, well tacked on.

Sub-Floors.—Cover all joists on first floor with ⅞ x 8 inch surfaced and jointed hemlock boards, butt joints cut on center of joists; all laid diagonally across joists, firmly nailed with three 8d. nails in each bearing, and strained up tight.

Siding.—Cover all surfaces so indicated on plans with No. 1 5-inch white pine siding, free from sap or knots, to lap at least 1 inch; all firmly nailed to each studding.

Shingling on Side and Gables.—Cover all sides and gables where indicated on plan with No. 1 Washington red cedar dimension shingles, 6 to 2 inches, laid 5 inches to the weather.

Roofs.—Cover all roof surfaces with surfaced 6-inch hemlock boards, laid 2 inches apart and firmly nailed; all valleys to be laid straight. Cover these with No. 1 Washington red cedar shingles, 5 to 2 inches, laid ½ inch less than one-third their length to the weather, all firmly nailed.

Metal and Iron Work.

Lay all valleys in roof of 14-inch tin; all gutters to be formed of 28-inch tin; cover roof to dining room extension and balcony roof with tin, all well laid and soldered; flashings for chimneys, caps to windows and door frames and all other work necessary to make a waterproof job in all cases—all to be done with N. & G. Taylor Company IX "Old Style" tin.

Grade all gutters to outlets, and connect with 3-inch corrugated galvanized iron conductors, to be carried down and connect with drain, as shown, with all necessary crooks and bends, and all firmly fastened to house.

Place 2-inch gas pipe supports under porches and steps, as shown, with adjustable 5-inch collars.

Cornices and Belt Courses.

All cornices and belt courses as per detail, of good grade of white pine lumber, all worked as per drawings, put up straight and true, with all moldings neatly membered. Corner boards, 1⅛ x 4½ inches. Water table as per detail.

Porches.

Build porches as shown, with turned columns, molded and paneled pedestals, molded rails and turned baluster. All porch floors to be laid with white lead of 1⅛-inch Washington red cedar match. Ceilings of ½-inch N. C. pine, matched and beaded; steps, 1⅛-inch white pine, as per plans.

Balustrade over dining room extension to have 5 x 5 inch turned newels with molded rails, and 1⅝ x 1⅝ inch turned baluster. Balustrade on balcony with molded rail and 1¾ x 1¾ turned baluster.

Window and Door Frames.

Cellar frames of 2-inch white pine, with 1⅝-inch sill fitted to stone sill, with 1⅛ x 2½ face casings and 1⅛ staff mold. All window frames to be made in the usual manner with ⅞-inch jambs, 1⅛ x 4½ inch face casings, ⅞ subsill and 2-inch sill. All (except attic, which will be provided with spring bolts) will be fitted with pockets and 2-inch steel axle sash pulleys.

All door frames to be made with 1½-inch rabbetted jambs and oak sills.

Sash and Glazing.

All windows shown on plans to have 1⅜ C. C. white pine sash, glazed with No. 1 American glass, double strength, all to be oiled, back puttied and well sprigged, and puttied in the best manner; all to be hung on best braided cotton sash cord, and balances with cast weights.

Cellar sash hung at top and provided with hook and button.

Interior Finish.

All interior finish shown in parlor, toilet, dining room and reception hall to be of No. 1 kiln dried red oak; kitchen, pantry and side entrance in black ash; entire second floor in No. 1 Gulf cypress. All trim as per detail. All window and door casings to be brought on the job with all miter joints put together with dowels and glue.

Doors.—All doors as per sizes marked on plan. Colonial panel, flush molded front doors, as per plan, raised molded outside, with plate glass. Vestibule door to have plate glass same hight as front door. Side entrance door to be glazed with No. 1 American glass, double strength.

All doors shown in rooms on first floor finished in hard wood, to be veneered with wood to correspond with the room in which they show.

All doors on second floor to be solid Gulf cypress, blind tenoned, wedged and glued in the best manner. Cellar door, 1⅝-inch thick regular stock pine.

Wainscoting.—Toilet room, first floor, to be wainscoted 4 feet high with ¾-inch matched and beaded wainscoting, to set on 1 x 6 inch molded base, and finished with 3-inch neat molded cap.

Kitchen to be wainscoted 3 feet high, behind sink 4 feet, with ¾-inch matched and beaded black ash wainscoting, finished with neat cap and ⅝-inch quarter round at floor.

Bathroom to be wainscoted 4 feet high with matched and beaded Gulf cypress, with same base and cap as specified for toilet room.

Stairs.—Build main stairs, as shown, of No. 1 red oak, molded and paneled newels, 2½ x 3⅛ inch molded rail, 1⅛ x 1⅛ inch turned baluster, set 1½ inches apart on inclosed paneled string. Panel side of first and second run from string to floor, and soffit of second landing and third run.

Build rear stairs from kitchen to landing of No. 1 white pine.

Build attic stairs of No. 1 white pine; all to be housed, wedged and glued in the best manner, with 1⅛ inch treads, with nosing and cone, ⅞-inch risers and strings.

Build stairs from kitchen down to grade landing of No. 1 pine, 1⅛-inch treads, ⅞-inch risers and strings; from landing to cellar, of 1⅝-inch pine treads, ⅞-inch risers, 1¾-inch strings, all pine.

Closets.—Furnish all closets where shown with two shelves and 3-inch beaded wardrobe strip all around, with steel wire coat and hat hooks, spaced 1 foot apart.

Pantry.—Fit up pantry, as shown, with all drawers and tilting flour box brought on to job made up. Build counter shelf and work shelf 2 feet 6 inches high, under counter shelf. Build cupboard with one shelf and inclose with panel doors. Above counter shelf build cupboard. Extend doors to line with main door, finished at this point with neat cornice from there to ceiling. Build cupboard inclosed with short door for storage. Finish at ceiling with neat molding. Middle cupboard to have 15-inch shelving, spaced about 12 inches apart, inclosed with panel doors; all to be finished in black ash.

Picture Molding.—Put up in each room on first floor and each chamber on second floor a 2-inch picture molding 18 inches from ceiling down; all of same materials as room in which they are placed.

Floors.—After finishing is completed, lay over subfloors in kitchen, pantry and side entrance a ⅞ x 2½ inch No. 1 kiln dried white maple matched floor; in dining room, parlor, reception hall, bathroom and toilet, a ⅞ x 2½ inch No. 1 kiln dried white oak matched flood; and entire second floor to be covered with ⅞ x 3 inch white pine.

All hard wood floors to be thoroughly dressed up true and even and finished with sandpaper, leaving perfectly even surface for finishing.

All attic surface to be covered with ⅞ x 4 inch matched hemlock, firmly nailed and strained up tight.

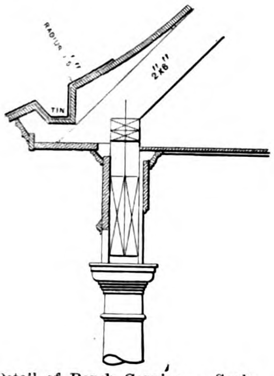
Mantels and Grates.—The mantels used, as shown by the floor plans, are to be regular stock mantels, similar to the Ironton wood mantel No. 231, as shown in their catalogue, with grate and tiling, and not to cost more than $40 each, complete.

Hardware.

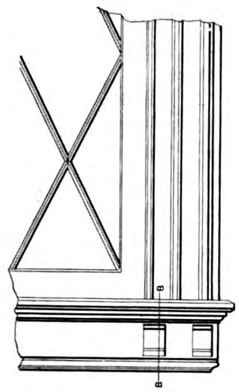
Front door to have Sargent 5-inch easy spring cylinder locks, with 3 x 10 inch bronze escutcheon and 2¼ inch bronze knobs. Keys to pass vestibule door. Vestibule door to have same style escutcheon and knobs, only smaller escutcheon. These doors to be hung with three 4½ x 4½ steel bronze plated butts to each door. Sliding doors to be hung with McCabe's ball bearing roller, stops, strikes, &c., complete, to be trimmed with bronze faced locks and cap escutcheon, same style as front and vestibule. Toilet door to have Sargent's 3½-inch easy spring bronze faced lock, same style escutcheon and knobs as vestibule, to be hung with three bronze butts 4 x 4 inches. Double swing door from dining room to pantry and pantry to kitchen to be hung with Sargent's double acting bronze plated hinges. Push plate on dining room side of pantry door to be bronze, same style as escutcheon on other doors. Side entrance door to have Sargent's 3½-inch easy spring bronze front locks, with flat steel keys.

All other doors in house (except cellar, which will have heavy thumb latches and plain 4 x 4 inch steel butts) will have same make and style of locks, 3½ inches; all to be trimmed with bronze plated knobs and escutcheons 2 x 8 inches, and hung with three 4 x 4 inch bronze plated steel butts. Push plates on pantry and kitchen side of double swing doors to correspond with escutcheons on doors, and to be 3 x 10 inches. All cupboard doors to be hung with two 2-inch steel bronze plated butts, and trimmed with bronze plated cupboard trim.

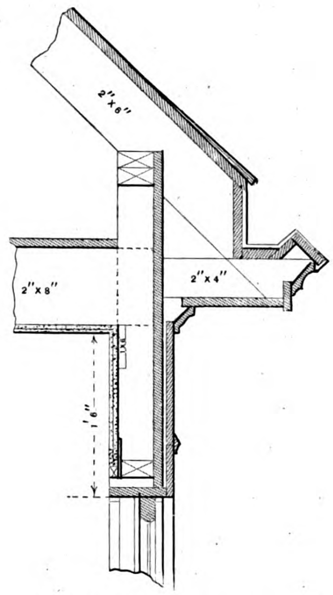
All windows shown in parlor, dining room and reception hall to have bronze sash locks and bronze cup sash lifts; all others to have bronze plated.



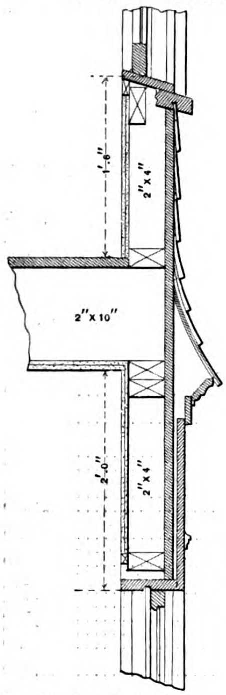
Detail of Porch Cornice.— Scale, ½ Inch to the Foot.



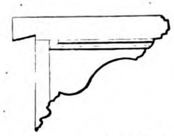
Partial Elevation of Dining Room Casement, Showing Shelf Underneath.—Scale, 1 Inch to the Foot.



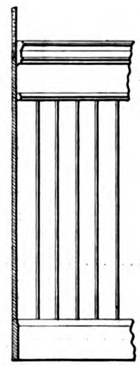
Details of Main Cornice.—Scale, ¾ Inch to the Foot.



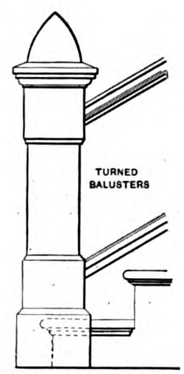
Details of Belt Course.—Scale, ¾ Inch to the Foot.



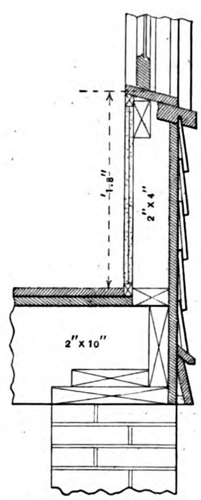
Section through Dining Room Window Shelf on Line B B.—Scale, 1½ Inches to the Foot.



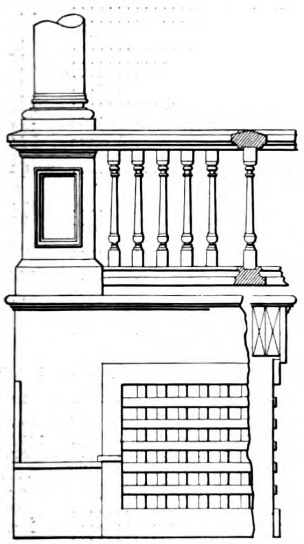
Detail of Wainscoting in Toilet and Bath Rooms.—Scale, ½ Inch to the Foot.



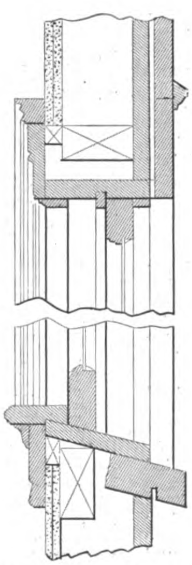
Newel Post at Front Steps.—Scale, ½ Inch to the Foot.



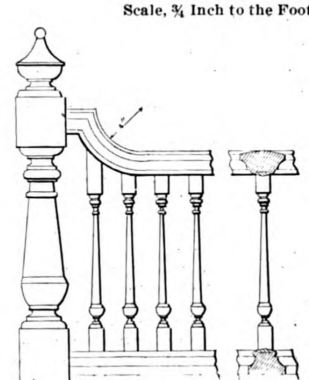
Section through Sill Course, Showing Construction, also Detail of Water Table.—Scale, ¾ Inch to the Foot



Details of Front Porch.—Scale, ½ Inch to the Foot.



Vertical Sections through Head Casing and Sill of Windows.—Scale, ¾ Inch to the Foot.



Balustrade Over Dining Room Extension.—Scale, ¾ Inch to the Foot.

Miscellaneous Constructive Details of First-Prize Design in Competition in "Double" or "Twin" Houses.

Furnish and set one electric bell complete, with push button to match front door hardware.

Painting and Finishing.

Paint all woodwork on exterior and porch floors three coats of best white lead and linseed oil, in colors to suit owner (except porch ceilings), having first shellacked all knots and pitchy spots after first coat is dry; putty all nail holes. Dip all shingles shown on sides and gables two-thirds of their length in Cabot's creosote shingle stain; after being laid finish with one coat well brushed on.

Finish all porch ceilings with one coat best liquid filler; after dry and hard sandpaper lightly, and finish with two coats best spar varnish.

Finish all woodwork shown in vestibule (including outside of front doors), dining room, reception hall, main stairs and toilet, including window sash, with one coat Berry Brothers' paste wood filler, well rubbed in and wiped off clean, after thoroughly dry and hard. Putty all nail holes with putty to match wood, and finish with one coat best white shellac, and follow with two coats best No. 1 Murphy & Co. transparent wood finish.

Interior.—After last coat is dry rub with pumice stone and oil to a dull gloss. Pantry, kitchen and side entrance, including window sash, to be finished with one coat filler and two coats of varnish, same as above, left with gloss.

Entire second story and all window sash to be finished with one coat best liquid filler and two coats best No. 1 Murphy & Co. transparent wood finish (interior), left with gloss.

Rear, attic and cellar stairs and woodwork in cellarway to be painted three coats lead and oil. All hard wood floors in parlor, dining room, vestibule, toilet, bathroom and reception hall to be finished with one coat Berry Brothers' wood filler, rubbed off clean, and finished with two coats Berry Brothers' floor finish.

Kitchen and pantry floors to have one coat oil put on hot, and after dry thoroughly wipe up all that does not penetrate the wood. All above work to be done in a first-class manner.

All metal work to be painted two coats best mineral paint.

Electric Bell.

Furnish and place where directed one electric bell, wires to be carried under floor to point of rising, connected with push button at front door. Button to be furnished with hardware.

Lighting.

Furnish and put in electric wires throughout the house, with sufficiently large wires to carry the number of lights as shown by the outings on plan; furnish and put in four circuits or switches, as directed by owner or architect. All wires, materials and workmanship to be subject to the test under the order of the local lighting company and of the National Board of Underwriters.

All fixtures to be of neat design, and to correspond with hardware in rooms in which they are placed; all to be complete with lamps, shades and globes.

Plumber Specifications.

Sewer.—Furnish and connect with sewer, and carry 5-inch vitrified pipe to house and to a point under bathrooms as indicated on cellar plans. Connect the same with all 4-inch tile as shown, with the proper Y's, T's and elbows; connect fresh air inlet and traps as shown; all to be laid with cement joints and have proper drainage. At the points indicated on plans connect with cast iron pipe, and carry same up and through roof and flash with lead, one for bathroom and one for toilet. All joints calked with lead and oakum. Lay off on each stack openings for each set of fixtures.

City Water.—Furnish and start from water main in street; furnish all needed connections, with cut-off at curb.

Water pipes in cellar to be ¾-inch galvanized iron; all others to be lead, with wiped joints and brass ferrules.

Plumbing.—Furnish and place in laundries where indicated on plans one set of two soapstone laundry tubs, connected with city water by ½-inch galvanized iron pipe, and ½-inch N. P. Fuller patent bibbs for hot and cold water, and connected to drain with 1½-inch lead pipe and 1½-inch lead trap.

Place in toilets off laundry one low down syphon closet, with hard wood tank and seat, connected to main sewer with lead bend and brass ferrule, and supplied with city water through ½-inch N. P. pipes.

Furnish and place in toilets, first floor, one low down syphon closet, quartered oak seat and tank, connected to sewer with lead bend and brass ferrule. Place one 20 x 28 inch marble slab and 10-inch marble back, and 14 x 17 inch porcelain basin, to rest on N. P. brackets, and connected with hot and cold water through ⅜-inch N. P. pipes, and N. P. lever faucets, Fuller patent; waste to have 1¼-inch N. P. brass trap connected to sewer.

Furnish and place in kitchens one 18 x 36 inch cast enameled sink, with 12-inch back, 3-inch roll rim, and connect same with hot and cold water through ½-inch Fuller patent bibbs, and furnish waste with 1½-inch N. P. brass trap, connected to soil pipe.

Place 40-gallon extra heavy galvanized boiler, set on ornamental iron stand, supplied with hot and cold water, with ½-inch compression stops, connected to range.

Furnish and place in bathrooms on second floor a low down siphon closet, with seat and tank same as toilets first floor, and connect same to soil pipe with lead bend and brass ferrule.

Furnish and set a 5-foot 3-inch roll rim cast enameled bathtub, with N. P. waste and overflow; hot and cold water supplied through ½-inch N. P. brass pipes, and No. 4½ Fuller patent double bath cocks, with 1½-inch N. P. brass trap connected to soil pipe.

All above fixtures to be first-class, all pipes well supported and left in perfect condition.

Heating.

Furnish and set on foundations prepared by mason contractor one No. 352 Boynton Renown furnace, capacity 20,000 square feet, and connect same with 10-inch IX tin pipes running to parlor, dining room, reception hall, and 9 inch to toilets first floor, and 9-inch pipes to risors to second floor, as indicated on plans, all to be covered with asbestos. All pipes to be furnished with suitable dampers, so heat may be shut off from any one pipe at will.

First floor registers to be japanned 10 x 14 inch; parlor, reception hall and dining room, 9 x 12 inch circle top for toilet; second floor registers to be 9 x 12 inch circle top, japanned finish; all properly connected with suitable size wall pipes, covered with asbestos.

Connect furnaces with chimney with 7-inch No. 24 galvanized iron pipe. Furnish and set one 9 x 12 inch cast iron door and frame in bottom, at each side of chimney.

All above to be done in a workmanlike manner and guaranteed to heat the house in zero weather. Furnace dampers to be so arranged as to be operated from first floor.

Detailed Estimate of Cost.

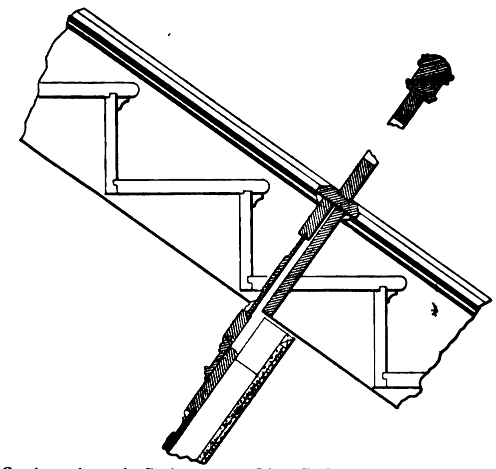
The detailed estimate of cost accompanying the set of drawings is as follows:

EXCAVATING.	
363 yards, including trench and drain, at 80 cents	$108.90
Total	$108.90
MASON'S WORK.	
100 perch of stone, laid and pointed, at $2	$200.00
152 square yards cement floor	91.20
14,300 brick in foundation and partition in cellar, laid, at $16	228.80
12,200 brick in chimneys, at $18	219.60
1,570 square yards of lath and plastering, including lath, at 30 cents	471.00
52 square yards of lath and plastering in attic partition, at 25 cents	13.00
72 square feet of 2-inch flagstone for cold air flue in celar, at 10 cents	7.20
14 4 x 8 inch sandstone sills for cellar windows	14.00
200 lineal feet drain tile, laid	5.00
Filling in trenches and outside of main wall	10.00
Terra cotta chimney tops	20.00
Total mason's work	$1,279.80
CARPENTER WORK.	
16,000 feet framing materials, at $19	$304.00
6,700 feet surfaced and jointed sheathing and subfloors, at $20	134.00
2,650 feet surfaced roof boards, at $20	53.00
2,700 feet matched hemlock for cellar partitions and attic floor, at $24	64.80
27,000 shingles on roof, at $4.25	114.75
19,000 shingles for sides and gables, at $4	76.00
150 pounds best Manila sheathing paper, at 6 cents	9.00
1,800 feet No. 1 pine siding, at $35	63.00
1,300 feet red oak flooring, first story, at 5 cents	65.00
428 feet white maple flooring, first story, at 3½ cents	14.98
1,925 feet white pine flooring, second story, at 3 cents	57.75
Total rough lumber	$956.28
MILL WORK.	
160 lineal feet water table complete, at 4½ cents	$7.20
72 lineal feet corner boards complete, at 4½ cents	3.24
242 lineal feet belt course, including eaves, cornices to porches, at 10 cents	24.20
114 lineal feet eave cornice, including gutter forms, at 15 cents	17.10
264 lineal feet gable cornice, including returns and belt across front gable, at 12 cents	31.68
110 lineal feet ridge boards, including 5 finals complete	6.90
Materials for porches, not including framing materials, roof or cornice, with step newels, pedestals and circle rails, made up ready to set	169.39
Materials for circle balustrade in front gable, complete	9.00
Materials for balustrade over dining room extension, 28 feet	21.00
52 windows and casements, 1⅜ C. C., glazed A. D. T.	148.27
14 cellar sash	8.63
38 window frames, with pockets and pulleys made up complete	62.00
6 casement frames, made up	7.50
6 window frames for attic, made up	9.00
14 cellar frames, made up	14.00
4 windows in cellar partition, and frames	10.40
6 sets ash window trim, put together	10.80
18 sets cypress window trim, put together	27.00
20 sets red oak window trim, put together	36.00
10 common stock pine doors, cellar	20.00
2 front doors, veneered red oak, one light plate glass	27.50

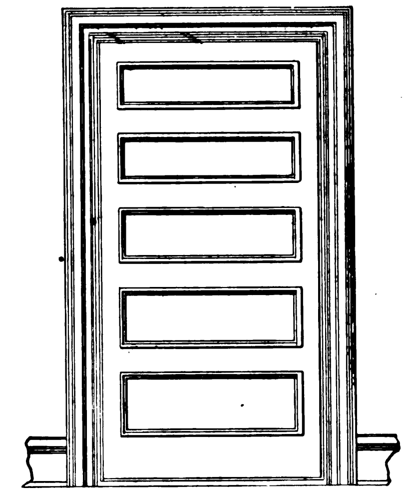
2 vestibule doors, veneered red oak, one light plate glass	27.50
2 toilet room doors, veneered red oak, Colonial	11.85
2 sliding doors, veneered red oak, Colonial	20.50
6 doors, veneered ash and red oak	33.75
4 doors, veneered ash and cypress	22.50
2 doors, solid cypress, one light sheet glass	12.00
All above first floor.	
20 doors, solid cypress, second floor	63.68
2 front door frames and oak trim, complete	5.00
2 rear door frames and ash trim, complete	5.00
6 sets inside door jambs, ash and oak trim, two sides put together, complete	19.50
4 sets inside door jambs, with ash trim, two sides put together, complete	12.00
4 sets red oak trim for cased opening reception hall	50.00
20 sets inside door jambs, with cypress trim, two sides put together, complete	44.00
360 lineal feet 9-inch molded cypress base, three members	21.60
Materials for front stairs from hall to second floor, with newels, panels, &c., and first steps built up, strings housed, complete	174.00
Materials for stairs from hall to toilet, strings housed	6.00
Materials for attic stairs, with railing to attic, complete	15.60
4 oak mantels with grates, complete	160.00
Total mill work	$1.520.01

METAL AND IRON WORK.

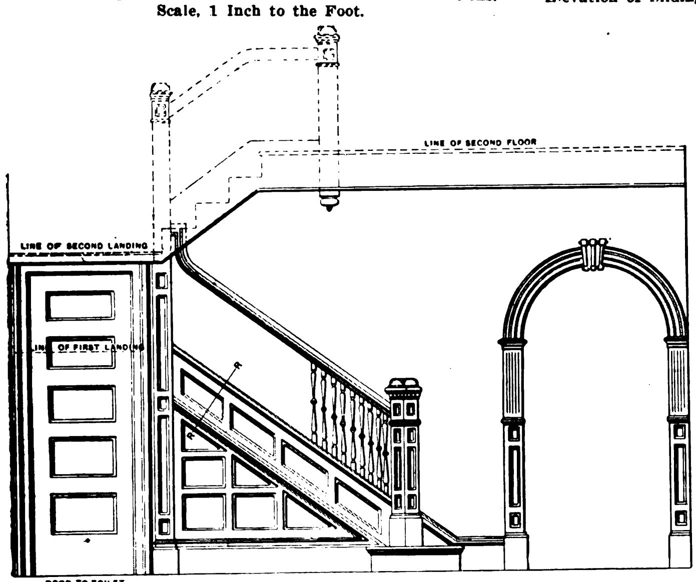
96 lineal feet 28-inch gutter tin, laid, at 30 cents	$28.80
104 lineal feet 14-inch valley tin, laid, at 12½ cents	13.00
200 feet tin roofing, at 7 cents	14.00
100 lineal feet of 3-inch conductor, with crooks and elbows, complete, at 18 cents	18.00
12 gas pipe porch supports, at $1.25	15.00
Total metal and iron work	$88.80



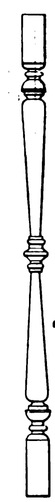
Section through Staircase on Line R R of the Elevations.—Scale, 1 Inch to the Foot.



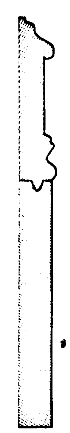
Elevation of Sliding Doors, Showing Style and Trim.—Scale, ¾ Inch to the Foot.



Elevation of Main Stairs and Side of Hall as Viewed from the Parlor.—Scale, ¼ Inch to the Foot.



Stair Baluster.—Scale, 1½ Inches to the Foot.



Base.—Scale, 3 Inches to the Foot.

Miscellaneous Constructive Details of First-Prize Design in Competition in "Double" or "Twin" Houses.

58 lineal feet ¾-inch cypress matched and beaded wainscoting, 4 feet high, with cap and base, complete	16.70
100 lineal feet ⅞ x 3 inch beaded cypress wardrobe strip for closets	1.50
36 lineal feet 16-inch pine shelving for closets	1.68
12 cypress wall angles, 4 feet long, turned	3.00
260 lineal feet 9-inch red oak base, three members	11.05
600 lineal feet 2-inch picture molding	6.00
24 lineal feet 9-inch ash, three members, pantry	1.38
76 lineal feet ¾-inch matched and beaded ash wainscoting, 3 feet high, with cap and base, complete, for kitchen	16.44
36 lineal feet ¾-inch matched and beaded wainscoting, 4 feet high, with cap and base, complete, for toilet	9.09
Materials for two pantry dressers, with drawers and flour boxes made up	43.76
Materials for rear stairs from kitchen to second story.	17.14
4 red oak turned wall angles	1.00
Material for rear stairs from kitchen to landing and laundry to cellar and outside steps	20.98

RECAPITULATION.

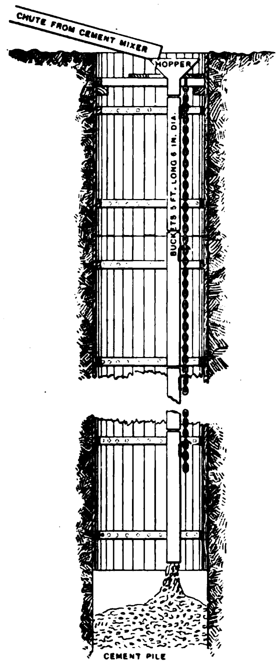
Excavating	$108.90
Mason work	1,279.80
Rough lumber	956.28
Mill work	1,520.01
Metal and iron work	88.80
Rough hardware	48.00
Finished hardware	165.00
Heating, complete	268.00
Plumbing, including all drain tile laid, complete	495.00
Lighting and fixtures, complete, including electric bells	168.00
Painting and finishing	375.00
Carpenter work	937.80
Total	$6,410.59
2 steel ranges for kitchen	$85.00
2 cast ranges for laundries	75.00

The builder's certificate was signed by Frank Harrison of Penn Yan, N. Y.

Expediting Foundation Work.

(With Supplemental Plate.)

A novel method of getting rid of dirt in excavating for foundations is being employed by S. Krug, who has the excavating contract for the foundations for the new portion of the First National Bank Building, Chicago. Instead of drawing the wagons up an incline, through the soft soil of the foundation, requiring four to six horses to get the load to the street level, the wagons are driven on to a platform at the street level, the horses are unhitched and a wagon is picked up by a jib crane and lowered to the exact point where excavation is being done. The wagon is quickly loaded, and is hoisted by means of the crane up to the platform, as shown in one of our half tone supplemental plates, when the horses are hitched and the load is carried off with the minimum of effort. In order to provide against the possibility of the wagon slipping from the chains which hold it during the hoisting operation, the loops are passed between the spokes of the four wheels



Showing How the Cement is Put in Place.

Expediting Foundation Work.

and over the hubs. This method is expediting the removal of dirt to such an extent that the whole foundations, covering 110 feet by about 200 feet, will be completed in about 60 days from the inception of the work. A portion of the excavation is 23 feet below street level, and the general excavation is 15 feet.

Another interesting feature of this foundation is the speedy method of forming the cement piling upon which the building will rest. Ninety-four wells running down to rock 105 feet below street level are being sunk, the wells being sheathed with wooden staves held in place by heavy steel hoops on the inside. When the well is completed to bed rock a chain is hung down one side of the well and buckets are hung onto this chain by means of hooks that engage links of the chain, all as shown in the illustration presented herewith. These hooks are so placed on the side of the bucket that buckets are in close touch with each other, making a continuous flexible pipe. The buckets are 5 feet long, 6 inches in diameter, and are made from galvanized sheet steel. At the top of the well a cement mixer, driven by a pony engine, is at work, and as rapidly as a crew of eight men can shovel the material into it, it automatically dumps the mixed ingredients into a hopper at the top of the continuous line of buckets, and operators at the bottom of the well seize the bottom bucket of this "flexible pipe line" and swing it where they desire, depositing the material evenly around the bottom of the well and tamping it as it is deposited. In this way John Griffiths & Son, the contractors, say that they can make a cement pile in one-eighth of the time that would ordinarily be required by means of the single bucket lowering the materials to place. The wooden sheathing is removed as the work progresses, to be used in the next well.

D. H. Burnham & Co. are the architects, and to them is given the credit for the continuous bucket device, while the method of hoisting wagons is said to be original with Mr. Krug.

Law Covering Ventilation of School Houses.

After long continued and persistent effort on the part of those interested in the proper ventilation of buildings, more especially of school houses, the New York State Legislature passed in April what was known as the Davis bill, providing for the ventilation of school buildings. Its principal clause reads as follows:

1. No school house shall hereafter be erected in any city of the third class or in any incorporated village or school district of this State, and no addition to a school building in any such place shall hereafter be erected, the cost of which shall exceed $500, until the plans and specifications for the same shall have been submitted to the Commissioner of Education and his approval indorsed thereon. Such plans and specifications shall show in detail the ventilation, heating and lighting of such buildings. Such Commissioner of Education shall not approve any plans for the erection of any school building or addition thereto unless the same shall provide at least 15 square feet of floor space and 200 cubic feet of air space for each pupil to be accommodated in each study or recitation room therein, and no such plans shall be approved by him unless provision is made therein assuring at least 30 cubic feet of pure air every minute per pupil, and the facilities for exhausting the foul or vitiated air therein shall be positive and independent of atmospheric changes. No tax voted by a district meeting or other competent authority in any such city, village or school district exceeding the sum of $500 shall be levied by the trustees until the Commissioner of Education shall certify that the plans and specificatioins for the same comply with the provisions of this act. All school houses for which plans and detailed statements shall be filed and approved, as required by this act, shall have all halls, doors, stairways, seats, passageways and aisles, and all lighting and heating appliances and apparatus, arranged to facilitate egress in case of fire or accident, and to afford the requisite and proper accommodations for public protection in such cases. All exit doors shall open outwardly, and shall, if double doors be used, fasten with movable bolts operated simultaneously by one handle from the inner face of the door. No staircase shall be constructed with wider steps in lieu of a platform, but shall be constructed with straight runs, changes in directions being made by platforms. No doors shall open immediately upon a flight of stairs, but a landing at least the width of the door shall be provided between such stairs and such doorway.

New Hotel for Brooklyn.

The contracts have recently been awarded for the erection on the site of the old Pierpont House, at Montague and Hicks streets, Brooklyn, N. Y., of a hotel structure, which is estimated to cost in the neighborhood of $1,500,000. The hotel will be of fire proof construction, 12 stories in hight, the walls being of granite and fancy brick, with terra cotta and limestone trimmings. There are to be 450 rooms in the building and 250 bathrooms. A feature of the second floor will be the banquet hall, which will seat 500 people and have a floor area of over 5000 square feet. The new hotel is to be known as the Woodruff, after ex-Lieutenant-Governor T. L. Woodruff, one of the stockholders. The contract for the construction has been secured by the Thompson-Starrett Construction Company, and it is expected to have the work completed in the course of a year.

WIND BRACING OF BUILDINGS.

BY F. E. KIDDER, CONSULTING ARCHITECT.

IT is generally considered that buildings of substantial masonry construction with permanent partitions do not require any special wind bracing unless the hight exceeds one and one-half times the width of bases, and for hights of from one and one-half to two times the width of base what bracing is required can generally be provided by a few brick partitions, or by substantially braced wooden partitions.

Frame buildings are not as rigid as those with masonry walls, but a well framed wooden building having cross partitions extending from first floor to top story, and not over 18 feet apart, will not require special bracing unless the hight exceeds one and one-half times the width of base. If the building has high stories and few, if any, partitions some form of bracing will be desirable, if not absolutely necessary.

For frame buildings having a hight two or more times the width of base some provision should be made for wind bracing. The method of computing wind stresses can best be explained in connection with an example.

EXAMPLE OF WIND STRESSES AND BRACING.—Let Figs. 1 and 2 be the plan and cross section of a long and narrow dormitory or rooming house. The floors of such a building should be supported by posts and girders, as indicated in solid black. There would, of course, be no necessity for bracing the building endways, so all we need to consider is the cross bracing of the building. We will assume that the building is exposed to the wind on both sides.

The first step is to decide on the wind pressure per square foot. It is customary to figure wind stresses on a basis of 30 pounds per square foot of vertical surface. The actual pressure on buildings often reaches 40 pounds and sometimes 50 pounds, but it is generally assumed that the natural stiffness of the building will care for all wind stresses above 30 pounds. It is also assumed that the wind pressure will be concentrated at the floor lines, in the same way that the loads on a truss are concentrated at the joints.

These wind loads will be represented by the arrows P_1, P_2, P_3, &c., in Figs. 2 and 3. The wall area contributary to P_1 will be equal to the distance down from the top plus one-half the distance to P_2 times the length of the building; the area contributory to P_2 equals one-half the distance from P_1 to P_3 times length of building, and so on. The contributary area multiplied by 30 pounds will give the pressure in pounds. In this example we will assume that the wind pressure on the end panels is resisted by the ends of the building, and that only the six interior panels need be figured for wind load.

P^1 will then be equal to $2' + 7' \times 84' \times 30$ pounds $=$ 22,680 pounds. P_2 will be equal to $7' + 5' \times 84' \times 30$ pounds $=$ 30,340 pounds.

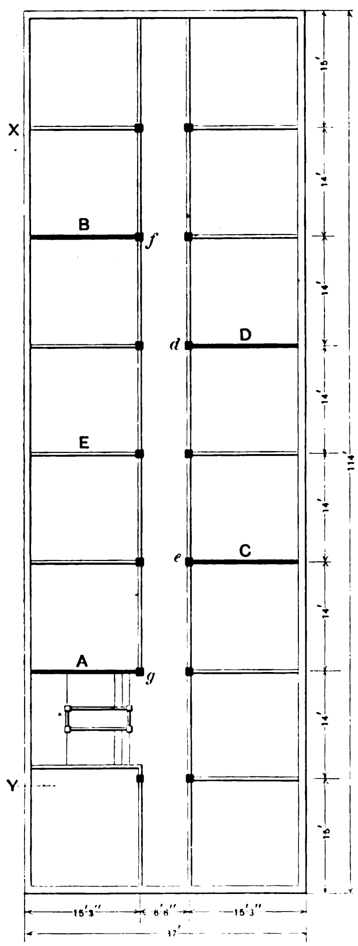


Fig. 1.—Plan of Walls and Partitions.

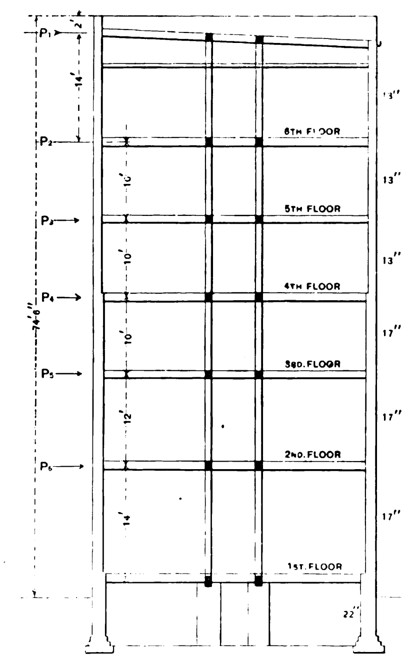


Fig. 2.—Section.

Wind Bracing of Buildings.

There are two methods generally adopted for interior bracing: First, by diagonal systems, placed in partitions; and, second, by knee braces.

Both systems require continuous posts from basement to top story, and struts or girders in each floor, connected to the posts. In the diagonal system the struts in the floors are connected by diagonal rods or bars, provided with turnbuckles as in Fig. 3. With the knee brace system the struts are connected to the posts at each end by knee braces, or in steel buildings by gusset plates, which must be capable of resisting both tension and compression.

Knee bracing requires posts in outside wall as well as interior columns.

The diagonal system is considered the most economical when it can be employed—*i. e.*, when it will not interfere with the interior arrangement of the building.

DIAGONAL SYSTEMS should be symmetrically located in relation to the plan, so that there will be no tendency to twist. In the building in question we will locate diagonal systems in the partitions at A, B, C and D of Fig. 1.

A diagram of one system is shown in Fig. 3. The struts S_1, S_2, S_3, &c., will be in compression, also the leeward columns, C_1, C_2, C_3, &c., while the diagonals and the windward columns will be in tension. With the wind from the left the diagonals shown by the full lines will be brought into action, and with wind from the right those shown by the dotted lines will be needed. As the wind may blow from either direction, both sets of diagonals will be required, and all columns must be capable of resisting tension and compression.

If the building in question were built of frame there should be a post in the outer wall opposite each strut, and both the exterior and interior columns should be spliced so as to be continuous from bottom to top, the struts and girders being supported by steel brackets bolted to the posts. The most practical construction is to make the struts S_1, S_2, &c., of two pieces, so that the diagonals may pass between them and be attached to a pin bolt. In steel buildings [illegible] of channels are commonly used for the struts.

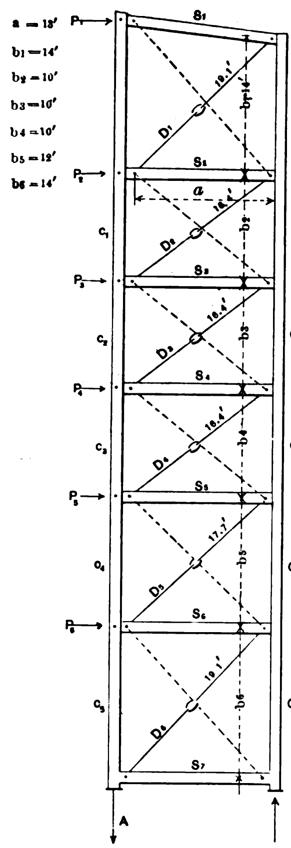


Fig. 3.—Diagram of Wind Bracing.

Wind Bracing of Buildings.

The stresses in the different members of a diagonal system are computed as follows, the dimensions being those shown on Figs. 2 and 3, P_1, P_2, &c., representing the entire wind load from X to Y of Fig. 1:

LOADS:

Load $P_1 = 7' + 2' \times 84' \times 30$ lbs. $= 22,680$ lbs.
" $P_2 = 5' + 7' \times 84 \times 30$ " $= 30,240$ "
" $P_3 = 10' \times 84 \times 30$ " $= 25,200$ "
" $P_4 = 10' \times 84 \times 30$ " $= 25,200$ "
Load $P_5 = 11' \times 84 \times 30$ lbs. $= 27,720$ lbs.
" $P_6 = 13' \times 84 \times 30$ " $= 32,760$ "

STRESS IN STRUTS (COMPRESSION):

Comp. in $S_1 = P_1 = 22,680$ lbs.
" " $S_2 = P_1 + P_2 = 52,920$ "
" " $S_3 = P_1 + P_2 + P_3 = 78,120$ "
" " $S_4 = P_1 + P_2 + P_3 + P_4 = 103,320$ "
" " $S_5 = P_1 + P_2 + P_3 + P_4 + P_5 = 131,040$ "
" " $S_6 = P_1 + P_2 + P_3 + P_4 + P_5 + P_6 = 163,800$ "

STRESS IN DIAGONALS (Tension):

Lbs.

$$\text{Tension in } D_1 = \text{stress in } S_1 \times \frac{D_1^*}{a} = 22,680 \times \frac{19.1}{13} = 33,340$$

$$\text{" " } D_2 = \text{" " } S_2 \times \frac{D_2}{a} = 52,920 \times \frac{16.4}{13} = 66,680$$

$$\text{" " } D_3 = \text{" " } S_3 \times \frac{D_3}{a} = 78,120 \times \frac{16.4}{13} = 98,430$$

$$\text{" " } D_4 = \text{" " } S_4 \times \frac{D_4}{a} = 103,320 \times \frac{16.4}{13} = 130,180$$

$$\text{" " } D_5 = \text{" " } S_5 \times \frac{D_5}{a} = 131,040 \times \frac{17.7}{13} = 178,210$$

$$\text{" " } D_6 = \text{" " } S_6 \times \frac{D_6}{a} = 163,800 \times \frac{19.1}{13} = 240,790$$

STRESS IN LEEWARD COLUMNS (Compression):

$$\text{Comp. in } C_1 = \text{stress in } S_1 \times \frac{b_1}{a} \qquad 24,400 \text{ lbs.}$$

$$\text{" " } C_2 = \text{" " } S_2 \times \frac{b_2}{a} + \text{stress in } C_1 = 65,150 \text{ "}$$

$$\text{" " } C_3 = \text{" " } S_3 \times \frac{b_3}{a} + \text{" " } C_2 = 125,300 \text{ "}$$

$$\text{" " } C_4 = \text{" " } S_4 \times \frac{b_4}{a} + \text{" " } C_3 = 204,850 \text{ "}$$

$$\text{" " } C_5 = \text{" " } S_5 \times \frac{b_5}{a} + \text{" " } C_4 = 325,800 \text{ "}$$

$$\text{" " } C_6 = \text{" " } S_6 \times \frac{b_6}{a} + \text{" " } C_5 = 502,170 \text{ "}$$

Tension in c_1 = comp. in C_1; in c_2 = comp. in C_2, and so on.

* The length of D_1, D_2, &c., should be taken. D_1, a and b should all be in the same unit of measurement, either feet or inches.

These stresses are the TOTALS for the entire six interior panels, and if we use four sets of bracing, as at A, B, C and D, the stresses for each of the four systems will be one-fourth of those given above.

If we were to use still another set of bracing at E, then the stresses for each system would be one-fifth of those found above.

Comparing the formulas for the stresses, it will be seen that the stress in any strut is equal to the wind load at that floor plus all of the loads above, also that the column loads accumulate rapidly toward the bottom.

In proportioning the parts of a wind brace system it is customary to allow greater unit stresses than are used for ordinary live loads. Thus the diagonals are generally proportioned to a unit stress of 20,000 pounds to the square inch.

The compression in the leeward columns must be added to the usual live and dead loads, to get the size of the column.

Thus with four sets of wind bracing, the compression in one first-story column, from the wind pressure, will be 125,540 pounds. Allowing 80 pounds per square foot of floor for dead and live loads and partitions and 60 pounds for roof and upper ceiling, the load produced thereby on the first-story columns will be 66,550 pounds. Therefore the columns must be proportioned to resist 125,540 + 66,550 = 192,090 pounds. A smaller factor of safety may be used, however, than ordinarily.

With the wind from the left, the columns at d and e, Fig. 1, will be in tension, and with the wind from the right those at f and g will be in tension, and, according to our figures, the tension due to the wind load will be greater than the compression from the floors and roof. If this condition really existed in the building it would be necessary to anchor the lower columns to the foundations. In a building such as we are considering the writer does not believe that this is necessary, although if the building were built of frame it would be advisable to anchor the outer columns to the foundations.

TO FIND WHETHER THERE IS DANGER OF A BUILDING BEING OVERTURNED.—There is sometimes danger of narrow and tall frame buildings being overturned by the wind, and to determine whether such danger exists, multiply the area of the entire side of the building by 30 or 40 pounds (according to the exposure), and this product by one-half the hight of the building, and divide by one-half the width of the building. If the quotient is greater than the weight of the building, there is some danger of its being overturned.

Example.—The area of one side of the building shown by Figs. 1 and 2 = 74' × 114' = 8436 square feet. Multiplying by 30 pounds per square foot, and that product by one-half of the hight, or 37 feet, we have 9,363,960 pounds as the moment tending to overturn the building. Dividing this moment by 18½ (one-half of the width) we have 506,160 pounds.

The weight of the building is equal to the weight of the walls, floors, roof and partitions.

For a frame building the walls may be figured at 20 pounds per square foot, the floors, including partitions, at 40 pounds, and the roof and ceiling at 40 pounds.

In this building there are 302 x 74 feet of wall, equals 22,348 square feet, which, at 20 pounds, will equal 446,960 pounds.

The five floors and roof, including partitions, will weigh about 36 × 113 × 40 × 6 = 976,320 pounds, and the total weight of building, neglecting first floor, will be 446,960 + 976,320 = 1,423,280 pounds, and as this greatly exceeds the quotient found above, there is no likelihood of the building being overturned.

Frame buildings without cross partitions should be braced by knee braces, when the hight of the building exceeds the width. Fig. 4 shows one method of bracing mill buildings.

The above covers in a general way the method of figuring wind stresses, although there is very much more that can be said on the subject. The wind bracing of skeleton steel buildings is ably discussed by J. K. Freitag in his excellent work, "Architectural Engineering."

CONSTRUCTION OF LIME KILNS.

BY ELLIS B. NOYES, C. E.

BEFORE giving a description of any kilns, a short consideration of the nature of limestone and of the change effected by burning it may be of interest. Limestone occurs in nature of all degrees of purity, though that with less than 1 per cent. of impurity is very rare. Pure limestone is a carbonate of lime, and is composed of 56 parts by weight of oxide of lime and 44 parts of carbonic acid or carbon dioxide. The impurities commonly present are silica, alumina, iron, magnesia and organic matter. When the limestone is to be burned to make quicklime, those limestones containing alumina or alumina and silica combined in the form of clay should be avoided, since in these a sintering is very apt to occur, and this should in all cases be strictly avoided. Iron in any quantity will discolor the lime, and magnesia in excess of about 10 per cent. makes a meager lime. According to the character and amount of impurities, limestone grades into magnesian limestone and dolomite on the one hand and into cement rock on the other.

Limestone when subjected to heat begins to part with its carbonic acid at 750 degrees F., and the whole of the acid and vapor passes off at from 1300 to 1400 degrees F., which is a bright red heat. A pure limestone loses 44 per cent. of its weight in burning and decreases in volume 16 to 18 per cent. Since nearly one-half of the limestone passes off in burning, the per cent. of solid impurities in the quicklime is nearly double the percentage which the same impurities formed in the stone before burning. There is also a certain amount of water in the limestone, which varies with the density and character of the rock, the length of time it has been quarried, &c. In chalk and marl the moisture may reach 40 per cent., in which case the resulting production of quicklime would be only about 30 per cent. The denser a limestone is the harder it is to burn and the more fuel it requires, but, on the other hand, the better the quality of the lime.

In burning limesone the temperature should be maintained as constant as possible, avoiding both overburning and underburning. The quicker lime is burned at the highest permissible temperature the denser will be the quicklime and the more readily it will slake. The time required for burning depends on the density of the stone, the size of the lumps and the amount of moisture. Moisture aids and hastens the burning, as the carbonic acid passes off more freely in the presence of steam. Coal high in sulphur should not be used, as the sulphur unites with the lime and forms calcium sulphate. This combines readily with any alkalies that may be present, and the alkaline sulphates being soluble cause the white efflorescence so frequently seen on bricks. This white coating may also be caused by the presence of soluble sulphates in the clay.

It is quite possible to burn lime over an open fire, and a rude pile of logs burning in the open air with the lime-

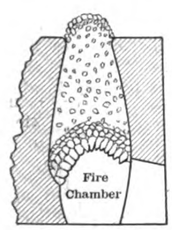
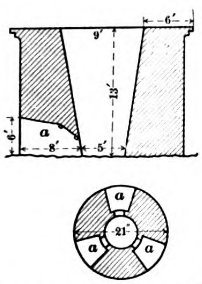


Fig. 1.—Style of Kiln Commonly Used in Europe and the United States.



Figs. 2 and 3.—Sectional Elevation and Plan of Another Form of Kiln.

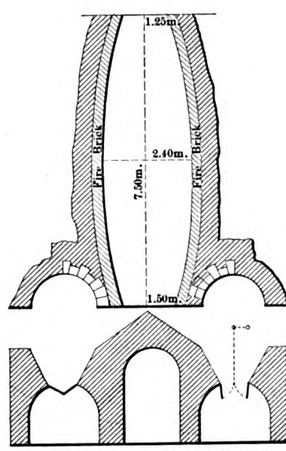
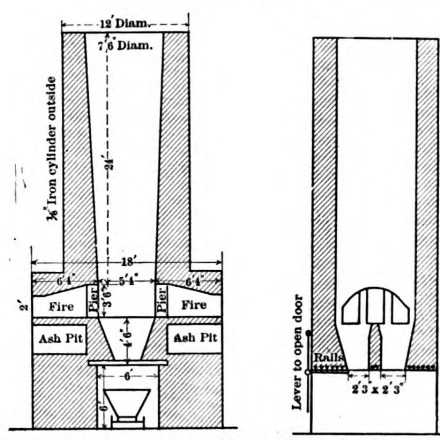


Fig. 4.—Type of Kiln Used in France.



Figs. 5 and 6.—Sectional Elevations of a Flame Kiln Near Rutland, Vt.

Construction of Lime Kilns.

stone thrown on the top has frequently been made to answer. Of all known methods of burning this is the most expensive in the consumption of fuel.

Fig. 1 is the drawing of a kiln given by Gillmore in his treatise on cements, and stated by him to be commonly used in Europe, and with slight modifications in the United States. The writer has seen them in Pennsylvania built of rough rubble masonry without mortar and cruder in general construction than the drawing shows. The chamber is cylindrical. It is known as an intermittent kiln, because each charge is burned as a whole and the kiln is allowed to cool off before another charge is put in. The fuel used in this kiln is wood. It is most frequently built on the side of a hill, so that access to the top is easy. In loading it the largest pieces of stone are selected and formed into an arch; and above this the kiln is filled by throwing the stone in loosely from the top, using the largest pieces first, and finishing with the smaller pieces, which are piled above the mouth of the kiln. The fuel is fed in through the arched opening at the side.

It is necessary in kilns of this class that the heat should be applied gradually, since a too rapid elevation of the temperature might cause much of the stone to break

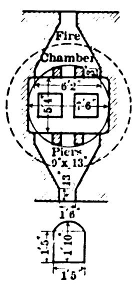


Fig. 7.—Plan of Flame Kiln with Elevation of Fire Door Shown at the Bottom of the Cut.

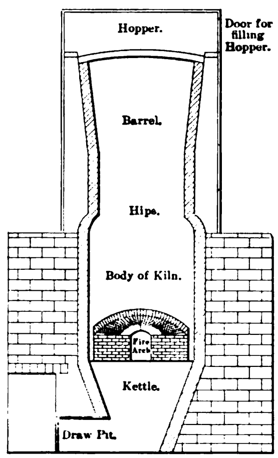


Fig. 8.—Sectional Elevation of Glens Falls, N. Y.

Construction of Lime Kilns.

up into small pieces and choke the draft, or even cause the downfall of the arch. Since the walls of the kiln, as well as the charge, must be heated each time the kiln is loaded, and cool down each time the charge is drawn out, the kiln is very wasteful of fuel.

Figs. 2 and 3 show a perpetual kiln, also given by Gillmore as in common use in Europe. The fuel used is coal. There are three openings, *a*, *a*, *a*, for drawing the quicklime, these openings being provided with doors for regulating the draft. The fire is started by a layer of light wood and wood, then coal, and then layers of limestone and coal alternately until the kiln is filled. As the stone is burned and drawn out at the bottom additional layers of limestone and coal are supplied at the top, the kiln being kept continually full. The quicklime may be drawn three or four times in 24 hours. Gillmore says: "A kiln of this form and of the dimensions indicated ought to yield about 500 cubic feet of quicklime every 24 hours, with a consumption of about 2 tons of coal."

Fig. 4 is a drawing given by Caudlot in his work on cements as a type of the kilns used in France. This kiln is provided with cooling chambers, under which there are arched passages into which wagons can be run, and the cooled quicklime can be dumped into these wagons through gates provided for that purpose.

Figs. 5, 6 and 7 show a flame kiln measured by the writer near Rutland, Vt. This kiln, as also those of Figs. 4 and 8, is lined with fire brick. The arch over the ash pit is also of fire brick, the floor of the fire chamber being laid open so as to allow the ashes to drop through. The ash pit door is 12 inches wide and 10 inches high. Fresh stone is continually fed in at the top as the quicklime is drawn out at the bottom. The quicklime is dumped into wagons through sliding doors, which are worked by a lever on the face of the opening. These sliding doors are kept closed, except when dumping, the draft being regulated entirely by the fire doors.

Fig. 8 is a flame kiln given in the Bulletin of the New York State Museum on the "Lime and Cement Industries of New York" as a form used in Glens Falls in that State. The body of the kiln is circular in form, and there are two fire chambers, one on each side, with ash pits under them. The draw pit has a door which is kept closed except when quicklime is being drawn out, the draft being regulated entirely by the fire doors. The fuel used in this class of kilns is wood.

I am largely indebted to the Bulletin of the New York State Museum, above referred to, and to Gillmore's work on cements for the material of this article.

Model Workingmen's Houses.

The housing of workingmen is a subject which has engaged the study of a great many careful thinkers at different times and in different countries. Nearly every large manufacturer likes to see his employees well taken care of, and, as far as the men will allow him, takes an interest in putting up tasteful, well-arranged houses for them. The extent to which we in this country can profit by the experience abroad in these lines is not very large, says a writer in a recent issue of the *Brickbuilder*. In the cheaper houses in England the bathroom facilities are extremely primitive. The idea of a tub being sunk in the floor of the kitchen near the hearth and covered by a standing or draining board may meet the requirements of the English laborer, but would surely not answer in many of our manufacturing towns. Furthermore, in figuring out the returns from these workingmen's houses evidently the land is not considered at all and nothing is allowed for depreciation, and even our most philanthropic mill owners would be hardly satisfied with an investment of that sort.

There is one point about these English cottages, however, which is certainly deserving of imitation by us, and that is the use of brick for the external walls. The average workingman's house hereabouts costs from $1200 to $1500 for five rooms and bath. Usually the houses are built for two families, one above the other, making the total cost for the house itself in the vicinity of $3000. Upon such houses there does not seem to be a great deal of difficulty in obtaining a return of $500 a year, which will easily net nearly 6 per cent. Now, if our philanthropically inclined mill owners could feel disposed to pay the slight additional advance in cost for constructing the outside walls in brick, which for the average house probably would not exceed $200, while the income derived therefrom would probably not be at all increased, the cost of repairs would be diminished, the life of the structure would be greatly increased, and the resulting appearance to the community would be vastly better.

It has been our fortune to visit many of the workingmen's colonies in the United States and in foreign countries, and the difference between what is expected here and what is found abroad is that, generally speaking, the foreign colonies present a very attractive external appearance, especially in England and in Italy, and are more or less surrounded by judicious planting; but the personal comforts of the interior are quite restricted, and the arrangement of rooms is what we should call decidedly crude. In this country, on the contrary, our workingmen have a good bathroom with open plumbing and a very attractive interior, but the exterior aspect of our colonies is usually most hopelessly uninteresting, and there is seldom much attempt at gardening or planting of any description. Where our workingmen's houses attempt to be picturesque they generally hopelessly fail. The English cottage is reduced to its simplest factor—the wall of brick full of texture, a simple, unbroken roof and a lot of green foliage and flowers. These give the picturesque grouping which every visitor admires, and if we can only couple our internal arrangements with English external simplicity and charm our workingmen's dwellings ought to be models for the world.

CORRESPONDENCE.

Replying to Criticism of First-Prize Design in Two-Family House Competition.

From R. B. McEachern, *Savannah, Ga.*—Replying to the comments of "A. E. C." in the May issue on the first prize design in the two-family house competition, I will say that the guttering of the main roof is plainly specified under the heading of "tin work," while the porch cornice gutters are plainly detailed as well as specified.

The second point in his comments—that is, the lack of deafening between the two apartments—is well taken and is a refinement easily included and advisable. Local usages and requirements would vary the building methods very much to suit the particular locality in which it may be proposed to erect this house. Here and further South, the entire basement, the heating apparatus and the vestibules would quite likely be omitted. Open fire places would be used and the space under the house well ventilated. In Southern Florida and Cuba the storm sheathing and paper would be omitted from both walls and roofs and the siding applied directly to the studding, and the shingles would be laid on shingle lath. The frame would be stiffened by cutting in wind braces wherever practicable, and quite likely wire screening would be used on the porches.

My lookout in the present case was to comply as completely as possible with the conditions laid down in the competition, and I was immensely gratified that in so general a problem my solution was given the preference. The comments of "A. E. C." will apply equally to the second-prize design, and yet in my opinion will detract nothing from that excellent design as a whole.

The committee to whom the various designs in competition were submitted for award must have been puzzled many times during their deliberations to be fair to all the many contestants and to give just the proper weights to the various claims of excellence offered. The draftsman, too, who prepared the drawings for printing in your journal deserves praise for unusual faithfulness in reproducing the originals and great clearness of execution in his work. It would be very interesting to me, and doubtless to others, to know something of the methods employed in this class of work.

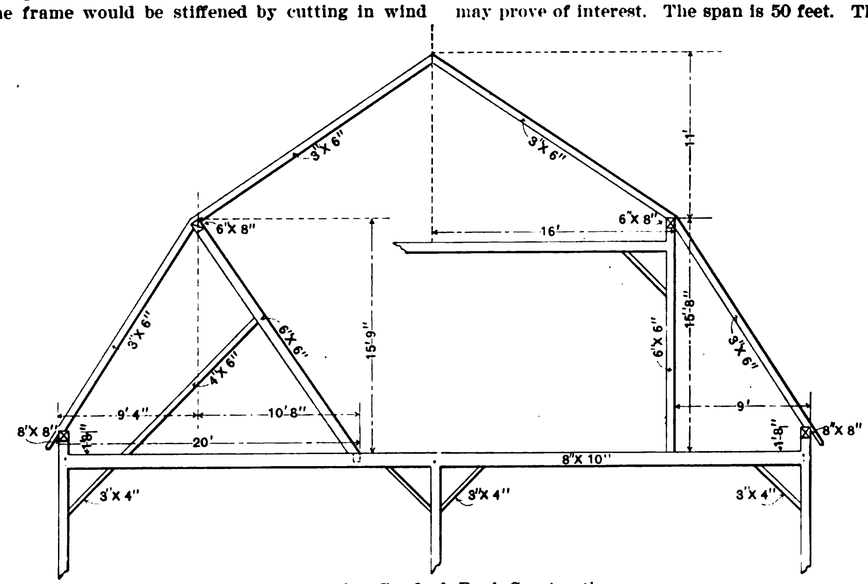
Can Tin Roofs of Large Area Be Made Satisfactory?

From C. C. F., *St. Joseph, Ill.*—I would like to ask the readers if tin roofs of large area can be made satisfactory? We have several here of the best tin put on by first-class tinners, but all of them have to be repeatedly repaired in order to prevent the buildings becoming untenantable. Some were painted on the underside before laying and all were kept painted on the top surface afterward. Has this painting before laying anything to do with their failure? Some of our standing seam roofs are equally as bad at times. Will those readers who have had experience with various roof coverings give their views for publication and tell where the fault lies, also tell how, in their opinion, tar and gravel compare with other roofing materials for flat roofs of large area?

Note.—With no desire to anticipate the discussion on this topic which we feel sure our readers will promote, we suggest to our correspondent that his trouble is without doubt largely due to the quality of the tin, as the painting on the underside before laying is in no sense a detriment, but may in many instances prove a decided advantage, depending, of course, upon local conditions.

Designs for Gambrel Roof Construction.

From A. P. L., *Schenectady, N. Y.*—In reply to the inquiry of "F. F. B.," Slippery Rock, Pa., which appeared in a recent issue, I send herewith a drawing showing two styles of gambrel roof construction which I trust may prove of interest. The span is 50 feet. The drawing so clearly indicates the method of framing suggested that extended description would seem to be unnecessary.



Designs for Gambrel Roof Construction.

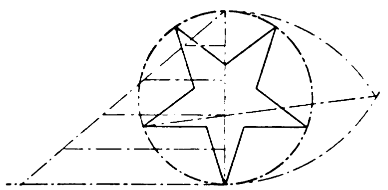
Designing Retaining Walls of Concrete or Stone.

From Sanford E. Thompson, *Newton Highlands, Mass.*—In the issue of the paper for May, there is an inquiry from "G. A. C." in regard to a design of retaining walls of concrete or stone. In reply, I would say that a common rule among engineers is to design a stone masonry wall so that the thickness of its base is about ⅜ of its hight, with the back of the wall vertical and the face of the wall on a slope of not more than 1½ inches to the foot. A wall 8 feet high would thus be 3 feet thick at the base and 2 to 2½ feet thick at the top. A concrete wall may be made slightly thinner than this, even if it has no reinforcement, by spreading the base, which can be conveniently done by stopping the sheeting of the form 8 inches or 1 foot above the level of the bottom of the trench, so that the concrete will flow out under it, as shown in the sketch of the thin reinforced wall in the article on "The Elements of Concrete Work," which appeared in the issue for March of the present year. A "surcharged" wall, that is, one against which the earth is piled above the level of the top, must be thicker than the proportions given.

Steel reinforcement in retaining walls is of little value unless the wall is short or is supported at the top, as well as at the bottom. Retaining walls are occasionally built with buttresses, that is, short walls, at intervals projecting from the face of the long wall and at right angles to it, or counterforts, which are similar projections on the back of the wall so designed that they receive the weight of the earth filling. The counterforts must be tied to the face with imbedded steel rods. The advantage of such special construction, that is, the use of buttresses or counterforts, is to divide the wall into short lengths, which may be built as thin reinforced slabs, instead of being heavy enough to resist by weight the tendency to slide or overturn. Such special design, with buttresses or counterforts, is safe and economical only when the thickness of the different parts are accurately calculated, and it should not be attempted by any one who is not familiar with the principles of engineering design.

Making a Five-Pointed Star with the Steel Square.

From M. T., *Sentinel Butte, N. D.*—I am sending sketches of a five-pointed star, and showing the figures to be used on the steel square when the diameter is given. I am sending one in answer to "C. V. F.," where the diameter is divided into five equal parts. In doing the work use the diameter as radius and describe the arcs. Draw a line where they intersect through the second division point until it intersects the circumference, and where it intersects the circumference will be one-fifth of it. The other sketches, Figs, 2 and 3, so clearly show the numbers used on the steel square that further description would seem to be unnecessary.



Dividing Diameter Into Five Equal Parts.

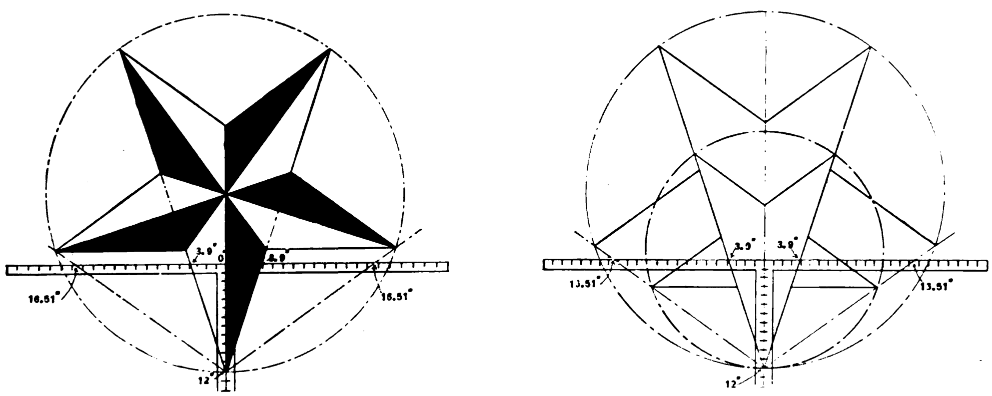


Fig. 2 and Fig. 3.—Diagrams Showing Numbers to Be Used on the Steel Square When the Diameter is Given.

Making a Five-Pointed Star With the Steel Square.

From G. L. G., *Enid, Okla.*—Replying to the inquiry of "C. V. F.," regarding a method of drawing a five-pointed star, I would suggest that he first draw a straight line and select a point for the center of the star. Lay on the steel square with the 6⅛-inch mark of the tongue at this point, and with the 19-inch mark of the blade on the line. Draw a line along the tongue, extending it so that the square may be used in the same manner on this line. Repeat this operation four times, and the result is the five points, or centers. It is easy to measure the required radius on these points from centers and outline the star.

Suggestions for a Dumb Waiter.

From J. C. B., *Glenwood, Mich.*—Will some of the readers furnish for publication a sketch of a simple form of dumb waiter to run from the first floor to the cellar, a distance of say 11 or 12 feet, more or less?

Wind Bracing of Building.

From J. C. B., *Glenwood, Mich.*—Will you state briefly through the columns of the Correspondence department how the wind stresses on the sides of a building are estimated? I have a structure I wish to brace properly, while still observing a strict economy in the use of the timber.

Note.—The question raised by our correspondent is a rather broad one for consideration in brief space, but we present in another column an article on the wind bracing of buildings from the pen of F. E. Kidder, the well-known consulting architect, which we think will meet the requirements of the case.

Strengthening a School Building.

From D. P. B., *Redford, N. Y.*—Referring to the letter of "W. H. W.," Campbelltown, N. B., in the February issue, he should be able to determine if there is a bulge anywhere in the school building in question. If there is, it is only a common occurrence, caused by the load on the outer edge causing it to sink faster than the inner edge. I have some girders on my hands which have rolled because the partition on the under side is on one edge and the joists are on the opposite edge. There is only one remedy for the school building. The wall must be undermined 30 inches at least. As fast as the work goes on run railroad rails about 8 feet long under the wall, placing them about a foot apart. Rest the inside end on a wide timber along the inside of the wall. Place a similar timber outside the wall in a trench 5 feet below the bottom of the wall. Set jack screws on this, and then another timber on top of the jacks, with the outer ends of the rails on the last timber. Jack up, tighten the rods and fill under the wall, burying the rails, with concrete 30 inches deep by 6 feet wide. Take abundant precautions by cutting a stone out between each two windows near the brick, having a stone at the top, and shore up, placing a jack at the bottom of each shore. All the jacks should be such as will stand any strain. There is no need of fear. The building cannot only be raised, but can be moved

"Compo-Board" as a Substitute for Lath and Plaster.

From J. O. J., *Deer Creek, Minn.*—I should like to know through the columns of the paper what some of the readers think of "compo-board" as a substitute for lath and plastering. There are two kinds of compo-board, one being water-proof and the other not. Will some of the readers who have had practical experience in the use of the material express their views as to its merits as a wall lining?

Planed or Sawed Joints in Finished Work.

From C. A. W., *Port Jervis, N. Y.*—In the May issue of the paper, "Curious," of Newport, Ky., asks with regard to planed or sawn joints in finished work. To my mind a sawed joint is the best, but always back off to a feather edge, or rather 1-16 inch off face of member, so as to leave no danger of any dampness to swell the back of the member joined. It will always leave a good tight joint on the face. A sawed joint is easier to make, but it should always be backed off with a chisel or jack-knife.

Setting Prismatic Corrugated Glass.

From A. P., *Victoria, B. C.*—I read with more than usual interest the article on house glazing which appeared in the April number, and I am prompted to propound a few questions on the subject of glass. I have lately had charge of some work at a hospital, and among other things was a room built for operations. The sides and roof were covered with prismatic corrugated glass,

Front Elevation.

which in cross section has very much the appearance of saw teeth. The glazier put in this glass with the lines of the ribs or points running horizontally. A few days after the work was done a critic came along and said the lines should run vertically. I should like very much to have some one who has had experience tell which way is the correct one; also which will give the better light from a slanting roof—the prismatic corrugated glass or the plain corrugated.

Note.—In the installation of glass of the character indicated by our correspondent there are many things to be taken into consideration in order to obtain the very best results. Among the points which might be mentioned are the angle of the prisms, of which there are many kinds, and the exact pitch of the skylight in which the glass is placed, all of which govern absolutely the thorough distribution of light. Just what the proper angles may be can best be determined by a person who has had experience with setting prismatic glass and who would be thoroughly familiar with all the conditions governing the particular case in question.

With regard to the question raised concerning prismatic and corrugated glass, it may be stated that they are two distinct products, and one cannot possibly perform the functions of the other. Corrugated glass merely permits the light to pass through in straight lines, whereas prismatic glass is designed when properly used to refract, transfer and diffuse light. We place the inquiry of our correspondent before our readers, and shall be glad to have those experienced in the installation of glass of the character indicated freely express their views.

Preventing Porch Roof from Sagging.

From MAC, *Savannah, Ga.*—Referring to the sagging curved porch plate problem in the March number, I notice that all those offering suggestions seem to be willing to leave "C. C. H." in the "consomme" if his porch happens to have open framing and not ceiled level underneath. Allow me to suggest that the correspondent bolt the corner rafter to the house corner and to the plate at X, and if properly done the plate will not sag, because the strains are transferred by the bolting to the fixed point afforded by the house corner and the porch posts.

If the plate is to be boxed, extend the runs of boxing well past the posts into the straight runs, which will afford additional stiffness. The whole practice, however, of the projecting curve should be avoided because of the undesirable effect to the eye of insufficient support. It is not usually necessary that posts be located opposite the house corner. I prefer to place a post at 45 degrees to the house corner or else two posts divided on the curve to relieve the effect.

Elevation for "J. W. H.'s" Floor Plans.

From S. P. B., *Smethport, Pa.*—I send herewith front and two side elevations, in reply to the inquiry of "J. W. H.," Lynbrook, L. I., which appeared in the February issue.

Side (Right) Elevation.

Side (Left) Elevation.

Elevations for "J. W. H.'s" Floor Plans.—Scale, 1-16 Inch to the Foot.

Plans Wanted for a Library Building.

From S. P. B., *Smethport, Pa.*—I would like to see published in *Carpentry and Building* the plans for a library building about 33 feet wide and 60 feet deep, three stories in hight; the first story to be of broken Ashler stone and the second and third stories of brick, with stone trimmings. The first floor is to be utilized for a public library and the second and third floors for offices.

Barn Roof With Reinforced Joints.

From C. S. D., *Mount Vernon, Ont.*—I have been putting up small barns and other buildings in which the joints of the roof were so made as to do away with purlins. I used what might be called an "intersecting joint," constructed of 2 x 6 stuff for the rafters, and spiking to each side of them a piece 1 x 8 inches by 4 feet in length. Each piece was spiked on to the joint so that the lap was the same on both sides, and then with an adze I trimmed off the projecting material, so that each piece conformed to the outline of the rafter at that point. A roof of this sort gives very good overhead room without the inconvenience of purlins, and at the same time makes a very stiff roof with less strain on the frame, as the pressure is downward instead of outward, as is the case with a common roof. This information may possibly be of interest to those wishing a cheap, strong roof for a small building.

Cleaning an Oilstone.

From D. P. B., *Redford, N. Y.*—I would suggest to "J. W. T.," Weatherby ,Mo., that he heat his oil stone slowly, and when sufficiently hot the oil will ooze out of it. Then cover it over in concentrated lye. The alkali will unite with the oil and form a soap. Repeat the operation, getting the stone very hot. An oven will be a good place for it, hanging it on a wire. Sometimes oil stones can be cleaned by bathing in a strong lye solution.

From H. J. W., *Crawfordsville, Ind.*—In answer to the inquiry of "J. W. T.," I can recommend a method of cleaning an oil stone which I have used successfully without injuring the stone. Put a package of Pearline into enough water to cover the stone and boil until the oil is all out of it. It will take several hours, but it will prove successful in the end.

Note.—We have a similar suggestion from "O. N.," Atkinson, Ill.

From M. T., *Sentinel Butte, N. D.*—As regards a method of cleaning an oil stone, I would say boil your oil stone well. Put a piece of woolen cloth in the bottom of a box, fill the same with heavy oil, leaving your stone loose enough so that you can turn it over about every other day, and you will find it as clean and with as good a grit as the day it was new.

From A. L. W., *Carbondale, Pa.*—I would suggest to "J. W. T.," Weatherby, Mo., that he boil his oil stone in vinegar two or three hours and then wash it with soap and hot water.

From L. L. H., *Glenwood, Ill.*—If "J. W. T." of Weatherby, Mo., will drop his oil stone into extra strong boiling soap suds or boiling lye for a few minutes he will clease it thoroughly. Should, however, the face be out of true, which is very common in oil stones which have been in use for a long time, take a piece of marble, such as the top of an old washstand or bureau, or any flat stone surface, and with sharp sand and water rub the stones together until the desired surface is obtained.

Tool Chest Construction.

From C. C. H., *Brookville, Pa.*—I have what I consider a very handy tool chest and have been thinking of having a picture of it taken, with a view to publishing it in *Carpentry and Building.* As to the tool chest of "W. S.," Walcott, Iowa, published in the October issue, I would say it takes up too much room and too much time is required in getting the tools. According to my understanding of the picture of the chest, it is necessary to leave the drawer open, and that takes a good deal of space. When the two drawers are open it requires almost space enough for three chests of the same size. The correspondent says he uses only one combination lock to fasten everything. If I look at it aright, there are two combination locks—one for the lid and one for the drawer G, coming out at the end. In the chest which I use I can get every tool in it without lifting out any of the tills. The saw till is in the same place as shown in that of "W. S.," and there are two drawers at each end, crosswise with the chest, and one between the two upper ones. This one slides crosswise of the chest, and, of course, the four drawers that are crosswise slide lengthwise. I have many tools in the lid of the chest, which are fastened by thumb screws and turn buttons. Under the saw till and the other tills is ample room for the panel plows and planes of all kinds, as well as a Langdon Improved Miter Box, together with hatchets, mallets panel gauge, etc. I notice that "W. S.'s" chest has 48 compartments set off in the drawer. This looks and seems, when you ponder it, like foolishness, as every little tool does not need a separate place, and it only adds weight to the chest, which, as a rule, is heavy enough. I have a combination lock that you can open in the dark as well as in the daylight. This I consider a special advantage, as compared with a dial having a hundred figures to consider, and in order to open the lock in the night it is necessary to have a light of some kind. I trust that "W. S." will accept my criticisms in the same kindly spirit in which they are intended.

Remedy for Wormeaten Posts.

From L. L. H., *Glenwood, Ill.*—Replying to the inquiry of "G. G.," Garfield, N. Y., in the March number, I would say peel off the bark and apply linseed oil to hickory wood and the worms will not molest it. This treatment will also prevent season cracks to a great extent and assist in seasoning the wood.

From L. A. W., *Carbondale, Pa.*—In regard to the question of "G. G.," Garfield, N. Y., I would say that the best method of treating hickory, if he wishes it good and tough for handles and to prevent it from being worm eaten, is to put it in water and keep it there for six months or a year. As a result he will have the best of handles, provided, of course, the hickory is good quality.

Durability of Cypress Shingles.

From A. E. B., *Grant, Pa.*—What has been the experience of readers of the paper with regard to the durability of cypress shingles when used on a roof? Are there any shingles better than cypress?

Note.—With no desire to anticipate the comments of our readers, we would say to the correspondent above that cypress shingles are noted for their long life, and instances are numerous where they have been in use scores of years with entire satisfaction. We published not long ago a short account of an old Colonial mansion in Virginia, built in 1776, and covered with cypress shingles, which it was not found necessary to remove for renewal until 1880, a period of 104 years. Doubtless our readers can relate many instances showing the durability of this form of roof covering.

Designs Wanted of Tool Box.

From M. A. R., *Allegheny, Pa.*—I have been a reader of the paper for a long time and have taken much interest in what has appeared in its columns, more especially the Correspondence Department. I now come to the practical readers for suggestions regarding the construction and arrangement of a neat and convenient tool box, or shoulder box, suitable for carrying from one job to another, and which a mechanic who takes pride in his "kit" and work would not be ashamed to carry on the street cars. The arrangement should be such that the tools can be readily taken out and replaced. I should want a hardwood finish so as to give the box as attractive an appearance as possible. The 2-foot steel square need not be considered in the make-up. I have seen a great many tool boxes, but none have exactly met the requirements, and I therefore come to the practical mechanics who are readers of *Carpentry and Building* to give me the benefit of their experience.

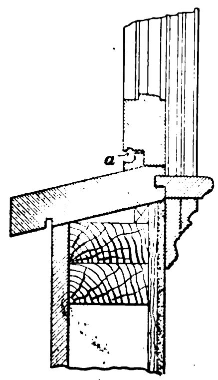
Securing Wood Trim to Brick and Stone Walls.

From C. A. W., *Port Jervis, N. Y.*—In reply to the inquiry of "H. R.," of Joplin, Mo., which appeared in the May number, I would say use the Rutty Metal Wall Plug, putting it in place when the brick work is laid, and then the furring of other work can be nailed into these plugs, securing a better job than by the use of plugs of wood. I should think the architect of the correspondent would, or rather should, specify what plugs to use, and not keep the builder in the background and necessitate his finding out for himself.

From "MAC," *Savannah, Ga.*—I would say to "H. R.," whose inquiry appears in a recent issue, to use metal wall plugs to fix his wooden finish to brick walls.

Swinging French Window Construction.

From A. P. L., *Schenectady, N. Y.*—I inclose herewith a sketch representing a vertical section through a lower portion of a window and frame and showing what I consider an improvement in swinging French window construction, which is calculated to keep out the rain. The water will not blow in at the joint *a*, as in the plan



Swinging French Window Construction.

submitted by "Hee H. See" of Belleville, Canada, whose communication appeared in a recent issue.

Estimating Frame and Brick Buildings.

From Fred. T. Hodgson, *Collingwood, Ont.*—The correspondent, "M. L. H.," Cleveland, Ohio, makes some reference to my books on "Estimating," and intimates that their contents might be extended. I might say for the benefit of "M. L. H." and others that my first book, "The Builder's Guide and Estimator's Price Book," was prepared over 22 years ago, has been obsolete for more than ten years, and should have been either revised or taken off the market long ago. I have frequently called the attention of the publishers to this fact, but for some reason, known only to themselves, it has not been done. I have no interest in or control over the book whatever, or it would have been revised long since. Of course, there are a number of good things in it, but as a guide for the estimator it is now of little use. Books on estimating, where prices are given, should be revised at least once in ten years, as the values of labor and materials continually vary, and the introduction of machinery and new methods have their influence over prices, as well as on the producing power of labor. In England and in France "Builders' Price Books" are published yearly, like Almanacks, and this method keeps the contractor informed of all changes in prices, methods and costs in everything relating to building.

With regard to my second book, "Estimating Frame and Brick Houses," I would say this is prepared on a different line altogether from any other book published on "Estimating," inasmuch as it deals with quantities which give the estimator the opportunity of adding current prices per yard, foot, rod, perch or square. Again, this book went through a thorough overhauling a year or so ago, and everything was brought up to date. Doubtless, a work on the cost of "factories, business building, &c.," would be found useful, but would so enlarge the book, if added to either of the ones named, that the price of the book would be more than double. Like "M. L. H.," I do not take kindly to the stories that give credit to men laying 10,000 shingles a day, or fitting, hanging and trimming from 10 to 20 doors in eight hours. Stories of this sort smack too much of our old friend Baron Munchausen, and may do very well to while away a dinner hour under the shade of a spreading elm, when the mercury stands at 90 in the shade, but they have no value whatever in estimating the cost of a building.

A Whitewash Closely Resembling Paint.

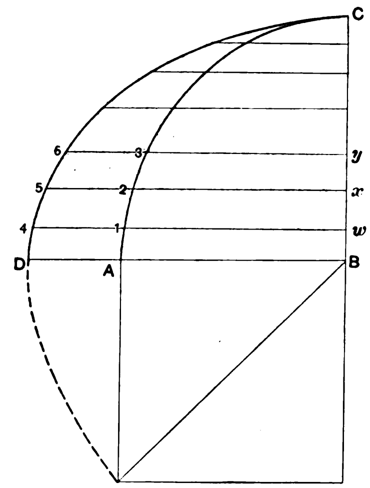
From S. D. R., *Newfane, N. Y.*—Will you please publish in the next number of the paper a good recipe for whitewash that is very adhesive, to be used to coat rough and smooth inside wood work in a factory, for the purpose of rendering it reasonably fire proof in so far as the rapid spread of flames is concerned? The company with which the writer is connected was told that a good lime whitewash not only makes a room very light, but also is a good protection from fire.

Answer.—In one of the recognized receipt books we find the following directions for making a brilliant whitewash, which closely resembles paint and which, we assume, is what our correspondent has in mind.

"Slake ½ bushel of lime with boiling water, covering it during the process to keep in the steam. Strain the liquid through a fine sieve or strainer and add to it 8 quarts of salt, previously dissolved in warm water, 2½ pounds of ground rice boiled to a thin paste and stirred in boiling hot, ½ pound of powdered Spanish whiting and 1 pound of clean glue, which has been previously dissolved by soaking it well, and then hang the whole over a slow fire in a small kettle, within a large one filled with water. Add 5 gallons of hot water to the mixture, stir it well and let it stand a few days, covered from the dust. It should be put on quite hot; for this purpose it can be kept in a boiler on a portable furnace. It answers as well as oil paint for wood, brick or stone, and is cheaper. It retains its brilliancy for many years. Colored matter, with the exception of green, may be put in it and made of any desired shade."

Finding Radius for Hip Rafters on Circle Roofs.

From O. L. W., *Dallas, Texas.*—In my opinion, "A. H. H. M." of St. Louis, Mo., is wrong in claiming that a hip rafter for a circular roof can be struck from the center like a common circle, for the reason that the hip is a portion of a true ellipse. The diagram which I inclose shows a method which I believe to be accurate and in his case convenient. Describe the common rafter A 1 2 3 C. Draw its run, A B, and its rise, B C. Draw parallel to A B any number of lines, as 1 *w*, 2 *x*, 3 *y*, &c. It is evident that the run of the hip will equal the diagonal of a square on A B. Lay off this distance from B to D. Find the diagonal on 1 *w*, and lay it off from *w* to 4. Treat each parallel in like manner, and draw the hip through



"O. L. W.'s" Method of Finding Radius for Hip Rafters on Circle Roofs.

the points thus obtained—namely, 4, 5, 6, &c. By measuring each parallel and adding 5 inches for every foot the diagonals could easily be figured with sufficient accuracy.

From C. L. G., *Enid, Okla.*—I would like to say to "A. H. H. M." of St. Louis, who asks for a method of laying out hip rafters on circle roofs, that if the main rafters are a portion of a complete circle then the hip must be a part of an ellipse. Lay out the hip or ellipse in this manner: The length of the hypotenuse of a right triangle, the base and altitude of which are each one-half the span of the plate, will be one-half the major axis of the ellipse and the rise of the common rafter will be one-half the minor axis of the ellipse. Lay out the ellipse by a correct method and one-quarter of the ellipse will be the hip and make a perfect roof.

OUT-DOOR FURNITURE.*

By Paul D. Otter.

IN continuing the consideration of the subject, it may be stated that the construction shown in Fig. 13 is intended for a lounging settee, and if the head rest and sloping end be adjusted at the proper angle it will be found not uncomfortable for reclining. Children are well satisfied with the ground and grass upon which to scamper and roll about, and the older people or the mother welcome such a resting place. In time the old tree and bench become the recreation ground for the family. Frequently two trees have grown from the same root, and it is found desirable to remove one of them. The stump may then be converted into such a seat as that shown in Fig. 14. A comfortable back is improvised by hewing out slightly two wings for the top slat, supported by a

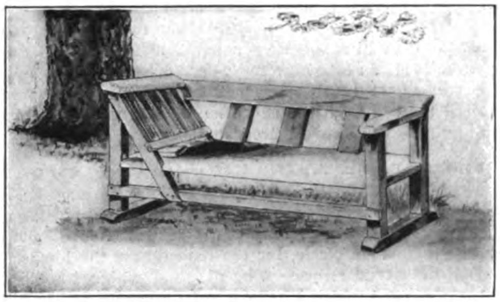


Fig. 13.—Lounging Settee.

Fig. 14.—Stump of Tree as Used for a Seat.

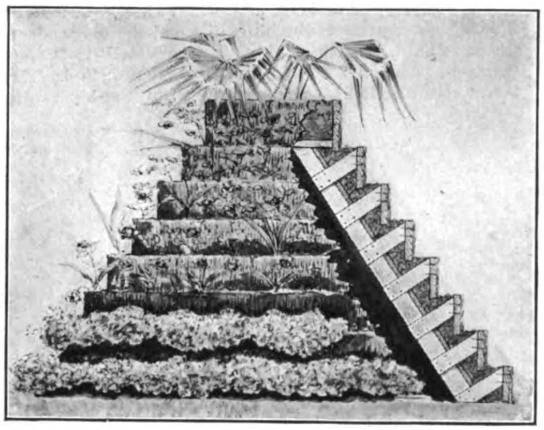


Fig. 16.—The Flower Pyramid.

Fig. 15.—Support for Jardiniere.

Our-Door Furniture.

brace from behind, and under the edge of these are nailed two slats on each side of the portion of the tree trunk forming the middle of the back. The stump should be sawed off at the proper inclination for comfort. In order to prevent hasty decay, treat the surface with paint or other preservative. In Fig. 15 is a suggestion for a stand supporting a *jardinière*, which is usually brought from the living room during the summer. Many other forms will no doubt suggest themselves to the enterprising and wideawake carpenter who is prolific in ideas.

The structure shown in Fig. 16 was observed by the writer during the past summer in a park, and is offered as an excellent setting for the gardener's potted plants. The frame is made of four 2 x 4 inch pieces placed in the form of a pyramid. In the illustration the construction is partially exposed, showing the intermediate studding of 2 x 4 inch lumber, with extended brace nailed on the ends of them, while on the outer face of the studding is a covering of rough boards, upon which, when the structure is finished, the earth will be thrown, filling in from the bottom box up to the top, which has a separate boxing. The face of the boards is finally covered with bark, thus obliterating all evidence of carpentry work.

At this point, it may not be out of place to refer to the varied points concerning the preservation of wood work, which is a matter of great importance. In its bearing on rustic fixed furniture, however, it is well to let time and the elements treat it as they will. It would, indeed, be like "gilding the lily" to paint it, although some portions may be treated with boiled oil, particularly the end wood, where decay first sets in. All benches, settees and other furniture of made up stock should be painted, and painted underneath as carefully as in the exposed portions. Buff and shades of green would no doubt be most satisfying, while a settee with lattice back, or Chippendale style, as in Fig. 17, painted pure white, affords an agreeable marking point on the lawn. The double back settee with flower supports, such as indicated in Fig. 18, would also be appropriate in cream or white.

* Continued from page 147 of the May issue.

The Louisiana Purchase Exposition.

The Louisiana Purchase Exposition at St. Louis, Mo., was formally opened Saturday morning, April 30, with all the pomp and splendor that is appropriate to the inauguration of an event of such international importance. This is easily the largest and greatest of all world's fairs, having also greater practical educational value than other fairs. This desired result has been attained by the consistent and persistent policy of the officers of the fair to apportion space in proportion to the live interest and educational value of the exhibit rather than the wealth of the concern exhibiting. No charge has been made for space, and the amount given to the exhibitor was left to the discretion of the chiefs of departments. As much as possible, exhibitors have been encouraged to install what are known as live exhibits. In other words, in the case of machinery, for instance, the machines are in operation and doing actual work. Much wisdom has also been exercised in the arrangement of exhibits in logical sequence, so that the visitor is oftentimes able to follow the course of material clear up to its most highly finished state by passing from one exhibit to another in the same section of the building.

Faultless weather and the largest crowd ever attending the opening day of a fair contributed to make the ceremonies a brilliant success. It was 12:14 noon when the pressure of a button by the President of the United States set in motion the machinery of the exposition, including the grand cascade. It was a most impressive spectacle and was greeted with the " Star Spangled Banner," sung by the crowd, with uncovered heads. Externally the fair is in an admirable state of completeness.

As the result of extraordinary efforts on the part of the management, and the employment of nearly 30,000 men working in three eight-hour shifts day and night, what would normally be a month's labor was completed in the week previous to the opening. The percentage of completeness in the various buildings is about as follows: Machinery and Power buildings, 75 per cent.; Transportation, 65 per cent.; Varied Industries, 70 per cent.; Electricity, 80 per cent.; Manufactures, 85 per cent.; Liberal Arts, 80 per cent.; Mines and Metallurgy, 95 per cent.; Agriculture, 80 per cent.; United States Government, 90 per cent. In general, the fair was more complete on opening day than was the Columbian Ex position at Chicago or the Pan-American at Buffalo.

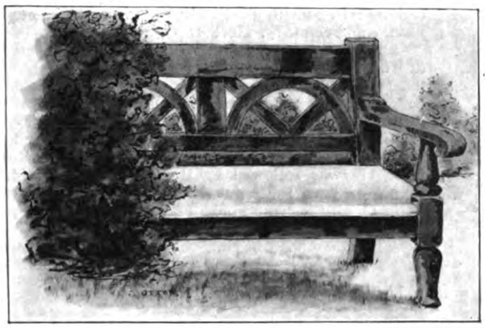


Fig. 17.---Settee with Lattice Back.

Fig. 18.—Double Back Settee.

Our-Door Furniture.

A Concrete-Steel Factory.

In these days, when reinforced concrete is being more and more employed in connection with various forms of building construction, it may not be without interest to present a few particulars regarding a striking illustration of work along these lines. The example in question is a four-story building, 600 feet in length by 60 feet in width, and is used for the manufacture of brass work. The concrete is reinforced by the Ransome system of twisted steel rods, each floor of the building being a solid continuous concrete slab 60 x 300 feet, separating the tiers of columns above and below it. The roof is similar to the floors, except that it is pitched about 1 foot in 50 transversely. All sides of the building are glazed throughout a large portion of their area, so that the wall piers between the openings become narrow and are equivalent to ordinary columns, except at the four corners and at two intermediate points 60 feet distant from them on the side walls, where the piers are made of about twice the regular width, in order to secure architectural effect and to divide the building into panels.

The first-story columns are made up of a short lower section to the underside of same floor, and an upper section which extends from floor to floor. The columns thus are seated on the several floors which they support. The columns are square at top and bottom, with chamfered corners, or octagonal. The upper ends are corbeled out by moldings on all sides, and form capitals, and thus double the area of bearing to each floor slab. These columns are 24 inches square below first floor, 23 inches on the first story, and 20, 15 and 10 inches, respectively, on the second, third and fourth stories. Each is reinforced by eight ¼-inch vertical bars equidistant in a circle about ½ inch clear of surface of concrete. These bars are surrounded from end to end by a helix of 4-inch pitch, made of ¼-inch twisted steel, to which they are wired at intersections.

The wall columns are rectangular in section, and are made hollow, with air spaces cored out so as to leave a minimum thickness of 3 inches of concrete, and are reinforced at each corner by a ¼-inch rod, which is made continuous from foundation to roof by lapping 12 inches for a splice at each floor.

The floors are continuous, and carried on the tops of the columns below, and project beyond them and form outer faces on the exterior walls; the first floor is 4 inches, and without reinforcement. The projecting edges outside are L-shaped in cross section, reinforced by ¼-inch bars top and bottom. The upper floors are proportioned for a live load of 250 pounds to the square foot, and are divided into panels 3 feet 8 5-16 inches wide, and 8 feet 4 inches long by transverse and longitudinal girders, which are 12 inches deep below soffit of 3-inch floor slab. These are not reinforced. The transverse girders are in pairs, supported on each row of columns, and they carry 13 lines of intermediate beams connected by transverse girders. The longitudinal beams are 3 inches wide and 3 feet 8 5-16 inches apart in the clear, reinforced by 1⅛-inch tension bar on the lower side, and by one ¼-inch bar in upper part of floor slab.

In all beams and girders, vertical U-bars of ½-inch steel, with loops engaging the lower tension rods, are placed close together at ends of beams so as to take the shearing stress; these stirrups are further apart in the center of beam. All angles are filleted with concrete. At the intersection of the transverse and longitudinal beams at the columns there is a solid concrete slab 3 feet square and 17 inches deep, the upper part of which is reinforced by four ¾-inch horizontal bars 4 feet long and 8 inches apart. The beams and girders are of the box type.

The building in question is the factory of the Kelly & Jones Company, Greensburg, Pa., the architect and engineer being E. L. Ransome of New York City, and the general contractors the Ransome & Smith Company of the same place.

WHAT BUILDERS ARE DOING.

IN view of the statements presented in these columns last month regarding the building situation in leading cities, many of the readers will doubtless be surprised to learn that the amount of new work projected in Chicago during the month of April was far in advance of any corresponding month since 1892. According to the figures of the Building Department, permits were taken out in April of the current year to the number of 704 for buildings having a frontage of 18,914 feet and estimated to cost $4,287,250. These figures compare with 542 permits for buildings having a frontage of 14,355 feet and costing $2,386,985 in April of last year, and 666 permits for buildings covering a frontage of 18,275 feet and costing $3,406,010 in April of 1902.

It is unfortunate with this very gratifying showing, just as the season is opening, that friction should develop in certain branches of trade which it is feared may affect work upon some of the more important building operations now under way.

Cleveland, Ohio.

The management of the Builders' Exchange have decided to renew their lease of the quarters at present occupied by the association, and are contemplating a number of changes with a view to making the rooms more than ever attractive and convenient. The 1904 edition of the Exchange Hand Book, consisting of 96 pages, has just been issued and contains a great deal of valuable information relative to the exchange. The names of the members are presented in alphabetical and classified forms, the various trade associations, architects and committees are given, together with data likely to prove valuable to the building interests of the city.

The Entertainment Committee of the exchange this year varied the form of annual entertainment from a banquet to what may be termed a builders' May party, which was held on the evening of May 5 at the Colonial Club. There was a reception in the early evening, followed by games and other forms of amusement in the parlors and dancing in the ballroom. Refreshments were served by the club caterer, and there was both vocal and instrumental music.

Denver, Col.

There is an increasing amount of new work in progress in the shape of brick residences, the figures for the month of April showing that out of 182 permits issued for structures of various kinds 96 of the permits were for brick houses. The estimated cost of the building improvements for which permits were issued in the month named was $262,125.

The recent labor troubles are being satisfactorily adjusted, and there seems to be a growing belief that the city will resume the rapid growth that characterized it a year ago.

Harrisburg, Pa.

There are many signs of increasing building activity in and about the city, and from the number of permits which are being issued by the Building Department it is felt that the season will be fully up to the average.

For some little time a movement has been under way among the leading builders and contractors of the city looking to the formation of a Builders' Exchange, and as a result of the agitation of the question a permanent organization was effected on the evening of May 10, when officers for the ensuing year were elected as follows: President, J. P. Gohl; vice-president, S. S. Keim; secretary, H. T. Bayles, and treasurer, J. K. Ness. The headquarters of the exchange are at 23 South Third street, where rooms have been fitted up to meet their requirements.

Kansas City, Mo.

The figures covering building operations which have recently been issued from the office of the Superintendent of Buildings afford a most interesting study. In the fiscal year ending April 18 there were issued 3569 permits for building improvements estimated to cost $6,905,550, while in the previous fiscal year there were 3979 permits issued for buildings calling for an outlay of $8,054,248. From this it will be seen that there has been a very appreciable shrinkage in the amount of building in Kansas City as compared with a year ago, but it must be borne in mind that the fiscal year ending in April, 1903, was a record breaker.

During the month of April of the current year the number of building permits issued was 405, calling for an outlay of $814,050, as against 464 permits for improvements costing $887,410 in April of last year. One explanation offered for this falling off is that April was rainy, and the weather conditions, on the whole, were not as favorable for building operations as they were in April last year. Dealers in building materials are of the opinion that, based on present activity, the months of May and June will witness a large increase in the expenditures for building improvements.

The members of the Master Builders' Exchange are much pleased with the appointment by Mayor Neff of Samuel Edwards, architect, to the office of Superintendent of Buildings.

Los Angeles, Cal.

Work in the building line continues quite active, the number of building permits issued by the building superintendent in April being 602 and calling for an outlay of $698,821, while in April, 1903, the number of permits issued was 449, with a total aggregate value of $796,199, and in April, 1902, the number of permits was 337, the total value being $771,410.

The semiannual session of the California State Board of Architecture was held in Los Angeles on April 12. The report of the secretary showed that during the year there had been 11 applications for licenses. Of this number five passed the examinations, two were advised to continue their preparation, and the remainder were refused licenses.

Builders report that the plans and specifications now being brought forward show that the use of stone and pressed brick is to be more general this year than in previous years, particularly in the matter of large contracts.

Lowell, Mass.

The annual meeting of the Builders' Exchange occurred on the afternoon of Wednesday, April 20, when reports of officers were presented, showing the condition of the organization, and officers for the ensuing year were elected, as follows: President, R. S. Ripley; vice-president, J. B. Varnum, and secretary, Herbert R. White.

In the evening occurred the seventeenth annual banquet at the St. Charles Hotel, which is said to have been the most enjoyable in the history of the organization. A large representation was present, including a number of invited guests. President Ripley acted as toastmaster, and after full justice had been done to the good things set before them, he introduced Mayor Howe as the first speaker of the evening. He was followed by Representative W. H. I. Hayes, and he in turn by Frank E. Dunbar. The last speaker was John C. Burke, who spoke of the impress left upon civilization by the master builders.

The committee having charge of the entertainment consisted of Frank Weaver, Charles F. Varnum and James Whittet.

Minneapolis, Minn.

The feeling prevails in certain circles that the present building activity is in many respects the greatest in the history of the city. The records are being broken so far as the permits issued in stated periods are concerned, and the outlook is most encouraging for a good season's business. On May 2 there were 52 building permits issued, this being said to be the largest for a single day in the history of the Building Inspector's Department. The number of building permits issued during the month of April was 620, the best previous record having been during the "boom times" in 1888, when 601 were issued in April of that year. The number of residences upon which work was started during April of the current year was 191, and 295 permits were taken out for additions, alterations or repairs. Permits were also issued for 11 stores, 5 apartment houses, 3 warehouses, 28 barns and 26 miscellaneous buildings. The total cost of these structures is placed at $898,000, which compares with $1,250,870 for April of last year. The point is made, however, that while the figures of cost are not quite up to those of a year ago, yet the conditions are more encouraging and there is every reason to believe that the figures for May will be in excess of those of the month noted.

New York City.

Nothing of great moment has occurred in the local building trades since our last issue, and the situation is rapidly assuming a more normal aspect. The first of May passed without the customary upheaval in labor circles, and it is only here and there that a ripple was caused through minor differences. The amount of new work projected as the season advances is pretty well up to that of the corresponding period last year, the features being the gain in the Bronx and the falling off in Manhattan. It is thought, however, that with no labor troubles to interfere with active operations a fair aggregate for the year will result. Since the first of the year permits have been issued in the boroughs of Manhattan and the Bronx for new buildings estimated to cost $30,474,430, as compared with $31,243,125 for the corresponding period of last year.

The annual meeting of the Building Trades Employers' Association was held April 12 in the Townsend Building, when officers for the ensuing year were chosen. The old board was re-elected, as follows:

Charles L. Eidlitz, president.
Leonard K. Prince, first vice-president.
Hugh Getty, second vice-president.
William K. Fertig, secretary and treasurer.

The chairman of the Board of Governors is Otto M. Eidlitz.

Not the least interesting feature of the first annual banquet of the Building Trades Employers' Association, held in the ball room of the Waldorf-Astoria in April, was the presentation to Otto M. Eidlitz, chairman of the Board of Governors, of a massive sterling silver bowl, plateau and ladle, made by Tiffany & Co. The testimonial was given in appreciation of Mr. Eidlitz's services in arranging the scheme of arbitration, through which medium the differences existing in the building trades of the city were adjusted, and it was quite natural, therefore, that the artist should select the olive to symbolize the central idea of peace.

The bowl measures 15½ inches in diameter and has a capacity of about 4 gallons. It is encircled by a wreath of fruit and leaves chased in high relief. Above the wreath are ornamental panels connected by festoons of ivy and a ribbon bearing in raised letters the inscription, "Presented to Otto M. Eidlitz by the Members of the Building Trades Employers' Association." Below the wreath are flutes and oak leaves, the latter emblematic of strength. The plateau, which also serves as a tray for the glasses, has a border of panels similar to the bowl, but connected by chased grape leaves and fruit, instead of ivy. The raised inscription around the plateau is a continuation of that upon the bowl, and reads, "In Recognition of His Services to the Building Industries of New York Rendered in 1903." the ladle is decorated on the shank with olives. Above the panel bearing clasped hands there is an owl, signifying wisdom, and on the handle the letter "E."

The building inspectors of the city have for some little time past been agitating the matter of increased compensation for the amount of work which they are called upon to perform. It is pointed out that in other cities of much less population than New York the pay of the building inspectors is appreciably greater, while the responsibility involved is decidedly less. Nearly a year ago, at a regular monthly meeting of the "Associated Employees of the Bureau of Buildings," expression denouncing the present wages as incommensurate to the services rendered was made in the form of a "memorial," a copy of which was sent to the department superintendents of the five boroughs, the Mayor, the Borough Presidents and to the members of the Board of Estimate and Apportionment. Among other statistics the memorial includes a list of 28 trades, with the wages paid the respective laborers. Except for six branches of the 28, the men who do the work receive higher wages than the inspector who supervises it.

At the annual meeting of the Association of Dealers in Masons' Materials of New York City Francis H. Howland was elected president; John A. Filbrick, vice-president, and Nathan Peck, treasurer.

Philadelphia, Pa.

An agreement was reached May 4 between the Hoisting and Portable Engineers' Union and the Advisory Board of the Master Builders' Exchange whereby the union waives the right to engage in sympathetic strikes and accepts arbitration for the adjustment of trade disputes, work to be continued pending settlement. The conference was held at the rooms of the Builders' Exchange, and was participated in by the full Advisory Board and a committee representing the engineers.

The figures of the Building Department for April show a slight falling off as compared with last year, but not of sufficient magnitude to be regarded as significant. Of course the attitude of labor is an important factor, and may cause quite a decided change in the outlook ere the season is very far advanced. The permits issued in April were 963, calling for building improvements estimated to cost $3,486,695, while in April last year there were 816 permits issued, involving an estimated outlay of $3,732,810.

Among the more important building operations may be noted one involving the erection of 150 dwellings and four stores and dwellings in West Philadelphia, the aggregate cost being placed at $382,000. The dwellings will be two stories in hight, 54 of them measuring 15 x 47 feet each, and 42 will be 16 x 52 feet in plan.

Pittsburgh, Pa.

The figures issued for the month of April indicate a marked advance over the previous month, but is not so favorable when compared with the corresponding month last year. The total number of operations for which permits were issued in April of the current year was 521, involving an estimated outlay of $1,573,718, while in April last year the total operations for which permits were issued was 333, estimated to cost $1,837,945. From this it is inferred that there is likely to be more dwellings and flats erected this year and fewer large business blocks. Of the permits issued in April 290 were for new structures to cost $1,386,090, while 86 were for additions to cost $58,597 and 145 were for operations to cost $129,028. Owing to the fact that there seems to be little prospect of serious trouble this summer in the building trades, and that materials are slightly lower in price, with money easier to obtain on loan than six months ago, the situation is steadily improving and the outlook is regarded as most encouraging.

The contract for the addition to the building of the Colonial Trust Company on Fourth avenue has just been awarded by Architect F. J. Osterling to Lauer Brothers, the figures being placed at about $150,000. The new structure will cover an area 40 x 120 feet, extending from the rear of the present building to Diamond street.

As announced in our last issue, the second annual banquet of the Master Builders' Association of Pittsburgh, Allegheny and vicinity was held on the evening of April 22 at the Colonial Hotel. The large banquet hall was attractively decorated, and there were present nearly 250 members and invited guests, prominent among the latter being Benjamin B. Traitel, president of the Traitel Marble Company of New York City.

J. Charles Wilson, the newly elected president, was toastmaster, and after the refreshments provided had been duly considered he introduced D. F. Crawford, who delivered a most interesting address on "Our Organization." He reviewed its history from the time the subject of organizing was first discussed by the Pittsburgh men, and told how the master builders had been benefited by it. P. K. Stephenson, the general business agent for the association, made a few remarks, and in behalf of the members presented William T. Powell, the retiring president, with a gold medal for his work at the head of the organization.

Mr. Traitel of New York was the next speaker, and his talk on "The Builder" was the feature of the evening. Robert K. Cochrane, the secretary, reviewed the work of the association for the past year, after which J. C. Mohney, a prominent member, discussed the question of sociability.

The Banquet Committee was composed of Robert K. Cochrane, chairman; J. Charles Wilson, F. Benz, R. J. Grahan, George W. Miller and P. K. Stephenson.

Portland, Ore.

Spring building operations began in all parts of the city during the early part of April and have continued without interruption ever since. It is estimated that there are now in course of construction over 1000 houses of various sorts. On April 7 the ground was broken for the first of the buildings to be erected for the Lewis and Clark Exposition. Contracts for all the buildings to be erected by the commission have been let, and the contractors in charge of the various buildings have signified their readiness to begin work immediately. Before the end of May the commission hopes to have all buildings under way and to have work progressing in earnest.

Builders are making good progress in the erection of business blocks in the down town district. A large force is employed in the Weinhard Block on Pine street, and the six-story Fenton Building on Sixth street has already reached the fourth story. The labor condition is satisfactory, and there is a general feeling that the building situation will continue good from now until after the close of the Lewis and Clark Exposition in 1905.

Rochester, N. Y.

The figures compiled in the office of the Fire Marshal show that the month of April was a record breaker for the city so far as building operations are concerned. During the month there were 152 applications for the erection or remodeling of buildings, the estimated cost being placed at $775,602, this being an increase over the corresponding month of last year of $465,360. Among the permits granted were those for the new building of the Rochester Trust & Safe Deposit Company, the German Insurance Company's building, and the Strong Building on Platt street. The figures do not include the new Sibley Building, the Hayden factory, the new building for Bausch & Lomb, or the addition to the Stein, Bloch & Co. Building on St. Paul street, as these will be included in the report for May.

President Edgerton of the Common Council is authority for the statement that the claim is entirely unfounded that extensive building operations in the city have created a scarcity of masons and carpenters. While there is more building going on than usual this year, there are plenty of men to do the work. In fact, he states that many carpenters and masons have been unable to find work this spring and there is no need of sending for outside help. There has, however, been some scarcity of teams for hauling material.

San Francisco, Cal.

The total cost of building improvements projected during the month of April amounted to $2,101,488, this exceeding the volume of business for any month since the city charter went into effect. The aggregate of the building permits issued during the month preceding was $1,507,000, showing a gain of more than 25 per cent. for April. The number of new buildings begun during the month was 220, while the number of alterations for old buildings which were undertaken was 72. The most notable feature of the month was the number of frame apartment houses and hotels planned for the near future. The movement in this direction is due in large measure to the agitation going on in favor of extending the fire limits of the city, and builders are anxious to get work started before such an ordinance is passed.

There has also been an increase in the number of flats started. Architects state that the tendency is toward two-story flats, the three-story structures not having proved entirely satisfactory.

The Board of Supervisors of San Francisco has passed an ordinance requiring all buildings devoted to hotel, hospital or similar purposes hereafter erected to have passages provided leading direct to the fire escapes. The ordinance proposing to limit the hight of wooden buildings hereafter erected to 45 feet and the number of stories to three has not yet been passed, but has been referred to the Fire Committee for further discussion.

Seattle, Wash.

A large increase in building projected during April is shown by the report of the building inspector, there having been 693 permits, aggregating in value $805,801, as compared with 589 permits, valued at $459,063, in April, 1903. Builders anticipate that the current year will witness a continued activity in the building trade. Work will proceed more actively on the new federal building and a considerable part of its cost—$700,000—will be credited to this year. The 14-story Alaska Building, for which the foundation is now being cleared and costing $600,000, will be well under way before the end of the year. There is some difference of opinion regarding the outlook for smaller buildings and residences. Some builders hold that the outing and camping business will retard building during the summer, but others hold that the lower cost of building material and the increased competition among builders is already having its effect, and that many are now preparing to take advantage of these conditions. There is a good demand for residences ranging between $1500 and $5000 in cost.

The City Council has appointed a committee to consider a revision of the city building ordinances.

Spokane, Wash.

The amount of new building undertaken in Spokane during the month of April surpassed that of any previous month in the year by nearly $250,000. The largest permit for the month was issued to the Conzaga College for an addition to the college to be built at a cost of $250,000. During the month 11 permits were issued for buildings ranging over $10,000 each. Many of the proposed buildings are for large flats, one of these calling for the expenditure of $70,000. There is also a large amount of warehouse building going on.

St. Paul, Minn.

Building continues active in and about the city, and while no very large contracts are under way, the amount of work in shape of new buildings makes a fair aggregate. Probably the largest permit issued during April was that for the completion of the new armory, which will amount to $70,000. During April of the current year 203 permits were issued authorizing work estimated to cost $441,080, and in the same month of last year there were 167 permits issued for building improvements involving an estimated outlay of $485,084.

Notes.

The Builders' Association of Lorain, Ohio, unanimously voted at their regular meeting, on May 9, to adopt the "open shop" policy in the future.

The carpenters' strike, which was in progress at Youngstown, Ohio, has been settled by the men adopting the scale in force last year.

The season has opened very auspiciously in New Castle, Pa., contracts having already been awarded for the erection of a number of dwellings. Prices of materials have been shaded to some extent and the labor situation is such as to warrant the belief that there will be no interruption to active operations.

All indications point to an active season for carpenters and builders in Geneva, N. Y. The large contractors have plenty of work on their hands, and while no important individual operation is under way, there is an active demand for dwelling houses, the inquiry at present being greatly in excess of the supply. Plans have been prepared for many new structures in this line and numerous contracts have already been awarded.

The closing of the sugar works for the summer at Pekin, Ill., is expected to have a rather depressing effect on building operations in the city. Many who had planned the erection of dwellings have canceled the contracts, and the outlook for new work is anything but encouraging. Several hundred workmen have left the city, with the result that there are at present many vacant houses.

With the opening of spring Scottsburg, Ind., is said to be enjoying one of the greatest building booms in its history.

Carpenters, contractors and builders in Sterling, Ill., report an increased activity in building circles, many new residences going up in that place, while in Rock Falls there is every prospect of a small sized boom.

The opening of the spring season has greatly stimulated building activity in Bayonne, N. J., and at the present time dwelling houses are in course of erection in all parts of the city. The demand for houses and flats is said to be in excess of the supply, and as a consequence many landlords have raised rents, while at the same time the situation has greatly stimulated the building of new homes.

As a result of an agreement recently entered into by the carpenters of Scranton, Pa., and their employers, the men will receive a minimum wage of $2.30 a day until March, 1905, and from then until March, 1906, they will receive a minimum rate of $2.80 a day.

Considerable activity prevails in the building line in Laporte, Ind., and all indications point to something in excess of an average season.

The amount of building in progress in Allentown, Pa., is said to be greater than ever before in its history. The record year was 1901, when 573 new buildings were erected, but thus far the present year 246 have already been projected. During the month of April 56 permits were issued, calling for 165 new buildings, of which 149 were brick houses.

The new scale of wages for carpenters in Reading, Pa., which went into effect May 2, provides for 30 cents an hour, with 45 cents per hour for overtime and 60 cents per hour for Sundays and holidays. One apprentice is allowed for each 10 journeymen, and five miles from the city the men are alowed to work with nonunion men.

Contracts have thus far been awarded for 73 new houses in Connersville, Ind., not one of which is to cost less than $1800. Other improvements contemplated warrant the belief that the summer will witness an unusual degree of activity.

From present indications the amount of building in Albany, N. Y., this season is likely to prove somewhat in excess of last year, although it is not expected to reach the figures of 1902. There a number of important contracts under way, as well as a large number of dwellings scatteered over the city and through the subways.

At a meeting of the Master Builders' Exchange held on the evening of May 12 at the Grand Army Hall, Oswego, N. Y., resolutions were adopted in favor of the "open shop," so far as the employment of union laborers is concerned.

Plans have recently been perfected whereby 50 attractive dwellings will be erected in Mamaroneck avenue, White Plains, N. Y. It is stated that of the 50 to be erected 28 are already leased, and some have been sold in advance of their completion.

LAW IN THE BUILDING TRADE.

CONTRACT NOT IN RESTRAINT OF TRADE.

An agreement by a dealer in building material, on selling out the business, to buy from the purchaser of such business, and from no one else, certain building materials for a period of five years (the materials being needed for buildings, &c., in a specified county) is not in restraint of trade, nor is an agreement that they will refrain from bidding on public work for same period and in same locality.—Trentman *vs.* Wahrenburg (Ind.), 65 N. E. Rep., 1057.

"TO BE DONE TO THE OWNER'S SATISFACTION."

Where a building contract provided that the work should be done to the owner's satisfaction in a perfect, workmanlike manner, and should be accepted by him, and after the work was finished the owner refused to accept it and pointed out defects to the contractor, which he made no attempt to remedy, the fact that the work was done under the owner's supervision during its progress was immaterial, and the fact that the owner allowed a tenant to move into such building and use same did not constitute an acceptance; and the owner is not compelled to take possession and complete on default, as that is his privilege and not a duty.—Mitchell *vs.* Williams, 80 N. Y., S. Rep., 864.

WHEN CONTRACTOR WILL BE ENTITLED TO EXTRA TIME FOR OWNER'S DELAY.

Where delays in the performance of a building contract were occasioned by the owner's change in plastering to adamant, by which the contractor was relieved from the plastering, and the owner contracted with others for that work, which was neither done promptly nor in a workmanlike manner, by reason of which the contractor was delayed in completing the work, he was entitled to a reasonable allowance of extra time for same in computing the number of days' delay for which the owner was entitled to damages under the contract.—Vanderhoof *vs.* Shell (Ore.), 72 Pac. Rep., 127.

LAYING OUT CIRCULAR ARCHES IN CIRCULAR WALLS.*—XVII.

BY CHARLES H. FOX.

WE shall next consider that phase of the subject which relates to a radiant arch in a batter wall, together with molds, &c. In Fig. 155 is shown the plan of arch, H *u* representing the opening line and O the center. In Fig. 156 is represented the directing curve of the soffit, A, B, C, &c., indicating the points at which joints are desired. These are projected in A, B, C, &c., of the opening line, Fig. 155, the radials A′ *a*, B′ *b*, C′ *c*, &c., being drawn in the manner already fully described in connection with similar constructions. In A′ 9′ of Fig. 157 is shown the batter of the wall—that is, the wall in the vertical hight A 9 batters or sets back a distance equal to that of A′ 10, or 9 9′. This being understood, we shall next explain the manner in which the plan of the intersection of the conoidal surface of the

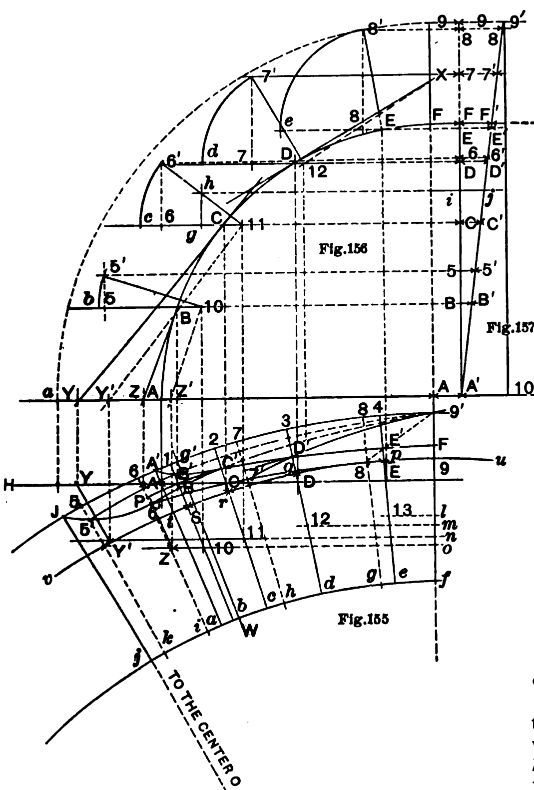


Fig. 155.—Plan of Arch in Batter Wall.
Fig. 156.—Directing Curve of the Soffit.
Fig. 157.—Showing Batter of Wall.
Figs. 158, 159 and 160.—Showing Method of Developing Joint Sections.

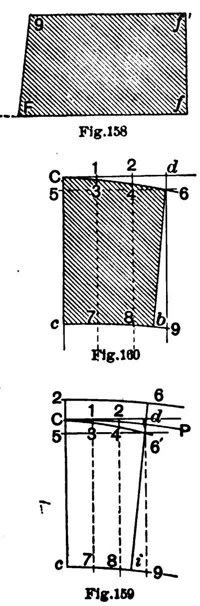
Laying Out Circular Arches in Circular Walls.

soffit with that of the conical surface of the wall may be projected.

Take as an example the point C′ of the element projected in C of Fig. 156. At the point A′ in Fig. 157 erect the vertical A′ 9; then in Fig. 156, parallel with the base line, draw C C C′. Now at the radial C′ *c* of Fig. 155 set off 2 C′, equal to C C′ of Fig. 157, which gives in C′ one point of the plan required. In a similar manner other points may be obtained, through which trace the curve, as shown. Now divide C′ *c* in 11 into two equal parts, which gives in 11 the point at which the normal of the plane surface joint may be projected. The normal in question is shown in 11 6′ of Fig. 156, the construction of which will be apparent from the drawing when considered in connection with the explanations of previous articles. In a similar manner the normals 10 5′, 12 7′, &c., may be projected.

Now to find the point through which to trace the plan curve of the intersection of the exterior bounding surface of the arch with the conical surface of the wall, proceed as follows: Take the point 6′ of the normal 11 6′ of Fig. 156, and parallel with the base line draw 6′ 6 6′. Then in Fig. 155 set off 2 6, equal to 11 6 of Fig. 156, and through 6 draw the radial 6 *i*. Next set off 6 6′, equal to 6 6′ of Fig. 157, which gives one point of the curve. In a similar manner find other points and trace the curve.

In order to develop the face molds we first draw 9′ 9, as shown in Fig. 161. Square with 9′ 9 draw 9 4 and set off 9 9′, equal to A′ 9′ of the inclined line in Fig. 157. Square with 9 9′ draw 9′ *p*. Now in Fig. 155 set off 9 9′, equal to 9 9′ of Fig. 157, and with O 9 as radius draw the curve 9 *v*.



In Fig. 161 set off 9 4 and 9′ *p*, equal respectively to the lengths of the corresponding arc of Fig. 155. Join 4 *p*, and square with this draw 4 3 and *p q*, equal respectively with the lengths of the corresponding arcs of the plan. Join *q* 3, and square with it draw 3 2 and *q r*, equal respectively to the lengths of the corresponding arcs of the plan. In the same manner find the points 1 *s*, 1 A *a*, &c. Now set off in Fig. 161 the distances 4 E, 3 D, &c., equal respectively to A′ E′, A′ D′, A′ C′, &c., of the inclined line of Fig. 157. Through the points given in A, B, C, &c., trace the developed curve of intersection of the soffit surface with that of the wall. Square with *s* B, *r* C, &c., draw B *b*, C *c*, &c., making the angle *b* B 5, *c* C 6, &c., equal to that of the corresponding normals of Fig. 156. Through the points given in *a*, 5, 6, &c., trace the curve, as shown, which will complete the face molds required.

For the purpose of developing the joint mold we proceed as follows: Take as an example that required at the joint surface 11 6′ of Fig. 156. In this figure divide the normal as shown in two equal lengths. Then square with 11 6 draw *h g* and parallel with the base line draw *h i j*. Now in Fig. 155 set off 2 *g′*, equal to 11 *g* of Fig. 156; set off *g′* B, equal to *i j* of Fig. 157, and a curve traced through 9′ C′ B 6′ gives the plan of the intersection of the joint surface with that of the outer wall. Now, with O as center and O C′ as the radius draw the arc C′ P.

To make the construction clear the figure C′ P *i c* of the plan has been transferred to the corresponding diagram of Fig. 159, in which square with *c* C draw the tangent C *d*; then parallel with *c* C through 6′ draw 9 6′; now divide C *d* into any number of equal parts, and draw the ordinates 1 7, &c. In Fig. 160 set off C 5 *c*, equal to that of the corresponding letters of reference of Fig. 159. Square with C *c* draw C *d* and 5 6, making the latter equal to the length 11 6′ of the normal of Fig. 156; now divide 5 6 into the same number of equal parts that the corresponding line of Fig. 159 may be divided, and parallel with *c* C draw the ordinates 1 7, &c., equal to the corresponding ordinates of Fig. 159. Through the points given in C 3 4 6 and *c* 7 8 9 trace the developed curves of the outer and inside face of the mold. Now set off *c b*, equal to the length of the joint line, as given at the inside face molds of the joint in question, and drawing 6 *b* the mold may be completed. In a similar manner may each joint section be developed. The inside face being a cylindrical surface, the molds for the face in question may be developed to the directions given in preceding issues for like devolpments. We will endeavor in a later drawing to show a very simple method by means of which the curve lines represented in 4 3 *a* and 9' *q s* of Fig. 161 may be developed.

A Mammoth Barn.

The plans have recently been prepared for a barn of somewhat mammoth proportions, which will be erected for Frank K. Bull of Racine, Wis., and which when completed will be arranged so as to constitute two separate stables under one roof. The structure will be two stories in hight, and will cover an area 114 x 117 feet. The exterior will be of dark brown mottled pressed brick, with Bedford stone foundation and trimmings. The second story will be of rough cast plaster and half timber work in the dormers, while the roof will be of green tile. The ground floor of each stable is so arranged as to provide for an automobile and waiting room, 20 x 40, finished in old English oak, with enameled brick wainscoting; carriage wash, 16 x 45 feet, finished to ceiling in white enameled brick, with adamantine clinker brick floor; carriage room, 46 x 37, with white enamel brick wainscoting, oak trim, beam ceiling and hard wood floor. The stable room is 55 x 33, and contains eight single stalls and three box stalls. This room is finished to the ceiling with white enameled brick, and has adamantine clinker brick floor. The plumbing and fixtures are of the most modern and sanitary construction. The stalls are provided with an original flushing device. One of the stalls is fitted up as a water stall, in which a horse with dry or cracked feet may stand in water covering his hoofs. A perfect system of ventilation is provided, calculated to remove all odors. The harness rooms are to be finished with mahogany paneled wainscoting and hard wood floors. On the second floor are the loft room, storage room, grain bins and a suite of living and bath rooms for the use of the coachmen and stable men.

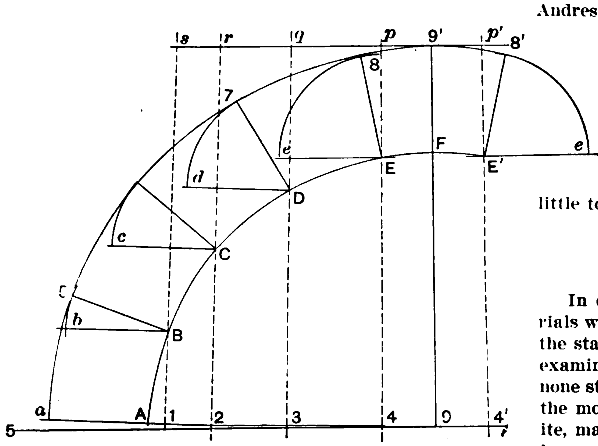


Fig. 161.—Diagram Showing Method of Developing Face Molds.

Laying Out Circular Arches in Circular Walls.

A Ruined Mexican Church.

The suburban town of San Angel, at the base of the foothills, three-quarters of an hour from the capital by electric car, is every year becoming more fashionable as a summer resort, and every year, as modern conveniences and better houses are provided in the outlying districts, more people take up their permanent abode there. To the casual visitor to San Angel, says a writer in a late issue of *Modern Mexico*, the most interesting feature is the handsome old church of Neustra Señora del Carmen. Its triple domes, with their tiles shining brightly in the sunlight, are the first objects that arrest the attention of strangers approaching the town. Its Carmelite bell tower, or campanario, is distinctive, and the edifice is one of the handsomest ecclesiastical monuments in all Mexico. It was dedicated to the worship of God in 1617, or three years before the Pilgrim Fathers of New England landed on Plymouth Rock.

The interior is handsomely decorated and contains some notable paintings by the famous Mexican artist Cabrera. Pious women have adorned the Chapel of Our Lady, which is one of the features of this ancient church, and the magnificent Churrigueresque ornamentation of the northern transept is a splendid specimen of this most distinctive Spanish mode of decoration. Beneath this transept rest in their eternal sleep 45 American soldiers, who were killed or died of disease during the war of the North American invasion, when the adjoining monastery of the Carmelite Fathers was converted into a military hospital and barracks, the good fathers nursing the wounded Americans with such Christian devotion and good will that when the troops evacuated San Angel monks and soldiers fell on one another's necks and wept.

Janvier speaks of San Angel's church as follows: "In the year 1613 Don Felipe De Guzman, a pious 'cacique' of Chimalistac, in fulfillment of his father's testament, gave up to the Carmelite order a *huerta* of considerable size. Here the Carmelites built a little hospice. Don Felipe De Guzman presently died, and a little later died also his widow, childless. By her will the entire estate of which she died possessed passed to the Carmelite Fathers, and by these it was devoted to the building of the existing monastery and church. The plans for these buildings were prepared by the celebrated architect, Fray Andres De San Miguel, a lay brother of the Carmelite order, and at that time held to be the first architect of New Spain. That this reputation was well merited is shown by the beauty of his still existing work. The building was begun June 20, 1615, and was pushed with so much vigor that the church and convent were finished within two years. The church was dedicated to San Angelo Martir, whence came the name of the little town that presently grew up around it."

Severe Test of Baltimore Brick.

In discussing the severe test to which building materials were subjected in the recent Baltimore conflagration, the statement is made by the *Herald* of that city that an examination of the ruins will show that of all material none stood the fire better than the Baltimore red brick. In the more modern buildings stone of various kinds, granite, marble and the whitish variety of brick, made chiefly, we believe, of material found in the West, and concrete in one building, at least, were used, and in the intense heat all, of course, suffered, but the red brick, it is believed, least of all. It has been estimated that perhaps 20 per cent. of old brick can be used in rebuilding in work on inside walls, which will amount to considerable in the way of saving. It is admitted that in the residence section red brick has been too freely used, giving the effect of too great uniformity, but in the business district affected by the fire this was not so much the case. As to durability, this brick is perhaps the equal of almost any material. There is a dispute as to whether some of the old Colonial churches still in good condition in Eastern Virginia were built of brick brought from England, but it is certain that they were most substantially constructed. This brick corresponds closely to what used to be called "Baltimore pressed brick," and is a splendid specimen of material. Some of these churches date back to early in 1700, and a few were constructed still earlier. The best quality of Baltimore made brick, it is believed, is quite as good as these old specimens.

Some of the daily papers express the opinion that there has been a change in architectural taste in New York, and that it will show itself within the next few months, when the rebellion against the French style of building that has been so popular in the city will begin to have its effect. In the last ten years the most popular style of building here has been French. The majority of houses now being built are in the Georgian style, which promises to enjoy as much popularity as the fashion just gone out. After New York has passed through several periods of such exclusive devotion to the various styles its buildings will be fairly representative of all schools.

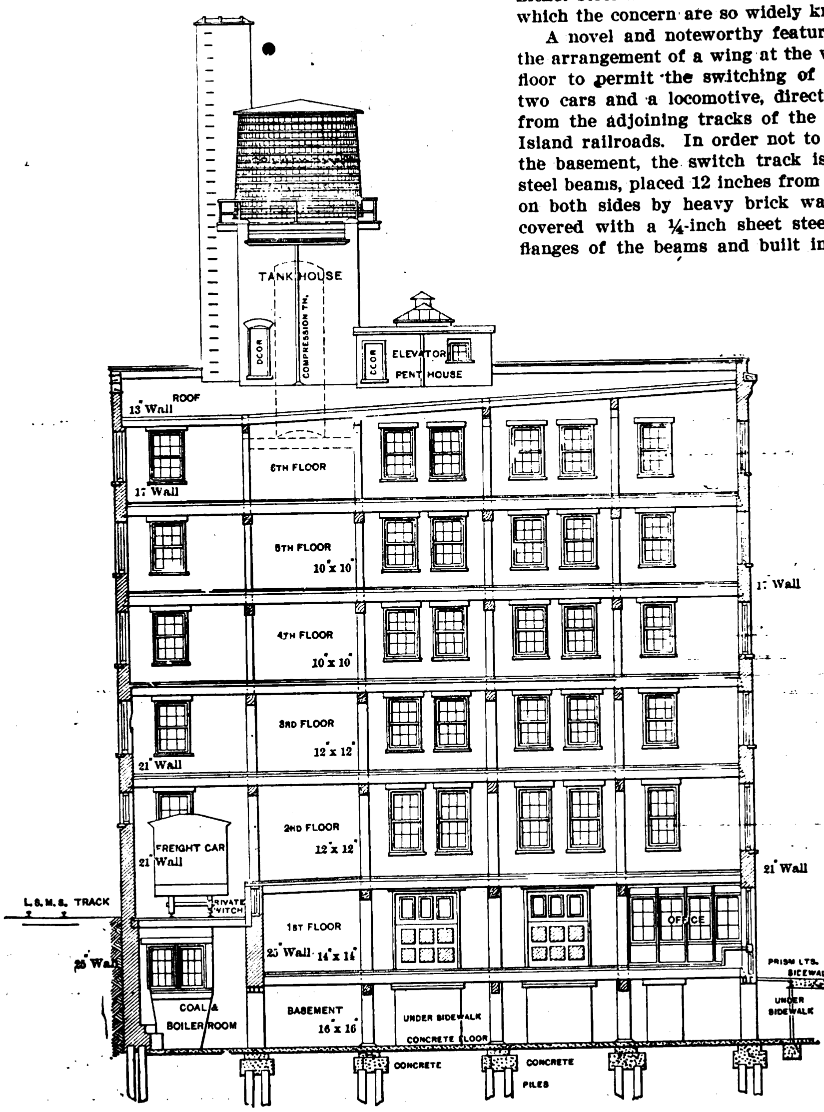
A MODERN FACTORY BUILDING.

WE present herewith elevations and details which relate to a modern factory building embodying in its construction many features likely to interest a large class of our readers. It is a six-story and basement warehouse covering an area 79 x 152 feet inside dimensions and is what is known as slow-burning semi-mill construction, being put up in accordance with the specifications and requirements of the Factory Mutual Insurance Company.

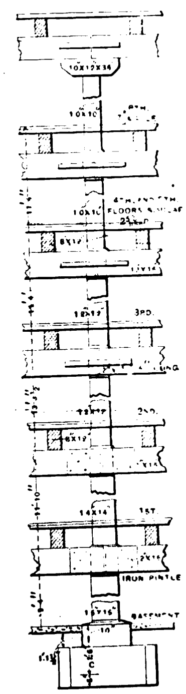
A feature of the construction is the way the posts and girders rest upon cast iron pintles, or shoes. The usual custim of using wood bolsters throughout a building puts the floors out of level with the shrinkage of the bolsters. This is entirely done away with by the use of cast iron pintles. The girders also rest on top of the posts and are not supported by brackets or projections at the sides. With the exception of the edges of these pintles, the whole of their surface is concealed by the girders, thereby protecting the iron in case of fire.

An electric Eaton & Prince 8 x 10-foot elevator in the center of the building serves the seven floors, and cases of goods on each floor are so arranged as to leave broad aisles at the sides and in the center, to facilitate the trucking of goods to and from the elevator. The building is the new Chicago warehouse of the Lalance & Grosjean Manufacturing Company of New York, and has just been completed at Clark and Nineteenth streets. It is peculiarly fitted, both by location and design, for the proper storage and speedy handling of the lines of agate, nickel steel and other enameled wares, tinware, &c., for which the concern are so widely known.

A novel and noteworthy feature of the warehouse is the arrangement of a wing at the west side of the second floor to permit the switching of three freight cars, or two cars and a locomotive, directly into the warehouse from the adjoining tracks of the Lake Shore and Rock Island railroads. In order not to lose valuable space in the basement, the switch track is supported by 12-inch steel beams, placed 12 inches from centers, and supported on both sides by heavy brick walls. These beams are covered with a ¼-inch sheet steel floor, riveted to the flanges of the beams and built into the brick walls on both sides. The rails for the switch track are laid directly on the sheet steel, and are clamped to the beams with clamps especially designed by the engineers of the Lake Shore & Michigan Southern Railroad. This arrangement actually divides the west end of the building into two stories, occupying the same height as three stories in the east part. The space under the steel floor is partly occupied by a boiler and coal room. A sliding steel door or curtain closes the track entrance. The track is sunk just low enough below the level of the floor to bring the floor of the cars level with the unloading platform. Outside of the sliding door this platform extends along the side of the building and 36 feet beyond it southward, in order to permit of loading or unloading



Vertical Cross Section of the Warehouse.



Section, Showing Construction at the Different Floors.

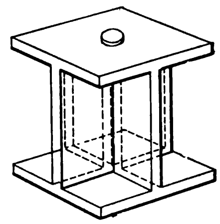
A Modern Factory Building.

two additional cars. There is no grade from the adjoining railroad tracks into the building, owing to the fact that the railroad is elevated about 10 feet above the level of the adjacent ground. A cement loading and unloading platform for wagons extends the width of the building at its north end, the platform being level with the floor of an ordinary dray. As Nineteenth street is closed by the embankment of the railroad, the stub end of the street is at the disposal of the company for handling their wagon traffic without interference or interruption. Jack-knife doors lead from the building to the shipping platforms. By the arrangement just described it will be seen that boxes of goods may be unloaded from freight cars in the building, trucked to the elevator, lowered one floor and, without leaving the truck, be wheeled to waiting wagons for reshipment by local freight.

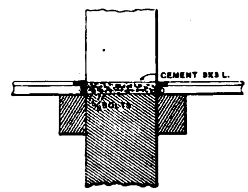
The third floor is filled with a series of shelving, divided into compartments, or bins, and in these bins, which are numbered serially, stock for broken package shipment is stored. The center of this floor, to one side of the elevator, is the packing and weighing floor. On each floor the aisles are numbered and sections lettered, and the stock book shows by letters and numbers the exact location of each case of goods, so that even the

tubular boiler in the basement. Steam from the boiler is conducted to the fourth floor, from which it is carried upward to floors above and downward to the lower floors.

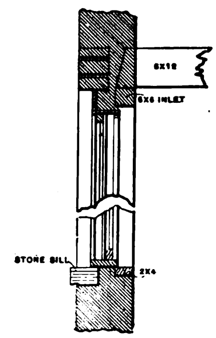
The east frontage of the northern half of the main floor is partitioned off for the office, and finished in Georgia pine. A telephone and tube system will furnish communication between the office and various parts of the warehouse. The whole structure is an excellent type



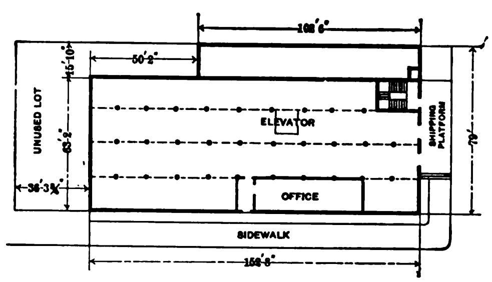
Cast Iron Pintle Used at Column and Girder Intersections.



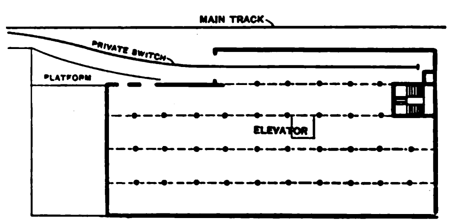
Section of Sills at Fire Doors.



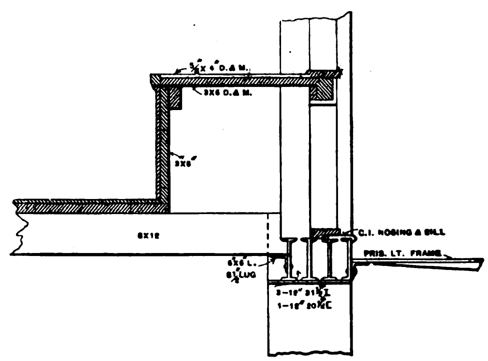
Detail of Lintels, Front and Rear.



Main Floor.



Second Story.



Section through Loading Platform.
Scale, ¼ Inch to the Foot.

A Modern Factory Building.

most unskilled freight handler can quickly get any case desired.

A broad daylight stairway connects the floors at the north end of the building, and entrance to the stairs is through steel fire doors, which automatically close, by the melting of a fusible retaining link, in case of fire. A fire escape is built at the opposite end of the building.

The whole seven floors are protected against disastrous fire by the Niagara Fire Extinguisher Company's wet type overhead sprinklers. This system is in two units, the northern and southern halves of the system being controlled separately, each having its own cutting-off device. This device, by the throw of levers, cuts off rangement prevents the damage of property by water already stored in them to flow into the sewer. This arrangement prevents the damage of property by water after fire has been extinguished. The water for the sprinkler system is pumped from the city mains into two steel pressure tanks extending from the sixth floor to the top of a penthouse on the roof and to a 20,000-gallon wooden gravity tank, also on the roof. This latter tank is intended for reserve supply, and the water in it is prevented from freezing by the admission of steam from the boiler in the basement.

The building is lighted throughout by arc and incandescent lights and is heated by means of steam from a

of modern warehouse in its construction and arrangement.

The architect of the structure was Fritz Foltz, of 69 Dearborn street, Chicago, Ill.

A Common Result in Estimating.

Building has become so highly developed and specialized that the cost of omitting work has become an important item in making estimates. Not long since a factory obtained a contract for furnishing the outer and inner wood finish of a chapel, says a writer in a recent issue of the *Western Builder*. Specifications for the outer work required that it be without "surfacing" or planing—as the saw left it. The office man who "billed" the work to the factory took pains to mark all over the lists and drawings that the stuff was to be planed on the back side only—this to bring it to a proper thickness—and that all exposed surfaces were to be left as sawn. In due time, chancing to be in the warehouse, he saw stacked up ready for shipment all this outer finish fully dressed and planed, and of course it all had to be thrown away. It is safe to say that the next time the managers of the factory estimate on work in which the surfacing is to be omitted they will add something to cover the chance of having to do the work over again.

Design for Front Door or Entrance.

One of the points to be considered in the finishing of the exterior of a modern up-to-date dwelling is the front entrance, which may consist of a single door or a combination of door and side lights, with transom, as the style and character of the design of this part of the building often has much to do with the general effect produced upon the eye of the beholder. The front entrance to a house admits of a great variety of treatment, depending upon the taste of the architect or owner, as well as upon the amount of money which one feels disposed to devote to this feature of the structure. An idea of the manner in which almost any of the hard woods may be effectively treated in combination with a neat transom is shown in the accompanying illustration, which represents one of the designs of front entrances produced by the E. J. Davis Mfg. Company of 251 to 271 West Twenty-first street, Chicago, Ill. The glazing is of bevel plate glass, set in metal, while the handsome carving is hand wrought and the cabinet work of the first quality.

Design for Front Door or Entrance.

The inside of the door and side lights is flush molded and the finish is intended to harmonize with the wood work of the hall. The engraving very clearly shows the delicate tracery of the ornamentation and the effective treatment of the different parts. The design is cleverly worked out, and will doubtless prove of suggestive value to many of our readers.

A California Home.

A handsome residence in the Colonial style as exemplified in the Southern States is now in process of erection at San Mateo, near San Francisco, for D. F. Walker, of the latter place. The most noticeable feature of the building, viewed exteriorly, is the large double deck porch which extends across the front of the building. From the ground floor this opens upon a reception hall, around the walls of which are columns twined with vines in gold. To the right of the hall is a large drawing room in the Renaissance style, the mantel for which is said to have been specially carved in Venice. The finish of the room will be in Venetian walnut. At the end of the drawing room is a glass inclosed porch. At the left of the reception room is a library, finished in mahogany, onyx and marble, adjoining which is an entrance from the *porte cochere*. The billiard room is finished in dark green oak. The finish in the dining room will be in oak, and the same kind of wood will be used for the floors. In the basement is a large dancing hall, a music room and a supper room.

The second floor will have a large living room and sleeping rooms, each having its private bath and dressing room. The sleeping rooms are to be finished in birch, white cedar, Oregon ash and red wood, while the living room will be in Flemish oak.

The exterior of the mansion will be painted with old fashioned white enamel, and the windows will be provided with green blinds. Corinthian columns will rise to the second story at regular intervals from the verandas. The house occupies a commanding site on a 12-acre tract of rising ground.

New Publications.

739 Paint Questions Answered.—Size, 7 x 10½ inches. 382 pages. Bound in board covers. Published by the *Painters' Magazine*. Price, $3, postpaid.

This, as the title indicates, consists of a large number of answers to questions which have been propounded by those connected with the painting and decorating business. The matter originally appeared in the Question and Answer Department of the *Painters' Magazine*, and the publishers, feeling that the information would prove valuable in book form, have put the matter in such form that it is convenient for reference, and the book will be found a valuable encyclopædia for the painter, decorator, and, in fact, all having occasion to do work connected with the lines of trade indicated. In reprinting the matter from the *Painters' Magazine*, the publishers have omitted the initials and the location of the questioners, and instead of presenting their letters have stated concisely the conditions of the particular case concerning which information was requested, or have summarized it in the title of the paragraph or section.

A feature of the work and one which will commend it for its convenience is an index alphabetically arranged and so complete that any particular subject may be readily found.

American Renaissance.—By Joy Wheeler Dow, Architect. 182 pages. Size 8 x 11 inches. Illustrated by 96 half-tone engravings and numerous line drawings. Handsomely bound in board covers, with gilt top. Published by William T. Comstock. Price, $4, postpaid.

This review of American Renaissance originally appeared as a series of papers in the *Architects' and Builders' Magazine* and the interest shown in them as they were brought out lead the publisher to suggest the propriety of putting them in more permanent shape. With this idea in view the author collated the articles, adding some new illustrations, and in some cases the plates were enlarged where the subjects seemed worthy of fuller representation than was possible in the limited space allowed in the magazine. The book is intended to be an impartial outline history of American domestic architecture from Colonial times to the present day, and is of a character to justly entitle it to a place in the library of everyone who desires to familiarize himself with the subject. The matter is comprised in 12 chapters and is presented in a way to appeal not alone to the architect, but to the general reader as well. The value of the work is greatly enhanced by an index, alphabetically arranged, and so complete as to permit of ready reference to any phase of the subject considered. The selection of illustrations is specially noteworthy, embracing as they do many rare and beautiful examples of American domestic architecture.

Light Oak Finish on Pine Wood.

In order to produce a light oak finish on pine wood the *Painters' Magazine* suggests the following treatment: Stain the wood with raw sienna in oil, that is thinned with equal parts oil and drier for soft pine and with equal parts raw oil, drier and turpentine for hard pine. Apply the stain with the brush, and when about ready to set wipe off the excess of stain with a cloth, so that the grain of the wood will stand out clear. When dry finish with hard oil for inside or spar varnish for outside.

Death of Clarke Merchant.

Clarke Merchant, president of Merchant & Co., Incorporated, Philadelphia, Pa., died of pneumonia on May 7 after a short illness. He was born in Oglethorpe Barracks, Savannah, Ga., September 20, 1836, his father, Charles Spencer Merchant, being an officer in the United States Army, who retired with the rank of colonel and brevet brigadier-general. Clarke Merchant entered the navy as midshipman in 1852, and served on the Pacific Coast, in China, in the Mediterranean and subsequently on the Atlantic Station throughout the whole of the Civil War, in which he distinguished himself. He retired from the naval service in 1863 with the rank of lieutenant-commander and engaged in business in Philadelphia as a member of the firm of Carman, Merchant & Shaw. Subsequently he entered into business alone, his trade being principally in sheathing metal, sheet copper and other metals. Adding tin plate to his line of goods, he eventually made an arrangement with the tin plate manufacturers of Wales by which he gained a controlling position in this line of trade. The firm of Merchant & Co. to-day handle the entire product of some of the leading brands of roofing tin, and also operate a tin plate works of their own.

Curtailing Shingle Production.

Representatives of 31 shingle manufacturing companies of Northern Wisconsin and the Peninsula of Michigan, operating under the name of the Northwestern Shingle Manufacturers' Association, recently met at Escanaba, Mich., and agreed to curtail the production of shingles until the price of the product is raised to the normal level.

The manufacturers claim they are unable to make shingles without loss at the present price, and some mills may not open for work at all this season.

The price of shingles in the Central West, it was claimed by members of the association, has been driven to a bed rock basis by shipping into the territory great quantities of shingles from the Pacific Coast.

Decision Regarding Forfeiture Clauses in Building Contracts.

A decision has recently been handed down by Justice Gildersleeve in the New York Supreme Court, in the case of the owners of the new hotel in course of construction at the northeast corner of Eighty-first street and Columbus avenue, New York City, against Joseph McConnell, the mason contractor, which establishes an important precedent in difficulties arising in building contracts containing forfeiture clauses.

McConnell had a contract for $17,000, and it was provided that in case of a "general" strike the time would be extended over the period of the strike. Delay for any other cause would be considered abandonment, and give the owners the right to end the contract. The contractor, who is a member of the Mason Builders' Association, had done considerable work when the bricklayers' strike, recently ended, was declared, stopping his work. The owners ended his contract by a three days' notice, contending that the bricklayers' strike was not a "general" strike.

The owner obtained an injunction preventing the contractor from removing his scaffolding and other tools. Counsel for the contractor contended that the strike was in effect a "general" strike, and that therefore the contract could not be terminated, and in this view the Court concurred.

An Important Legal Decision.

One of the most important legal decisions, from the viewpoints of purchasers of modern improved property and of building loan operators, which has been made in recent months, has been handed down by the Appellate Division of the Supreme Court, with every judge concurring. The unanimity with which the opinion was affirmed makes it quite sure to stand, whether the case be carried to the higher court or not. The decision furnishes a new protection to innocent buyers of the builder's product.

The case was that of Walter M. Jermyn against William C. Hunter, and victory lodged with the defendant. But Mr. Hunter, who erected the structure in which the *casus belli* was located, merely represented the building loan operator, E. Clifford Potter, in the action. Mr. Potter carried the case up to the Appellate Division with the determination to make a final test of the merits of the issue, and won what all his friends believed would be a losing fight. It is said that even his attorneys had not entertained any strong hope for a decision in his favor.

By the decision in question the Court holds that the man who sells such fixtures as boilers to a building sub-contractor by what is known as a conditional bill of sale can no longer enter the building in which they have been installed after some one else has bought it, and take away those fixtures, on the plea that he has not been paid.

Another New York Theater.

Another theater is about to be added to the already long list of places of amusement in New York City, plans having just been filed with the Bureau of Buildings for a structure to occupy a site at the corner of Sixty-second street and Broadway. The drawings have been prepared by George Keister, and the estimated cost of the new building is placed at about $200,000. It will have a main frontage of 100 feet and a depth of 186½ feet. It will be three stories in hight and the façades will be of brick and ornamental stone. It will be known as the Colonial Theater, the owners being the Colonial Theater Company.

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CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS
232-238 WILLIAM STREET, NEW YORK.

JULY, 1904.

Advantages of a Trade Education.

It is one of the standing surprises of our social system that the advantages of a trade education seem to appeal to but a comparatively small proportion of American youths. Possibly the artificial barriers which have been erected by certain labor unions may deter some boys from seeking to enter the mechanical trades. But this is evidently not the only reason for their apparent unwillingness to engage in skilled manual labor. Those who are interested in manual training institutions complain very generally that parents, even of the poorest classes, often object to their children being taught to work with their hands, preferring that they should study along commercial lines, under the mistaken idea that there is not only more dignity in clerking and kindred occupations than in the practice of a handicraft, but also more money. Nothing could be wider of the mark, as regards the youth of average qualifications and surroundings. On the one hand, in taking up the *rôle* of a clerk, he enters a field which has always been and always will be overcrowded, while on the other, by learning a trade, he equips himself with an unfailing means of livelihood, for, in our rapidly growing country, there is room for an almost unlimited supply of good workmen. Possibly the young clerk may secure more wages to start with than does the young mechanic, but to nine out of ten clerks the day comes when, grown older, they find they have reached the limit of their opportunity without having secured even a competency, much less anything like a leading position in the community. But while the young tradesman may possibly have had to undergo the grind of hard work on a small income during the first few years of his career, he can, with diligence and persistence, secure for himself steady and well paying employment, with the prospect of early independence and a position, when he shall have reached the upper rungs of the ladder of his calling, such as a very small proportion of his clerking *confrères* can hope to aspire to. The pecuniary advantages of the skilled workman, whose moral and mental qualifications are sound, are infinitely superior to those attaching to the ordinary run of clerkships. But, above and beyond this, there is, when rightly considered, a dignity and a satisfaction in skilled manual labor which does not exist to the same degree in the occupations to which so many young Americans are devoting themselves because in them they can wear nice clothes and enjoy the luxury of clean hands and linen. It is unfortunate that such distorted views should exist among our American youths to-day, and those who shall endeavor to disabuse the mind of the rising generation of these false ideas will be conferring a real benefit upon them, as well as upon the public at large, for a skilled mechanic is a valuable citizen of any country. Doubtless the adage "there's always room at the top" holds true of every calling, but it is also true that the "room at the top" is apt to be much more spacious in the mechanical trades than in the general commercial field, in proportion to the number of candidates for its occupation.

Apartment House Refrigerating Apparatus.

The practicability of supplying cold to dwellings and apartment houses by means of brine, chilled by the expansion of ammonia and allowed to circulate through a tank, in the same way that the cold storage houses of our cities are kept at a low temperature, is an extremely interesting theme for discussion. By enabling housekeepers to dispense with ice, these miniature cold storage closets form an excellent and economical substitute for the old fashioned refrigerators, and the brine chilled refrigerators are better than those cooled with ice in being perfectly dry, as the cooling pipes, which are kept at a temperature of about 20 degrees F., condense upon their surface the moisture in the air around them and freeze it into a mass of frost crystals which cover the pipes to a depth of an inch or more. In St. Louis chilled brine for cooling purposes is supplied from mains laid in the streets, but in cities where cold storage warehouses are not so common as in St. Louis individual plants are likely to be required. A plant suitable for an apartment house containing 25 families costs about $5000, but it is very probable that the extra rents that tenants would pay for sharing in its use would afford a large interest on the investment. The owners of some apartment houses in New York already supply their tenants with ice gratuitously as a special attraction; and it is probable that anything so simple as a cooling pipe service would soon come to be regarded by tenants as a luxury to which they were entitled without paying any extra rent for it. Under such circumstances it seems as if small individual cooling machines would be useful, not only to owners of apartment houses, but to housekeepers in general. It is said that a concern in Paris, France, makes a domestic ice machine, selling for about $15, which will freeze an ice cream or a *carafe* of water in a few minutes; and it seems as if such a machine might easily be made to chill a tank of brine of sufficient size to keep a refrigerator of moderate size cool with no further expense or trouble than that involved in turning a crank for a few minutes each day.

Sanitary Inspection of Schools.

The only practical way in which a permanent reform can be effected in the provision of proper sanitary conditions in school houses is the adoption of regular sanitary inspection devoted exclusively to schools. The present health laws of many cities contain no provision for such inspection, and it is only when complaint is made by individuals that the Health Department investigates and takes action. Moreover, in a great many cities no sanitary engineer is regularly employed by the city to consult with the building inspector on the erection and details of plumbing in public buildings. The larger cities throughout the United States, however, employ sanitary engineers, who render valuable service in securing proper buildings and adequate sanitary arrangements for schools. The public schools are so important in their relation to the mental and physical well being of the present as well as future generations as not only to warrant, but demand, the employment of every reasonable safeguard to health in every city in the land. The interests involved are too great to be trusted to the care of general agencies. They can and will be propertly protected only through a scientific system of inspection, designed wholly for their benefit and carried out with unremitting vigilance. Such a system should be established by the city authorities everywhere with as little delay as possible. It will not do to wait until it has been forced upon the city by some costly and destructive experience. The adoption of such a plan of sanitary supervision might possibly involve other changes in existing methods relating to the construction and alteration of school buildings in order to make the whole system harmonious and effective. One reform that is most urgently demanded, and which is really essential to the accomplishment of perfect sanitation, is the formulation of some plan that would insure the selection of proper sites for school houses and their construction on hygienic principles. Faulty construction of buildings and the choice of wrong locations are responsible for much of the existing trouble, and if we are to go on building schools on unscientific principles sanitary inspection will be seriously embarrassed. It is much cheaper to construct school buildings in the right manner in the beginning than to tear them to pieces afterward in the effort to make them what they ought to be. The "penny wise, pound foolish" policy that has been too often pursued in the past in such matters has been productive of results that cannot be contemplated with pride or satisfaction. There is no subject to which city councils can devote their attention and be surer of public interest and sympathy, nor any which more urgently demands consideration.

A Striking Contrast.

A comparison of the Produce Exchange Building, ou lower Broadway, New York City, with the first structure built by white men on the same site shows the wonderful growth of the city since the Dutch first took possession of Manhattan Island. In 1641 Philip Geraerdy built the White Horse Tavern, on what is now the northeast corner of Stone and Whitehall streets. It was 18 x 25 feet in size, with one door and one window, and seems to have had but one room on the first floor. It cost 75 florins, or about $30 of our money. It was patronized largely by the soldiers from the fort opposite, where the new Custom House is to be. To-day this site and the garden attached, as well as many other lots, are covered by the big Produce Exchange Building, which is ten stories high, with a tower of 16 stories, and has 14 acres of floor space.

Wanamaker's Philadelphia Store.

The contract for all the mason work, foundations and steel construction for John Wanamaker's new department store in Philadelphia has recently been awarded to the Thompson-Starrett Company of 49 Wall street, New York City. This new building will cover an area 250 x 479 feet, will be 12 stories in hight and will have a floor space nearly equal to 38½ acres. It is estimated that 18,000 tons of structural steel will be required and the foundations laid in concrete will extend 47 feet below the street level. The estimated cost is placed at $5,000,000, and the work will be done in accordance with plans prepared by D. H. Burnham & Co. of Chicago. The building will be equipped with 62 passenger and freight elevators, and the power house, which will occupy a separate building, will be connected with the main structure by a tunnel through which all pipes will be carried.

An apartment house of attractive exterior and handsome finish is about being erected in West Forty-fifth street, New York City, between Fifth and Sixth avenues, and which when completed will cost in the neighborhood of $300,000. The exterior will be of limestone, brick and terra cotta, in the modern French style, and the interior will be arranged for 22 families on a floor. The structure will be eight stories in hight and will cover an area 57½ x 85½ feet. The plans were drawn by A. N. Allen and F. Garvin Hodson, associated architects, who have their offices in the Windsor Arcade.

New Banking Building.

A short time ago we called attention to a handsomely finished annex just completed for the National Park Bank, next to the corner of Broadway and Fulton street, and extending through to Ann street. The bank itself has a frontage of 59½ feet on Broadway, and plans have now been filed with the Bureau of Buildings for a structure to be erected on the site of the old bank which will cost in the neighborhood of $250,000. The work will be done in accordance with drawings prepared by Architect D. Barber, which call for a facade of decorated limestone harmonizing with the annex and having an arched central window three stories high and a triple set of massive entrance doors at the basement story. The interiors of all the apartments and offices are to be finished in mahogany or chestnut and everything will be throughly in keeping with a structure of this character. The first floor will be devoted to offices and the main banking rooms, while on the sixth floor will be dining rooms for the president and vice-president, and on the seventh floor a large dining hall for the clerks. It is stated that the completed structure, with its annex wings, will have cost more than $1,000,000.

Increased Cost of Living.

Colonel Carroll D. Wright, United States Commissioner of Labor, one of the recognized statisticians of the world, has compiled statistics which have just been issued in a bulletin by the Department of Commerce and Labor, and which demonstrate the increased cost of living in 1903 over the preceding 13 years. Colonel Wright bases his report on no less than 260 series of quotations, giving the wholesale prices of farm products, food, clothing, fuel and lighting, metals and implements, building materials, house furnishing goods and many miscellaneous articles. His tables show that the average price of all these commodities was higher in 1903 than at any time since and including 1897. The farm products group, for example, was 18.8 per cent. higher in 1903 than the average price for the ten years from 1890 to 1899. Fifty-three articles of food are given, on 35 of which there is an increase over the average of the preceding 13 years ranging from 5 to 70 per cent. The table of fuel and lighting shows a remarkable increase in cost during 1903, amounting to 53.1 per cent. for petroleum and 26.2 for anthracite coal over the average price for the ten preceding years. Almost all the articles were higher last year than the average for the ten years preceding except in the case of manufactured products, which are largely lower. In almost all instances the increased prices referred to have benefited the farmers, who, in consequence, have prospered.

A Fifth Avenue Office Building.

Among the improvements contemplated in what has up to a recent period been the residential portion of Fifth avenue, New York City, is an 11-story fire proof office building, to be erected at the northwest corner of the avenue and Thirty-second street and to cost in the neighborhood of $700,000. The structure, which will be put up in accordance with plans drawn by Architect Robert Maynicke, will have a frontage on Fifth avenue of 65 feet 10 inches and on the cross street of 123 feet. The façade will be of brick, limestone and terra cotta. The old buildings on the site have already been torn down and the work of excavating for the foundations is now in progress.

It is stated that King Aggrippe built the roof of the Pantheon at Rome of concrete 27 years B. C. This roof is dome shaped and about 146 feet across, and stands today after a lapse of 2000 years a remarkable monument to the qualities of the old Roman cement.

SOME FEATURES OF THE NEW "TIMES" BUILDING.

THERE are many interesting features in connection with the construction of the building to be occupied by the New York *Times* which is now in process of erection at Broadway, Seventh avenue, Forty-second and Forty-third streets, New York City, and especially is this true as regards the foundations and substructure, for it is through the latter that the underground railroad will pass. The half-tone supplemental plate which accompanies this issue of the paper indicates the appearance of the structure a short time ago, and is made from a photograph showing a portion of the skeleton frame and the way the masonry was carried up from different levels. While the main structure is to be 16 stories in hight, the Forty-second street front, which is in the background of the picture, will be carried up 20 stories, giving a tower avenue runs parallel with the top portion of the framing plan.

A view of the substructure and foundation is shown in Fig. 1, where some of the iron work of the subway is indicated by the smaller columns and beams, the latter being placed at a slight angle with the girders of the building itself. This picture was made from a photograph, for which we are indebted to the *Sun*, taken at an early stage of the substructure work. In Fig. 2 is shown a cross section through the substructure on the line of the columns E, F and G of the framing plan, Fig. 3. The subway construction is indicated by the short columns represented by the dotted lines, and is wholly above the pressroom of the building. It will be seen from an examination of this illustration, taken

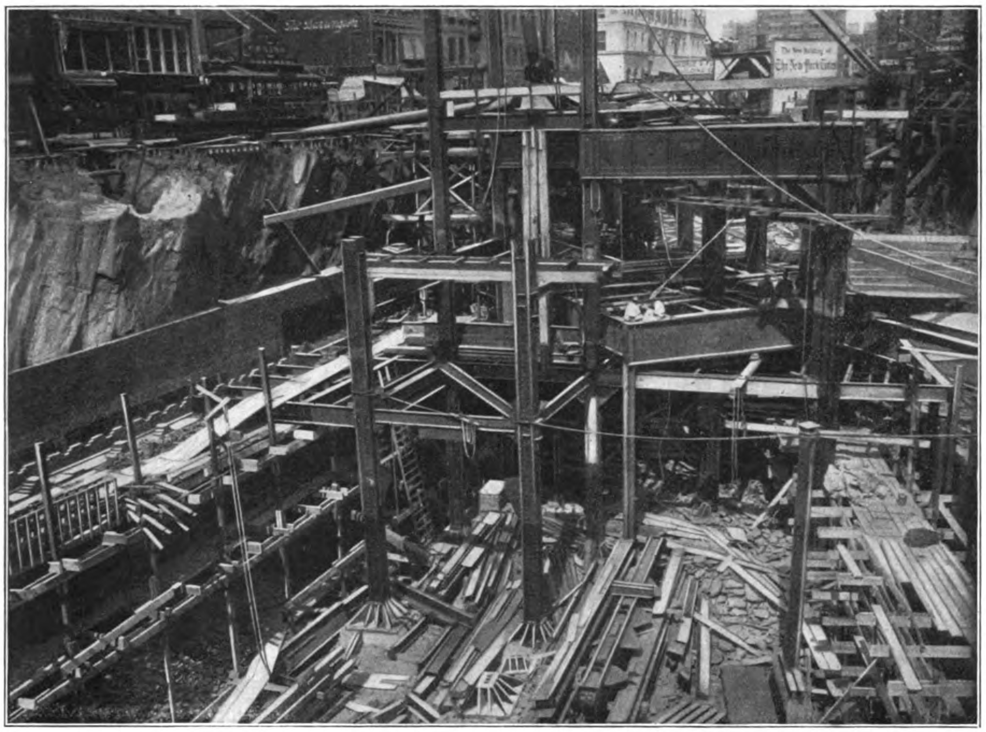


Fig. 1.—View of Substructure of Building Looking Toward the Nose at Forty-third Street; Also a Portion of the Frame Work of the Subway Shown at an Angle to that of the Building Proper.

Some Features of the New "Times" Building.

effect. At the time the picture was taken the frame work of the tower had not been completed. As previously stated in these columns, a portion of the space on the level of the basement and first cellar will be occupied by one of the stations of the Rapid Transit Subway, but the steel supports for the building are entirely independent of the underground railway construction. The distance from the level of the sidewalk to the floor of the third or last cellar is 55 feet, this subcellar being entirely below the rail level of the subway, and will be used as a pressroom.

The subway curves north from Forty-second street and cuts into the building site at a point just at the left of column B, shown on the first-floor framing plan, Fig. 3, and then continues to the right, passing up Broadway. In its course the tracks run between the columns indicated on the framing plan by letters rather than figures. It may be well to here state that Forty-second street runs parallel with the left end of the building as represented by the framing plan; Broadway runs parallel to the heavy dotted line in the foreground; Forty-third street cuts across the narrow end of the building, while Seventh in connection with the framing plan, Fig. 3, that some of the columns for the *Times* Building had to be placed out of line in order to allow for the subway, and then extra heavy girders were used to span the track space, as indicated in Fig. 2 by the dotted portion marked "girder."

Another interesting feature in connection with the building is the girder connections and the methods adopted for bracing the structure in order to withstand any wind pressure to which it may be subjected in the most severe gales. In Fig. 4 of the illustrations we show a section taken on the line B B of the framing plan and near column 7. This, it will be observed, is at a point where the building is narrowest and where both tracks of the subway pass through the substructure. The gusset plate connections at columns 8, 9, 10, 11 and 12 are similar to that shown here. The column in the center of the building at this point is designated as F, and in Fig. 5 we show an elevation of it, with the brackets which are used under the cross girders. A plan of these brackets is represented in Fig. 6, the view being taken on line A A. An idea of the girder connections at the wall columns may be gained from an inspection of Fig. 7, while in Fig. 8 is represented a section of one of the very heavy girders over the subway, and which, for example, extends from column E to column F, and another one from column F to column G. These are of such capacity and strength as to sustain the weight of the structure above, carrying in this instance near the ends columns marked 7 and 10 on the framing plan.

In the construction of the *Times* Building a great deal of attention was given to this question of wind bracing, and in order to make assurance double sure the engineering firm of Purdy & Henderson, who prepared the specifications, arranged for three distinct systems of bracing. Charles F. Berger, the engineer in charge of the work for the firm and who superintended all the arrangements for the proper installation of the strengthening bars, states that every additional safeguard rendered advisable by the narrowness of the structure was included in the plans. The first and most important of the three systems of bracing is that which pertains to the frame work of the outer walls, and the method here employed is indicated in Fig. 9 of the engravings. Between the upright supporting columns of every floor are transverse plate girders which are riveted to the upright columns with gusset plates, the construction being clearly indicated in Fig. 4 of the details. The next system or form of bracing is that shown in Fig. 10, this being used at the elevator inclosure. The illustration represents a vertical section of the framing between columns 3 and 20, while in Fig. 11 is represented the style of bracing used through the elevator shaft and extending from columns 4 to 21. In the case of Fig. 10 it will be noticed that the braces do not cross the centers of the panels, but are run from the centers of the ceiling on the side down to the centers of the supporting columns. Taking any room bordering on a partition, for example, the braces cross the upper cor-

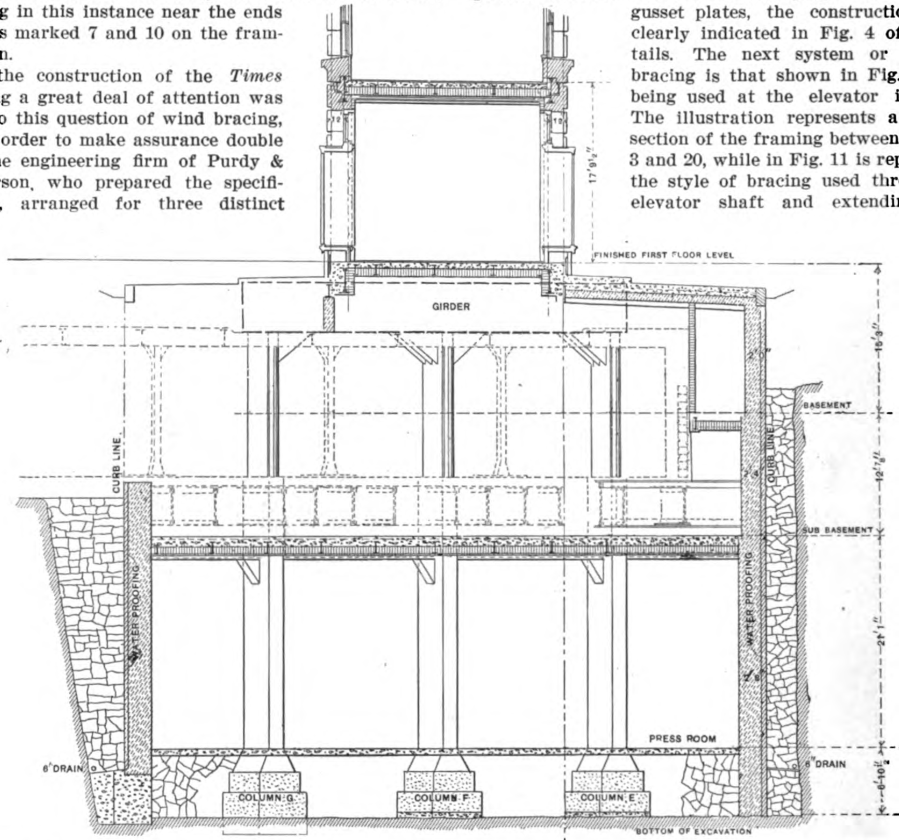


Fig. 2.—Cross Section through Substructure on Line of Columns E, F and G, and Showing, by the Dotted Portions, the Subway Construction Above the Pressroom.

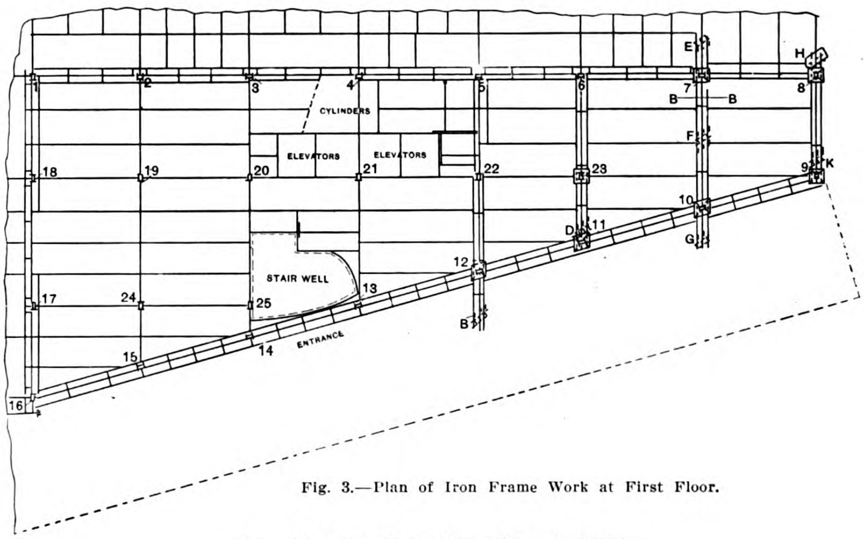


Fig. 3.—Plan of Iron Frame Work at First Floor.

Some Features of the New "Times" Building.

ners of the wall of the room that is part of the partition, thus leaving below each pair of braces enough space to cut doors wherever desired.

Another striking feature of this building is found in connection with the methods used to render the basements dry and free from dampness. Such walls as are below the level of the sidewalk are lined with water proofing made of five thicknesses of particularly heavy tarred paper laid in hot liquid asphalt. The lining is carried all the way down under the press room floor, and where it goes under the column bases, in order to insure absolute protection for the steel, are placed 20-ounce copper pans. As an additional precaution in case any water does manage to get down outside the wall, there will be a 6-inch perforated tile drain, whereby the water will be conducted to a pit and thence pumped automatically up to the sewer above. As a still further safeguard, in case the water should pass that drain, another interior drain will be placed inside the wall on the natural rock foundation. All this care, it is explained by the engineer, is for the purpose of protecting the steel against corrosion or deterioration. Furthermore, all the steel columns and girders up to the first story will be protected by incasing them in ¾ inch of Portland cement, which it is well known is particularly adapted for the purpose.

Some idea of the extent of the underground work of the building may be gathered from the fact that the area of the subcellar is about three times that of the first or ground floor, the difference being due to the fact that the excavations extend out under the sidewalks of the three streets by which the building is bounded.

The architect of the building is C. L. W. Eidlitz of 1123 Broadway, New York City, and the contractors are the George A. Fuller Company.

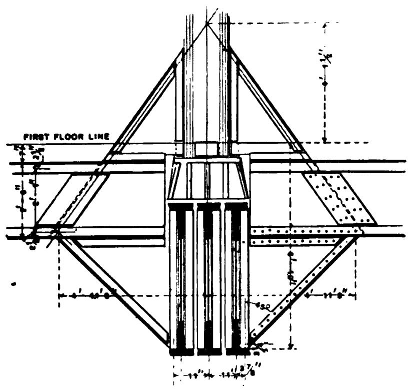


Fig. 4.—Section on Line B B of Framing Plan and Near Column " 7."

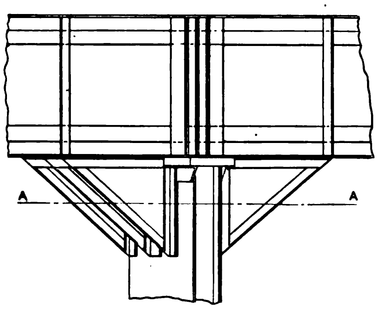


Fig. 5.—Elevation of Column " F," Showing Brackets Under Cross Girders.

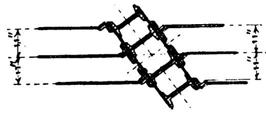


Fig. 6.—Plan on Line A A of Fig. 5.

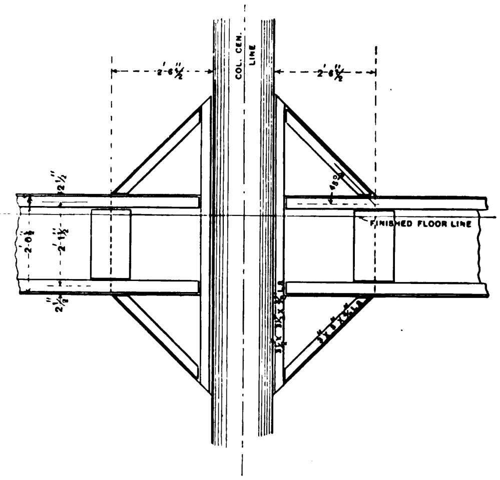


Fig. 7.—Girder Connection at Wall Columns.

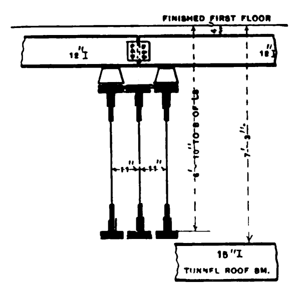


Fig. 8.—Section of Heavy Girder Over Subway.

Some Features of the New "Times" Building.

A Mississippi Houseboat.

Houseboats have been growing in popularity—to such an extent in recent years that a short description of one which appeared in the New York *Sun* not long ago may prove interesting to some of our readers. We, therefore, present the following extracts from it:

Instead of pulling the "Idler" along by means of a cable, the "Wanderer" pushes the houseboat in front of it. The stern of the "Idler" is fitted to the bow of the "Wanderer," and the two boats are held together by heavy chains, so that they steer as one craft.

The "Idler" is 120 feet long and 20 feet beam. Her lower deck contains all the cabins, staterooms, &c., of the vessel.

The advantages of not having the motive power on the houseboat are many. There is a total absence of the throbbing and jarring of machinery. There is no heat, no smoke, no smell and no room is taken by the engines which might be put to other use.

The main deck is entirely surrounded by light but strong iron guards. A great plate glass window fills the bow end of the inclosed deck, and is flanked by two doors. These lead into the saloon, a luxuriously furnished apartment, 16 x 22 feet. It is entirely finished in polished woods. Besides the large bow window there are 12 others. Writing desk, piano, tables, chairs, divans, books, pictures—all the accessories of a comfortable and up to date home are here. Electric lights make it brilliant at night, and steam heat enables the happy voyager on the "Idler" to snap his fingers at storms or cold weather. Every door, window and transom on the boat is carefully screened. From the saloon a long, narrow passage leads through the center of the boat, and from this open the six staterooms. Each of these is 6½ x 11 feet. Each has a lower berth of the size of an ordinary bed, while above is a berth of the width of a single bed.

Each room has three windows and six large transoms, electric lights, porcelain basin with hot and cold water, steam heat, a large dressing bureau, a wardrobe and one chair. Each room is completely furnished in its color; red, yellow, blue, green, pink, lavender; the color scheme is complete, even to the candlestick and the candle. The passage flanked by the staterooms ends in the dining room, a beautiful apartment 10 x 16 feet in size, with corner cupboards, where the boat's own special glass and china gleam behind the leaded panes. Back of the dining room is a cross hall opening at each end onto the outer gangway, giving air and preventing any heat or odors from the kitchen or the electric light plant from invading the forward part of the boat. A drop table here is raised

tirely. A lattice work screen divides this deck, but the forward portion is a clear 90 feet in length.

Here are hammocks, great swinging leather cushioned settees with high backs, an army of lounging chairs, rugs, cushions—all the gay paraphernalia of summer loafing. The deck has its own complement of electric lights, as well as a powerful search light.

Back of the lattice are three water tanks; one, with a capacity of 250 gallons, carries artesian water for drinking. The other two take the river water for all other purposes. On the hurricane deck, above this one, are four clinker built boats for use in fishing expeditions or in case of accident.

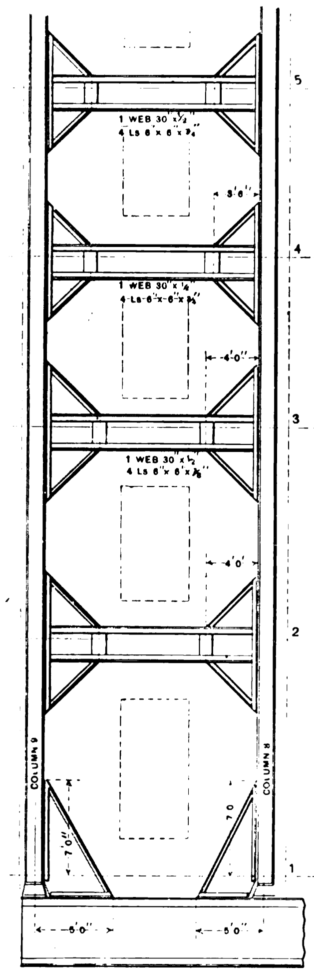


Fig. 9.—Method of Wind Bracing Employed in the Outer Walls of the Building.

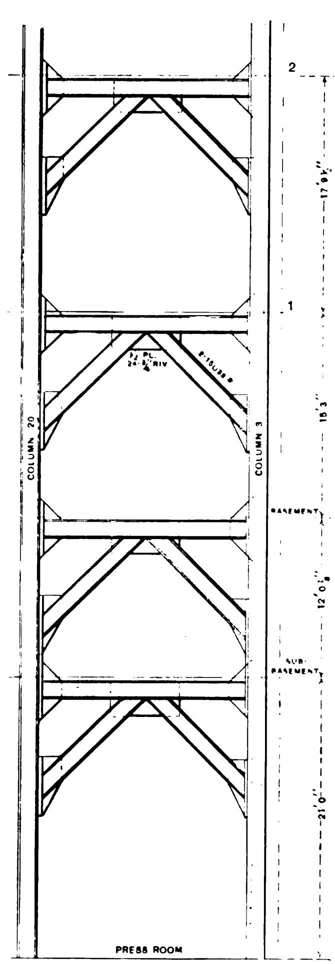


Fig. 10.—Form of Bracing Used at the Interior of the Structure.

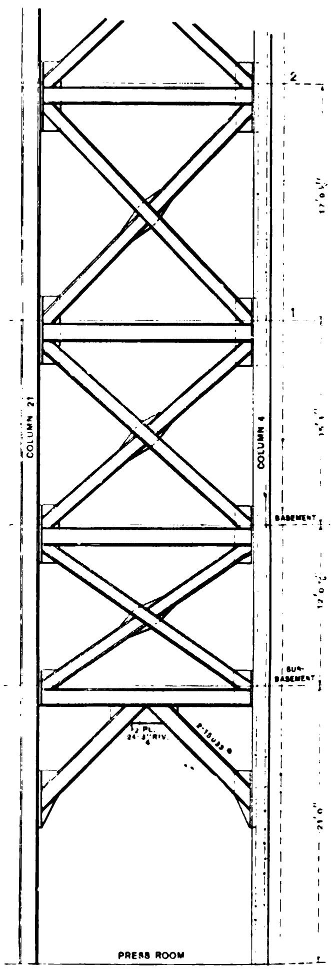


Fig. 11.—Style of Bracing Used through the Elevator Shaft, as Between Columns "4" and "21."

Some Features of the New "Times" Building.

to be used as a serving table at meal times. At the other end of this hall is a recess for the water cooler, and conveniently near by is the lemon squeezer, the ice shaver, the shaker, &c.

Beyond the cross hall on the starboard side is the aft gangway leading to the upper deck. Next comes the kitchen. Behind the kitchen is the cold storage room, next the ice house, then the men's bathroom, next the laundry, and finally the servants' bath. On the larboard side, beginning at the cross hall, are, first, a bathroom, then the electric light plant, then the servants' rooms. There are two gangways leading to the upper deck, which is entirely open at the sides, although canvas curtains may be dropped so as to shut it in, either in part or en-

The hold of the "Idler" is divided into coal cellar, store room and wine cellar.

The "Wanderer" is 100 feet in length and has a 20-foot beam. It is as white as the "Idler," and is by no means an unworthy Cinderella to go along with its lady-of-leisure sister craft.

The lower deck is inclosed. Here are the boiler and engines, the latter 10-inch bore and 6-foot stroke. On the saloon deck are two dining rooms, eight state rooms, a bath and the kitchen. Occasionally, when there is too large a party to be accommodated on the "Idler," some of the men are berthed on the "Wanderer."

The success of this boat has been very great. It is a distinctive type, suited to Western waters.

SOME LESSONS FROM THE BALTIMORE FIRE.

SINCE the destructive conflagration which wiped out the heart of the city of Baltimore numerous reports of experts have been published, all tending to show some of the important lessons from the builder's standpoint to be drawn from the great fire. Among the more recent contributions to the literature of the subject may be mentioned the document which has just been issued from the Insurance Engineering Experiment Station, and which opens with an introduction by Edward Atkinson. The latter calls attention to many of the points brought out by Prof. Charles E. Norton of the Massachusetts Institute of Technology, in charge of the station, whose observations and deductions make up the body of the report. Professor Norton made a careful study of the various buildings in the burned district which withstood to a greater or lesser extent the ravages of the flames and had a number of photographs taken of the ruins. Those which best show the condition of the various buildings, so far as the effect of the fire on the buildings is concerned, are used in the report, these including something like 20 half-tone reproductions. While the report is of too great length for presentation in full, we give extracts herewith. The result of Professor Norton's investigations leads to two general lines of suggestion for future safety of similar districts in cities now built or to be erected. He says:

The first thought that occurs to one in looking over the situation is the similarity of conditions prevailing in almost all large cities in the matter of lack of preventive measures in retarding fire spread from building to building, the lack of protection against exposure hazard. The second thought brought home by the towering remains of the tall steel frame buildings is the failure of the word "fire proof" to give any proof of its right to exist as applied to such buildings.

Unless violently scattered as by an explosion, fire spreads through such a district by the carrying of sparks, by direct contact of flame and by radiation across open spaces. Protection against all these dangers is to be sought by means of non-inflammable roof materials, shutters and wired glass, in metal or metal covered frames for all openings and roof hydrants.

Fire has apparently in this case found its way from building to building through doors and windows, and through roofs which offered but slight resistance. There were buildings in this district equipped with tinned and sheet iron shutters, and some with other protective devices, but few or none withstood the enormous volume of flame and hot gases coming from the majority of partially protected or unprotected risks. There is nothing new in this, but it is a condition so common and so dangerous as to bear repeated references.

I am satisfied that with roof hydrants having a good supply of water, and the universal use of wired glass and tinned shutters and metal covered sash in this district, the Baltimore fire of 1904 had been relatively a small conflagration. And, further, the systematic use of these three preventive appliances and sprinkler systems in other cities where they are not in use would greatly decrease the conflagration risk.

Condition of the Buildings.

The second and more interesting line of suggestion comes from a minute study of the condition of some 17 so-called "fire proof" buildings in the burned district. Some of these are untouched. Some are ruined. Some are sadly damaged. It is apparent at once that some of the buildings are intact in large part because of their having been less vigorously attacked by the fire than were the others, and for no other apparent reason. These buildings being low, surrounded by taller neighbors, or situated on street corners, seem to have been actually jumped over by the wave of combustion. There is ample evidence that the outside of these buildings did not rise in temperature to the igniting point of wood or paint. On some of them not even the skylights are broken, and an almost incredibly small amount of damage was done to their exterior. In most cases the buildings may be said to have been without a severe fire trial.

A second group of fire resisting buildings includes those which have been well described by the word "monumental." The Court House and City Hall offer examples of this type, being heavy stone buildings, with comparatively few window openings. Offering a small area for the entrance of fire and a non-inflammable exterior, these buildings withstood great heat, with no damage except from the spalling of the stone and charring of window frames. On the whole, these monumental buildings demonstrate the effectiveness of a minimum window area in reducing the danger of ignition rather than anything else. They further call attention to the frailty of stone.

The modern steel frame construction, popularly called "fire proof," was exemplified by some half score of buildings in the edge and center of the burned area. These buildings furnish material for much study, and, from their defects as here demonstrated, I have no doubt that we may learn much that will go far to prevent even the partial destruction of such buildings built in the future.

The general condition of the steel work itself is apparently good, except in a few instances. Neither the fire nor corrosion preceding the fire has sensibly affected it, if we may judge from its appearance. The "fire proof" buildings of steel frame construction show in general failures along the same lines. Where the walls are substantial and of good, red brick, they stood the test fairly well. There was some spalling, and in some cases a crumbling, but good, red bricks seem to have lived up to their earlier reputation. Where brick work of a lighter color, ornamented with terra cotta, was used, considerably more damage was noticeable, especially after the slight snow storms of the week following the fire. Stone trimmings, almost universal on the lower fronts, demonstrated the unfitness of that material beyond all question. Granite, marble, sandstone and limestone all fared about alike, even when, as near as can be ascertained, very little or no water was thrown upon it. In general, all outside wall material suffered, but brick much less than the rest.

Concrete and Steel Construction.

Where concrete floor arches and concrete-steel construction received the full force of the fire it appears to have stood well, distinctly better than the terra cotta. The reasons, I believe, are these: First, because the concrete and steel expand at sensibly the same rate, and hence when heated do not subject one another to stress, but terra cotta usually expands about twice as fast with increase in temperature as steel, and hence the partitions and floor arches soon become too large to be contained by the steel members which under ordinary temperature properly inclose them. Under this condition the partition must buckle, and the segmental arches must lift and break the bonds, crushing at the same time the lower surface member of the tiles. Especially in the Calvert Building I found evidence which leads me to believe that not an excessive temperature but the differential expansion under a moderate high temperature of the terra cotta of the top and bottom members and of the inclosing steel is responsible for the general failure of the terra cotta partitions, beam covering and floor arches.

Further examination of the expansion phenomena points to them as the main source of distress to the whole beam and post covering, floor, arches and partitions. Most of the fallen terra cotta partitions and the floor blocks were still hard and had a clear ring when struck, though cracked and broken. There was no evidence of any such temperature as that at which the terra cotta had been baked originally, and the material of the blocks could not have been altered chemically. It will be readily understood that the thin walled hollow tiles would become heated upon one side much more quickly than would the equivalent area of a solid partition.

There is no evidence that the tall steel building was subjected to an unusually severe test. While it must be admitted that not enough concrete received the full effect of the fire to make the test a perfectly complete one, when I add to this the experience of several years in examining the action of fire upon concrete, I am convinced that had the floors of the Continental Trust or the Calvert Building been of any one of the better class of concrete types, and had the beams and posts been incased in 4-inch coatings of sound concrete, then renewal would have required little but plastering.

Little difference in the action of the fire on stone concrete and cinder concrete could be noted; the burning of the bits of coal in poor cinder concrete is often balanced by the splitting of the stones in the stone concrete. I never have been able to see that in the long run either stood fire better or worse than the other. However, owing to its density, the stone concrete takes longer to heat through. When brick or terra cotta is heated no chemical action occurs, but when concrete is carried up to about 1000 degrees F. its surface becomes decomposed, dehydration occurs and water is driven off. This process takes a relatively great amount of heat. It would take about as much heat to drive the water out of this outer ¼ inch of the concrete partition as it would to raise that ¼ inch to 1000 degrees F. Now a second action begins. After dehydration the concrete is much improved as a non-conductor, and yet through this layer of nonconducting material must pass all the heat to dehydrate and raise the temperature of the layers below, a process which cannot proceed with great speed.

Much has been said about the uncertainty of concrete. The value of concrete in theory is often admitted by those who consider it unwise to use it because of the difficulty of getting the materials properly proportioned, mixed and placed in position. I have never been able to see the force of this. It is quite as easy to lay sound concrete as it is to put somewhat irregular and confessedly brittle blocks of terra cotta into place with proper bonding. The main difference seems to be that poor concrete reveals its weakness when it falls on "pulling the centers," while terra cotta is likely to be strong enough to hold itself in position even when it can do little more. Further, a prolonged search reveals only occasional evidence of temperatures as high as 2400 degrees F., and no instance could be found of real fusion of terra cotta or brick in them. Occasional evidences of temperature of 2200 degrees F. were found, but in general there was ample evidence that the temperature of the fire in these buildings had never in most places risen above 1700 degrees F. This is likely to happen in almost any office building where little care is taken as to the nature of its contents, and must be provided for if these buildings are to be proof against the combustion of their own contents.

It seems apparent that, with care, steel frame buildings can be so constructed as to stand the destruction of their contents without injury to the steel, and probably without danger to the protecting material or floor arches; that, with shutters and wired glass, the burning of more combustible neighbors may be expected to cause little permanent injury to the structure proper; and that a district composed wholly of such buildings would be reasonably immune from danger of conflagration.

The Pantry as an Adjunct to the Kitchen.

In planning a home too much care cannot be given to the pantry, for here it is many unnecessary steps may be taken, many false movements made, if the place is not convenient in every detail. In most homes it is here the baking is prepared, for unless it is possible to prepare many dishes on a broad shelf in the pantry, it means that all the ingredients used must be carried from the pantry out into the kitchen to the table, and back again into the pantry when the cooking is finished.

In a most convenient pantry there is a broad shelf, sufficiently large to hold a wide bake board, this shelf being at right angles with the shelves on which the supplies are placed, and it is possible to stand in one place while preparing a baking, and, at the most, take but a step or two to the farthest end of the shelves. In front of this shelf is a large window which gives perfect light with which to work, without straining the eyes, says a writer in a recent issue of the *Housekeeper*. All up and down the sides of this window small brass hooks are fastened into the wood work, and on each of these hooks is placed one utensil used in cookery. When one is at work it is possible to lift any one article without disturbing the rest, and as each article is always kept on its own screw it becomes almost a mechanical movement to reach for any article that is needed.

On the wall, at the right hand side of the bake board, is a knife rack, and all around the wood work of the door, as well as on the back of the door, more brass screws are fastened, and on these sauce pans, baking pans and larger utensils are hung, each one on a hook by itself.

The worker in this kitchen believes in saving work as much as possible, so papers are kept at hand all the time to use in various ways, and on the upper part of the pantry door is fastened a receptacle for the papers. It is very simple in construction. An oblong piece of denim is turned in on all the edges, a selvage edge being used for the top of the bag. The denim is then laid against the back of a door and tacked into place with large headed tacks. Another line of tacks down the middle divides it into two compartments, and in one side newspapers are kept, while in the other are kept paper bags of all sizes and pieces of clean white wrapping paper. The linings of all cracker and cake boxes are saved, for these may be used underneath a flat iron, as a lining for cake tins and for wrapping the various parts of a luncheon, so that one article of food will not be contaminated by the rest. There are many other uses to which these box linings may be put.

A large bake board is a home made affair, and is most convenient, since it is sufficiently large to hold all cups, bowls, and even a pan placed on the edge, so that everything is kept on the board and the shelf or table underneath is not soiled.

This bake board is made of a single piece of board 19 x 30 inches—white pine. A long cleat was placed across the back, making a kind of ledge, which holds the utensils on the board, preventing them from falling off. Two shorter cleats were nailed to the sides, and these cleats slope down toward the front edge of the board, where they end almost even with it.

A splendid idea for pantry shelves is to use two coats of white paint—ordinary paint—and then a third, finishing coat, of white enamel. Wash the shelves with cold water as soon as the enamel dries, and then it will harden quickly. Over this place no oil cloth nor papers, but leave the shelves bare and notice the improvement; since there are no covers under which crumbs can collect, there is no encouragement for mice, the enamel is easily wiped off with a damp cloth, and with such a finish it is never necessary to clean the entire pantry at once—it keeps clean all the time.

Another Co-operative Housekeeping Scheme.

Every once in a while some genius evolves a scheme for housekeeping on the co-operative plan, the idea being to eliminate many of the objections which can be urged against the operation of individual establishments. The scene of the latest scheme of this nature is laid in Bergen, N. J., where on a single block are to be erected 100 eight-room houses, with electric lights, steam heat, hot water supply and a central pavilion in which will be a large dining room run by a caterer, a smoking room and a roof garden with weekly music. The houses are to be two stories in hight, the first floor to contain a parlor, a library in the front, a large reception hall, and a dining room and kitchen in the rear, while on the second floor will be four sleeping rooms and a tiled bathroom. At the back of the house, or the center of the block, will be a three-story pavilion of steel and glass, the basement of which will contain boilers for steam heating and dynamos for lighting. The first floor will have a large dining room with kitchen, the second floor a large reception hall, smoking room for gentlemen and a ladies' room, while the third floor will contain offices for the association which will own the property, and the roof will be turned into a garden, with music weekly.

The claim is made that all this can be furnished at moderate cost to each family, not exceeding $35 per month, including rent, interest, sinking fund and all other expenses. While the houses are building a small sum will be paid by each stockholder for the creation of a sinking fund. Any owner will be entitled to sublet his premises upon submitting the name of the applicant to the officers of the association and receiving their approval.

The idea as above outlined is that of C. J. Chambers of 49 Astor place.

Plate Glass in Imitation of Marble.

Plate glass made in imitation of Carrara marble, and also in colors other than this famous white, has been turned out by the Pittsburgh Plate Glass Company in an experimental way for some months, and Pittsburgh, it is said, has been the first city to use this new product in place of marble for decorative work in interiors of buildings. The glass is made as thick as marble slabs, such as are used for counters and lavatory walls. The fact that the material is being used in a building in Pittsburgh has become known to architects and builders, and recently visits to a new terra cotta building in Diamond street, built by Philip Flinn, have been frequent. It is claimed for the glass that it is more durable than marble; cannot stain; will withstand heat and cold better; is stronger and more perfect in form than marble, while the cost is much less. Builders are seeing ahead a new market for Pittsburgh products, the limits of which are hard to define.

COMPETITION IN "DOUBLE" OR "TWIN" HOUSES.

SECOND-PRIZE DESIGN.

ACCORDING to the announcement made in our last issue, the second prize in the competition in "double" or "twin" houses was awarded to William H. Harvey of 311 Main street, Worcester, Mass., and we take pleasure in presenting herewith the drawings submitted by him, together with the specifications and detailed estimate of cost.

Specifications.

The specifications furnished by the author are to the following effect:

Excavations.—Excavate under the entire main building as indicated by foundation and cellar plan, and use the excavated materials about the building for grading.

Foundations.—To be built according to plan, with good building stone from local stone quarry. To be laid up dry, well bonded together, and pointed on inside with lime mortar, finished with a coat of lime whitewash over all stone and brick work in cellar. Place bed stones for all piers, posts and chimneys of good, large, flat stones.

Concreting.—The cellar bottom is to be concreted in best manner, with tar and gravel concrete.

Brick Work.—The underpinning, walls, chimneys and ash pit to be built according to plans, of good merchantable hard burned brick, laid in lime and sand mortar. Underpinning wall to be laid up with air space in center. Chimney flues to be plastered from bottom to top, and outside from cellar to roof boards, cap as shown. Place thimbles in cellar and for all rooms above. Iron cleanout doors to be in each chimney. Provide for and build fire places as shown, line with pressed brick, set iron damper in each, lay hearths with tile.

Iron Work.—Provide iron posts for piazza supports in ground, also in cellar under main girder. Cover all exposed wood in ash pit with tin.

Lathing and Plastering.—Lath with good spruce laths and cover same with one good coat of lime and hair mortar, proper proportions, and well applied. Finish with a good skim coat, all plastering run to floor. This applies to all walls and ceilings of two stories.

Carpenter Work.

The frame and partitions to be of good spruce as per sizes indicated on plans and sections. Put 8 x 8 inch girders under main partitions first floor, double floor joist running same way as partitions. All partitions to have caps, and all floors bridged. Provide all needful grounds and beads.

Boarding.—The entire outside of building, including all roofs, to be covered with ⅞-inch matched spruce, well laid and nailed. Underflooring square edged hemlock well nailed. (Attic unfinished.)

Upper Floors.—Where not otherwise provided for, to be of good spruce flooring, well laid and nailed. Lay rift grain matched North Carolina pine floors in kitchens, rear halls, pantries, bathrooms, dining rooms and front halls, all well laid and blind nailed.

Clapboarding.—On first-story walls laid with first quality 5-inch spruce clapboards, laid 3½ inches to weather, laid in best manner.

Shingles.—On second-story walls laid with first quality clear butt cedar shingles, laid 4½ inches to weather. Do all required flashing with tin.

On roofs to be the best cedar shingles laid not over 5 inches to weather, over a layer of tar paper. All well laid, flashed and nailed. Hips overlaid. Provide lead flashing for chimneys.

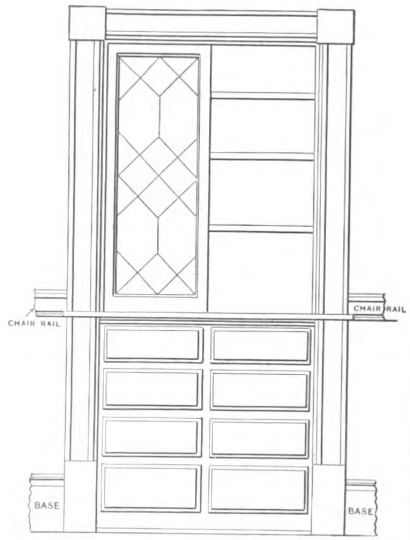
Outside Finish

To be wrought as per details, from good white pine, well seasoned and of good quality. All moldings to be stock patterns. Construct porches as shown. Ceilings matched and beaded North Carolina pine. Floors 1⅛-inch clear spruce. Columns of front piazza turned work. Balustrades and railings as shown and detailed.

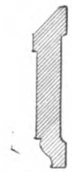
Window Frames.—Constructed of style shown and in the usual manner, all stock patterns. Above cellar fitted

Front Elevation.—Scale, ⅛ Inch to the Foot.

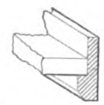
Competition in "Double" or "Twin" Houses.—Second-Prize Design.—William H. Harvey, Architect, 311 Main Street, Worcester, Mass.



Elevation of China Closet.—Scale, ½ Inch to the Foot.

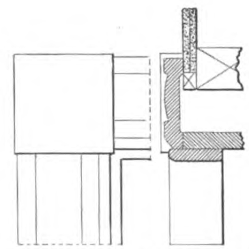


Section of Chair Rail.—Scale, 3 Inches to the Foot.

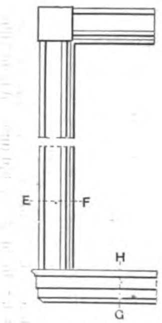


Detail of Shelf Cleats. — Scale, 1½ Inches to the Foot.

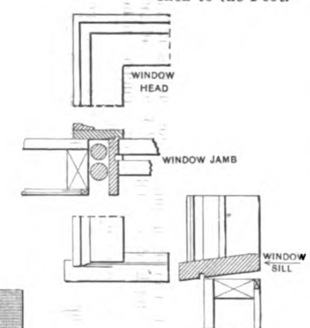
Base.—Scale, 1½ Inches to the Foot.



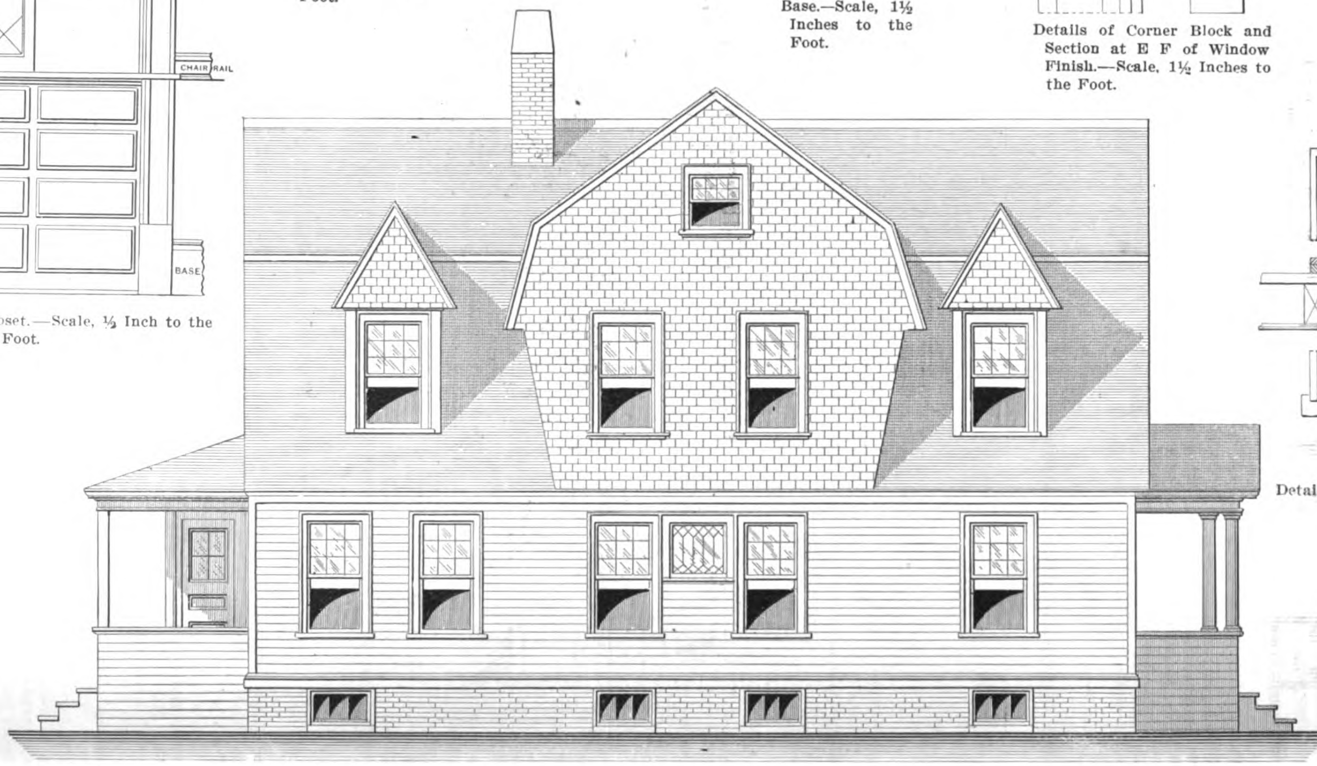
Details of Corner Block and Section at E F of Window Finish.—Scale, 1½ Inches to the Foot.



Elevation of Window Finish.—Scale, ½ Inch to the Foot.



Details of Window Frame.—Scale, ¾ Inch to the Foot.



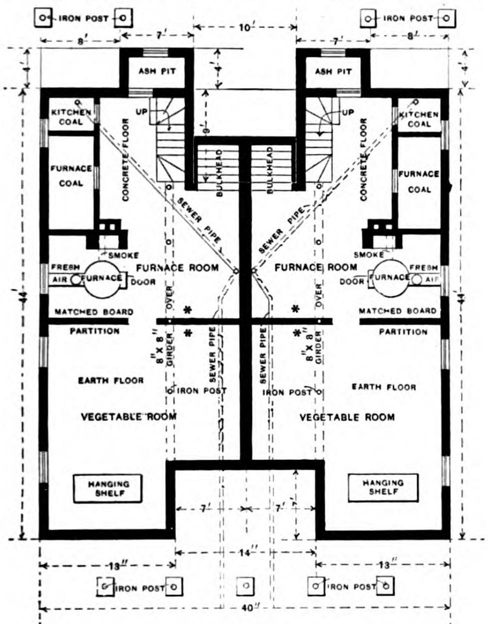
Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

Competition in "Double" or "Twin" Houses.—Second-Prize Design.—Elevation and Miscellaneous Details.

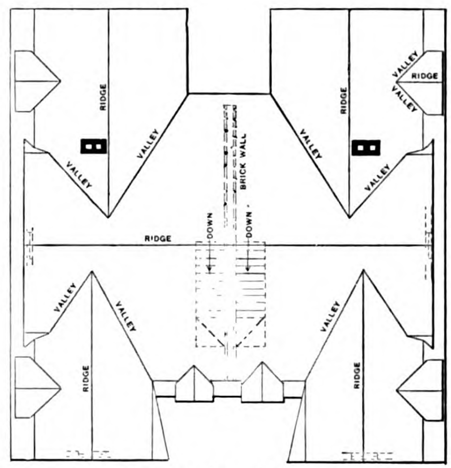
with 1⅜-inch molded sash, glazed with first-quality double thick glass in large lights, single thick in small lights, and fitted with one-half rolling double shutter blinds. All in proper manner. All of the sliding sash weighted. Cellar frames of plank, with 1¼-inch sashes glazed with common glass.

Interior Finish.

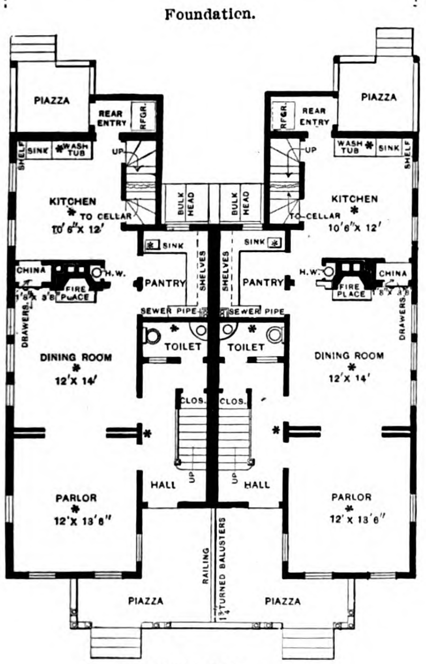
To be made from first-quality North Carolina pine throughout, and put up after the plastering is dry. All



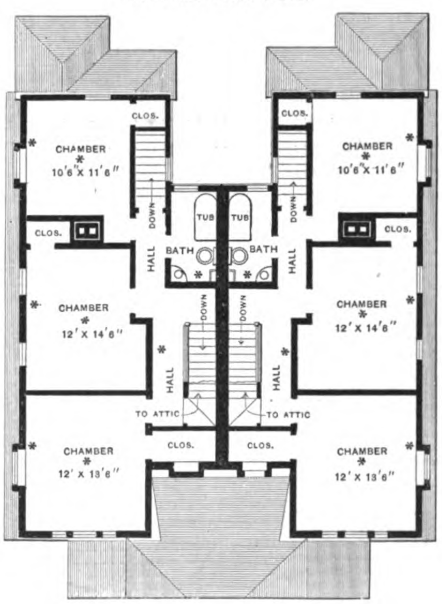
Foundation.



Attic and Roof Plans.



First Floor.



Second Floor.

Competition in "Double" or "Twin" Houses.—Second-Prize Design.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

to be as per details, or of stock patterns where not detailed.

Doors 1½ inches thick as per detail, same kind of wood as finish. Fit up pantries as shown and with shelving inclosed with sheathing doors; provide drawers. China closet fitted with the usual shelves and case of drawers, glass panel doors, as per detail. Fit up closets with shelves, drawers and sash front of shelves, glazed with good glass. Fit up sink with drip boards and one case of drawers. Fit up wash trays, as shown. Do all cutting and fitting for plumber and other craftsmen. Make cellar partitions of matched spruce on 2 x 4 studs. Place hanging shelves where shown. All closets on each floor to have shelves and cleats with hooks.

Wainscot.—Walls of the kitchens, bathrooms, rear halls, and cap with mold, as per details.

Build front stairs as per plan and details, landing post 4 x 4 inches, turned. Back stairs box flight made of birch. Cellar stairs made of good spruce. All stairs constructed in best manner on three 2-inch plank stringers.

Base in all rooms ⅞ x 8 inches with 2-inch base mold. Thresholds of hard wood throughout.

Cellar doors made from pine, common cleated. Coal bins made from matched spruce; put in slides to each.

Mantels to be placed at fire places. Allow for each, all set in place, $20.

Hardware.—Contractor to provide all required nails, spikes, screws, sash cords, window weights, pulleys, as may be needed. Contractor to allow for hardware not mentioned above for the general trim $75.

Painting.

Paint outside wood work (except shingles) two coats of lead and oil (trimmings lemon yellow and clapboards moss green). Shingles on side walls to have one coat of oil stain. Putty stop all of the painted work properly. The interior to be finished to show the grain of wood, one coat of stain, one coat of shellac, one coat of dead-lac. Putty all nail holes. Clean all wood before finishing and make a neat job throughout. The North Carolina pine floors and thresholds to have a coat of grain sealer, finished with two coats of floor wax well rubbed in.

Plumbing.

To consist of the fixtures shown on plans in each tenement, all properly plumbed and connected with the street sewer ready for use, and to be in each tenement one steel clad copper bathtub, two wash basins, two siphon water closets, one two-part wash tray, one kitchen sink, one hot water boiler, one refrigerator waste. All trapped into main waste to sewer and supplied with hot and cold water. The cold water via iron pipe where not exposed to view, and where exposed through brass pipe. The hot water pipes and all other exposed water supply pipes to be of brass. The trimmings to the several fixtures to be the best nickel plated work. The hot water boilers supplied through a copper lined wood tank in attic, and tank from the street main. Water meter to be provided and connected with street main, and cold water run to all fixtures. Provide and place two sill cocks where directed.

Place refrigerator wastes and drain outside of building. Each tenement plumbed separately.

It is to be understood that all the work is to be done agreeable to the local plumbing ordinances.

Gas Piping.—Pipe each tenement separately for gas in the best manner, with outlets where shown on plans, according to rules and regulations of local gas works.

Heating.

Each tenement to be heated separately by a hot air furnace of ample dimensions for the required rooms to be heated, fitted in a first-class manner, with all required fresh air and heat conveying pipes necessary to heat the several rooms satisfactorily in the coldest weather. The supply pipes to be run to all rooms and halls, excepting rear halls, kitchens and pantries.

Provide for and set refrigerators in a neat manner, and leave the work when finished ready for use.

Detailed Estimate of Cost.

The estimate of cost in detail, as furnished by the author, is as follows:

MASON WORK.

Cellar—Excavating	$50.60
Foundation walls	113.00
Grading	25.00
Concreting	41.00
Total	$229.60
Brick underpinning, walls and chimneys	425.00
Fire places	33.00
Tile fire places	5.60
Lathing and plastering	250.00
Painting and whitewashing	20.00
Iron doors and thimbles	12.00
Total	$745.60

IRON AND TIN WORK.

Iron tubing for posts	$17.00
Metal ceiling ash pits	5.00
Tinning and flashing	30.00
Total	$52.00

CARPENTER WORK.

Spruce framing timber	$280.00
⅞-inch matched spruce	134.86
⅞-inch hemlock	72.00
Grounds and beads	15.00
Sliding door sheathing	12.00
Cellar partitions	20.00
Cellar doors and bulkhead	17.00
Sheathing paper	20.00
Rear piazza floors and finish	16.00
Roof shingles	130.00
Side shingles	48.00
Clapboards	70.00
Outside finish	42.00
Front piazzas floors and finish	82.64
Outside steps	20.00
Cellar frames and sash	15.00
Window frames	103.00
Window sash and glass	89.00
Window weights and cords	34.00
Window blinds	44.00
Outside frames	12.00
Outside doors	22.00
Total	$1,298.50

INTERIOR WORK.

Top floors (soft)	$82.23
Top floors (hard)	35.00
Partition windows	6.00
Door finish	88.80
Window finish	34.00
Interior doors	121.00
Base and mold	52.27
Sheathing and cap	45.00
Pantry and china closets	40.00
Closets	10.00
Front and attic stairs	45.00
Rear and cellar stairs	25.00
Mantels	40.00
Cutting for mchs	20.00
Nails	40.00
Total	$684.30

MISCELLANEOUS.

Electric work	$18.00
Hardware allowance	75.00
Painting	250.00
Plumbing	520.00
Gas piping	26.00
Sewer connections	35.00
Water meter connections	36.00
Gas meter connections	30.00
Heating apparatus	300.00
Carpenter labor	900.00
Total	$2,190.00

RECAPITULATION.

Mason work	$229.60
Brick work, plastering, &c	745.60
Iron and tin work	52.00
Carpenter work	1,298.50
Interior work	684.30
Miscellaneous	2,190.00
Total cost	$5,200.00

The builder's certificate was signed by John Holden of 44 Central street, Worcester, Mass.

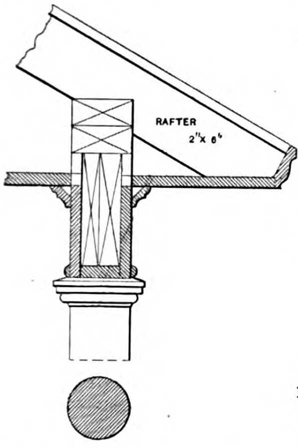
Learning Modeling.

Most of the modeling done in the tin shops and sheet metal working establishments of a quarter of a century ago was done with the rasing hammer, but since that day a wonderful change has been experienced by the trade in the character of the metal which is furnished to be worked and the demand for artistic shapes which the architect requires in his cornices and structural sheet metal work. There is less difficulty in producing relief figures of ornamental character in sheet metal than those who have never attempted it might imagine. The work is simply another form of handicraft which can be readily mastered under instruction, and the Acorn Modeling School, 1022 East Washington street, Springfield, Ill., have planned to teach the art of modeling figures and preparation of dies for stamping ornamental sheet metal forms by mail.

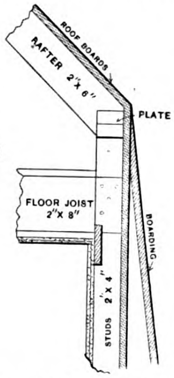
They inform us that they have in their employ French and German artists who are thoroughly proficient, not only in the art of design, but in producing dies which are absolutely true and guaranteed not to destroy the metal. They invite correspondence from those who desire to acquire this art and state that they furnish each pupil with a modeling outfit, some modeling wax and a plaster cast to work from free of charge when he enters for a course of instruction by paying the required fee. The student may use his own time in progressing with the work and the lessons are carried along systematically until he is thoroughly proficient. The school is run in connection with the Acorn Modeling Works, who have made a specialty of ceiling dies, models for classic and modern statuary and busts, composition ornaments, staff ornaments, zinc castings, plaster dies and cast iron dies for some of the leading manufacturers of artistic sheet metal work for architectural purposes.

Lead Roofs.

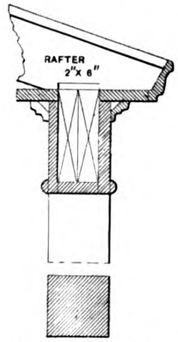
For many classes of roof, lead is suitable, says the *Metal Industry*, and in England and on the Continent it has been used for a long time. Some beautiful examples of architectural designs in lead now exist in England, but in our own country the use of lead does not seem to have made much headway. A recent writer makes the following comments on the subject: He says that in a steep pitch roof, and which shows conspicuously against the sky, lead is hardly suitable, unless the building is lofty and monumental. When the roof is flattish and not conspicuous, lead is undoubtedly the best material for the purpose. It is particularly suited for roofs of a highly decorated nature. Special devices are used to keep the lead from creeping. In order that the lead should resist the action of the atmosphere as much as possible it is best to make the sheet from scrap, which gives a metal better suited for this purpose. Pure lead soon becomes covered with a white coating, but lead which contains a small amount of tin or antimony does not corrode as readily. Scrap lead is sure to contain considerable of these metals and so gives a better material than the pure metal.



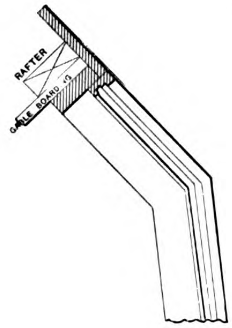
Detail of Cornice and Column of Front Piazza.—Scale, ¾ Inch to the Foot.

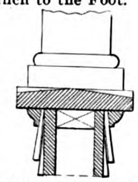


Detail Showing Construction of Gambrel Roof.—Scale, ½ Inch to the Foot.

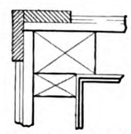


Detail of Rear Piazza Post and Column.—Scale, ¾ Inch to the Foot.

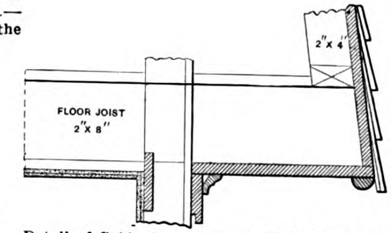




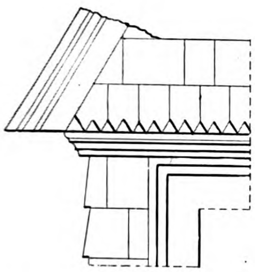
Front Piazza Construction.—Scale, ¾ Inch to the Foot.



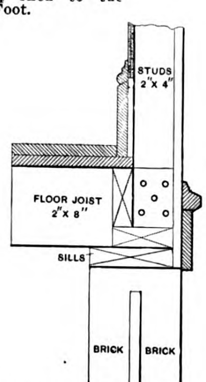
Section through Corner Boards. —Scale, ¾ Inch to the Foot.



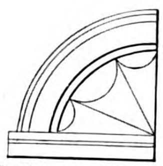
Detail of Gable Finish.—Scale, ¾ Inch to the Foot.



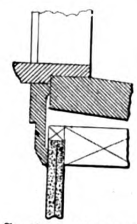
Dormer Window Cornice.—Scale, ¾ Inch to the Foot.



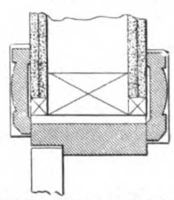
Detail of Water Table.— Scale, ¾ Inch to the Foot.



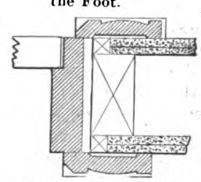
Portion of Dormer Window.—Scale, ½ Inch to the Foot.



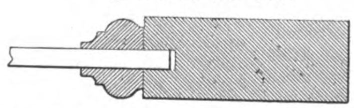
Section through G H of Window Finish Shown on Previous Page.—Scale, 1½ Inches to the Foot.



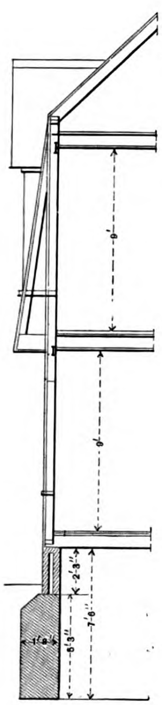
Section through A B of Door Finish. — Scale, 1½ Inches to the Foot.



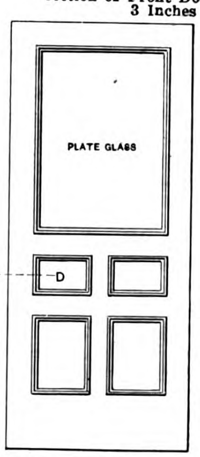
Section through C D of Door Finish.



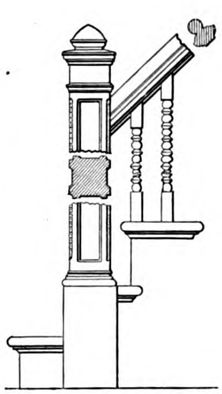
Section of Front Door on Line C D.—Scale, 3 Inches to the Foot.



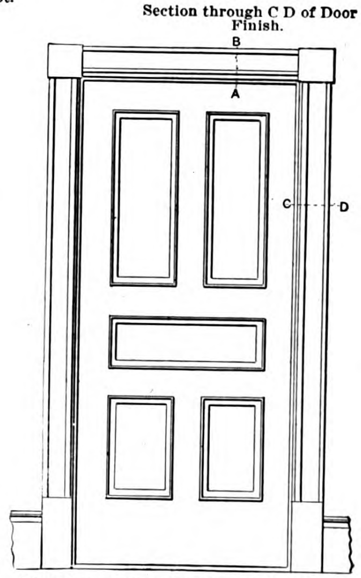
Section Showing Hight of Stories.—Scale, ⅛ Inch to the Foot.



Elevation of Front Door. Scale, ¾ Inch to the Foot.



Detail of Front Stairs. Scale, ½ Inch to the Foot.



Elevation of Door Finish.—Scale, ½ Inch to the Foot.

Competition in "Double" or "Twin" Houses.—Second-Prize Design.—Miscellaneous Constructive Details.

Wood for Making Patterns.

In a recent discussion of the different varieties of wood adapted to the making of patterns, M. J. Golden, Professor of Applied Mechanics at Purdue University, Lafayette, Ind., brought out some very important points to be considered by the pattern maker, and as the subject is one in which a large class among our readers are interested, we take the space to present the following extracts:

A suitable wood for pattern making must be cheap, of such a nature that it can be shaped or formed easily, have a fine grain and a fair degree of strength. The requisite of cheapness throws out of the list, except for special and restricted use, some woods, such as cherry and mahogany, from which excellent patterns may be made. A study of the microscopic structure of the wood will show why certain classes are not and cannot be suitable for pattern making. For instance, take oak and pine, which are very much alike in cost and the ease with which they may be shaped. Oak, however, is not at all suitable for patterns, while white pine, though weaker, is much to be preferred, and is used more than all other woods. Some knowledge of the structure and growth of the two will help us to understand this. Upon examination we find that the pine has a texture that is smooth and even, while the oak has a very great variation in the wood that formed in the spring of the year and in that which formed in summer. The spring growth is open and contains many holes that follow the direction of the grain, while the summer wood is dense and hard. In addition, in the oak we find the hard shell like plates that form the silver grain comparatively large and numerous, while in pine these plates are hardly distinguishable at all.

One requisite of a good pattern wood is that it must be of such a nature that the grain can be filled with shellac varnish or some corresponding medium, to protect the pattern from the action of moisture in the molding sand. It is evident that the wood of the oak will serve this purpose but poorly and that pine would be much better.

The wood of the oak is made up practically of two different kinds of elements, one kind called the vessel. This is shaped like a tube, which may and often does extend the whole length of the tree trunk. The structure of this vessel is much like that of a wire wound garden hose, except that the ridges are on the inside of the walls of the tube. These ridges serve to stiffen and strengthen the tube. The vessel is for carrying sap from the roots to the branches and leaves. This kind of element forms larger openings, and the vessels have grouped around them elements of the second kind. These are comparatively short in length, and much stronger in the walls. The ends of these shorter members overlap and dovetail together, the shorter members being called fibers and serve as a mechanical support to the vessels. The vessels and groups of fibers that surround and stiffen them are together called a bundle.

There is still another kind of tissue in the oak that forms the silver grain. This is of the same kind that is found in pith, and it occurs in flat plates that connect the outer and inner parts, growing from the heart outward. One of these plates is called the medullary ray and the wood between two of them is a bundle.

As the tree grows older the tissue in the medullary ray hardens very much, and as it does not change its form during seasoning, it has considerable influence in causing the wood to warp. This greater tendency to warp on the part of the oak is another point against it for pattern purposes. During the growth of the tree the food matter is taken up by the roots and is carried up to the leaves through the vessels, and there it is brought in contact with the air that it takes in through openings in the surface of the leaves. The sap is then changed into food matter for the tree. The principal portion of the food matter comes from the air, and is carried back with the sap from the leaves to the outer part of the branches and trunk, where it is used in building new wood and other tissue. The medullary rays help to carry food matter to the inner growing parts of the tree.

Pine wood differs from oak in that it has only one kind of element instead of two. In place of the vessels and fibers there is a kind of element called tracheide that serves the purpose of both. The walls of this tracheide have small openings through them from one to another, so that the sap may be carried from the roots to the leaves and back again to the growing tissue. In spring when the flow of sap is greatest, the elements that are formed from the growing part of the oak are very large and have thin walls, while during the summer the walls are thicker and stronger and the elements correspondingly smaller. The summer wood of oak is consequently harder and more fine in grain and thus better adapted for pattern making. The difference in the growth in pine at different seasons of the year is much less than in oak, and so, of course, the wood, as a whole, is much more even in grain. When this and the fact that there is only one kind of element in pine are taken into consideration, it is evident that the pine is better suited for pattern work than the oak.

When the pattern maker comes to use these two woods he finds the oak having clearly marked annual rings in which there are side by side wood tissue that is very hard and dense from the summer wood and tissue that is very light and open from the spring growth, so that it is practically impossible to get a surface that will resist the action of moisture in the molding sand or even a surface sufficiently smooth to leave a good impression in the mold. Then, too, the oak pattern would have a constant tendency to warp because of the moisture taken in from the open vessels of the spring wood.

The pine, on the contrary, has not much difference in the tissue that goes to make up its spring and summer annual rings, these rings being distinguishable more on account of a slight change in color in some parts than on account of the size of the elements. The elements in all parts of the pine are thin and light enough so that the wood is easily shaped and yet the elements are small enough to make protection of them by varnish an easy matter, on account of the fact that they are easily filled. These peculiarities of structure adapt the pine especially to the needs of the pattern maker, its principal drawback being because of the lightness of its tissue and the ease with which it is bruised.

Architects in Egypt.

In ancient Egypt the architect was socially superior to the painter, and even to the sculptor. His uncontested pre-eminence is to be explained by the secondary *rôle* which sculpture and painting had to fill, says a writer in an English exchange. Those arts were cultivated in Egypt with sustained persistence; rare abilities were lavished upon them, and we may even say that masterpieces were produced. But plastic images were less admired in themselves; their intrinsic beauty was less keenly appreciated in consequence of the practical, religious or funerary office which they had to fulfill. Statues and pictures were always means to an end; neither of them ever became ends in themselves, as they were in Greek works, whose final object was to elevate the mind and to afford to the intellectual side of man that peculiar enjoyment which we call æsthetic pleasure. Such conditions being given, it is easy to understand how painters and sculptors were subordinate to architects.

It was to the latter that the most pious and at the same time the most magnificent of kings confided all his resources, and his example was followed by his wealthy subjects. It was to him that every one employed had to look as the final disposer; the other artists were no more than agents and translators of a thought which was grasped in its entirety by the architect alone. His work, embellished with all the graces of a decoration which reckoned neither time nor materials, formed a homogeneous and well balanced whole. It was in inventing, in bringing to perfection and in contemplating such a work that the Egyptian mind gave itself up most completely to love for beauty. If we take an Egyptian building in its unity, or the product of a combined effort on the part of a crowd of artists laboring under the directing will of an architect, we shall no longer feel surprised at the time demanded by the study of his art in Egypt.

CONSTRUCTING AN ELLIPTICAL STAIRWAY.

BY MORRIS WILLIAMS.

THE articles which are to follow have been prepared for the purpose of demonstrating the principles underlying the construction of hand rails. the lines which are essential to the devolopment of the face mold and to the finding of the bevels to twist the wreaths. A better problem than a stairway, elliptical in plan, could not be selected for the purpose of thoroughly demonstrating the fundamental principles of the tangent system of hand railing, nor could there be a problem better adapted to the requirements of the young, ambitious mechanic to enable him to understand the compound construction of all that he is ever likely to be called upon to know of the theory of the science. It is, perhaps, not too much to say that to know how to scientifically construct a stairway having an elliptical plan is to be familiar with all that is known in the field of geometrical stairway construction. It has been said that one of the prime requisites to success in every department of study is to have faith in ourselves—that is, to possess self confidence. On this rock the student should firmly stand and heroically defy apparently insurmountable intricacies, never forgetting that he has the faculties and much better opportunities for achieving success in this branch of his craft than had many of his predecessors. There is a great deal of truth in the old saying that a man may reach to the stars if he will only stretch out his arm.

Surely, every carpenter ought to be able to stretch out his arm to the comparatively insignificant hight that is called for by the tangent system of hand railing. As we have stated in previous communications to this journal, it needs the knowledge of but few geometrical problems, many of which are doubtless already known to most carpenters, in order to apply the principles of hand railing. The mechanic who can cut his timbers for a hip and valley roof, and do it intelligently, is already in possession of all the technical knowledge that the most complicated piece of hand railing requires for its execution. I mean to affirm that in these two branches of our trade, hand railing and roof cutting, the technical knowledge is absolutely identical. There is not a single problem in hand railing that is not solved in roof cutting, and vice versa. This is probably news to most of the experts in hand railing, and surely to those timid ones who have shrunk from the study of hand railing, owing to an unwarrantable delusion as to its mysterious complexities, it ought to be of such a stimulating nature as to rekindle the smoldering embers of their dead ambition. The technical requirements for the construction of hand rails may be considered to consist in the simple methods that are used to project the plan of a cylindrical rail and its tangents to an inclined plane, with an additional method to find the angle of inclination of such plane.

What is termed the face mold is simply such projection, and the bevel to twist the wreath is simply the angle of inclination of the plane. In roof cutting we find problems exactly of the same nature. Where a cylindrical tower projects through a roof, the interesection of its sides with the inclined plane of the roof delineates a curve identical with the projection of the cylindrical well hole in wreath construction—that is, it will be the same curve as that which constitutes the form of the face mold. Where two hips meet and are mitered together at the apex, the angle between the two coincides with the angle between tangents in the face mold. The geometrical problem in the two instances exists in finding the angle between two inclined lines lying in an inclined plane. In regard to the hips, the solution is found in the miter, while in respect to the face mold it is found to be the angle between the tangents. Thus the tangents are shown to be two inclined lines lying in an oblique plane and coinciding in principle with the inclined position assumed by the two hips in the inclined plane of the roof. The drawing of the face mold is then shown to consist simply in the solution of two very simple problems, both of which are as applicable to roof construction as they are to the formation of the face mold. In finding the bevel to twist the wreath, as previously stated, the problem is to ascertain the angle of inclination of the inclined plane. In roof construction it is simply to find the top cut of the common rafter. When the rafter is cut to the right angle or bevel it will butt against the vertical face of the ridgepole. If the same bevel is applied to the wreath lying in an equally inclined plane as the plane of the roof, it is evident that the sides of the wreath also will be vertical, which is all that is required in squaring the wreath.

In Fig. 1 our contention is clearly illustrated, where the shed roof and the plank are shown equally inclined and the same bevel that cuts the top end of the rafter as at A, when applied to the plank as at C, will square the end D of the wreath. These remarks are presented with a view to destroying the delusion of extreme abstruseness which is attributed, and most unreasonably, to the science of hand railing, and also to encourage the beginner to push forward by removing from his path obstacles generated in misconceptions.

A simple case of a stretch out piece of rail will demonstrate conclusively that hand railing construction demands not a single geometrical solution which is not also demanded in roof construction. The analogy is complete and should be taken seriously into consideration by the students of either class of work.

In this and the articles to follow an endeavor will be made to give a clear and concise intimation of the technical knowledge required for the proper solution of the problem of an elliptical stairway. The first consideration is to draw an ellipse for the plan. When the dimensions

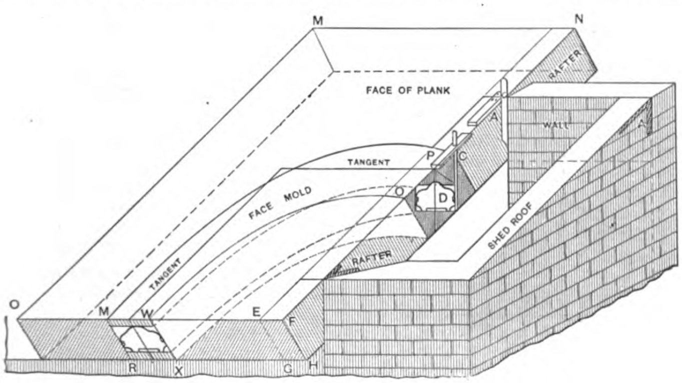


Fig. 1.—Demonstrating the Principles of Hand Railing.

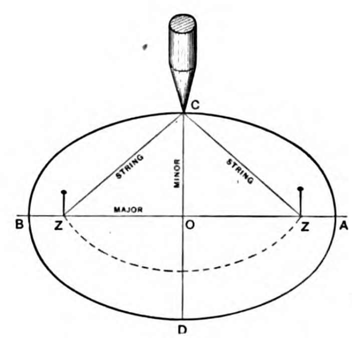


Fig. 2.—Method of Describing an Ellipse by Means of String and Pins.

Constructing an Elliptical Stairway.

are known the ellipse may be described either by finding the focus and using the elliptical trammel, the string and pins or the straight edge.

In doing the work let us proceed as follows: Referring to Fig. 2, let B A represent the major axis and D C the minor axis. Take the length of the semimajor axis O A or O B as radius, and, with C as center, describe the arc Z Z as shown. Where this arc cuts the major axis, as at Z Z, the intersections indicate the foci. Place a pin in each foci, attach a string to each pin and stretch it to the point C, using the pencil as shown to sweep the elliptical curve all the way around.

In Fig. 3 is shown the method of constructing an ellipse by means of the straight edge, the tool itself being indicated in Fig. 4. The distance from the end O of Fig.

Another method of describing an ellipse is shown in Fig. 6. In this case we determine the axis B A and D C. Then draw the diagonal line C A. Divide this into three equal parts and from point 2 draw the line 2 E D perpendicular to C A, cutting the major axis at E and the minor axis at D. Now take E for center and E A for radius and describe the arc N A W. Again, with D as a center and D N as a radius, describe the arc N C G. For the opposite side take M as center, with M B as radius, and describe the arc G B H. Then with C as center describe the arc H D W, which completes the ellipse. In this figure four centers are used to describe the sections composing the ellipse and, therefore, it has the advantage of being described by means of a pair of dividers, each section being an arc of a circle. This method is

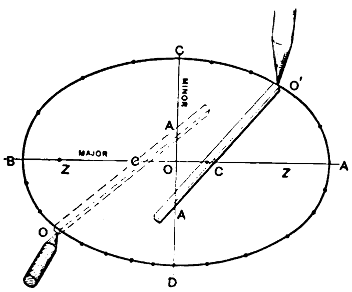


Fig. 3.—Describing an Ellipse by Use of Straight Edge.

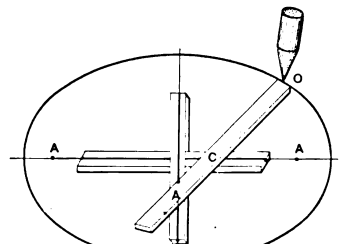


Fig. 5.—Using a Trammel.

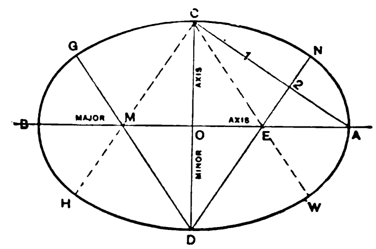


Fig. 6.—Another Method of Describing an Ellipse from Centers.

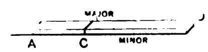


Fig. 4.—View of Straight Edge.

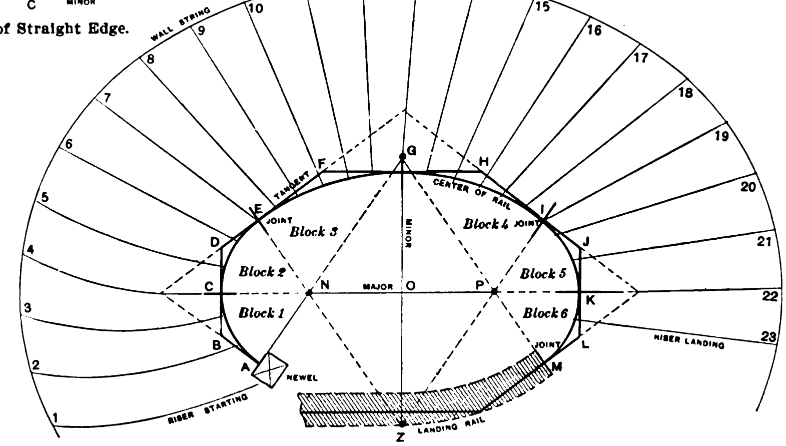


Fig. 7.—Plan of an Elliptical Stairway, Showing Tangents, Joints, &c., for a Rail Constructed in Six Sections of Wreaths.

Constructing an Elliptical Stairway.

4 to the point C represents the length of the semiminor axis O C of Fig. 3, and from O to A of Fig. 4 is the length of the semimajor axis A O of Fig. 3. Place the straight edge as shown in Fig. 3, keeping the point C on the major axis and the point A on the minor axis. Mark a dot at O', which will be a point in the circumference of the ellipse. By changing the position of the straight edge, while keeping the point C on the major and A on the minor axis, and marking dots in connection with each movement, a curve traced through them will give an ellipse.

In Fig. 5 is illustrated the method of using the trammel. It is formed with two pieces of wood, 1 x 2 inches, having grooves running along their upper face and halved together at right angles. A straight edge, similar to the one shown in Fig. 4, is placed on the cross pieces, as shown, and loosely attached by means of pins in such a way as to facilitate the movement of the tool along the grooves. It will be seen that the principle is the same as that in Fig. 3, with the advantage of having the curve described without tracing.

especially adapted to many practical operations in building construction, and in none more so than in the construction of a geometrical elliptical stairway. For this reason it is given the preference in the present articles.

Mathematicians will tell us that this figure is not a true ellipse; nevertheless it is so near as to defy detection, and therefore is often used in practical construction.

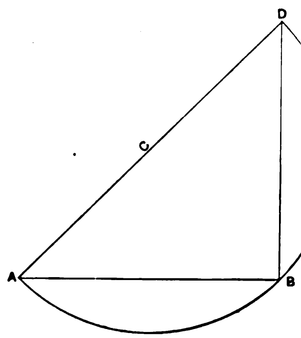
In Fig. 7 the ellipse is shown described from the centers N, P, G and Z, respectively. In this diagram is also shown the tangents to each portion of the curve as at A B, B C, C D, D E, &c. The finished rail by this arrangement of the tangents will be composed of six wreath pieces, the joints being shown at C E G I K and M. At M the top piece is shown jointed to the level rail of the landing, and at A the bottom piece is shown intersecting the newel post at right angles to the tangent A B. The top tangent, L M, must be a level tangent to conform with the level rail of the landing. The bottom tangent may be level or inclined.

(To be continued.)

CORRESPONDENCE.

Squaring Up a Drawing Board.

From OLD CHIP, *Bakersfield, Cal.*—I have never made myself conspicuous by contributions to *Carpentry and Building*, but having been an interested reader for many years, I think I might take a hand with profit to some one, for I have nearly reached the age when I may be retired almost any time. I have had quite a varied experience, and in the hope that I may shed a little light on the question propounded by "A. L. W.," Carbondale, Pa., will give what I regard as the most simple methods of squaring a drawing board, or, in other words, turning a right angle where the work does not come within



Squaring Up a Drawing Board.

the scope of an ordinary steel square. In this particular case, however, the correspondent states that it can be accomplished quite readily with the steel square. We will, however, assume to begin with that this proposed board is perfectly straight and of equal width at each end. First, center at each end longitudinally, and with a straight edge from point to point draw a fine line. At the place where it is to be cut apply the blade of the square so that it exactly coincides with the line and strike by the tongue. Turn the square over and do the same for the other half. By this method a board 32 x 36 inches in width may be squared, according as a 16 or 18 inch tongued square is employed.

Here is another method: Any parallelogram yields readily to triangulation. Center the board both in respect in its length and its width, then from its center point with dividers, trammel heads mounted on a bar, pocket rule, square, or any other instrument, take the exact diagonal distance from the center to each corner, which in every case should be alike. With a straight edge strike from point to point, where the distance touches the margin of the board and cut to the lines.

Still another way is as follows: Make a straight edge of suitable length, fast to the board at one edge at the point you wish to cut it, using for the purpose a small wire brad. Bring the square up to the straight edge on the other side, and when the square fits the angle perfectly remove and strike by the straight edge.

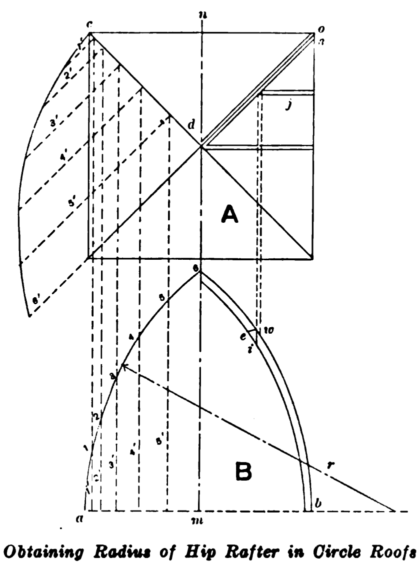
Another way is by triangulation, or what is known among carpenters as the rule of 6, 8 and 10. There is no reason for using 6, 8 and 10, only that the diagonal is a whole number, as would also be any multiple of these numbers, as 3, 4 and 5, or 12, 16 and 20. This rule is so well known among mechanics that I do not think it worth while to further explain it. I might say, however, that any numbers may be employed, but whatever they are, if within the range of the figures on the square, the diagonal may be found by actual measurement with the pocket rule.

I think the correspondent had in mind some method by triangulation, and asks if it may not be done by the use of trammel points. I would answer, "Yes, if the points are mounted on a bar and used in the place of a compass." To erect a perpendicular at the end of a line, or turn a right angle, proceed as follows: Place one foot of the dividers anywhere above the line, as, for example, at C of the accompanying diagram, with a radius equal to B C. Describe an arc of a circle as A B D indefinitely. Through C draw A D, connect B D, then will B D represent the perpendicular required. There are several ways of setting up a perpendicular, bisecting a line, &c., but as they all amount to the same thing, I will not give any other methods, simply remarking that in the practical work of turning a right angle by this method, I would take for a radius about half the width of the board so as to give a longer range between points of the perpendicular.

Obtaining the Radius of Hip Rafter in Circle Roofs.

From P. C. C., *Brookland, D. C.*—In a recent issue "A. H. H. M." of St. Louis, Mo., asked the readers to tell him the proper method of obtaining the radius of hip rafter to intersect with the common rafter on a circle roof. This is impossible, as the outline of the hip rafter will have the form of an ellipse or part thereof. Accompanying this letter will be found a diagram showing the method of obtaining the curve. In the elevation marked "B" is indicated the form of the common rafter from *a* to 6, while in the plan "A" the seat or run from *c* to *d*. The common rafter is now divided into any number of equal parts; in this case 6. The points are then projected parallel to the center line *m n* from the line *a b* to the line *c d*, then at right angles to *c d* indefinitely, as shown by the figures. Distances are then taken in the elevation B from points on the curve to the line *a b* and transferred to the plan A. Thus 5′ in B is equal to 5′ in A, &c. A line drawn through these points will be the true curve of the hip rafter, as shown from 6′ to *c* in the plan A.

Now to find the length of the jack rafters we proceed as follows: The jack J is shown intersecting the hip. Lines are projected from J to *e i* on one side and *w* on the other. From *e* to *b* is the length, and the jack cut is found by squaring from *e* and then measuring back the distance *e w*. The amount of bevel for the angle rib is



Obtaining Radius of Hip Rafter in Circle Roofs

found by drawing a line with a gauge parallel to the edge and at a distance equal to *o s* of the plan below this edge. The material between it and this line to the center of the rafter is then cut away.

Building on a Percentage Basis.

From M. J., *Westerly, R. I.*—Your editorial on the matter of percentage work in the April number of *Carpentry and Building* brings before us again a matter which we have had in mind to write about for nearly 18 months, with the thought that an article on the subject of percentage building, covering the methods prevailing in the trade in various localities, would be of great value to many builders, and would perhaps have a tendency to standardize the very unsympathetic customs prevailing on work of that character. We know that in our case we are doing a great deal of large work on that basis, and while it has many satisfactory and desirable features, yet at the same time there are constantly cropping up others which are in no way pleasant, probably because no uniform custom prevails between architects and builders satisfactorily covering work done on this basis. We have been much puzzled at times to know just what was the proper thing to do in all fairness to ourselves, the architect and the owner. We are satisfied that it is not advantageous to the owner especially, or even to the architect, to place work with any but an absolutely honest and conscientious builder, if it is to be done on that plan, because there are so many exigencies constantly arising wherein a little carelessness or inattention on the part of the builder, or lack of persistent effort to keep the cost down, subjects the owner to greater expense than would otherwise be the case. We believe that the builder who is honest will constantly exert his best efforts in endeavoring to make his purchases at a minimum cost, and that he should refuse all commissions, or if taken, should be given to the owner, and that he should be constantly alert to prevent the work costing more than it would if done by contract. There are certainly serious objections from the standpoint of the owner in doing work on this basis, some of which are alluded to in the editorial in the April issue. We should be very much pleased to see the subject gone into deeply, with the thought of establishing uniformity as far as possible for work of that kind. We submit herewith a few questions or suggestions calling to mind several points on which we would like information as to what other builders are doing in this line. There are, of course, many more points on which information would be desirable, but these suggest a few of the more important ones:

1. What kind of a contract or agreement for percentage work is usually made with a contractor, as to stipulations, requirements, &c.?

2. To what extent should the contractor supply implements, machinery, staging, elevators, hoisters, &c., and on what basis are his charges for same made?

3. What charges, if any, are made for personal supervision or services of the contractor?

4. To what extent and how based are several office expenses to be charged? (This does not allude to the office on the job, but to the contractor's main office, where the keeping of the books, accounts, payroll, ordering of material, &c., is done.)

5. What are the usual terms of payment on percentage work?

6. Is it usual to withhold any part of the payment until completion, as is customary on contract work?

7. What is the usual percentage on a job of $10,000 or more?

8. Does the percentage vary according to the amount?

We trust that contracting builders and others interested, irrespective of the section of the country in which they may be doing business, will take up the subject and ventilate their views, to the end that the greatest good may result, and that a movement may possibly be set on foot looking to the establishment of more uniform methods in this branch of business.

From J. H. J., *Geonoa, Ill.*—I have read with no little interest the editorial in the April issue on the matter of building on a percentage basis. In this part of the country the way the contractor obtains his percentage is to charge 2½ cents per hour for each man where the work is done by the day. We would state, however, that most work in this section is done by contract. The contractor has to furnish all staging for day's work, and there is no charge for personal supervision by the contractor. The 2½ cents per hour on each man is intended to cover all office expenses.

All work done here in this way is payable on demand of contractor. None is held until the building is completed, as is the case in connection with contract work. The percentage, for example, on a house to cost $10,000 would be $125. Carpenters' wages are $3 per day for 10 hours' work, and as we have no unions to bother us we get along very well.

Figuring Capacities of Tanks and Cisterns.

From D. C. C., *Jacksonville, Ill.*—In one of the issues of the paper for last year "A. A. M." of New Roads, La., asked how to determine the size to make a circular tank in order to hold any given number of gallons, to which an answer was given in the columns, but while "A. A. M." may have understood the reply, there may be some who did not, and yet would like to know more fully as to the methods pursued. With the permission of the editor, I will give my method of finding the dimensions, and also the contents of tanks and cisterns:

To find the capacity of a tank, multiply the square of the diameter in inches by 0.7854 and this product by the depth in inches. Divide the last product by 231, the U. S. standard gallon, and you have the number of gallons the tank will contain.

To find the diameter of a tank when the number of gallons and depth are known, multiply the number of gallons by 231, the U. S. standard gallon; divide the product by the depth in inches, and the quotient obtained by 0.7854, then extract the square root, which will give the diameter in inches.

To find the depth when the diameter and number of gallons are given, multiply the number of gallons by 231 and divide this product by the square of the diameter in inches and the quotient obtained by 0.7854, which will give the depth required.

As cisterns are generally estimated by barrels, instead of gallons, I also give the following rules:

To find the number of gallons in a cistern, the diameter and depth being known, multiply the square of the diameter in feet by the depth in feet, and this product by 0.1865, and the answer is in barrels.

To find what depth a cistern should be when the diameter and number of barrels are known, divide the number of barrels by 0.1865 and the quotient thus obtained by the square of the diameter in feet, and the quotient obtained is the depth in feet and fractions thereof.

To find the diameter when the depth and contents are given, divide the number of barrels by 0.1865 and the quotient obtained by the depth in feet. Of the last quotient extract the square root, and the answer is in feet and fractions for the diameter. By depth is meant the distance from the bottom of the cistern to the spring of the arch crown, or dome, as it is variously termed.

I know your magazine is called *Carpentry and Building*, but buildings are not all built by carpenters, for there are plumbers, bricklayers, steam fitters, iron workers and other mechanics interested in building, but we hear very little from them in "Correspondence." Perhaps they think there will not be room among the 10,000 shinglers and 20 a day door hangers.

Note.—The point raised by our correspondent regarding buildings being constructed by others than carpenters is well taken, and we hope that members of the other trades will appreciate the valuable assistance which they might render in promoting the material interests of their fellow craftsmen by sending letters to the editor for publication in the Correspondence department. The field offered for discussion is an extremely good one, and there would seem to be no reasonable excuse for any reader refraining from taking part in contributing material for this department of the paper. We trust, therefore, that all will improve the opportunity and send us frequent letters for publication.

Floor for Dancing Hall.

From CURIOUS, *Newport, Ky.*—Once more I come to the practical readers of the paper for information as to a job of work I am called upon to execute. I would like to have their views as to the best method of constructing a spring floor for a large dancing hall or ballroom. Any information which those who have had experience in this line of work may choose to give will be greatly appreciated by me, and at the same time will doubtless prove interesting to many others.

Bents for 12-Sided Plank Frame Barn.

From J. D., *Ubly, Mich.*—I send herewith a rough sketch, Fig. 1, showing one of the bents of a 12-sided plank frame barn, and would like to have the architectural readers of the paper state whether or not it will be strong enough for the purpose, and, if not, wherein changes can be made to advantage.

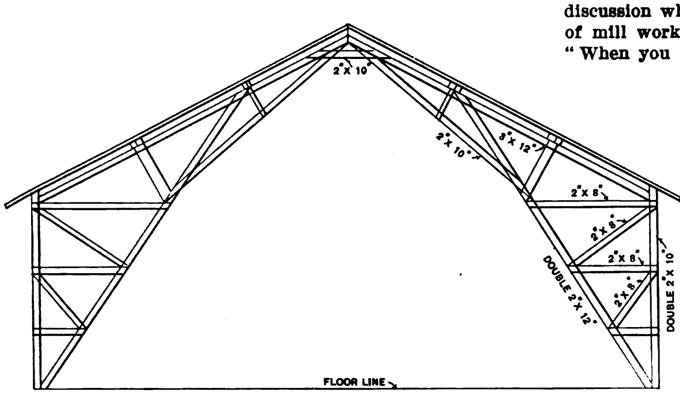


Fig. 1.—Elevation of Bent Submitted by "J. D."

Note.—With a view to obtaining the opinion of an expert who has had long experience in the construction of plank frame barns, we submitted the inquiry of our correspondent above to John L. Shawver, who furnishes the following in reply:

In the first place, the purlin posts in the sketch of the correspondent are so sloping that while they brace well they are not in position to sustain the most weight, and these with the roof supports are so long that they have to be spliced. While this is easily done in the case of posts, it is not so readily performed with supports, and, when so done, it will not present as attractive an appearance as would otherwise be the case.

In the second place, one of the weakest points about the barn is the shape. It is true it would be a novelty in most communities, but, like the round barns, is wasteful of material. It is out of the question to place joists, rafters, flooring, sheathing, roofing, &c., on barns of this shape without much waste of both materials and labor. Then, too, it is next to impossible to provide for satisfactory lighting or ventilation, both of which are essential features in every up to date barn.

The frame construction indicated in Fig. 2 is stronger, and at the same time gives more open space in the interior, this being secured by running the purlin posts up to the first purlin plate, instead of to the second, and supporting the second plate on the truss brace. This saves in the lengths of the purlin posts, but requires the same length of supports and longer sub-supports.

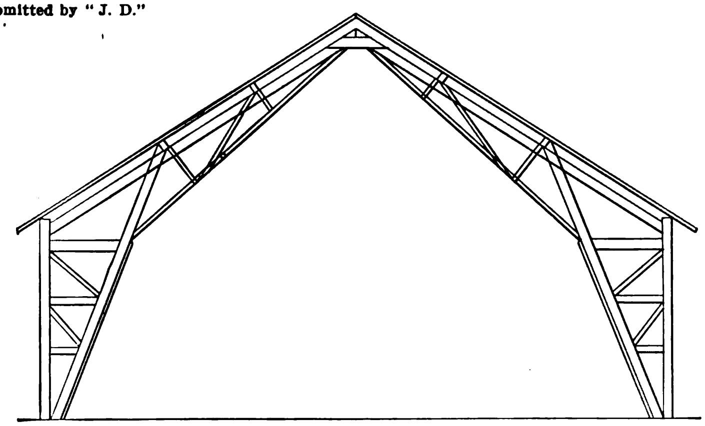


Fig. 2.—One Form of Plank Frame Suggested by Mr. Shawver.

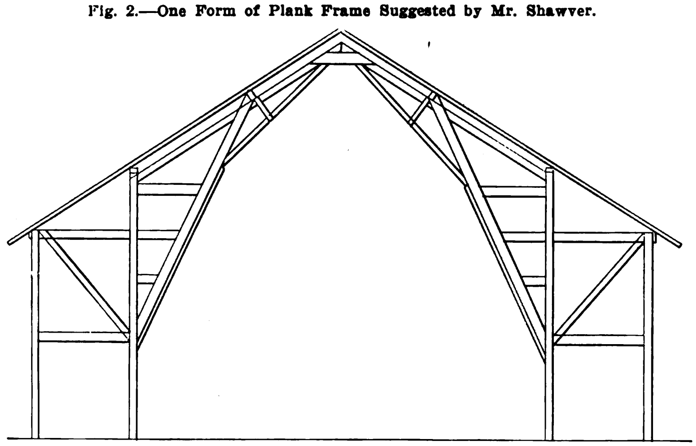


Fig. 3.—The Preferable Style of Framing.

Bents for 12-Sided Plank Frame Barn.

The form of construction indicated in Fig. 3 is, in my opinion, preferable to either of the others, if it is found that the vertical posts set in 10 feet will not in any way interfere with the purpose of the structure. In this case all the timbers are either shortened or placed in such shape that they may be spliced without in any way weakening the structure. Whichever form may be used by the correspondent, it is important in bents or arches of this size that the purlin posts should be placed on the inner edge with 2 x 6, which will add materially to the strength of the frame, and at the same time prevent any tendency to spring sideways either in the raising or from the pressure of the hay or grain within after the building is completed.

Are Mill Men Getting Careless?

From W. P. C., *Wahpetan, N. D.*—With regard to the discussion which is now going on touching the question of mill work, there is an old saying to the effect that "When you can't get the best get the next best," so I will mention a few points as they come under my observation and leave the boys to draw their own conclusions. Two cases I have in mind which occurred this last fall and winter. Last fall I did the carpentry work on a brick hardware store, 25 x 175 feet in plan, two stories and basement in hight, and finished throughout in white oak. The doors were in the middle and recessed back about 4 feet, all corner posts and door posts being rabbeted for sash. The interior trim was all right, but in putting in the plate glass front the posts for the doors were rabbeted for one door to swing in and the other door to swing out and the transom overhead would rest on the inside in one case and outside on the other. The plan was drawn by a first-class architect and the mill work was taken from specifications and blue prints giving full details. The same mill came the same trick on me this winter in the corner posts for the front of a warehouse which I put up for a harvester concern. The building was 50 x 250 feet, with a full glass front. There again they made one corner post to hold the sash from the outside and the door post to hold the sash from the inside. Now in both of these cases I do not think it was carelessness so much as not knowing how the work would go together when set up. Now "G. J. S." says in the February number, "We mechanics must refuse to handle this poorly milled lumber." That might be all right from the standpoint of the union mechanic in a large city where there are plenty of mills ready to enter into competition for a good job of mill work and where the union is strong enough to back up its members. But take it from the view of the journeymen working for contractors in the small towns—and their name is legion—how would it do for them to refuse to put the work into place after calling the attention of the boss to the serious defects in the material?

All mill work is handled through the local lumber dealers and they are always in a position to "make good" when the work is radically wrong or not up to specifications. I have in mind one instance where the lumber dealer stood in the gap between the mill men and the carpenter. The specifications for a certain house called for all sash to be plowed and bored for weights, and the price and estimates were given on that basis. What was my surprise on receiving the sash to find not one of them touched in that manner. I had to go to work and bore and plow them, keeping track of all time consumed in doing the work and charging the dealer for the same. Of course he "got back" at the millmen, so the full cost of the work went back to where it belonged. Now what was that? Carelessness or simply an oversight?

If our mill work came to us as "C. E. G." describes, all marked and bundled, we would have small cause for complaint, but I have lived here and worked at the trade for 15 years and have yet to see the work that was marked in any shape whatever, except in sash which has the size and number of lights. Here only good mechanics are allowed to put on any inside trim, and I really cannot see what kind of a mechanic put up that closet or dresser "C. E. G." tells about. Most all of our mill work comes from Minneapolis, with a little from Fergus Falls. I think that mill men have got to do what is right or else lose their customers.

From J. E. R., *North Chatham, N. Y.*—In regard to the question of mill work I would say that it does not take a very particular carpenter long to spot the lumber dealer who carries well milled flooring, ceiling, molding, siding, &c., and who won't have anything else in his yard. He is the man to cling to, and the other class is to be avoided. Neither does it take a very particular carpenter long to discover the mill man who takes pride in his work and has established a reputation by getting out perfect stair work and finish of all kinds. Now I say, tie up to this man and keep strictly away from the other fellow. Since following this plan the experiences I have had with the lumber dealer and mill man have been very satisfactory. Now builders are not compelled to buy botch mill work, but what protection has the mill man against some piece of work with which he has taken extra pains being botched and mauled in the setting up by some careless, incompetent carpenter? From what I have seen, I quite agree with "C. R. G." that the mill man has about as many occasions to kick as have the carpenters. It is my opinion that every young carpenter who is in dead earnest and wishes to accomplish the best results should study and practice mechanical drawing at least up to the point where he can make a working drawing with details of any piece of work which he is likely to be called upon to do. A thorough bench education is also a great thing for the young carpenter to acquire, for if he can himself get out a nice piece of work he will much more intelligently comprehend a piece of work gotten out by some one else, even though it be in a "knock down" condition.

From J. E. L., *Bay City, Texas.*—Having read the communication of "Apprentice Carpenter," also those of "C. E. G." and "P. & N." on mill work, I must say that I do not see how a mechanic could be blamed for something a "Jack Leg" might or might not have done, be he at work on a building or in a mill. The facts as they occur to me are that there is about the same proportion of "Jack Legs" in the mill getting out work that they know little or nothing about, as there are out on the building putting it up, so it seems to me that the "Jack Legs" are responsible for most of the trouble. I have found special work gotten out by the mills to be, as a rule, mechanical, though not always as substantial as I would like it to be. When it comes to work put up for stock the quality could and should be improved very materially on several articles. Doubtless a number of the readers realize how difficult it is to procure strictly first-class sash doors and O. S. blinds, though it may not be so difficult in some parts of the country to get really good stock as it is here. We have been compelled in several instances to make sash and doors when we wanted something on which we could really rely. The trouble with stock work has been that it is not always made of good material and is gotten out and put together so very poorly as to result in an article that will last but a comparatively short time.

The glazing is another source of trouble and annoyance. Sash made by the nearby mills has generally been more satisfactory as to woodwork, but the glazing is not so good as that which comes from a distance. Now as to panel doors, if some of those manufacturers who are so loud in their praise of the dowel door could have an experience such as I have had with these doors they would be silent on that particular subject for a long time to come. The doors might answer the purpose in a dry climate, but on this point I do not know. I do know, however, that for a damp climate like this they will never give satisfaction unless the manufacturers can and will use glue which will not be affected by dampness. The doors look all right until the glue gives way, then, in the slang of the day, they look like 30 cents. The sash and door people have evidently gotten into the same rut with the contractors—that is, working on a profit that will not justify employing the best mechanics and thus insuring work that would be a credit to them. I hardly think that "Apprentice Carpenter" has had any more trouble with his flooring, ceiling and molding than a great many others. The point raised by the correspondent as to undersized lumber should have attention, as I think the lumber men get enough for their product to justify making it full size.

Porch, Piazza and Veranda.

From D. McB., *Valleyfield, Canada.*—Will the editor kindly explain in the next issue of *Carpentry and Building* what the following names signify: Piazza, porch, veranda, balcony and gallery? Different men here appear to have conflicting ideas as to the names to be used and I like to have things as near right as possible.

Answer.—In some sections of the country the terms piazza, porch and veranda are used interchangeably, as are also the terms balcony and gallery. In giving a strict interpretation of their meaning we cannot do better than quote the definitions of these words as found in the Standard Dictionary:

BALCONY.—A railed or balustraded platform projecting from a wall, usually before a window, but sometimes a door.

GALLERY.—An elevated floor within a church, theater, or other large building, to give more space or afford a place of observation, commonly projecting from the walls, sustained by pillars, surrounded by a balustrade, and furnished with seats.

A passage way open at one end, sometimes projecting from the inner or outer walls of a building, and supported by corbels or by pillars.

A room or building used for the display of statues, paintings, &c.—a museum.

A triforium or a passage way in the thickness of a wall.

A railing around the top of a cabinet or other piece of furniture.

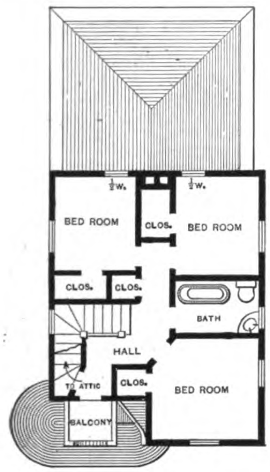
PIAZZA.—In Europe, especially in Italy, an open area, or public square in a city. Architecturally, the term means "a covered and usually colonnaded walk or gallery on the outside of a building." In the United States, "a veranda or porch."

PORCH.—A covered structure forming an entrance to a building; outside and with a separate roof, or as a recess in the interior as a kind of vestibule. In the United States it is also called a veranda.

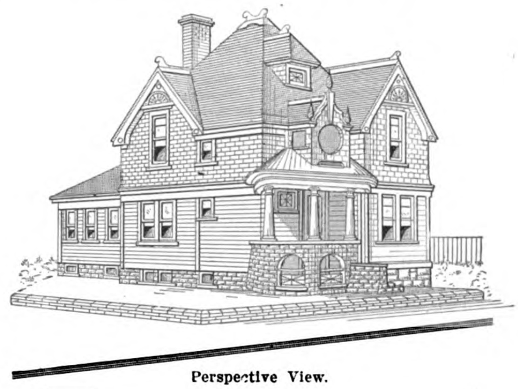
VERANDA.—An open portico or gallery extending along one or more sides of a building.

Elevations for "J. W. H.'s" Floor Plans.

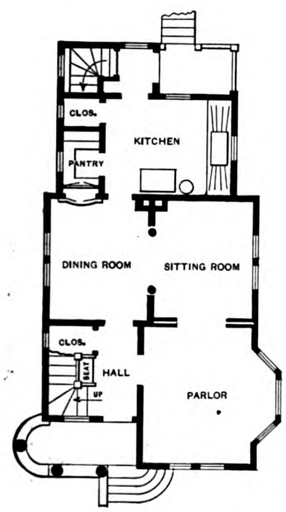
From M. P. KELLOGG, *Boulder, Col.*—In answer to the inquiry of "J. W. H." of Lynbrook, L. I., which appeared in the February issue of the paper, I have prepared some sketches showing perspective view and an elevation which may be of interest to him. I have made some changes in the floor plans, which I believe will make them more complete, and, if the drawings are carried out, will make a very pretty house. I would suggest that the exterior of the house be painted as follows: The first story and the shingles of the second story a dark brown, the cornice and trimmings white and the roof a moss green.



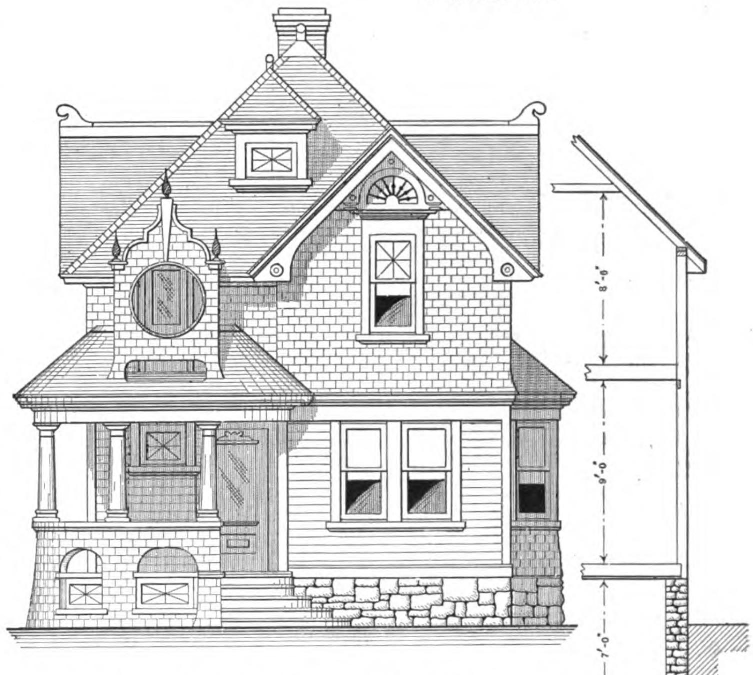
Second Floor.



Perspective View.



First Floor.
Scale, 1-16 Inch to the Foot.



Front Elevation and Section.—Scale, 1/8 Inch to the Foot.

Elevations for "J. W. H.'s" Floor Plans.

Finding Lengths of Hip or Valley Rafters by the Use of the Steel Square.

From M. S. M., *Auburn, Ind.*—Will some reader of the paper please explain through the correspondence columns the way to lay off hips or valley rafters by the use of the steel square when the rise and run of the straight rafter are not even feet?

Can Tin Roofs of Large Area Be Made Satisfactory?

From TIN PLATE MANUFACTURER, *Pennsylvania.*—We notice in your June issue an inquiry from "C. C. F.," St. Joseph, Ill., in regard to whether tin roofs of large area can be made satisfactory. To this we would reply that nothing better can be put on a small or large building than a roof of tin. And we would state, from what we have learned of slag roofing and its lasting qualities, that the architects and builders generally are now going back to tin roofs. As a consequence, our own business in this line is increasing. From what we can learn, the lasting durability of tin on a roof depends upon the following conditions: First, if there is first-class workmanship; second, if the seams are well soldered; third, and most important, the kind of paint used on the under and upper sides of a roof. Tin which is painted with metallic brown or Venetian red which has been ground and mixed with pure linseed oil is lasting. As for fish oils, cotton seed oil, benzine, &c., the first hot sun brings these oils out, and nothing is left but the metallic brown or Venetian red in streaks on the roof. We have learned for some little time past that where compositions of tar, &c., are used, there is something in these paints that eats out the tin and makes pin holes after a short time. We urge all our customers to use nothing but metallic brown or Venetian red, ground in pure linseed oil.

WHAT BUILDERS ARE DOING.

REPORTS which reach us from various sections of the country indicate a fair aggregate of building in progress, although there seems to be a greater degree of activity in the suburban districts and smaller towns than there is in the important cities. Some of the latter show a marked increase in the amount of work projected, as compared with a year ago, while against these are cities which report a material contraction in the amount of building under way. Locally matters are comparatively quiet, and there is a marked absence of important differences between employers and employed. The record thus far for the year is slightly behind that of 1903, but still the work under way and in prospect represents a very fair total.

Baltimore, Md.

The sixteenth annual meeting of the Builders' Exchange was held Tuesday evening, June 7, in the assembly hall of the Masonic Temple. The gathering was one of the largest in the history of the exchange and represented all branches of the building industry, including many architects, also representatives of the local trade journals and daily press. An early feature was the serving of an excellent dinner to the members and guests, followed by the reading of reports and the election, without opposition, of the following officers for the ensuing year.

President, John J. Kelly.	Third Vice-President, Jos. T. Lawton.
First Vice-President, Theo. Mottu.	Secretary, John M. Hering.
Second Vice-President, Theo. F. Krug.	Treasurer, B. F. Bennett.

The directors are Nathaniel W. James, J. Henry Miller, Geo. B. Roche, Geo. W. Walther, Harry L. Starr, Chas. H. Classen, Walter E. Burnham, A. E. Clarke, S. H. Calkins, I. S. Filbert, Henry A. Seim, F. G. Boyd.

A feature of the evening was the report of the retiring president, John H. Short, after an incumbency of three successive terms. In referring to the recent fire, he said: "Twenty-five per cent. of our members sustained serious loss, in many instances total destruction of buildings, stocks and fixtures, but not one is now out of business." He exhorted the builders and other members "to give to our city in her great need that which we so ardently profess and which she so justly deserves at our hands—materials as good as or better than specified, best workmanship and prompt fulfillment of every contract; and not less important than any of these, peaceable relations between employers and employees."

The report showed wherein the exchange had been active in matters of municipal and State legislation, aiding materially in securing the passage of important measures; also urging due consideration and attention to every detail of the new building laws about to be framed.

Under "Value of Building Improvements," President Short said: "The prospect for a busy year was brighter in the early part of 1903, perhaps, than we had seen for many years, but because of disturbed conditions in the labor world the confidence of investors was lost, and many large projected improvements, besides numerous smaller ones, were abandoned, in many cases never to be revived. These labor complications in most instances were wholly unwarranted, as the mechanics were receiving good wages for easy hours, with a prospect of steady work. It is stated on good authority that the loss to the mechanics has been double that to the employers. Contracts of $5000 and over awarded in and about Baltimore since June 1, 1903, as shown by our bulletins, we estimate in the aggregate at $7,140,000, divided as follows: Business buildings, $3,800,000; private residences, $240,000; miscellaneous, including churches, institutions, municipal and State buildings, $3,100,000. Notwithstanding the numerous contracts awarded in the rebuilding of the burned district, the grand total is still about $1,250,000 short of the previous year."

Among "Progressive Measures" inaugurated, President Short dwelt at length upon "'Change hour as essential to the ideal exchange," the establishing of a permanent exhibition of building materials and appliances, and the federating of employers in the building trade.

After reviewing the large amount of preliminary work performed relating to the permanent exhibition, he strongly recommended the appointment by the incoming president of a standing committee of seven to work out a plan of organization and report from time to time to the Board of Directors.

This recommendation was afterward adopted and committee appointed.

A synopsis was given of what had been done toward converting the exchange into a central body of building trades employers' associations, believing this to be the one sure way for the employers "to recover and retain their grip on the labor situation, and secure to themselves the control of their own business;" also "to restore the confidence of the building public and give protection against the unjust demands of unionized labor, especially that of the walking delegate and the sympathetic strike."

Recent extraordinary conditions led to a temporary postponement of final action, but encouraged by the success of similar organizations in Philadelphia, Pittsburgh, New York, Chicago, Albany and other cities in taking the initiative, President Short concludes: "It behooves us as the oldest and most thoroughly established contractors' organization in the city to adopt as early as practicable some methods that will enable us to cope successfully with the inevitable."

President Short, after paying a high tribute to the late Mayor, Robt. M. McLane, declared: "It is, to say the least, unjust to the deceased, whom we profess to honor, that people and press have insistently cried 'suicide' or 'insane,' when there has been no evidence to prove either and none to prove his death was not accidental."

Addresses were delivered by J. Lindsay Little, president of the Master Builders' Exchange of Philadelphia; George B. Hough, secretary of the Master Builders' Association, Washington, D. C.; S. Keighly of the Builders' Exchange League, Pittsburgh, Pa.; J. B. Noel Wyatt, architect, of Baltimore, and President-elect John J. Kelly.

Brooklyn, N. Y.

Activity in the building line continues on a gradually increasing scale, and it is thought that the present will be the banner year in the history of the Bureau of Building in the Borough of Brooklyn. For the first four months of 1904 the business exceeds that of any similar period, while the month of April last records a volume of business nearly equal to that of the three previous months. The estimated cost of new buildings for which plans have been filed and alterations for which permits were granted from April 1 to May 1 was $6,250,000, as against $7,765,381 for the first three months of the year, thus making a total for the four months or a trifle over $14,000,000, or more than half of the $26,000,000 of business in the entire year of 1903. Several reasons are assigned for this heavy increase, one being that hundreds of people by reason of the scarcity of apartments in New York are making their residence in Brooklyn. Another is the fact that building has started in with a rush after a little relief in the situation and the settlement of labor difficulties.

Superintendent Collins recently issued to contractors and builders a notice to the effect that on and after May 1 there shall be filed with each application for a permit complete plans in duplicate, both in cloth, showing all construction, plumbing and gas lights, and plumbing shall be approved before a permit for construction is issued. One set of the plans will be returned to the applicant with permit for construction, and is to be kept on the job at all times and in good condition as a reference plan exclusively. This order, it is stated, was caused by the many attempts on the part of contractors to evade the building laws.

The Builders' Association of the Borough of Brooklyn have recently filed articles of incorporation with the Secretary of State. The objects of the organization are mutual benefit, the enhancement of the interests of the building trade and the promotion of harmonious relations between employer and employee. The directors for the first year are William M. Calder, F. W. Rowe, F. L. Singer, Thomas F. Martin and Charles G. Reynolds, all of Brooklyn.

Chicago, Ill.

As the season progresses, activity in the building line shows a gratifying increase, and while the figures by no means establish a record, yet in the aggregate they indicate a very gratifying work under way and in contemplation. According to the figures of the Building Department, there were issued during the month of May permits for 687 buildings, having a frontage of 18,212 feet, and estimated to cost $3,663,050, while in the corresponding month of last year permits were issued for 622 buildings having a frontage of 17,451 feet, and involving an estimated outlay of $3,317,200. These figures are not quite up to the month of May, 1901 and 1902, but with these exceptions they are ahead of any previous May since 1895.

Taking the figures for the first five months of the present year, it is found that permits were issued for the construction of 2483 buildings, having a frontage of a trifle over 67,000 feet, and estimated to cost $13,409,310. In the corresponding period of last year permits were issued for 2334 buildings, having a frontage if 65,805 feet, and estimated to cost $13,095,310, showing that the amount of work under way and in contemplation the present year is a trifle in excess of that a year ago.

Evansville, Ind.

At a meeting held April 23 the Builders' Exchange of Evansville was reorganized, since which time its membership has increased from 55 to 83, and it is expected very shortly to reach the 100 mark. The dues have been reduced to a nominal figure, and there exists an enthusiastic interest in the welfare of the organization which speaks well for its future.

At the reorganization of the exchange S. G. Rockwood was chosen president; William Bedford, vice-president; H. C. Kleymeyer, treasurer, and C. H. Hitch, secretary. The directors for 1904 include Christian Kanzler, E. C. Johnson, Anton Kessler, W. J. Dunn, G. H. Bippus and W. B. Lensing.

Lorain, Ohio.

The disagreeable weather which has been experienced not only during the winter, but for a good portion of the spring, has tended to restrict building operations to a very appreciable extent. As the season progresses, however, indications are not wanting of increasing activity, and it is thought with favorable conditions a considerable volume of business may ensue. For some little time past the leading builders and contractors of the city have felt the necessity of a Builders' Exchange, and the matter has been seriously agitated with the result that a little more than two months ago an organization was perfected with the following officers for 1904: J. R. Leighton, president; C. F. Demmer, vice-president; N. B. Stauder, secretary, and J. J. Kauf, treasurer. The Board of Directors consist of F. W. Pierce, L. A. Burgett, H. Y. Baxter, M. S. Jackson and J. B. Nuhn.

An interesting event in connection with the exchange was the visit on Friday, May 27, of 35 builders from Cleveland. The purpose was to bring into closer relationship leading builders from the two sections, and to afford the younger exchange an opportunity to profit by the longer experience of the older body. The visitors left Cleveland at 1 o'clock in the afternoon on a special car over the Lake Shore Electric Road, and in the words of E. A. Roberts, the genial secretary of the Cleveland Builders' Exchange, it was "the first trade extension trip by trolley of the local builders." Arriving at Lorain, the visitors were met by Mayor F. J. King, and a committee from the local Builders' Exchange, consisting of L. A. Burgett, chairman, William Burford, F. S. Satter, Julius Glick and F. W. Pierce. A car was in waiting to take the party to the plant of the National Tube Company, and there they boarded an "observation car" for a trip of inspection through the immense yards of the steel plant, the tour occupying the entire afternoon. In the evening the party was entertained at the Franklin Hotel, and later a joint meeting of the two Builders' Exchanges was held in Arcanum Hall, J. R. Leighton, president of the Lorain Builders' Exchange, presiding. Mayor King, in welcoming the visitors, spoke of the benefits to the Lorain organization from a closer association with the Cleveland body, and of the building conditions prevailing in his city. He said that if 500 houses could be erected in Lorain at once all of them would be rented before they were completed, and that if an additional 1000 were started to be finished within a year, every one of these buildings would be occupied as soon as it was ready for tenants. In replying to the address of welcome, William H. Hunt of the Cleveland exchange, explained the conduct and workings of that body, which were of much interest to the members of the Lorain organization. Remarks of other visitors were of the same tenor, all offering suggestions and advise to the Lorain builders in their new undertaking. After the meeting a banquet was served in the upper hall.

New Britain, Conn.

A meeting of leading contractors, builders and dealers in builders' supplies was held April 15, resulting in the formation of what is known as the New Britain Interstate Local Assembly, this being a branch of the Interstate Contractors', Builders' and Dealers' Association, which was organized November 18, 1902.

At the meeting of the Local Assembly, the following officials were selected for the ensuing year: President, J. W. Allen; vice-president, E. U. Thompson; secretary, John Pinches, Jr.; treasurer, George Rapelye, and sergeant-at ams, W. A. Doolittle. The address of the secretary is P. O. Box 356.

Omaha, Neb.

A noteworthy feature of building operations in Omaha, Neb., just at this time is the number of modern cottages which are being erected. Most of these are being put up by people who want a home, and the operations are not in any sense speculative. The figures compiled in the Building Inspector's office show that the estimated cost of the building improvements projected during the month of May was $142,000. This is a favorable showing, as compared with the corresponding month of the previous year, when only 15 permits were issued calling for an outlay of $4500. At that time, it may be stated, labor troubles were seriously interfering with the work. The feeling among architects and real estate men is that the year will show up well in the aggregate.

Philadelphia, Pa.

The building season is now under full headway, and permits for new work are being taken out upon a scale which compares most favorably with a year ago, and which augurs well for the remainder of the season. According to the report of the Bureau of Building Inspection, there were 970 permits issued during the month of May, covering 1701 operations and involving an estimated outlay of $3,251,520. While these figures represent a falling off of a trifle over $230,000 in the cost of building improvements as compared with April, they are much in excess of those for the month of May last year, when 703 permits were issued covering 1170 operations and estimated to cost $2,933,470. As might naturally be supposed, the bulk of the operations is made up of new dwellings, these calling for a trifle over $2,000,000 of the entire total. Alterations and additions account for a little over $600,000, manufactories for $133,000 and churches $112,500. The Twenty-seventh Ward makes the best showing, the building improvements in that section being estimated to cost practically $500,000, while the Thirty-fourth Ward is second with $479,000, and the Twenty-second Ward third, with $44,000.

The members of the local Builders' Exchange held their annual dinner at Washington Park, on the Delaware River, on the afternoon of May 21, and had as their guests 12 representatives of the Builders' Exchange of Baltimore. After spending the morning inspecting various buildings in the city, the members and their guests left for the park, where a most delightful afternoon was spent. Speeches by the officers of both organizations and general merrymaking occupied the hours.

The visitors from the Baltimore Builders' Exchange were President John H. Short, Secretary John M. Hering, James F. Morgan, John J. Kelly, Jr., Louis N. Raucke, William S. Short, Joseph T. Lawton, George R. Bullen, F. G. Boyd, Addison H. Clark, Stephen J. Tongue and S. B. Sexton.

Washington, D. C.

The report of building operations for the month of May constitutes a very gratifying showing, permits having been issued to the number of 434, calling for an estimated expenditure of $1,240,254. Of this amount $793,530 covers the estimated cost of new brick dwellings, for which permits were issued during the month and over $200,000 repairs of brick structures. A scene of activity is the extensive area which is to be the site of the new Union Station. About one-fourth of the foundations for this structure have already been laid, and work is just now in progress on the foundations of the piers, which will carry the girders supporting the barrel of the arch of the roof over the waiting room of the depot. The piers are being built up of concrete, and will sustain iron trusses having a span of 150 feet. It is expected by the contractors that the entire work will be finished by July 1, and that the station will be ready for use by the beginning of the coming year.

An operation by Thomas H. Pickford and C. B. Hight involves the erection of 40 two-story houses of six rooms each and four two-apartment houses to cost $100,000. The dwellings are to have fronts of pressed brick with marble trimmings, tiles, vestibules and bathrooms, furnace heating, &c.

The annual meeting of the Employers' Association of the Building Trades was held the latter part of May in the Corcoran Building, at which time the president and secretary presented reports reviewing the work for the year. The statement of the treasurer showed the organization to be in a flourishing condition financially, and able to meet any contingencies that might arise. The officers elected for the ensuing year were: President, W. D. Nolan; first vice-president, John R. Galloway; second vice-president, W. E. Spear; secretary, E. C. Graham, and treasurer, William S. Hutchinson.

Wilkes-Barre, Pa.

The first annual meeting of the Employers' Association of Wilkes-Barre and the Wyoming Valley was held in the Common Council Room in the City Hall on the evening of June 2, when a large representation of leading members of the building trades were in attendance. President Shephard delivered his annual address, which received the closest attention on the part of those present. E. A. Scott, the secretary, read his annual report, showing a favorable financial condition and increasing membership during the past year. The report stated that owing to the disturbed labor conditions in the city and vicinity at the time of the formation of the association and for some time previous business was greatly hampered and building operations received more or less of a check.

At the conclusion of the secretary's report, the Nominating Commitee offered the names of all the officers of last year for re-election, and the secretary was intrusted to cast the ballot in their favor. The officers are: President, W. S. Shephard; first vice-president, H. E. Hilliard; second vice-president, O. J. Behrens; third vice-president, John Curtis; treasurer, Fred Lang, and secretary, E. A. Scott.

This concluded the business of the meeting, and President Shephard introduced the State president of the Builders' Exchange, Edwin S. Williams of Scranton, who is also the president of the exchange at that place and secretary of the Master Masons' Association of Scranton. He was enthusiastically received, and his address was followed with deep attention. Among other things he described in detail the prolonged strike of the Scranton building trades, referring to the part which the exchange took in that struggle and asserting that it is now establishing the open shop principle after a long and costly contest with the various labor unions.

Wilmington, Del.

According to latest advices building operations are active in and about the city, while the labor situation is such as to warrant the belief that there will be no serious interruption to work in progress. It is thought that several manufacturing plants will be built during the season, and this will keep busy the men in the various branches of the building business.

At the regular meeting of the Master Builders' Association of Wilmington, held on the evening of May 19, the following officers were elected for the ensuing year: President, George S. McKee; vice-president, Samuel J. Newman; recording secretary, James M. Smyth; financial secretary, J. M. Phillips, and treasurer, William D. Haddock.

Winnipeg, Canada.

The leading contractors and builders of Winnipeg have finally succeeded in organizing on a broad basis a Builders' Exchange, with a membership of nearly 100. Convenient and commodious quarters have been secured in the Rialto Block, 482½ Main street, where the meetings are regularly held, and where the members gather to transact the business incident to an organization of this character. The exchange has been in existence about three months, and has for its board of officers for the ensuing year the following well-known members of the trade: E. Cass, president; G. W. Murray, first vice-president; Joseph Bourgeault, second vice-president; T. D. Robinson, treasurer; W. W. Daly, secretary, and Alexander Irwin, sergeant-at-arms.

The objects of the Builders' Exchange, as set forth in the constitution are to "join in one association all contractors, manufacturers and dealers of good repute doing business in the city of Winnipeg, whose vocation connects them wholly or generally with the industry of building, either as employing contractors in any branch of the building business, or as manufacturers of or dealers in material used and employed in the erection of buildings or other structures, and who are not members of any journeymen's trade or labor union.

"To establish and maintain among the individuals so associated a just and equitable system of dealing and a uniformity in commercial usages by rules and regulations, to acquire, preserve and disseminate valuable information regarding the business in which they are severally engaged; to establish and maintain a system of adjustment of all disputes or controversies which may arise among its members, or between its members and their employees and other persons, and for that purpose to act in concert with similar organizations."

One of the first subjects brought before the exchange for its consideration was that of a Uniform Contract, the lack of which has been felt in Winnipeg, as it has in other sections of the country. At the present time it is the hope and expectation that during the coming winter lectures will be given and papers presented on subjects of interest to the members in the several branches of the trade.

Notes.

At a recent meeting of the contractors of Sharon and South Sharon, Pa., it was decided to adopt the "open shop" policy.

Knoxville, Tenn., is enjoying a degree of building activity which is in excess of anything witnessed for a long time past. In all parts of the city and in the suburbs numbers of new buildings are being erected, and contractors express the opinion that there has seldom been a period of more general prosperity in that section.

At a meeting of the members of the Builders' Exchange of Oswego, N. Y., held late in May, it was decided hereafter to make no distinction between union and nonunion men, and to conduct what are now termed "open shops." All that will be required is that the men do the work demanded, and the rate of wages established by the union will be paid. The builders claim that they were forced to take this step by the unreasonable demands made upon them.

A recent amendment to the building laws of Greater New York gives to the superintendents of buildings in all the boroughs summary power to stop work on buildings in process of erection when, in their judgment, such work menaces life and limb. It is expected that the law if properly enforced will tend to prevent disasters like that of the collapse of the Darlington Hotel, reference to which was made in these columns a short time ago.

Carpenters and builders in New London, Conn., are having a very busy season, and look for the activity to continue throughout the year. Most of the work is in the residential section of the city, although there is more or less being done in the way of structures for business purposes. At the present time it is said that something over 40 dwellings are in process of construction, while many old buildings are to be remodeled and extensive additions made to others.

Reports from Durango, Col., are to the effect that there is more building in progress this season than has been the case since the "boom" of 1891. At that time, however, business structures and dwellings were erected to such an extent as to exceed the demand, but as time went on conditions gradually changed, and at present the demand is said to be much greater than the supply. New residences are going up in many sections, a new four-room schoolhouse is under way, and improvements are in progress calculated to greatly swell the aggregate amount of capital invested.

Some idea of the amount of building in progress and contemplated in the city of Minneapolis, Minn., may be gained from the statement that in May not only did the number of permits exceed that of any month in the history of the Building Inspector's Department, but the value of the building improvements contemplated was greater than any May since the boom year of 1890. The valuation is placed at a trifle over $1,000,000, as against $1,193,000 in 1890, and it is stated that since that year the valuation has seldom exceeded $700,000. The number of permits issued is increasing daily, and the building inspector looks for the record of June to exceed that for May.

At a special meeting of the Pittsburgh Builders' Exchange League, held on the evening of May 23, Percy K. Stephenson was elected assistant secretary, although perhaps the position might more properly be termed that of general manager, as upon him will devolve a very large part of the active work of the league. He has been with the organization from the start, two years ago, he formerly being business manager of the master builders. Mr. Stephenson has been general organizer of the league, and the success which he has achieved is evidenced by the fact that there are 1500 members in the organization.

Law in the Building Trades.

RELEASE OF SURETY ON CONTRACTOR'S BOND.

Where a building contract provided that the owner, through his architect, might require alterations in the construction, arrangement or finish of the work, and that the expense of type change should be added to or deducted from the contract price, and that, if the difference could not be agreed on, the owner might employ another to make the changes, such provisions only authorized such changes as did not materially increase the cost of the work, and did not justify a change in the roof from shingles to slate, and the metal work from tin to copper, causing an increase of more than 10 per cent. in the cost of the building; and such change, made without the consent of the sureties, released them from liability.—Erfurth *vs.* Stevenson (Ark.), 72 S. W. Rep., 49.

LIABILITY FOR SUPERINTENDENCE IN ABSENCE OF SPECIAL CONTRACT.

Where it was alleged that the contractor had agreed to pay plaintiff a certain per cent. of the cost of the building, in consideration of his superintending the construction, and the defense was that there was a contract to pay a certain sum, which had been paid, and the Court instructed the jury that if it should find that the plaintiff believed the contract was on a per cent. basis, and the defendant believed it was for a certain sum, their minds had not come together so as to make a contract, and that if no contract was made they should award such sum as they should find the services to be reasonably worth was proper, as in effect telling the jury that if the parties had no agreement then there was no special contract.—Burton *vs.* Rosemary Mfg. Company (N. C.), 43 S. E. Rep., 480.

AGREEMENT TO FURNISH MATERIAL A BUILDING CONTRACT.

A transaction whereby a lumber dealer agreed to furnish finishing material according to the plans and specifications of the architect, that all material must be "thoroughly kiln dried, hand smoothed and scraped," was not a mere sale on inspection, but was in the nature of a building contract, obligating the dealer to furnish and deliver the material according to such plans and specifications.—Utah Lumber Company *vs.* James (Utah), 71 Pac. Rep., 986.

A PROMISE THAT NEED NOT BE IN WRITING.

The promise of the owner of a building to a material man who had supplied the contractor, and who was threatening to file a lien and take away the material not already used on the ground that the contractor was not responsible, to pay such bill and be responsible for all additional material, in consideration of the material man not putting on a lien, is an original promise, and need not be in writing, as it is not within the statute of frauds.—Cox *vs.* Halloran, 81. N. Y. Sup. Rep., 803.

DOORS AND DOORWAYS.*—VI.

By FRED. T. HODGSON.

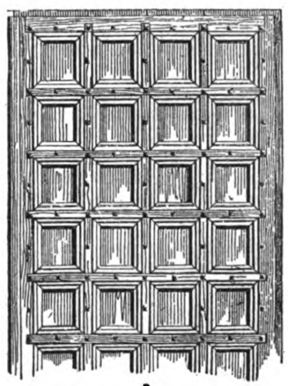
THE word 'door,'" says a witty writer, "is such a short one, and the object itself seems such a simple one, at first glance, that few persons would give it a second thought. But just insert the latch key of investigation in the subject, and at a touch it swings wide open, disclosing a long vista full of interest to the one who would enter. The mass of literature on the subject is enormous. Poole's index shows scores of magazine articles on doors, considered poetically and architecturally. The encyclopedias treat the subject exhaustively. Finally, the doors themselves have been treated on both sides; several large and finely illustrated volumes are devoted to 'doors,' hinges, fastenings and trimmings." The funny man, too, has had his quip regarding the "door," and the oldest story that has come down through the door of the classic "punch" of the past is of Diogenes of the tub. One of the favorite inscriptions over the Grecian door was, "None but an honest man shall enter here." Going to the house of a wealthy man, who in these days would be called "rapid," he hesitated at the entrance and, turning to a friend, asked wonder-eyed, "How in Jove's name does the owner get inside?"

The door of a house has been variously likened to a man's face—telling the character of the household; to the index finger of the right hand, which should point the way to all that is best and truest in a man's life; to the hour hand of the clock, which keeps time to the goings and comings of the family; to a letter of introduction, which admits to good fellowship if the one who waits on the outside is satisfactory to the master of the house, and to scores of other things, some of the comparisons being reasonable and pretty; others, far-fetched and unattractive.

Certain it is that a door may mean everything or nothing, its meaning depending not only on its architecture but on the eyes of the man who looks at it, his moods and his education. From the earliest doorway, shown in its simplest form here, through classic, ornate, conglomerate and now back to classic, is a long way, and the centuries are marked by doors of all degrees of beauty and hideousness, the ugliest doorways of civilization, it must be admitted, existing to-day in the United States. The most beautiful doors in this country are the bronze doors of the old Representative Hall, in the capitol at Washington. These were cast at Munich, Bavaria, and are covered with exquisitely designed historical and emblematical figures. The doors of many of our old Colonial buildings, also, are, after all, some of our best examples of honest art. The most celebrated examples of bronze doors in the world are those in the baptistry of the cathedral at Florence, Italy, by Ghiberti, and the doors of the Pantheon at Rome.

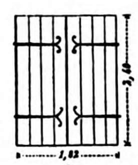
* Continued from December, 1903, issue.

Fig. 25.—Showing Ironwork on Door.



B

Fig. 26.—Half a Leaf of Door.



A

Fig. 27.—Inside of Door.

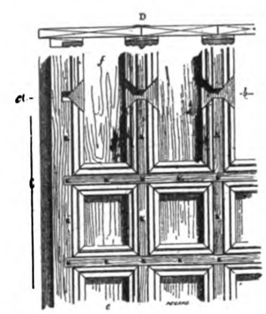


Fig. 28.—View Showing Panels Enlarged.

Doors and Doorways.

There are also a few fine examples of marble doors found in some of the old cemeteries abroad and in a few Belgian churches. Egyptian doorways, the best examples of which are found in the ancient monumental structures of gigantic proportions, are considered objects of great architectural importance.

The door shown in Fig. 25 is an example of the manner in which some doors were made in England in the fourteenth century. It is of oak, 2½ inches thick, nicely jointed together, with grooves in each edge of the inside planks, in which were inserted oak "feathers," with the grain at right angles to the grain planks. The whole was nicely fitted, glued up, and well clamped together, and the wrought iron hinges were so designed that each plank had five or six rivets through it, which also passed through the iron work of the hinges. These hinges were made heavy and strong, and were capable of sustaining a weight of several tons without showing any signs of distress. This example is taken from a church door in the city of Derby, England.

Doors made in France during the latter part of the eleventh and the commencement of the twelfth centuries were often quite rude, and were put together something similar to the one shown in Fig. 25; but the outsides were ornamented with wood instead of iron. A door of this kind, with leaves, exists in the church at Gannat, France, and is shown in Fig. 26. Each leaf is composed of eight planks with jointed edges, and to make it strong and prevent warping, the workmen placed on the exterior a wooden lattice, so as to form nearly square panels. The inside of the door is shown at A, Fig. 27, and the detail B in Fig. 26 gives the exterior of one-half of one leaf with its lattice. The section at D in Fig. 28 is taken on the line *a b*, and section E of Fig. 29 is taken on the line *e f* of Fig. 28. In G is a perspective of a joint of a rail, while F is a section of the meeting of the leaves. A nail with square diamond head is fixed at the center of each joint and on each rail and vertical midway between joints. These nails pass through the joints of the planks and have forked ends, that are clinched on each side, as shown at D. This work is firm, as it has remained in place since the fourteenth century; but it is not such a specimen of joinery as may be seen in the northern provinces at that time, and even earlier. The leaves of this door are supported by hinges spiked on the inside, as indicated at A. The wood work is of oak and is neatly wrought throughout.

Old church doors were sometimes nearly covered with ramifications of ornamental iron work, spreading from the hinges in marvelously equable, yet indefinable, designs. Sometimes their stout oak planks were studded with large nail heads, or bolts, similar to the doors shown in Fig. 30, which exhibits a door and doorway in Norton Church, Gloucestershire, England, and their locks and handles were always masterpieces of the smith's skill. The south doorway of Steetley Church is very ancient.

Around the semicircular door head is a series of large, long, sharp pointed bird beaks, pointing downwards toward the door, and round these beaks there are rows of zigzag ornament. The columniated jams are also carved with intertwined ornaments and animals of dim antiquity. The idea of arranging beaks or tongues to form an enrichment seems to have found favor in the old masons' eyes. In Kilkhampton Church there is a semicircular door head, very rich in zigzag moldings, that has a bead-like row of fox heads following the curve, with their tongues lying upon the molding below them; and in Morwinstow Church there is a variety of the same idea made by a mixture of animal and human heads, all ranged round a curved molding, with their tongues or chins lying upon it, pitifully quaint. Less striking than these, but still belonging to the early Norman period, is a door and doorway in Bucklebury Church, and another in Thatcham Church, with bead work, and a twisted variety of zigzag ornament marking the one and spiral enrichment of the columns distinguishing the other. These doors are in striking contrast to most of the doors and doorways made during the seventeenth century, one of which is shown in Fig. 31, this representing the entrance to a public hall, a porch covering the entrance and protecting the marble trimmings from the weather. This example is taken from a doorway in Fenwick Hall.

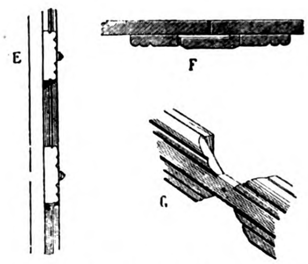


Fig. 29.—Details of Door Construction.

Fig. 30.—Studded Door in Norton Church, Gloucestershire, Eng.

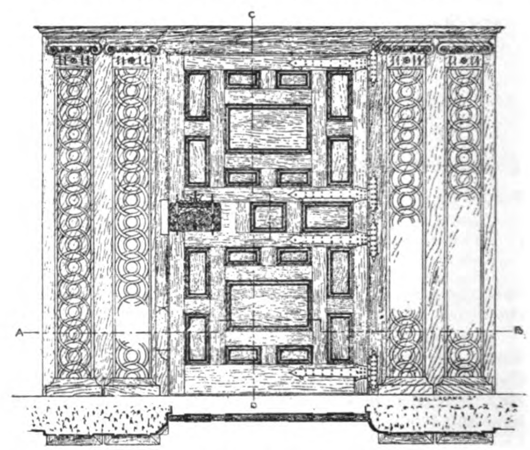


Fig. 31.—Elevation and Plan of Door and Doorway in Renwick Hall.

Doors and Doorways.

THERE are many differences to be observed in methods of construction employed in the Northwest, as compared with those in the East, says a writer in one of our exchanges. The severity of the climate in winter makes it necessary to give the occupants of buildings greater protection against the cold. Hollow walls and box construction for windows are prominent features. Houses are built as far as possible without projecting features, chimneys being kept inside the walls in order that as much heat as possible may be retained within the building. It has been found that a thin hollow wall is of greater service as a protection against cold than a solid wall, however thick. As during the period of frost there is little or no rain, no coping is required for brick walls and chimneys, and the exterior of buildings is not subject to disintegration by alternate thawing and freezing, as in a milder climate.

Protecting the Contents of a Building.

Before the Baltimore fire a fire proof building would have been defined as one in which all the structural steel was protected with at least 1 inch of terra cotta set in cement mortar, in which the amount of wood was limited to finish and the upper and under floor nailed to sleepers, and in which the exterior walls were faced with brick or terra cotta, says a recent issue of the ***Brickbuilder***. It would have been commonly stated by nine architects out of ten, at least, that a fire could not cause material damage within or without such a structure; that while it might catch from without and its contents be partially consumed, the fire would spread very little, if at all, from story to story, and each room would simply burn itself out without affording an opportunity for fires to spread through it to adjoining structures. Fire proof materials have abundantly demonstrated their ability to protect the steel frame and, used on the exterior of a building, to withstand a very considerable amount of heat without material damage. But from the point of view of the tenant who hires an office in such a structure, and tells his agent that because he is in a fire proof building he does not need to carry insurance on the contents of his offices, it is not enough to merely protect steel in which he has no personal interest.

The education of the country proceeds slowly. We have seen intelligent business men who have visited such ruins as to-day exist in Baltimore, and have come away with a freely expressed belief that because the contents were all consumed, therefore fire proofing involved a needless waste of money. That is thoroughly selfish, every man for himself and the insurance companies will pay the bill policy, which needs only to be stated to be condemned. The right way is to admit that in our large fires the fire proofing methods have never been able to do any more than protect the frame, and that therefore in all our congested business districts we simply must be more careful about the contents of our buildings. This is not an impossibility. It is a practical necessity which every man ought to be obliged to recognize. The owner and the insurance companies can make the frame, the structure and even the finish practically incombustible. It is the duty of the city authorities to insist upon the diminution of the fire risk by the elimination of inflammable contents, and their right to do so ought to be just as unquestioned as the right to prohibit the storing of gunpowder or naphtha.

LAYING OUT CIRCULAR ARCHES IN CIRCULAR WALLS.*—XVIII.

By Charles H. Fox.

We present in the accompanying illustrations an example of an arch with winding surface joints. As already explained, in treating upon the formation or generation of the joint surface, the plane surface joint is made normal to the center point of the right line element at the soffit which belongs to the joint considered.

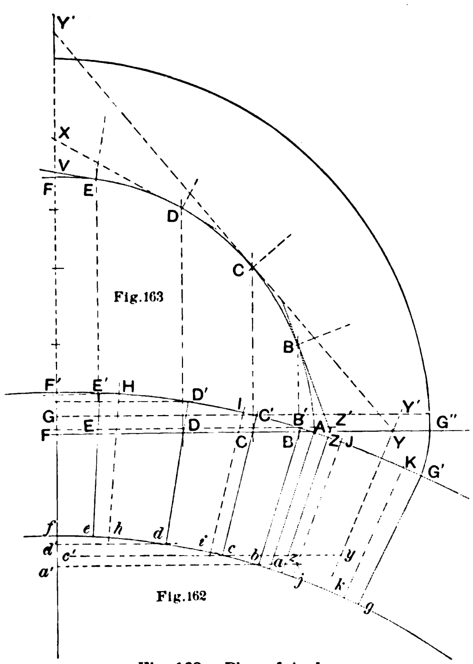


Fig. 162.—Plan of Arch.
Fig. 163.—Directing Curve Together with Tangent to Points as Given on Opening Line.

We will explain the projection of the normals with the points projected in C′ c, of the element C′ C c of Fig. 162. We may take C of Fig. 163 as the vertical projection of the element in question. First: In Fig. 163 erect the tangent Y′ C Y, then project C into the point C of the opening line of the plan, after which draw the radials C′ c and Y y. Parallel with the opening line draw through the points C′ c of the outer and inside face curves the right lines G C′ Y′ and c′ c y. Now in Fig. 164 set off a c, equal with the vertical hight C C of Fig 163; then make c, c C and a y Y, respectively, equal with G C′, c′ c, G Y′ and c y of Fig. 162; or set off a Y′ of Fig. 164 equal with F Y′ of Fig. 163. Now join Y′ C Y and Y′ c y, which gives the projection of the tangents to the points C′ c of the soffit. Square with these draw C h′ and c h, and the normals to the points in question may be obtained. In a similar

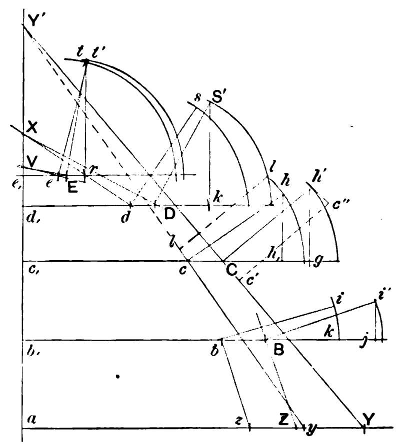


Fig. 164.—Developed Tangents and Normals to Points at Outside and Inside Face, at Soffit Elements Which Belong to Joint Surfaces.

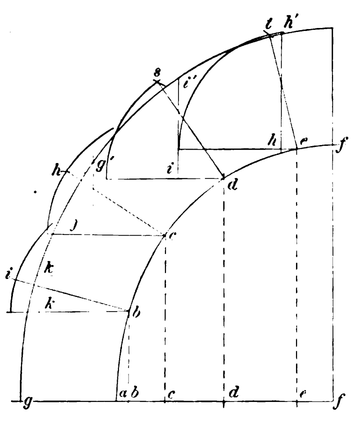


Fig. 165.—Developed Inside Face Molds.

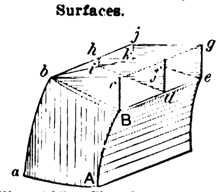


Fig. 167.—Showing Application of Triangular Twisting Rules at Joint Surfaces.

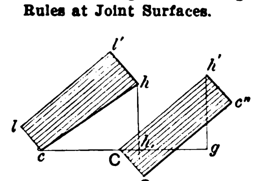


Fig. 166.—Developed Twisting Rules for Forming Joint Surfaces.

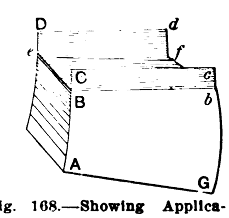


Fig. 168.—Showing Application of Twisting Rules of Fig. 156.

Laying Out Circular Arches in Circular Walls.

In the winding surface joint, now to be considered, the joint surfaces are normal throughout to the soffit surface, but for all practical purposes it will be sufficient to find the normals at the extreme points of the element of the soffit at the joint considered. The winding surface being a hyperbolic paraboloid having the horizontal plane which contains the element as its plane director and the normals just mentioned as its directrices, it follows if the direction of the directrices are obtained at the outer and inner faces of the stones, by applying a straight edge parallel with the element at the soffit, the winding joint surfaces will be readily formed.

manner the normals, &c., to the points B, D, &c., may be projected.

The normals are now transferred to their respective positions at the developed face molds, in the manner fully described for the like operations in preceding chapters. In Fig. 165 are shown the molds developed for the inside face, the construction of which is apparent from the drawing. We have shown, in Fig. 166, a simple method by means of which twisting rules may be constructed to give the direction for forming the winding surfaces of the joints. A separate rule is required at each joint, but the one set of templates will give the direction for forming the adjacent joint surfaces of two stones—that is, the template projected for the surface C *h* of Figs. 164 and 165 gives the direction at which to form the joint surface of the top of No. 2 and the lower surface of No. 3 stones. In Fig. 166 make the angles *g* C *h* and *h*, *c h*, respectively, equal with that of the corresponding angles of Fig. 164. Then parallel with C *h'* draw C, *c''*; now set off *c l* equal with C, C, and parallel with C *h'* draw *l l'*. The parallel rule, C, C *h' c''* may be made use of at each joint surface, but a separate diverging rule requires to be projected.

In applying the rules at the cutting of the joint surfaces, one important point requires to be noted. In their application to the top joint surfaces, the wide end of the diverging rule will be placed to the exterior surface in the manner shown in Fig. 168; while in their application to the under joint surfaces the position will be reversed—that is, the wide end of the diverging rule must be placed to the soffit surface.

In the manner above directed, by drawing parallels with B *i'*, D *s'*, &c., may the twisting rules as required to give the direction of the "twist" at the joint surrfaces in question be projected. In Fig. 167 is shown the application of triangular rules, which give the same result in practice as that obtained with the templates of Fig. 166. The templates of Fig. 167 are given in the angles *j* B *i* of the outer and *j b i* of the inside, as given in Fig. 164. By this method a separate rule is required both at the front and back surfaces of each joint.

SOME COMMENTS ON SMOKY CHIMNEYS.

THE question of smoky chimneys is one which has provoked no little discussion in the trade press, and various have been the remedies suggested for overcoming the difficulties of which complaint has been made. At a recent meeting of the Liverpool Architectural Society one of the papers presented was that of Hastwell Grayson, in which he dealt with the subject in a way to prove highly interesting to readers in this country. We present herewith some extracts from his paper, which was printed in the "Journal" of the Royal Institute of British Architects:

"The principle of a flue is simple. Smoke consists of warmed air charged with particles of matter, either wholly or partially consumed. The warmth makes it lighter than the atmosphere, and therefore smoke rises by the easiest way, which should be up the flue. The trouble begins when the flue is imperfect, inadequate, or when other forces are at work counterbalancing the natural tendency of the smoke to rise. Failure may show itself in two ways—there may be a steady down draught or the upward draught may be so sluggish that puffs descend occasionally. The first is more usual when the fire is just lighted or nearly out. In either case the nuisance may be accentuated by wind or the absence of it.

The chief cause of smoky chimneys is the lack of air supply at the base. A cubic foot of fresh air must be provided for every cubic foot of smoke that passes up the chimney. The Royal Commission on the Ventilation of Factories, after making experiments, ascertained that an ordinary fire in an ordinary room sent 4000 cubic feet of smoke up the flue per hour, and that, after hermetically sealing the windows and doors, the same flue drew 3000 cubic feet per hour. Before seeing this fact quoted I had made some personal observations of the smoke discharged through the chimney pots above an office building; it seemed to me that the velocity was 5 feet a second in still weather. As the diameter of the flues was about 7 inches, the volume of smoke discharged would be 4500 cubic feet per hour, or equal to the capacity of a room 15 feet broad, 25 feet long and 12 feet high. I do not believe that in a substantial building 3000 cubic feet of air per hour could be produced with windows and doors hermetically sealed, unless the air came down one-half of the chimney and the smoke went up the other half. It is well known that buildings with thick walls and fireproof floors, such as blocks of flats or offices, are most liable to down draught. These blocks have great numbers of fires lighted daily. They have very few outside doors, and a special effort is made in them to keep the windows and internal doors draught proof.

In a comparatively small office building, with the only entrance protected by heavy swing doors, there may be 30 or 40 grates in constant use, every one of which should have its 4000 cubic feet of air per hour. This supply is impossible unless special means are adopted to provide it. In an air tight building time is often the architect's ally; for every minute settlement and every infinitesimal shrinkage provides an additional air inlet. But biuldings specially constructed should have special ventilation. Even then some flues will smoke, because tenants persist in closing up the inlets. Warmed fresh air is almost unprocurable. Architects, therefore, can only supply fresh air from the outside, and trust that the tenants will use the inlets. But tenants, more often than not, consider fresh air a draught and ventilators an unnecessary fad. Air inlets are least objectionable when near the ceiling, as that position allows the fresh air partially to lose its chill before reaching the occupants of the room; high inlets are also useful as outlets, when the fire is not lighted. The best form seems to me to be in a grating at the side of a chimney breast into a flue that finishes just above the roof, with cast iron gratings on opposite sides. A contractor who has built many offices once advised me to have doors very close fitting at the floor, but very easy at the top, and with the rebate of the frame cut well back. By doing this a concealed inlet can be provided 3 feet long by ¼ inch deep, equal to 9 square inches. This device has extra value when the hall or corridor is warmed.

For years, when opening the front door on a winter evening, it puzzled me to find out what became of the immense volume of chilly air which came rushing in; 200 or 300 feet entered per second, but the house seemed able to absorb it indefinitely. The answer is that the flues drew up a greater quantity, and the cold, heavy air from the outside drives the lighter air in the house out by every ventilator and crevice that was acting as an inlet before the door was opened.

Given an air supply, the next consideration is the flue. The majority of architects and builders feel certain that a 9 x 14 inch flue is much too large; and the proportion is stupid. The opening at the junction of the grate and the flue is seldom 36 square inches, and often much less. Chimney pots vary in area from 40 to 60 square inches. A 9 x 9 inch flue can be more thoroughly cleaned, and works well enough.

Chimney pots have this in common: the more efficient the uglier; but the reverse is not as true as potmakers would have us believe. Pots with the ordinary zigzag rim cause an up draught much as the V in the body of a kite forces it up. Louvres, trumpet mouths, spirals and many other horrors force up the smoke when the wind blows; but even an Archimedean revolving cowl or a lobster back is useless in still weather. Trumpet mouthed blowers or drain pipes with the socket outward, built into a stack at an angle of 45 degrees a few feet below the pot, will sometimes cure a flue that is only troublesome when the wind is in one particular quarter.

The value of at least two bends is always insisted on in specifications, but in practice the bands are often scamped, and are difficult to provide in the attics, especially when the fireplace comes between other flues. The reason for the undoubted advantage of bends is not obvious. The contraction which is usual in making them may have something to do with it; they may act slightly as baffle plates, and, of course, the top bend catches the rain and helps to keep the lower part of the flue dry; probably under various atmospheric conditions all these reasons may have at least some truth in them.

The hight of the chimney stack is of the greatest importance; but again the reason is not obvious. When the wind blows at right angles to the ridge, the velocity must be greater nearer the ridge, and probably steadier. When the wind is not at right angles to the ridge, I cannot see how it can affect the flue. If the straightness of the flues in the chimney stack above the roof helps the force of the smoke, it is curious that bends should be useful below. There can be no appreciable difference in temperature of atmospheric pressure at the top of two flues, one of which is 5 feet higher than the other; yet we know that 5 feet extra hight to a stack may work wonders. That it is advisable to keep a flue warm is more obvious, for as soon as the smoke approximates in temperature to the atmosphere its tendency to rise is lost. All outside stacks should have 9 inches of brickwork between the flues and the weather. Single flues should be avoided, and above the roof it is better to have 9 inches of brickwork on the most exposed side and end, even if there is only 4½ round the rest of the chimney.

The plan of a stack and the direction of the wind seem to have no connection. A chimney much exposed to a west wind is just as likely to be satisfactory with its axis north and south as east and west. It is better to have the middle pots in a long stack raised a little above those at the ends, but the flue at the leeward end is just as likely to draw well as that at the windward.

We frequently hear it stated that on account of other buildings, trees or mountains, the wind is deflected and rushes down vertically on to some unfortunate flue and drives the smoke back to the grate. That argument, I believe, is generally false. A strong wind acts on the principle of an hydraulic jet pump, or one of those little sprays for fixing a pencil sketch. It drags after it the air on the lee side of an obstruction and tends to create a vacuum. If the air that replaces it comes from the inside of the building the chimneys will smoke. A vacuum is especially likely to occur in a *cul de sac,* or an area with buildings on all sides. Take an oblong building with an area, and the block on one side rather lower than the others. If a strong wind blows directly on to the low roof, it will bound on to the high one and create a vacuum in the area. Should the gust be prolonged, air will rush out through the crevices in the walls and windows and transfer the vacuum to the rooms. It was found in an important Liverpool building designed on these lines that the flues on the floor level with the bottom of the area smoked, but none of the others. Most buildings are not so fortunate, as a vacuum generally sucks impartially from all rooms round the area. An air trunk through the bottom of the low part of the building, in some convenient place, would probably allow the vacuum in the area to be filled direct from the street and save the down draught.

Fitness in Architecture.

If we would perceive in what manner the principle of fitness has given rise to the various members of architectural composition, we have only to refer to the remains of Egyptian monuments as the most venerable for remote antiquity; remains which, while they display the exemplars of classic taste, afford a grand picture of the power of art when even emerging in its simplicity from primitive rudeness. Looking back through these to the first invention of column and entablature, says a writer in the London *Architect,* we see the builder of the pristine temple adopting in the construction of his ponderous supporting masses somewhat of a cylindrical form, so that his pillars shall present no angles to impede the way, arranging them in a row and giving them such a hight as his unpracticed judgment may deem calculated to afford a covering of sufficient loftiness for the area to be inclosed, having first insured their stability by giving them that expansion at the lower extremity for which he would hardly need to seek an example from nature in the spreading root of the tree or the widening base of the rock.

In thus forming his line of columns he finds their distances from each other necessarily limited by the length in which he may have been able to procure blocks to lie upon and connect their summits. Hence his intercolumniation becomes fixed at a lofty proportion since his columns must rise to the hight of a spacious avenue or chamber, while they remain confined as to relative distance by the nature of the material which they have to sustain. These columns being raised, he places on the head of each a cubical block, the top of which, by being left square, may afford a broader bed to the superincumbent mass, while its lower side is reduced to a circular form corresponding to that of the shaft, and hence a simple capital. This done, he proceeds to connect the top of each to that of its neighbor by a series of blocks laid horizontally, of a depth and thickness nearly equal to the upper substance of the columns, forming thus his epistylium or architrave.

Before, however, any space can be inclosed, the whole operation must, of course, be repeated (unless the equivalent of a wall be adopted) by the erection of another line of columns behind the former, with similar capitals and epistylia, and the only part of the task then remaining is to form a covering across from one line to the other by means of large slabs of stone of depth suited to their surface, and which, being allowed to overhang the rest of the work, will extend the area of shelter and preserve the rest of the masonry from the effects of the weather, thus becoming a kind of cornice.

In these parts, therefore, without any attempt at decoration, we obtain upon the first and most obvious principle of constructive fitness and constructive expression an order of architecture; rude, indeed, but complete in all the members used in Egyptian practice, which did not exhibit anything perfectly analogous to the remaining portion of the Greek entablature, the frieze.

New Publication.

Carpentry and Building Series of Designs. By various architects. Size 9 x 13 inches. Bound in paper covers with attractive side titles. Published by the David Williams Company, 232 to 238 William street, New York City. Price per volume, $1, postpaid.

The active demand for back numbers of *Carpentry and Building* containing designs of attractive dwellings of varying cost and arrangement has exhausted the editions of the paper so rapidly as to render it expedient to put the more desirable designs in such shape as to be hereafter readily available to a very large class among our readers interested in house arrangement and construction. To this end we have carefully compiled the more attractive designs which have appeared in these columns during the recent past and now offer them in a series of four volumes as enumerated below and covering a range of cost calculated to meet nearly every requirement in the way of inexpensive homes. In a great majority of cases the drawings relate to houses already erected, some of them, however, consisting of designs awarded prizes in the recent competitions conducted under the auspices of *Carpentry and Building.* In connection with the designs are presented half-tone engravings showing the appearance of the completed structures. Accompanying the elevations, floor plans and miscellaneous constructive details, all drawn to convenient scale, are brief specifications, thus rendering each design complete in itself and affording the practical builder a substantial basis for carrying the work of construction to a satisfactory conclusion. A feature which cannot fail to be appreciated by the architect and builder is the fact that the various designs presented in the several volumes constitute a series of studies which will be found especially desirable to have conveniently at hand to exhibit to home seekers and prospective builders.

No. 1. Cottage Designs with Constructive Details.

This volume consists of 25 designs of cottages, ranging in cost from $600 to $1500, together with details of interior and exterior finish, all drawn to scale and accompanied by brief specifications. The illustrations are made up of 53 full-page plates of floor plans, elevations and details.

No. 2. Low Cost Houses with Constructive Details.

This, the second in the series, consists of more than 25 selected designs of cottages originally costing from $750 to $2500. There are 61 full-page plates of floor plans, elevations and details, all of which are drawn to convenient scale and accompanied by brief descriptive particulars, while in many instances there are given full specifications and detailed estimates of cost.

No. 3. Modern Dwellings with Constructive Details.

In this volume are to be found a carefully selected list of 20 designs of artistic suburban dwellings erected in various sections of the country and costing from $2000 to $5000. The illustrations are made up of half-tone reproductions of photographs of the completed structures, together with 61 full-page plates of elevations, floor plans and details. The selection affords the enterprising architect and builder an excellent series of studies, all of which are presented in such shape as to render them a basis for practical work.

No. 4. Suburban Homes with Constructive Details.

This, the last of the series thus far issued, comprises 20 designs of attractive suburban houses ranging in cost from the neighborhood of $3000 upward. In this, as in the previous volume, the illustrations consist of half-tone reproductions from photographs of the completed buildings, together with 75 full-page plates of plans, elevations and details, all drawn to convenient scale, and accompanied by extracts from the specifications.

Pilasters and Columns.

Pilasters must not be regarded as imitations of columns, as they owe their origin to the necessity of giving more solidity to the walls of the cella (the part inclosed by walls, and sometimes called naos) of Grecian temples, in which they were originally used merely as supports, without either base or capital. Subsequently, in order to give pilasters more elegance, as well as to ornament the walls of the cella, a base and capital were added to them, differing, however, from those of the columns with which they were connected. The Romans were the first who gave the same base and capital to pilasters as those of the columns behind which they were placed, says an English building journal, and modern architects have not only followed this practice, but have given them the same proportions, ornaments, names, &c., as are given to the columns with which they are associated. The Romans frequently entirely detached the pilasters from the wall against which they were placed, and as frequently employed them without any columns being placed before them; they have also used them in a variety of ways in connection with insulated columns. In some of the best modern examples pilasters have their bases, capitals and entablatures the same hight as those of columns; but, while the proportion is the same as regards the hight of capitals, the breadths are different, and the development of the form of a pilaster gives a greater space to each of its faces because it is quadrangular.

Building Bungalows.

The tendency in Southern California as to the better class of residences is toward the Bungalow type, which is now very popular in towns outside of Los Angeles and at the seaside resorts. The bungalow has characteristics all its own, which recommend it to the dry and sunny regions of Southern California. It is a wide roofed, low eaved building, preferably of one story, with lots of porch room, low large windows and usually antique trimmings. Inside it must first and always have a wide hearth—two or three of them are better. The ceilings are low, the fixtures odd, the colors dark, cool and pleasant, and the furniture plain. The houses cost from $1800 to $7500, according to the number of rooms, but more particularly according to the interior and exterior finish.

Paint for Outside of Dwelling Houses.

A writer in one of our exchanges, discussing the best paint for the exterior of dwelling houses, suggests that if the house has not been painted before a first coat or priming of pure white lead be used, either plain or tinted, to suit the taste, and with pure raw linseed oil for a thinner, and not over 5 per cent. turpentine dryer added. This is to be rubbed well into the wood and allowed to stand at least three days before the second coat is applied. For new work it is best to have three coats, and for the third and last coat a mixture of four parts white lead, by weight, to one part of zinc white, colored to suit the fancy, and thinned again with pure raw linseed oil and not over 5 per cent. japan drier. Should it be decided to use prepared paint, let the first or priming paint be pure lead and have the prepared paint used as second and third coats, following directions on label.

If the house has been painted before see that the surface is thoroughly dusted and every loose particle of old paint removed; touch up where needed and have the surface repainted with either two coats of pure lead tinted with color, or have two coats of prepared paint applied.

THE 1904 prospectus of the Workingmen's College, Melbourne, Australia, which has just reached us, is a publication of 132 pages, profusely illustrated and giving full details regarding the work of the institution. The college provides instruction by means of both day and evening classes, to both men and women, in a large number of subjects, including mathematics, engineering, commercial subjects, metallurgy, chemistry, architecture, art and applied art household economy, music and manual training. An important feature of the institution is the trade school, in which classes are held in plumbing and gas fitting, carpentry, carriage building, sheet metal working, machinists' work, blacksmithing, metal founding, printing, sign painting, &c. Completely equipped work shops are provided and materials are furnished by the college, but pupils find their own hand tools. The course in the trades named covers three years, and the fees charged are merely nominal. The total number of students enrolled on the books of the college in 1903 was 2182, of whom 464 were females.

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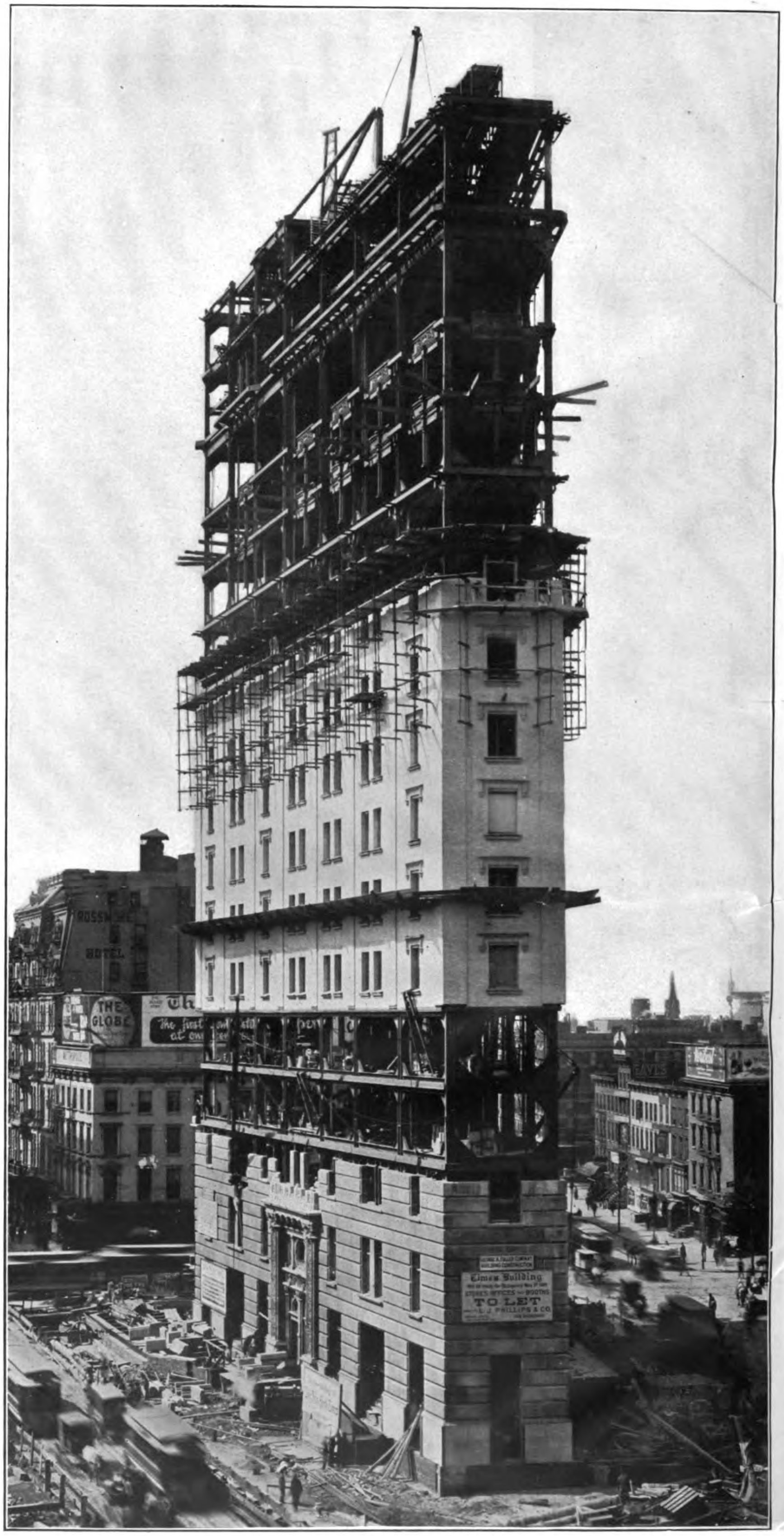


THE "NEW YORK TIMES" BUILDING AS IT APPEARS IN PROCESS OF ERECTION.

CYRUS L. W. EIDLITZ, ARCHITECT.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS

232-238 WILLIAM STREET, NEW YORK.

AUGUST, 1904.

New Trinity Office Building.

The visitor to the city who is interested in building construction cannot fail to be impressed with the massive character of the iron work which forms the substructure and the first few stories thus far erected of the new office building which is rising on the site of the old Trinity Building in lower Broadway, adjoining Trinity Churchyard. The effect is all the more striking by reason of the fact that the frontage on Broadway is only a trifle over 41 feet, while the depth on Thames street varies from 260 to 264½ feet, the frontage on Trinity Place being 47.3 feet. In constructing the foundations 50 caissons, of which all but 18 were of steel, were sunk by the pneumatic process to bed rock nearly 85 feet below the level of the curb. The building when completed will be 20 stories and basement in hight, not counting the six-story towers which will surmount it at each end, thus making a total elevation of 27 stories measured to the tops of the domes. The *façade* will be of granite at the basement story and limestone above, the architectural design being modified Gothic to harmonize with Trinity Church, which for many years was a landmark of the Metropolis and an object of deep interest to visitors from all parts of the country. The steeple of Trinity Church was in fact a measure of hight with which, as the years went by, the newer buildings of the city were compared, but at the present day many of the more important office buildings, seeming as they do to almost pierce the clouds, render the church tower insignificant in comparison. The new Trinity Building, of which Francis H. Kimball of 71 Broadway, New York City, is the architect, will be fitted with all the various plants necessary to the comfort and convenience of the tenants, and will have a row of ten rapid transit elevators inclosed in a corridor hall, access to which will be from a spacious vestibule opening from the main entrance on Broadway. The contract for the work is held by the George A. Fuller Company, and the estimated cost of the building is placed at $1,250,000. It is interesting to note in this connection that the site on which the new structure is being erected was occupied by the old Trinity Building for a period of 50 years, it having been put up in 1853 from plans prepared by Richard Upjohn, who was also the designer of Trinity Church.

Electricity in the Household.

As electricity is being so widely used in industrial operations and experimental electrical cooking and heating apparatus are being freely exhibited, it is not strange that many engaged in household work should look to this agent for a similar relief to that enjoyed in other fields. Some of the foremost electrical engineers have devoted no small amount of time and research along the lines of implements for doing household work, so far as the heating is concerned, with electricity. Unfortunately, as yet, the use of electricity is governed entirely by the cost, and for many of the uses to which it could be put with advantage to the housekeeper, it is out of the question, owing to the great expense involved in its employment. As electric radiators are used for heating cars, it would seem that where the electric wires run into a building to supply light it would be but a small matter to use electric radiators, with all the attending convenience for heating; but the all important factor of dollars and cents still constrains the average householder and building owner to rely upon the old methods of heating. The daily papers frequently discuss methods of heating water for bath and other purposes by means of electricity, showing how the wires from the ordinary lighting globe have only to be connected with some special apparatus to insure a current that can be turned on until the water has reached the desired temperature. In this last point, however, lies the whole trouble. To heat any considerable amount of water by electricity requires more time than to accomplish the same amount from the gas jet or by other methods that are not only more familiar, but more satisfactory, as they are quicker, to say nothing of being infinitely cheaper. One of the latest ventures on the part of electrical manufacturers is the production of a baking oven, designed for use where electricity is available, as in large hotels, restaurants, &c. The principal advantage claimed for this device is that the oven can be maintained at any temperature desired, steadily, without fluctuation and continuously. Here again, however, the all important feature of cost must be taken into consideration. Doubtless, in many of the hotels and restaurants where the patrons are willing to pay 40 cents for a chocolate eclair which can be purchased in a light lunch buffet for 5 cents, the electrical oven may be used. It is probable, however, that, so to speak, the *chef*, in the average kitchen, will continue to "stew in his own grease," with the charcoal, coke or coal fire to do his cooking and baking, at least until the cost of electricity and the keeping of the apparatus in order, to say nothing of its first cost, comes down to the level of the cost of coal and coal burning apparatus. That there is a cleanliness and convenience attending the use of electrical heating and cooking apparatus is one of the strong inducements for the public to utilize them, and for the electrical engineers to continue their endeavors to surmount the all important barrier of dollars and cents, and, in view of the advances made in other fields in recent years, none but a confirmed skeptic would feel confident that the convenience and pleasure to be secured from the use of electrical household apparatus are still a long way off.

A New Apartment House.

One of the latest improvements in that section of New York City known as Central Park West will be a 12-story apartment house, 204½ x 100 feet in area and having a frontage extending from Seventy-third to Seventy-fourth street. The plans have been prepared by Clinton & Russell of 32 Nassau Street, and call for a fire proof structure with exterior walls of Indiana limestone and light cream colored brick, with copper roof and ornamental bronze doors and balconies. The cost of the building is estimated at $2,000,000. It will contain four suites on each floor, the number of rooms varying from

8 to 14. There will be six elevators, as well as electric plant, steam heating plant, ice plant and all other modern improvements. A special feature will be a carriage driveway in the rear running from street to street. In the center the driveway will lead around an ornamental fountain, flower garden, &c. This is in line with the main entrance of the building and is separated only by glass and bronze partitions, the effect being very artistic, whether approached from the driveway or from the front.

Quick Work on a Chicago Bank Building.

One of the supplemental plates which accompanied the June issue of this journal showed the method employed for expediting the foundation work for the new section of the First National Bank Building now in process of erection in Chicago, Ill., in accordance with drawings prepared by architects D. H. Burnham & Co. of that city. The erection of the superstructure has gone rapidly forward, and in placing the steel frame in position a record has been made as regards the time consumed in doing the work. The first column was set April 15, and on June 15 one of the last tiers of the roof columns at the northwest corner of the building was put in place. Deducting Sundays, holidays and days when weather prevented work, 45 days intervened, during which time about 4500 tons of steel were erected, making an average of 100 tons per day. Some days as high as 250 tons were erected. The work was accomplished by a force of about 75 men, working 8 hours and 40 minutes to the day, under the personal supervision of Charles Volkmann of Charles Volkmann & Co., who had the contract, and Otto Klein, his superintendent. The working force was divided into a crew for each of four derricks, followed by a bolting gang, in turn followed by a gang who put in the small iron work.

All the steel for the building was delivered in Chicago before the work was begun and stored in a yard leased for the purpose at Twelfth street, where the material was sorted into piles according to floors for expedition in hauling. The steel work had to be hauled piece by piece from this yard a distance of 2 miles through the downtown streets to the building site and hoisted outside the building by means of derricks, two of which are boom derricks, with 70-foot booms, working on the new section, while two others worked either from the roof of the completed section or used columns of the old section for mast.

The new building, known as Section B of the First National Bank, occupies a plot 115½ x 202 feet in area and is 18 stories in hight. These stories are as follows: Basement story, 14 feet; bank story, 31 feet 8 inches; third story or gallery floor, 15 feet; fourth to fifteenth stories, each 12 feet 11 inches; sixteenth story, 12 feet 9 inches; seventeenth story, 11 feet 9 inches; eighteenth story or attic, 14 feet 2 inches. The steel work is supported by the following columns: Basement to bank floor, 42½ feet; bank and gallery floor, 46 feet 8 inches; fourth to fourteenth stories, each 25 feet 10 inches; sixteenth story to roof, 38 feet 8 inches. The columns for the bank floor weighed about 12 tons each. Some of the girders used were of exceptional size, notably the plate girders supporting the walls of the court in the center of the building, which are 60 feet 6 inches in length, 6 feet high, weighing 19 tons each.

When the building is completed the two sections combined will afford a floor area of 202 feet on Dearborn street and 242 feet on Monroe street, making it the largest office building as regards floor area in the City if not in the world. Section A, which is now occupied by the First National Bank and by offices, was completed last June, the same contractor setting the steel on that section in about four months. The steel for Section B aggregates about 500 tons, while that for Section A was nearly 7000 tons, making a total of about 12,000 tons for the whole building. The steel was furnished by the Carnegie Steel Company. The First National Bank will occupy the bank floor of the whole building, and the basement floor will be occupied by the First Trust and Savings Bank and their safety deposit vaults.

The work is noteworthy from the fact that no serious accident has occurred during the construction of the building. Riveting was done by hand, the joints in the four lower stories being riveted, while those of the upper stories were secured by bolts.

A California Residence.

(*With supplemental plate.*)

We present as the basis of our supplemental plate this month a very striking example of a Southern California residence, with surroundings which strongly suggest a tropical climate. The noticeable features of the dwelling are the *porte cochere* and bay windows, with their battlement effects, the colored tile roofs, the quaint dormers and the elevated observatory which surmounts the tower at the front of the building. The picture is presented as illustrating a type of residence to be found in the locality of Los Angeles and Pasadena, Cal., where also the "mission" style of architecture is very popular.

Architecture of Small Buildings.

A writer in one of the daily papers, who is a close observer of things, expresses the view that New York's small-shop architecture is adapting itself picturesquely to its purposes. A low building of the kind known as a "taxpayer," has been built on an uptown corner in the style of an old Dutch edifice, and its unusual architectural features are not only an ornament to the neighborhood, but have proved attractive enough to rent all the shops and offices before the building is finished. Another new shop intended for a special kind of business is built in imitation of an old English house, with the white wood work of its dormer windows facing the street. A house devoted to the sale of articles in the style of the Colonial period is an admirable reproduction of a building of that era. All these unusual edifices are in the same region, to which they add unusual picturesqueness.

Specifications for Tin Roof in Montana.

The subject of specifications for tin roofing has been treated from various points of view in recent issues of *The Metal Worker, Plumber and Steam Fitter*, and in the course of the discussion, a correspondent of that journal in Montana sends the following suggestions for standard specifications for a tin roof in his state:

Brick Mason.—Lay brick on fire wall at least two courses above roof at lowest step. The tinker will find a way to flash it.

Carpenter.—Use all boards and lumber from scaffolding and mortar boxes, and finish out with green fir. Needn't be particular about joints. If one corner hits the joist that will be sufficient; the tinker will do the rest. Needn't size the lumber. If one board is only ½ inch thicker than the next that will be good.

Tinner.—"Use the best Old Method tin, 14 x 20, squared all around," laid on tar paper, so you can't see where the cracks and knots are. Paint on the underside, and be sure to daub and smear the other side well. Lose the cleats down a handy chimney, and put about three nails through the sheet, leaving half of the large heads exposed. "Use best half and half solder, 5 pounds to the square." "Solder with the heel of the iron and soak in well." Don't forget to leave your irons in the fire up to the handles while you take a pull at the growler; then solder the remainder of the roof with a red hot iron, because the solder won't flow without it. "Counter flash with the same kind of tin," and drive plugs and old nails in the cracks; the wind will soon blow it away, and you or some one else will get a job of repairing.

Paint.—Leave the roof unpainted until the elements remove the rosin from the seams, then get some cheap but "strenuous" roof artist to put on only the best asphaltum and tar mixture procurable in any market, which will preclude any possibility of repair, and you will have a modern Montana roof!

COMPETITION IN "DOUBLE" OR "TWIN" HOUSES.

THIRD-PRIZE DESIGN.

We take pleasure in presenting to the consideration of our readers the drawings awarded the third prize in the competition in "double" or "twin" houses, the author being John P. Kingston, architect, of 518 Main street, Worcester, Mass. The specifications of the labor and materials required in the erection and completion of the house, as furnished by the author, are to the following effect:

Excavate the cellar as per plans and make trenches for bed stones, piers and other places required by the drawings. The stone work to be sunk below cellar bottom, as shown. The materials taken from cellar to be graded up around the building, with loam, &c., evenly spread over the top as directed.

Foundations.—Furnish, build and fit in place all materials to complete foundation work, as follows and as shown, in first-class manner.

To be built of local flat stone, with footings well bedded below cellar bottom. To be laid up dry, with inner face even and well bonded with through stone, and all joints trowel pointed. The wall to be 18 inches thick. Make footing for center wall, chimneys and piers as shown.

Mason Work.

Furnish, work out and fit in place all materials to complete the brick, lath and plaster work as follows, and as shown, in first-class manner.

The brick work to be done as shown with good hard red brick, all laid up in lime mortar, with exposed parts colored dark red. The chimneys to have rough opening and heart for fireplace and thimble in cellar, kitchen and middle chamber. To be lined and have brick cap cemented on top.

The fireplace to have iron linings, damper, tile facings and hearth.

The underpinning to be 12 inches thick, with air space, and one course to extend up between joist.

The center wall to be 8 inches thick.

The studding of center partition to be filled between from first floor to rafters with brick 4 inches thick.

Lathing.—Lath all the parts with good spruce lath, and to be laid about ⅜ inch apart. All to be well nailed to each and every bearing. To be carried down to lining floors on outside walls.

Plastering.—The walls and ceilings of the entire building where finished to be plastered with two coats of best lime mortar. To be well worked into the lath and smoothed up in best manner. Fill plastering down to lining floors on outside walls and well up to grounds and beads. The work to be done true and straight.

The exposed parts of brick and stone wall in cellar to have a coat of whitewash.

Cellar Concreting.—The whole of cellar floor is to be concreted 2 inches deep, composed of one part Portland cement and three parts coarse sand, floated off true and even while fresh.

The mason is to clean up all his rubbish and he is to assist the other mechanics employed in the building wherever his help is necessary, and is to do all cutting and jobbing required without extra charge, and leave all perfect.

Carpenter Work.

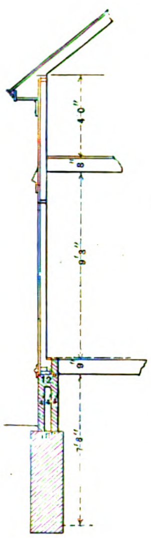
Furnish, work out and fit in place all materials to complete the following carpenter work, as shown, in first-class manner: The framing work is to be done in usual manner for such a building. The timber to be spruce or hemlock and of good merchantable quality. The sills to be made of 2-inch plank; girders in cellar, 8 x 8; first floor joist, 2 x 9; second floor joist, 2 x 8; third floor joist, 2 x 6; exterior wall studs, 2 x 4, with double plates; partition studs to be 2 x 4 and 2 x 3, all set not more than 16 inches on centers; hips and valleys, 2 x 9; furring for ceiling, ⅞ x 2 inches, put on 16 inches on centers. Rafters to be 2 x 5-6, 24 inches on centers.

Put beads on all corners and three-quarter grounds at all openings and bottom of all partitions to plaster against.

Floors to be bridged with 1 x 2½ inch stock.

Inclosing Boards, &c.—The walls and gables to be covered with No. 2 planed ⅞-inch matched hemlock boards, nailed with two nails to each bearing.

Boarding for Roofs and Bottom Floors.—The roofs and lining floors to be covered with ⅞-inch planed spruce



Section.

Front Elevation.—Scale, ⅛ Inch to the Foot.

Competition in "Double" or "Twin" Houses.—Third-Prize Design.—John P. Kingston, Architect, Worcester, Mass.

or hemlock boards. Those for floors to be laid close and well up to all openings and corners. Those for roofs to be laid open not more than 2½ inches, nailed to each bearing with at least two nails. Those for rear between gables where tinned to be laid close.

Clapboarding.—The side walls of first story to be covered with 6-inch cypress clapboards, laid not more than 4½ inches to the weather.

Side Shingles.—The gables and parts shown to be shingled with California red cedar shingles, laid not more than 5 inches to the weather, well nailed, with joints even on bottom.

Paper.—The side walls and lining floors to be covered with good quality of sheathing paper, well lapped before any finish, clapboards or side shingling are put on. Do all flashing necessary.

Roof Shingles.—The roof to be shingled with 18-inch sound clear cypress shingles, put on to show not more than 4½ inches to the weather, with at least two nails to each shingle. Valley to be laid open with 14-inch painted tin. Ridge to be covered with 6-inch pine saddle boards and a 2-inch three-quarter round on top.

Cellar and Piazza Supports.—The girders in cellar to be supported on 6 x 6 chestnut posts, and piazza to be supported on 2½-inch pipe and cap.

Bulkhead.—To be done with proper frame, finished on top and sides. To have sheathing covers hung with three heavy hinges and proper fasteners. Steps and stringers to be of 2-inch, and risers ⅞-inch spruce. To be a plank frame at bottom of steps, with cleat doors, hung and fastened in proper manner.

Cellar Work.—To be done with studding and matched boards.

Exterior Finish and Trimmings.

Furnish, work out and fit in place all materials to complete the outside finish work as follows and as shown, in first-class manner.

To be made from well seasoned pine or cypress lumber. Piazza floors to be hard pine, 6 inches wide. Ceiling to be done with cypress sheathing. Finished piazza work as per detail. Steps to have ⅞-inch risers, 1½-inch treads and 2-inch stringers. Do all flashing about frames, finish, &c., to make the job complete.

Frames.—The cellar windows to have plank frames and 1¼-inch pine sash. Frames above cellar to have 2-inch stools, ⅞-inch jambs and casings, with ¾ x 1½ inch molding around outside of casings. To have pockets finished, sash pulleys and grooved for 1⅜-inch sash.

Sash.—The frames to be fitted with 1⅜-inch pine double sliding lip sash, glazed with No. 1 glass, well fastened and puttied in place, and to be well fitted in frames and hung and evenly balanced with weights and cord. All bottom lights to be double thick.

Blinds.—All windows above basement to be fitted with best pine blinds, hung in proper manner.

Exterior Doors and Frames.—Frames to be made of 2-inch pine, with hardwood thresholds, casings and moldings.

Front doors to be No. 1 cypress, 1¾ inches thick, flush molded, with No. 1 double thick glass in top part.

Rear doors to be 1¾ inches thick, of cypress, with glass as shown.

Interior Finish and Trimmings.

Furnish, work out and fit in place all materials to complete the inside finish work, as follows and as shown, in first-class manner:

All to be worked out from good, clear, sound, kiln dried stock, to be sand papered, and put in place in good, workmanlike manner, and put on after all plastering is done.

Finish in the several parts to be as follows:

The halls, parlors and dining rooms in birch, the kitchens, pantries and entries in cypress, and all the second floor in white wood.

Door Jambs.—To be 1⅜ inches thick. Cased openings and sliding doors, 1 inch thick; all set plumb, level and true.

Doors.—Slide doors to be 1¾ inches thick, hung to roll at top with trolley rollers and track.

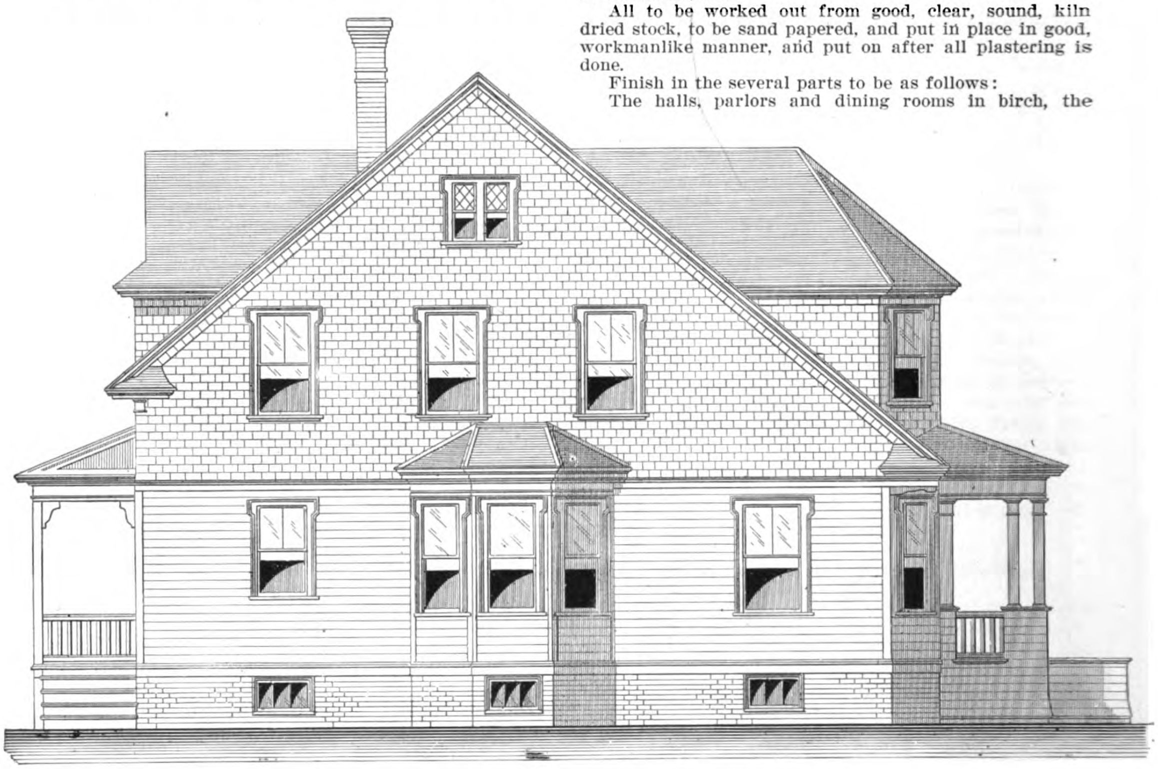
Other doors to be 1⅜ inches thick, five panels. Vestibule door to have glass same as front door.

Door and Window Trimmings.—The halls, vestibules, parlors and dining rooms to have 4¾-inch casings, 1 x 5 inch header, with molding around, and the second floor to have 4½-inch casings and corner blocks. The remaining parts to have 4½-inch side casings and 1-inch molded header. Stools to be ⅞-inch thick, rebated to rest on outside stool with ⅞ x 4 inch molded aprons. Window stops to be 5 inches thick, with molded edge, sides put in with screws, tops nailed in.

Base and Molding.—Each room not sheathed to have a 9-inch base. The vestibules, front halls, parlors and dining rooms to have molding on top of base.

Sheathing Wainscot.—The kitchens and entries to be wainscoted 3 feet 4 inches high, bathrooms 4 feet high, with narrow beaded sheathing.

Plate Rail.—The dining rooms to have a plate rail about 6 feet from floor to top. The outside member to return onto casings.



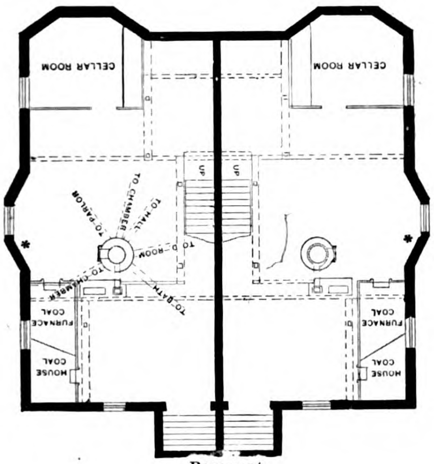
Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

Competition in "Double" or "Twin" Houses.—Third-Prize Design.

Cornice Molding.—The dining rooms to have a cornice molding as shown.

Closets.—To have narrow base and casings, with two rows beaded wardrobe strips, with coat hooks and one shelf.

Finished Floors.—The finished or top floors in vestibules, front halls, dining rooms, kitchens, entries, second story halls and bathrooms to be ⅞-inch smoothly worked matched birch or maple flooring. Top floors in other parts to be square edge, smoothly worked spruce. All top



Basement.

Tanks.—To be a 30-gallon tank made and placed in attics, and supported in proper manner. To be lined by the plumber.

Stairs.—The stairs to be built as shown on plank stringers, accurately cut to the required dimensions for risers and treads, and firmly secured in place. To have 1⅛-inch treads grooved together and base into risers. Front stairs to have twisted newel post, 4 x 4 angle post, 1½-inch twisted balusters and 2½ x 3¾ inch hand rail.

Attic to have a closed flight made of whitewood, with 4 x 4 posts, 2 x 3 hand rail, and 1-inch round balusters around well hole in attic.

The cellar stairs to be built of spruce, with guard rail.

Bells.—To be a small electric bell in kitchens, to ring from front door.

Hardware Trimmings.—All doors, windows, drawers, closets, shelves, &c., to have proper butts, locks, knobs, catches, fasteners, stops, &c., as selected by the owner. There will be $100 allowed in estimate for this.

Wall Decorations.—The vestibules, halls, parlors, dining rooms and chambers are to have side walls covered with wall paper, with picture moldings. There will be $125 allowed in estimate for this. The remaining walls to be painted by painter.

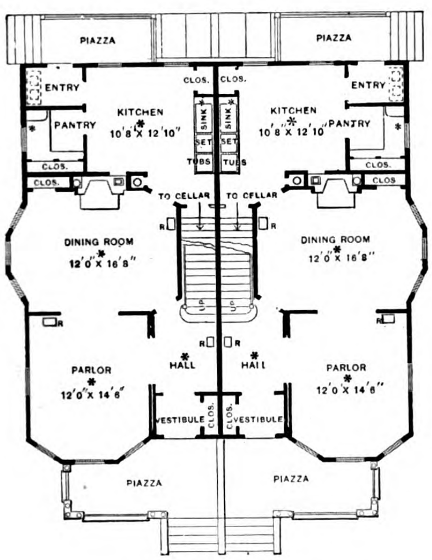
Heating Apparatus.

Furnish and set up in each cellar one No. 18 Kelsey warm air generator, with proper size galvanized iron cold air box, and heavy tin pipes to conduct the hot air to each room marked. The pipes going through floors or partitions to be properly protected with asbestos paper and tin. Each outlet to have a black japanned register with border. There will be allowed $350 in estimate for this work.

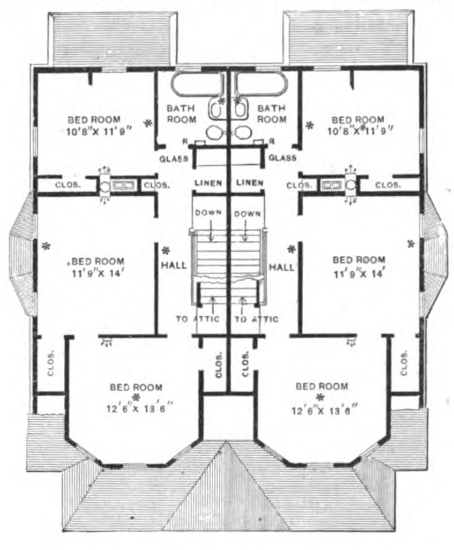
Painter's Work.

Furnish and put on the materials to complete the painting work as follows, in first-class manner:

Outside Work.—All the exterior work, except otherwise specified, to be painted with two coats of pure lead



First Floor.



Second Floor.

Competition in "Double" or "Twin" Houses.—Third-Prize Design.—Floor Plans.—Scale, 1-16 Inch to the Foot.

floors to have paper under and put down between base.

Linen Closets.—To have four shelves at one end and wardrobe strips on wall space.

Sinks and Trays.—To be sheathed up under, with two small cleat doors and case of drawers. Backs to be 12 inches h'gh, with 6-inch shelf on top. To have drip shelf.

Pantries.—To have counter shelf, with case of three drawers under.The remaining part closed in with beaded sheathing and cleat doors, over to be four shelves 12 inches wide. The part shown to be closed in with sheathing and to have two cleat doors.

Closet in Dining Rooms.—To have a case of four drawers and shelves over.

Mantels and Shelves.—The dining rooms to have mantel with mirror, as per detail.

Each kitchen and bathroom to have small shelf on brackets.

Bathrooms.—To be fitted up for open work.

Medicine Closets.—The closet off halls to have small case of drawers and four shelves.

and linseed oil and turpentine, all colors to please owner.

Side Staining.—The shingles on gables, &c., to have one coat of pure linseed oil stain and one coat of linseed oil.

Inside Work.—All interior work must be well cleaned before any finish is put on. All nail holes and other imperfections well puttied, matching wood as near as possible.

Floors.—The hardwood floors in vestibules, front halls and dining rooms to have a coat of alcohol shellac, sand papered, and a coat of floor finishing wax. The floors in bathrooms, pantries, kitchens, entries and second story halls to have a coat of oil and turpentine and a coat of floor varnish. The closet floors to have one good coat of paint.

Finish.—The halls, vestibules, parlors and dining rooms to have one coat of orange shellac and two coats of varnish, the last coat to be rubbed a little with pummice stone and oil.

The work in kitchens, pantries, entries, &c., to have a coat of primer and filler and two coats of varnish.

Rooms on second floor to have three coats of paint. The closets to have two coats of paint. The bathrooms to be painted enamel white.

Walls.—The walls of bathrooms, kitchens, pantries and entries to have a coat of sizing and two coats of paint.

All work to be done so as not to hinder or interfere with other workmen in any particular. All finished floors must be protected with paper at all times. No work to be done except in best weather, and all the work must be delivered to owner complete in every particular.

Plumbing.

To be a 4-inch cast iron soil pipe, with a running trap inside of wall, with fresh air inlet and hand hole. To brass bath cocks, chain, stay and plug, complete, all nickel plated.

Sinks.—To be a 20 x 36 x 5 inch beaded iron sink, with outlet. To have two arm brass compression bibb cocks.

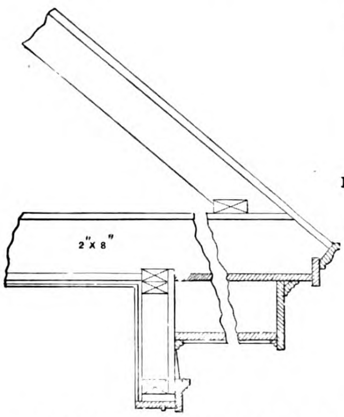
Trays.—To be soapstone, of regular size and pattern, with soap dishes and brass outlets. To have two arm brass compression bibb cocks.

These fixtures to be supplied with cold water through ½-inch standard size brass water pipe, and hot water through ½-inch brass tubing pipe branches.

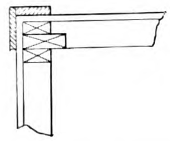
These fixtures, except water closets, to waste through 1¼-inch lead branches and 4-inch round trap, with trap screw caps, connecting to iron soil pipe with lead connections.

Boilers.—Fit up in closet near chimney a 30-gallon copper hot water boiler, to rest on iron stand. To have all necessary couplings, sediment cock, stop cock, complete. To be supplied with water through ½-inch 2-pound per foot lead pipe.

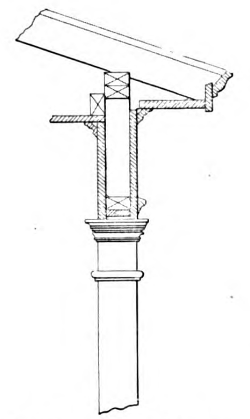
Tanks.—Fit up in place in attic and line with 20-ounce copper the two 30-gallon tanks made by carpenter.



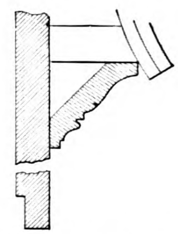
Details of Main Cornice.—Scale, ½ Inch to the Foot.



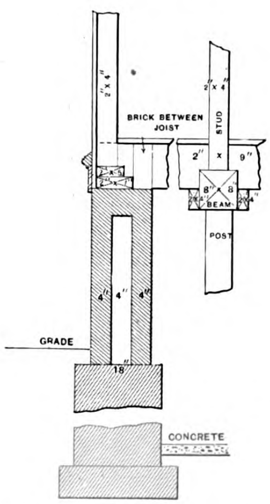
Detail of Corner Boards —Scale, ½ Inch to the Foot.



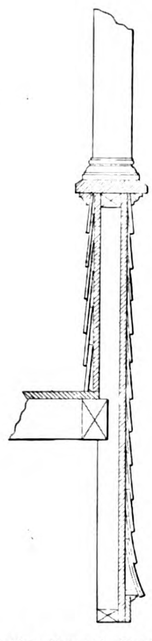
Details of Piazza Cornice.—Scale, ½ Inch to the Foot.



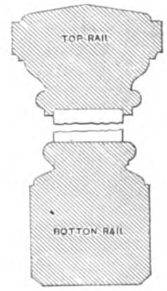
Detail of Belt Course—Scale, 3 Inches to the Foot.



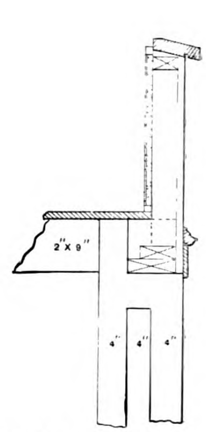
Section through Foundations.—Scale, ⅝ Inch to the Foot.



Section through Front of Piazza.—Scale, ½ Inch to the Foot.



Sections of Top and Bottom Rails of Piazza Balustrade. —Scale, 3 Inches to the Foot.



Detail of Water Table.—Scale, ½ Inch to the Foot.

Competition in "Double" or "Twin" Houses.—Third-Prize Design.—Miscellaneous Constructive Details.

be continued along to and under fixtures up through at least two feet, and flashed tight at roof with three pounds sheet lead. To have all necessary Y branches, bends, offsets, &c., to connect the several fixtures to. All branch joints to be made and calked with oakum and molten lead, well driven in and properly calked.

Closets.—To be all earthenware, syphon jet bowl, with copper lined, beaded finished tank properly supported. To have hardwood double seats. Supply from tank to be 1¼ inches, and to tank ½-inch brass pipe and fittings, with vent pipes, chain and pull. To have good valve, ball cock and float complete. To be properly trapped and have necessary vents. All exposed parts nickel plated.

Bowls.—To have marble slab resting on N. P. brackets, with a 14 x 17 inch white earthenware bowl properly clamped to same. Back to be 8 inches high, ⅞ inch thick, of marble, fastened to sheathing with round head screws. To have approved brass basin cocks, chain, stay and plug complete, all nickel plated.

Tubs.—To be 2½-inch roll rim porcelain enamel iron bathtub, 5 feet long, of regular pattern. To have double

To be supplied with water through ⅝-inch 2½-pound lead pipe, good ball cock and float complete, with shut-off in cellar, to overflow into nearest practicable place with ¾-inch lead pipe.

Supplies.—To be branches from cellar, one each, of bathrooms and kitchens of best ½-inch standard size water pipe, with stop and waste for each in cellar.

Cellar Supply.—The main supply in cellar to be best 1-inch galvanized iron water pipe, with stop inside cellar wall.

Connect all supplies and sanitary wastes to service pipes to street according to city or town rules.

Gas Piping.

Pipe the house for gas in usual manner, according to city, town or company rules, and to be inspected and tested before any lathing is done. All pipe to be well secured in place with iron clips and screws, and all outlets to have caps.

Incandescent Lighting.

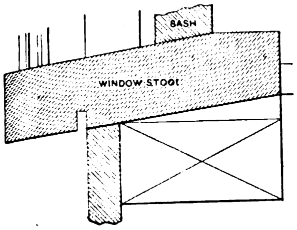
All outlets marked for gas to be wired for incandescent lighting. Installation to be according to the rules of the Insurance Exchange. Fittings and fixtures to be on approved list issued by National Board of Fire Underwriters. To be wired for two-wire system, and wires run as what is known as porcelain work. To be wired for 16 candle-power lamps, 104 volts. All the work to be done in best manner. Materials to be the best of their several kinds. The work to be done so as not to hinder or delay other workmen.

Detailed Estimate of Cost.

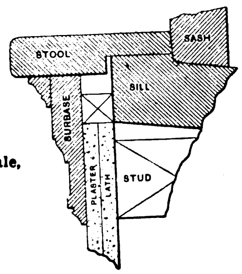
The detailed estimate of cost, as furnished by the author, is as follows:

CELLAR WORK.

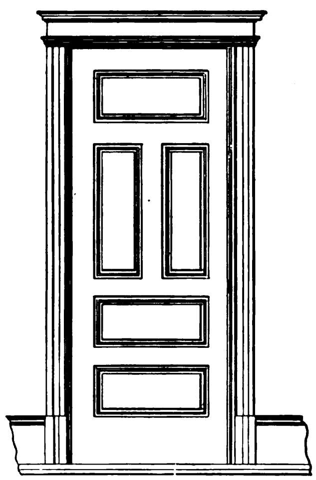
199 yards excavating, at 27 cents	$53.73
84 perch stone (16½ feet), at $1.75	147.00
	$200.73



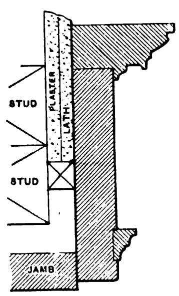
Section through Window Sill.—Scale, 3 Inches to the Foot.



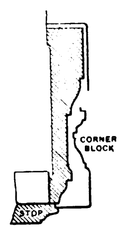
Detail of Window Stool and Apron.



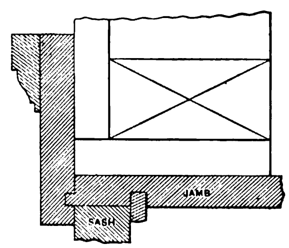
Elevation of Doors.—Scale, ⅜ Inch to the Foot.



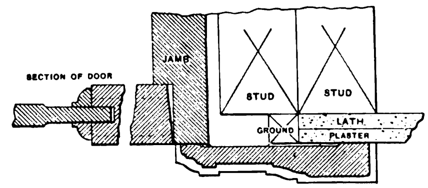
Head Casing in Principal Rooms.



Side Casing on Second Floor.



Section through Window Frame.



Side Casing in Principal Rooms on Main Floor.

Scale, 3 Inches to the Foot.

Outside Finish, Frames, Doors, Sash, &c.

Outside finish and moldings	$162.16
Front veranda finish and floors	65.00
Rear porch finish and floor	46.00
Outside steps	17.00
4 door frames, at $2.50	10.00
2 front doors, birch, at $9	18.00
2 rear doors, cypress, at $5	10.00
8 frames and sash for cellar, at $1.50	12.00
39 frames, sash, weights, cord and blinds, at $5.25	204.75
Incidentals	35.00
	$579.91

Inside Trimming, Doors, &c.

1,829 feet soft wood top floors, at 24 cents	$43.89
1,626 feet hard wood top floors, at 40 cents	65.04
16 birch frames, at 90 cents	14.40
10 cypress frames, at 80 cents	8.00
22 white wood frames, at 70 cents	15.40
40 sides birch finish, at $1.15	46.00
24 sides cypress finish, at $1	24.00
42 sides white wood finish, at 80 cents	33.60
2 birch slide doors and hangers, at $12	24.00
2 birch vestibule doors, with glass, $4.50	9.00
8 single birch doors, at $3	24.00
10 cypress doors, at $2.65	26.50
22 white wood doors, at $2.50	55.00
245 feet birch base and molding, at 7 cents	17.15
425 feet white wood base, at 4½ cents	19.12
750 feet sheathing for wainscoting, at 4 cents	30.00
160 feet cap band, at 2 cents	3.20
112 feet cornice molding, at 4 cents	4.48
60 feet plate rail at 5 cents	3.00
2 pantries, at $8.25	16.50
2 dining closets, at $6.30	12.60
Closet shelving and cleats	8.00
Stair work	78.00
2 mantels, at $28.50	57.00
Incidentals	40.00
	$677.83

Competition in "Double" or "Twin" Houses.—Third-Prize Design.—Miscellaneous Constructive Details.

BRICK AND PLASTER WORK.

22,900 brick, at $14	$320.60
Chimney trimmings	49.00
Material for the two fireplaces	30.00
1,055 yards plaster and lath, at 27 cents	284.85
149 yards concreting, at 68 cents	101.32
Whitewashing cellar	9.00
	$794.77

TINNING AND FLASHINGS.

160 feet tinning work, rear roof, at 8 cents	$12.80
Flashings and valley tin	15.00
	$27.80

CARPENTER WORK.

Frame, Boarding, Shingle, Clapboards, &c.

15½ M framing timber, at $20	$310.00
2,368 roof boards, at $17	50.25
4,600 bottom floor boards, at $17	78.20
2,984 feet T. & G. boards for inclosing, $20	59.68
Plaster grounds and beads	8.50
160 feet sheathing for slide doors	4.80
6 M feet paper for walls and floors, at 1½ cents	9.00
19 M cypress roof shingle, at $5.50	104.50
11 M side cedar wall shingle, at $4.75	52.25
1,100 feet cypress clapboards, at $50	55.00
Cellar entrance work	20.00
Iron pipe for veranda supports	8.00
Incidentals	35.00
	$795.18

MISCELLANEOUS.

Carpenter labor	$975.00
Nails, screws, &c	36.50
Trucking	43.00
Painting	265.00
Plumbing, including water and sewer connections	550.00
Gas piping, including connections to street	45.00
Electric bell work	9.00
Heating apparatus	350.00
Wall decorations	125.00
Hardware trimmings for doors, windows, &c	100.00
Incandescent wiring	40.00
Lighting fixtures	75.00
	$2,613.50

RECAPITULATION.

Cellar work	$200.73
Brick and plaster work	794.77
Tinning and flashing	27.80
Frame, boarding, shingle, clapboards, &c	795.18
Outside finish, frames, doors, sash, &c	579.91
Inside trimmings, doors, &c	677.83
Miscellaneous	2,613.50
Total	$5,689.72

The builders' certificate is signed by F. C. Johnson, contractor and builder, Worcester, Mass.

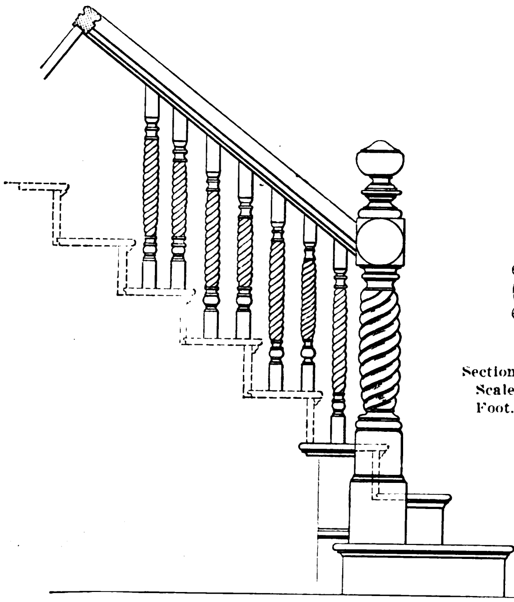
A FIRM of Pittsburgh builders is about putting up 100 houses in the Twenty-third Ward, to cost $175,000.

Selection of Architects for United Engineering Building.

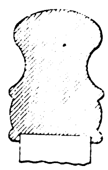
The Conference Committee of the three national engineering societies and of the Engineers' Club, charged with the responsibility of giving effect to the gift of Andrew Carnegie of $1,500,000 for the erection of two buildings in New York City suitable for their respective purposes, has reached an important stage in its work, and this week has made the selection of architects for the respective structures. It was the expressed wish of Mr. Carnegie that the competition should be a mixed one, so that in addition to selecting six competent architects the committee threw the work open to all comers and provided a prize scheme to compensate the best competitors of the open class. Since the middle of June the committee has received 26 complete sets of competitive plans for the two buildings, inclusive, comprising over 500 drawings, and with the assistance of Prof. W. R. Ware, as expert adviser, has spent a good deal of time in the consideration of these designs, all of which, of course, were submitted anonymously. The conclusions now reached are unanimous, and are approved by the professional adviser.

The successful competitor for the United Engineering Building is Herbert D. Hale of Boston, with Henry G. Morse of New York as associate architect. Mr. Hale is a grandson of Edward Everett Hale and has done a large amount of public architecture in New England, and has constructed some Carnegie libraries, besides doing a very considerable amount of work for the New York shipbuilding Company. The successful competitors for the Engineers' Club are Whitfield & King of New York, who have done a large amount of work in New York City, and on various Carnegie libraries, and were also associated in work on the buildings of the Pan-American Exposition. The designs of this firm were also among those favorably considered for the United Engineering Building, awarded to Mr. Hale. The successful competitors in the open class for equal prizes of $400 each, in addition to Mr. Hale, are Trowbridge & Livingston of New York, Frank C. Roberts & Co., with Edgar V. Seeler, associate, of Philadelphia, and Allen & Collins of Boston.

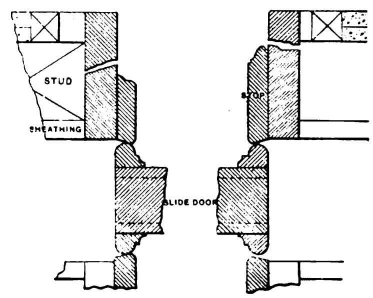
Details have already been made public as to the nature of the two buildings, which will require for construction from $1,100,000 to $1,200,000. The United Engineering Building will occupy land 125 feet front by 100 feet on West Thirty-ninth street, while the club, with a frontage of 50 feet and a depth of 100 feet, will face on Bryant Park and the new Public Library. The United Engineering Building, aside from quarters for the American Society of Mechanical Engineers, the American Institute of Electrical Engineers and the American Institute of Mining Engineers, as well as other societies enabled to participate in the accommodations, will have several fine auditoriums and a magnificent library. The club building will be about 11½ stories high, with the usual accommodations of a club and some 60 or 70 bedrooms for members. The work on tearing down the old buildings and the construction of the new is to be pushed vigorously and will begin forthwith.



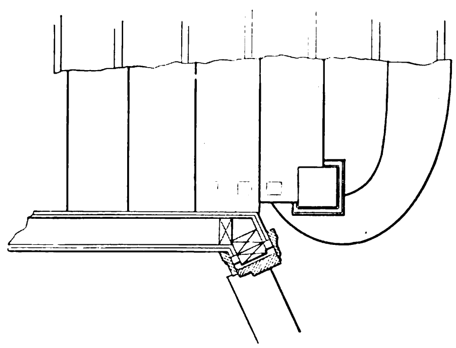
Elevation of Main Stairs.—Scale, ½ Inch to the Foot.



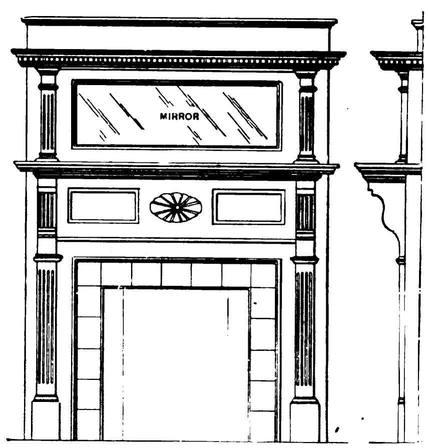
Section of Hand Rail.—Scale, 3 Inches to the Foot.



Details of Sliding Doors and Frame.—Scale, 3 Inches to the Foot.



Plan of Stairs.—Scale, ½ Inch to the Foot.



Elevation and Section of Fire Place and Mantel.—Scale, ⅝ Inch to the Foot.

Competition in "Double" or "Twin" Houses.—Third-Prize Design.—Miscellaneous Constructive Details.

A BRICK library building, to cost in the neighborhood of $10,000, is about to be erected in Penn Yan, N. Y., in accordance with plans drawn by Architect Albert R. Ross, of 552 Fifth avenue, New York City.

CONSTRUCTING AN ELLIPTICAL STAIRWAY.*

BY MORRIS WILLIAMS.

THE first riser is placed in the center of the newel post and the remaining 22 risers equally spaced along the curve of the center line of rail and also around the wall string. The first few steps are slightly curved, but all the others are straight and equal in form and size.

It may be well to observe here that the arrangement of tangents as exemplified in this diagram may be modified. If instead of having the rail made in six portions it is desired to have it made in three or four, the plan tangents would have to be arranged to meet the changed conditions.

In Fig. 8 such an arrangement as would be required under such modified conditions is shown. Referring to the diagram, let it represent the plan of the center line of rail and tangents when it is desired to construct the rail in three portions. In the treatment of the tangents the first consideration is the location of the two joints as at C and F. Draw the tangents C X square to C N and the tangent F X square to F P; continue X C to the point B and X F to G. Now to find the exact length of the tangents C B and F G it will be necessary to draw the pitch line of the tangents C X and X F, as shown in Fig. 9. In this figure draw the ground line C X F, and on F erect the line F F′, making it equal to the hight of 12 risers, which is the number of risers between the joints C and F in the plan. Draw the pitch line of tangents from F′ through X′ to C. Note that the distances from C to X and from X to F on the ground line represent the lengths of the plan tangents taken from C X and X F in Fig. 8.

To find the length of the tangent F G in Fig. 8 make F M of Fig. 9 equal to the hight of four risers, which is the number of risers contained in the plan, from the joint F to the landing floor line. Make M G′ equal to the distance determined upon for the landing rail to stand above the floor line. The hight from F to G′ represents the total hight the rail will rise from joint F to the landing rail. From G′ draw line G′ Z parallel to the pitch line of tangents F′ X′ C, as shown. The line Z F on the ground line, Fig. 9, will be the exact length of the plan tangent F G, as shown in Fig. 8.

It will be observed that by this process equal pitch is obtained for the two pieces of wreaths—namely, the piece that covers the distance between the two joints C and F, and the piece that covers the distance from joint F to the joint H, which connects the wreath with the landing rail. The length of the plan tangent C B in Fig. 8 is found by similar process. The length of the tangent B A in Fig. 8 is made equal to B C, so also is the length of tangent G H made equal to G F.

The face line of the newel post is made square to the tangent B A and, as shown, parallel with the radius A N of the curve that forms the center line of rail. The joint at H is made square to the level tangent H G and parallel with the radius H P of the curve of the center of rail. The portion of the landing rail that connects with the upper wreath is ramped, as shown, to conform with the elliptical curve of the plan rail.

The plan is now completed and is shown in Fig. 8 to be composed of three blocks, of which 1 and 3 are in plan exactly alike. In elevation they will differ to some extent, in that Block 1 will have its bottom tangent level or incined, as the case may be, while Block 3 will have its top tangent level. Both these blocks are designated acute angle blocks, owing to the angles between their tangents being acute. Block 2 is shown to be reverse, the angle between its tangents C X and X F being obtuse. It is therefore known as an obtuse angle block. It differs from the other two also in the fact that its two tangents are inclined, and, as shown in Fig. 9, their inclination equals the inclination of the inclined tangents of the other two blocks.

The necessity for uniformity in the inclination of all the inclined tangents is evident when we consider the relation that exists between the tangents and the joints. Take either joint C or F in Fig 8, it will be seen that it is made square to the tangent. Here the face of the joint is shown, but as the side of the joint is made square to the face of the plank it is obvious that the face of the plank in each connecting wreath must be uniform—that is, it must have the same inclination. Otherwise the joint will not be a true butt joint.

What is meant by "face of plank" in wreath construction is the inclination of the plane upon which the wreath rests in its ascent over the span it covers, and it is the tangents that determine the inclination of such planes. Hence the necessity for uniformity in their inclinations where two tangents of separate wreaths are to be jointed together.

When developing the face molds we shall take occasion to explain this more fully, but will now proceed to draw the face mold for each portion. Referring to Fig. 10, let A B C N represent the outlines of Block 1 in Fig. 8 and A C the center line of rail. First determine the hight of the point C″, which in this case is equal to that of five risers. Connect C″ with B, thus determining the inclination of the tangent over B C of the plan. The tangent B A of the plan is assumed in this case to be level, and

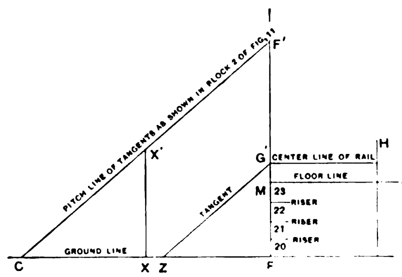


Fig. 9.—A Method of Finding the Correct Length of the Two Upper and Two Lower Tangents.

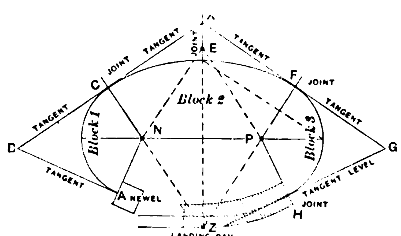


Fig. 8.—Plan of Center Rail and Tangents for an Elliptical Rail Construction in Three Sections of Wreath.

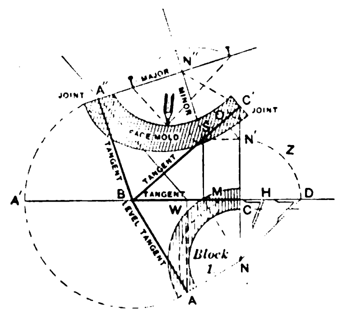


Fig. 10.—Diagram Showing Development of Block 1 of Fig. 8.

Constructing an Elliptical Stairway.

* Continued from July Issue.

it will therefore be a level tangent after it is developed.

From the point A and square to the plan tangent B C draw the line A W. Now from W and square to the inclined tangent B C' draw W A". Now revolve the bottom plan tangent B A, as shown by the arc A A' A" to A" and connect A" B, which will represent the bottom tangent developed into the face mold. Its position in its relation to the upper tangent B C' determines the angle between the tangents in the face mold. Make the joint at A" square to the tangent A" B and the joint at C' square to the tangent B C'.

So far we have developed the tangents and determined the joints of the face mold. It is now required to draw the form of its curve—that is, to develop the plan rail. From N, the plan center, draw the line N M parallel with the level plan tangent A B. On M erect M S. From S draw S N" parallel with the tangent A" B and make S N" equal to N M of the plan. In this case S N" will be the minor axis and N" A" the major axis. The curves may now be described by either of the methods already explained in connection with Figs. 2, 3, 4 and 5, thus completing the face mold for the bottom portion of the wreath.

It is further required to find the bevels that are used to twist the wreath, and by the method here presented they can be found with but very little trouble, although

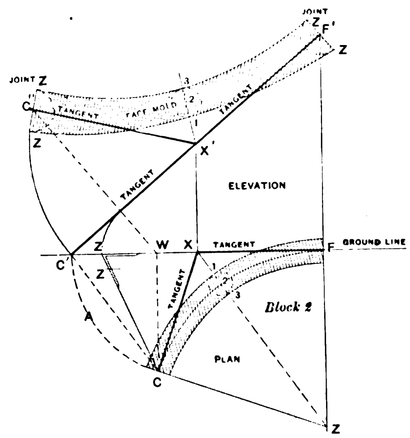


Fig. 11.—Face Mold for Block 2, as Shown in Fig. 8.

Constructing an Elliptical Stairway.

the finding of bevels is considered the most intricate problem in hand railing construction. The bevels as found are shown at H and D, respectively. Bevel H is shown to be composed of the upper angle of the triangle N C H and bevel D the upper angle of the triangle N C D. The base of both triangles is here shown to be the radius of the plan center of rail as at N C. The altitude of bevel H is taken from N' O, which is a line drawn square to the inclined tangents C' B from point N'. The altitude of bevel D as shown by the arc N' Z D is equal to the hight of point N' from C.

The hypotenuse of the triangles is determined by connecting H with N for the triangle N C H, and D with N for the triangle N C D. It is to be understood that this method of finding the bevels is applicable to all conditions of wreath construction and that in the opinion of the writer it excels all other methods in its simplicity as well as in its universality.

We will now take up the development of Block 2 in Fig. 8. Referring to Fig. 11, let Z C X F Z represent the plan of the block taken from Fig. 8, the bottom tangent being represented by C X and the upper tangent by X F. Both tangents will have the same inclination.

To find the inclination of the tangents it is required to know the number of risers the wreath is to span in its ascent from the joint C to the joint F, as indicated in Fig. 8. In this case it is 12 risers. Therefore fix the point F' of Fig. 11 at a hight above point F equal to the sum of 12 risers. Revolve the bottom plan tangent C X to the ground line, as shown by the arc C A C'. Connect C' with F', and this line will indicate the inclination of the two tangents.

From C draw C W square to the ground line. From W draw W C" square to the pitch line of the tangent C' X' F'. Revolve the point C to C" and connect C" with X', which will be the bottom tangent, as required in the face mold.

The angle C" X' F' between the two tangents in this position is the angle required between the tangents in the face mold to be utilized in squaring the joints as shown at both ends C" and F'. To draw the inside and outside curve of the mold make X' 1 2 3 equal to X 1 2 3 of the plan, thus establishing 1 and 3 as the points in the curves of the mold. At the ends of the mold place the distance Z Z, taken from the bevel on each side of C" and F', respectively. Now take a thin lath which will bend so as to touch the points Z 3 Z for the inside curve and to touch the points Z 1 Z for the outside curve, thus completing the face mold for the second piece of wreath.

(To be continued.)

The Consistency of Concrete.

Comparatively few experiments have hitherto been made upon wet and dry concrete, and owing to the lack of data on the subject, says a late issue of the *Stone Trades Jounral*, a series of experiments have recently been conducted upon 45 6-inch cubes made with three percentages of water and broken in a testing machine at the ages of seven days, one month and three months. The quantities of water used were: For dry concrete, 6 per cent.; for medium concrete, 7.8 per cent., and for wet concrete, 9.4 per cent., and the proportions of material used were one part cement, three parts sand and six parts broken stone. The dry concrete was about as moist as damp earth; the medium concrete would not quake in handling, but when well tamped water would flush to the surface, and the wet concrete quaked in handling and would bear only slight tamping. At the age of three months or more wet concrete is stronger than either dry or medium concrete. When recently set, medium concrete gives the greatest strength, thus showing that wet concrete acquires its strength more slowly than drier mixtures. In breaking the cubes it was found that the wet concrete was distorted more than the dry before failure occurred, thus proving the existence of greater elasticity. By using a rather wet mixture a compact mass could be obtained with comparatively little tamping, whereas a compact mass could not be formed with any amount of tamping upon a dry mixture. Summing up the conclusions to be drawn from the experiments, it appears to be clear that dry concrete should not be used under any circumstances; that medium concrete may be desirable in cases where immediate strength is required, and that wet concrete is stronger than either dry or medium concrete at any age over three months. In the course of some experiments undertaken to determine the behavior of Portland cement mixtures when subjected to repeated loads of less intensity than would cause failure when once applied, it was found that there was every reason for thinking it probable that concrete was liable to fatigue under repetitions of stress, such as is experienced by iron and steel under similar conditions. The experiments were conducted upon 2-inch cubes composed of neat cement. Altogether some 92 blocks were tested by repetitions of compressive stress, and the average results are shown in the following table:

Number of repetitions causing failure.	Load applied in terms of ultimate strength.
1	100 per cent.
75	90 per cent.
150	80 per cent.
400	70 per cent.
1,500	60 per cent.
5,500	55 per cent.

These figures indicate that failure occurs under repeated loadings of much less intensity than that necessary to cause failure when applied once, and the number of repetitions necessary to cause failure increases proportionately with the diminution of the load. Similar tests upon concrete have not been conducted upon a systematic scale, but eighteen tests on 7-inch cubes show that the same general law of gradual failure applies equally to concrete.

LAYING OUT CIRCULAR ARCHES IN CIRCULAR WALLS.*—XIX

By Charles H. Fox.

We now come to the cylindro-cylindric arch, which, it may be stated, is an arch in a circular wall, the soffit and exterior bounding elements of the arch being cylindrical surfaces—that is, the surfaces of the soffit and of the exterior bounding elements of the arch are generated in the manner in which the similar surfaces of an ordinary cylindric arch in a plane surface wall may be generated. These surfaces are intersected with other cylindrical surfaces which form the outer and inside faces of the arch; thus its name. In the example shown the axis of the cylindrical surfaces which form the soffit and exterior bounding elements is placed at right angles with the axis of the cylindric surfaces which form the face. The first is represented in the point O of Fig. 170 and in the horizontal G O of the plan. The latter is represented in the point O of the plan and in the vertical O 7 of Fig. 170. The surfaces of the joints are planes, normal with the curve of the soffit. The joint surfaces if produced will intersect the horizontal axis of the soffit, as shown in the diagram, Fig. 172. The reader understanding the nature of the surfaces by which the cylindro-cylindric arch is bounded will at once see this is not as difficult a problem as that of the radiant arch already considered. Indeed, for that matter, there is only one question to be considered in connection with its construction—viz., that of the method to be employed by means of which the separate stones may be formed from the smallest possible quantity of rough stock, and in the most expeditious manner.

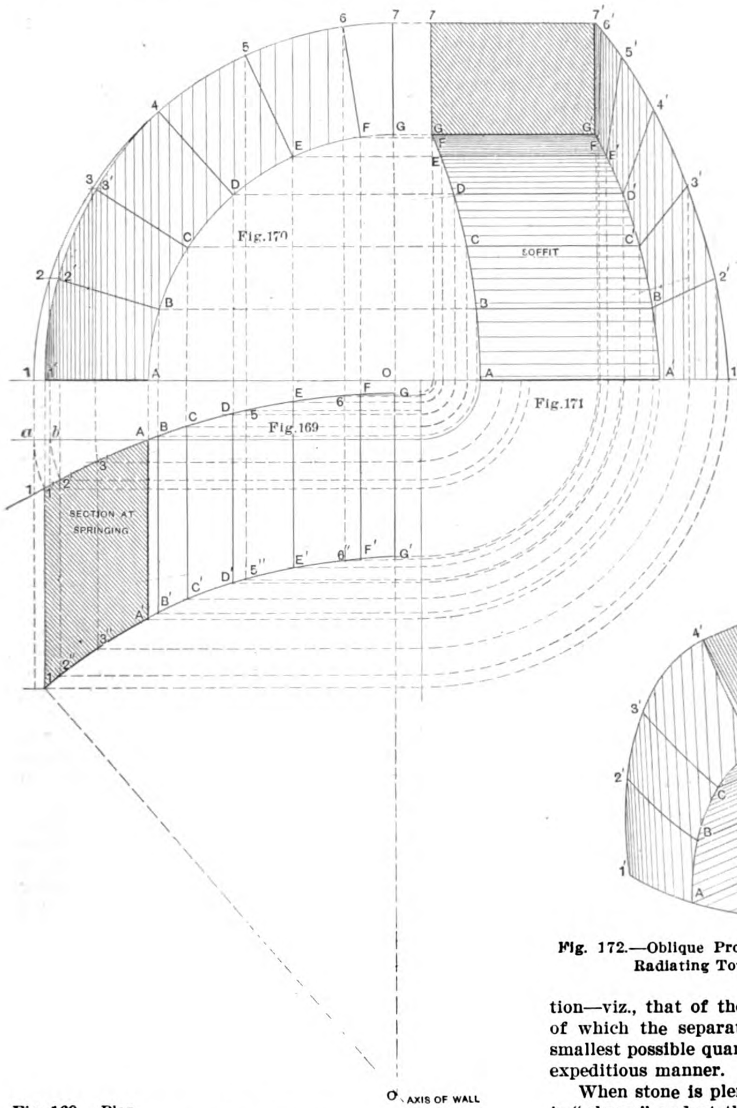


Fig. 169.—Plan.
Fig. 170.—Geometrical Elevation of Arch.
Fig. 171.—Geometrical Elevation, Showing Soffit and Concave Face Surfaces of Arch.

Laying Out Circular Arches in Circular Walls.

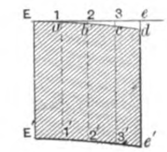


Fig. 178.—Right Section at Joint Surface E *e* of Fig. 174.

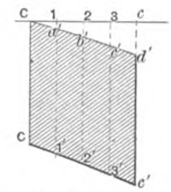


Fig. 179.—Right Section at Joint Surface C *c* of Fig. 174.

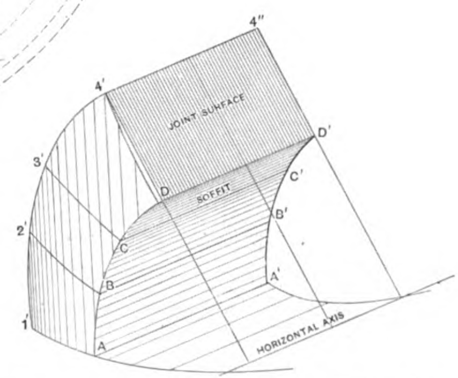


Fig. 172.—Oblique Projection, Showing Plane Surface Joint, Radiating Toward Horizontal Axis of Arch.

When stone is plentiful—by this we mean when stone is "cheap" and at the same time easily "worked"—the stones may, perhaps, be formed as cheaply by the method employed to form the stones which belong to a right arch in a plane surface wall; in this case the necessary face molds are given in the elevation, as that of Fig. 170. The other patterns required are those containing the face curves, as given at the intersection of the joint surfaces with that of the face, together with the developed curves of intersection of the soffit and exterior surfaces with that of the cylindrical surfaces of the outer and inside faces. If stock is scarce—therefore more valuable—the method above will be rather too primitive owing to the waste of stone, and at the same time the waste of that which is in general more costly than stock—labor in working the wasted stone. We shall, therefore, confine ourselves to the explanation of the method which requires the least possible quantity of stock and labor. Without entering here into a discussion of the question, we may remark, the cylindro-cylindric arch is one of the weakest forms of arch to construct within a circular wall. All things being equal—that is, the face curves drawn with an equal radius, and the opening of the same width, and the arch stones of an equal depth at the face—the cylindro-cylindric arch will not sustain as great a superincumbent weight as will that of the radiant form, or even that form of arch termed "the conical," the soffit surface of which is a portion of a cone, an example of which will be given later on.

In Fig. 173 is given the plan, at which 8 A represents the opening line, G *a′* the outer or convex, and *g′ a″* the inside or concave face curves of the wall. In Fig. 174 is shown the right section, divided in the points A, B, C, &c., to correspond to the number of stones the arch may

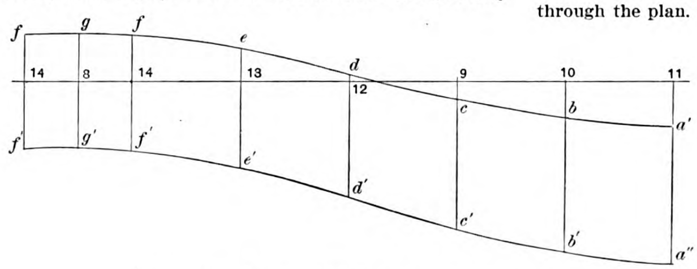


Fig. 176.—Developed Molds of Exterior Surface.

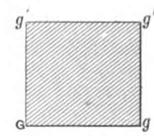


Fig. 177.—Right Section at Center Line G *g* of Fig. 174.

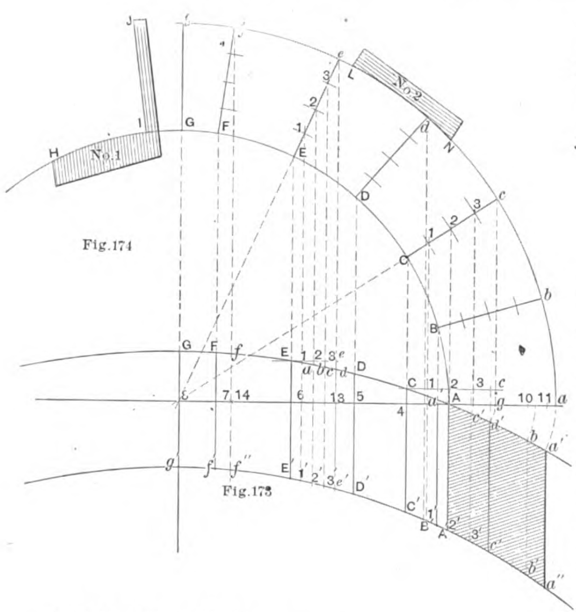


Fig. 173.—Plan of Arch.
Fig. 174.—Right Section of Soffit, Together with Joint Lines.

Laying Out Circular Arches in Circular Walls.

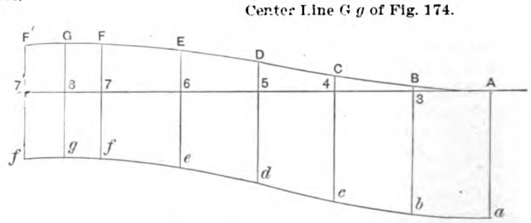


Fig. 175.—Developed Soffit Molds.

contain. The center point of the right sections, both of the soffit and exterior bounding elements, is given in the point 8, and the joint lines, as B *b*, C *c*, &c., of Fig. 174, each radiate toward this point as a common center.

We will explain, first, the development of the curves of intersection of the soffit and exterior surfaces, with the surfaces which form the outer and inside faces of the arch. In Fig. 174, parallel with the center line G *g*, through the points A, B, C, &c., produce lines as A A, B B, C C, &c., through the plan. Then at any line as that of A 7′, Fig. 175, set off A 3 4, &c., equal with A, B, C, &c., of the soffit curve of Fig. 174; then square with A 7′ through each point draw lines indefinitely. Now, set off A *a*, B 3 *b*, C 4 *c*, &c., respectively, equal with that of the corresponding projections of the plan. Through the points given in A, B, C, &c., and in *a*, *b*, *c*, &c., trace the developed curves of intersection. This gives the patterns as required for the cutting lines at the soffit surfaces of the separate stones. That is, A *a b* B is that as required at the soffit of No. 1; B *b c* C that as required at the soffit of No. 2, &c.

In Fig. 176 is shown the developed patterns as required at the exterior surface of the stones; these may be developed in the manner just explained for the similar construction in Fig. 175. Now to develop the joint patterns proceed as follows: The pattern, as required at the lower joint surface of the springer, is given in A *a′ a″* A′ A of the plan, and its construction may be readily understood from the drawings. Take the construction of the mold, as required at the joint surface, represented in E *e* of Fig. 174. First, divide the joint line, as shown in E 1 2, &c., into any number of equal parts; then parallel with the center line from each point produce lines through the plan. Then square with E E′ draw E *e*.

Now, in Fig. 178 draw the right angle E′ E *e*. Set off E 1 2, &c., equal with the corresponding projections of Fig. 174. Then parallel with E′ E draw 1 *a* 1′ 2 *b* 2′, &c., respectively, equal with that of the corresponding projections of the plan. Through the points given in E *a b*, &c., trace curves, which will complete the joint section required. In a similar manner may the section of each joint surface be developed.

In Fig. 179 is given that as required at the surface represented in C *c* of Fig. 174. Of course, it is only necessary to construct the molds for half of the arch, as the reversing of them in their application gives the other half. We may call attention to the templates, Nos. 1 2 of Fig. 174, the construction of which will be apparent from the drawing.

Coloring Wood in the Log.

A new Swedish method of coloring wood clear through, and while in the log, is thus described by the *Timber Trades Journal* of London. "All the sap is expelled and the log is then treated with chemicals, and the color or colors are pressed into the wood. Any shade desired can be obtained, and, in fact, several colors can be merged one into the other, producing a very beautiful effect. On cutting up the samples we received, we found that the color was evenly distributed all through the fibers, the grain of the wood giving a very pleasing effect, especially when polished. The wood, it is claimed, dries sooner than by ordinary seasoning, and it can also be rendered fire proof by adding special chemicals. Of course, painting is done away with, so that the natural structure of the wood is seen to better advantage than when painted in the ordinary way. The coloring is, we understand, free from arsenic and quite harmless; the colors do not fade, and, of course, cannot be worn off by rubbing, &c."

CORRESPONDENCE.

Design for a Plate Shelf for Dining Room.

From SUBSCRIBER, *Belleville, N. J.*—I would like to have some of the readers of the paper furnish a design for a plate shelf for a dining room to be built of cypress, and not too elaborate.

Plastic Material for House Covering.

From W. E. W.—Will not some of the many readers of the paper give their experience with cement and other plastic materials for house covering in place of weather-boarding? The scarcity and price of lumber is creating a tendency to resort to other materials for the construction of buildings, and I think a discussion of the subject will prove interesting.

Note.—We place the above request before our readers and shall be glad to have those engaged in doing work of the character indicated give their experience as to the durability and satisfaction which this form of construction is giving throughout the many sections of the country in which it is employed. The use of cement in connection with building construction is rapidly growing in popularity in many sections, and in past volumes of the paper more or less attention has been given to the subject in the way of decorative material and illustrations, showing the manner in which the work was executed. There remains, however, much to be said on the subject and an excellent opportunity is afforded for a discussion, which may bring out many points of interest and value, if readers, generally, will freely express their views.

Composition of "Granolithic."

From CONCRETUS, *Pittsburgh, Pa.*—Will some of the practical readers of the paper give through its columns the proper mixture of a first-class "Granolithic" for a sidewalk? Also a cheaper mixture and the probable cost of each one. What is the composition of "stucco" used on houses of the Spanish Mission style of architecture, both in frame and brick? I have been a reader of your valuable paper for several years, but have never before taken the liberty of using the columns for information.

A Lesson in Drafting.

From A. R., *St. Paul, Minn.*—I would like to know through the Correspondence department how an accurate pattern can be obtained for a groove to be cut serpentine in shape or outline in the face of a wooden frame 11 inches on the face, 10 feet 4 inches square inside measurements.

Answer.—We have reproduced in Fig. 1 of the accompanying diagrams one of the sketches submitted by our correspondent, showing a cross section of a frame and groove drawn to a scale of 2 inches to the foot, in accordance with the given dimensions. From another sketch furnished by the correspondent, showing the desired course of the groove along the face of the frame, we have substituted a carefully drawn elevation, shown in Fig. 2, in which is indicated the method of describing various curves of the design.

Since the frame is square, a draft of one-half of one side with a complete corner is sufficient to cover the entire design. Therefore draw to any scale conveniently large an elevation of one-half of one side of the frame with the corner as shown by A B C D E F, C D being the center line of one of the sides. It will be well to begin the work by first sketching into the elevation, free hand, the general course of the groove, determining thereby how many waves or curves will be desirable, letting the center of one of the waves be on the line C D. In the drawing two complete waves are shown, therefore divide the space from C D to a point near the corner or miter into four equal spaces as shown by the dotted lines G H, J K, L M and N P. Each space will then represent half the length of a wave or the distance from the highest or outer point, to the lowest or inner point of the same.

In establishing these spaces it will be advisable, as regards appearance, to bring the line N P so close to the point E that the radius of that part of the curve from N to R, forming the corner, shall be less than the radius employed in drawing the waves themselves. This can only be determined by experiment or inspection. Next determine how close it is desired to have the lines of the waves approach the outer and inner edges of the frame. Assuming this distance to be 1½ inches, set off 1½ inches from points C and D on the line C D, obtaining the points *a* and *b*. Next set off from *a* and *b* respectively toward the center of the frame, 3½ inches, the width of the groove as taken from the section Fig. 1, thus obtaining the points *c* and *d*. Now bisect the spaces *a c* and *d b*,

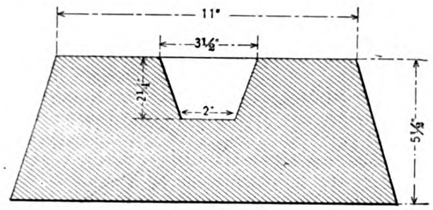


Fig. 1.—Cross Section of Frame, Showing Groove.

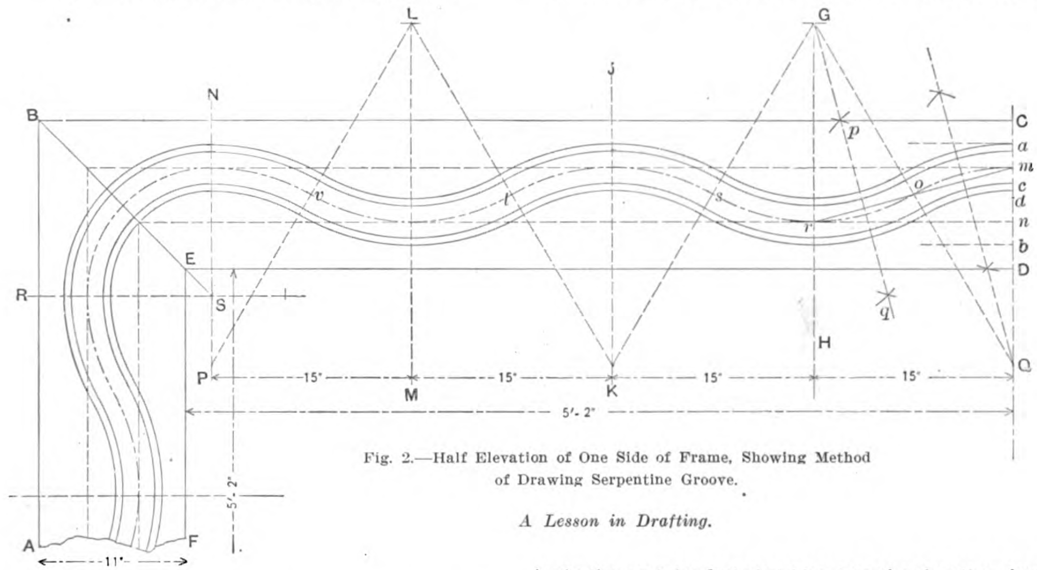
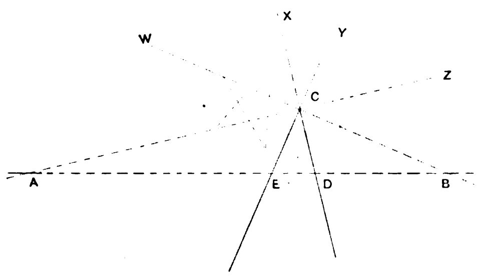


Fig. 2.—Half Elevation of One Side of Frame, Showing Method of Drawing Serpentine Groove.

A Lesson in Drafting.

obtaining the points m and n, and from the points m and n draw lines parallel to the edges of the frame, continuing them to the miter line as shown dotted in Fig. 2. These two lines just drawn will then form the limits between which the center line of the groove is to be drawn. After having determined the radius and the several centers from which this center line can be drawn, the other lines showing the sides and bevels of the groove can then be easily drawn parallel from the same centers.

To find accurately the length of radius necessary to describe the center line first draw a straight line from



Finding Degrees With Steel Square.

point m to r, where the line from n intersects the first division line G H. Now by any convenient method bisect m r, obtaining the point o, and from o and r as centers, and with any convenient radius, describe small arcs cutting each other on both sides of o r as shown at p and q, and through p and q draw a line, extending it to cut the line G H as shown at G. From o and m as centers repeat this operation, obtaining the line which cuts the line C D extended at Q. Then will G and Q be the desired centers from which to describe all the lines of the groove through one-half of a wave. Point L is obtained by drawing a line from G parallel to B C, cutting L M, and points K and P are obtained in like manner from point Q. Now connect the points Q and G, G and K, K and L and L and P, as shown by the dotted lines, which lines will form the limits, or points of meeting, of the several arcs drawn from Q, G, K, L and P as centers, all of which is shown sufficiently clear in the diagram to require no further description. Extend the miter line B E to intersect the line N P as shown at S, then from S as center continue the several arcs to the line R S, thus completing the corner.

In order to insure success in obtaining the points G and Q the utmost accuracy in the several steps will be required, as the angles of intersection at G and Q are very acute. Of course the radius G r is exactly equal to Q m, and the several arcs of the center line of the groove whose centers are at G, K, L and P should be drawn first, the accuracy of the radius being indicated by the perfect meeting of the arcs at o, s, t and v.

Truss vs. Frame Barns.

From P. G., *Chadwick, Ill.*—Will Mr. Hodgson, Mr. Kidder and some other good authorities give the relative cost of material and labor in a truss barn and a frame barn; also to point out the weak and the strong points in each form of construction. The barns are to be of the same size, hight, and have the same pitch of roof. I am not after any windy discussion, but rather the true merits of the truss and the frame construction.

Slate Roof Laid on Felt.

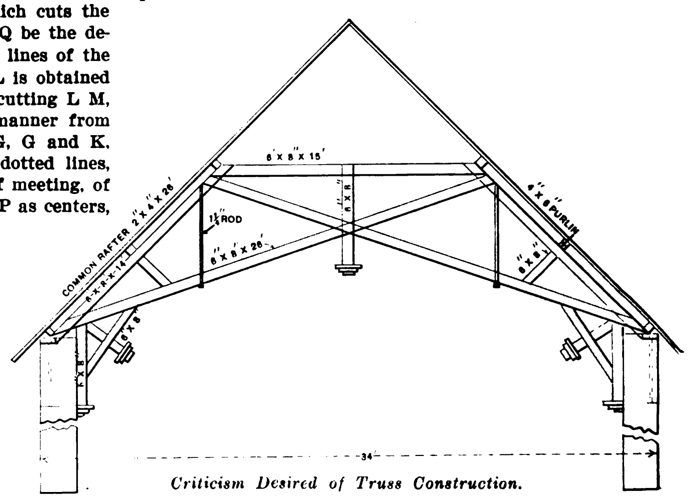
From G. R., *Carnegie, Pa.*—We should like to have some of your readers who have had experience in laying the old Scotch roof—that is, slate laid on felt, coated with asphalt or coal tar pitch—give us specifications for this work. We laid a roof a short time ago with a mixture of ½ pitch and ½ asphalt, and find that it cracks between the slate. We should like to overcome this cracking, and will be grateful to any who will give us their experience in laying this kind of roof.

Finding Degrees with Steel Square.

From O. L. W., *Dallas, Texas.*—As the problem presented by "C. V. F." in the March issue could be easier solved if we were able to construct angles containing a given number of degrees, I offer the following method of obtaining any number of degrees with the carpenter's steel square, this being the only tool employed. Referring to the diagram sent herewith, lay down the line A B and on it place the square in the position indicated by A C D, making A C 19½ inches and C D as many eights of an inch as the required angle contains degrees. In a five pointed star this would be 36 degrees, or 4½ inches. Draw the line C D, then holding the corner of the square on the point C, turn it around to the position B C E, making C B 11¼ inches. Draw the line C E and the angle D C E will contain 36 degrees. These figures will give any number of degrees by simply varying the length of the line C D. I have added dotted lines to show that by extending the lines we had three more angles of 36 degrees which could be formed, either of which may be used for a star, the construction of which should prove quite easy. It will be noticed that there are only two different angles about the point C, one 36 degrees and its complement 54 degrees.

Criticism Desired of Truss Construction.

From C. C. J., *Fort Davis, Texas.*—I enclose a sketch of a scissors truss which I should like to have the readers criticise in the Correspondence department of the paper. I should like to have the views of experienced readers in different sections of the country



Criticism Desired of Truss Construction.

and would especially value the opinion of Mr. Kidder, if it is not asking too much. I would say that the walls of the building in connection with which the truss is intended to be used are of adobe or sun dried brick, 24 inches thick and 15 feet high. There will be five trusses placed 12 feet on centers.

Care and Purchase of Tools.

From BLUE HAND SAW, *Shreveport, La.*—Referring to the letter from "Apprentice Carpenter" of Ft. Morgan, Col., with regard to the care and purchase of tools, I would suggest buying such as have the manufacturer's name engraved or stamped on them. Never buy those marked "Made expressly for" Tom Green, Dick Brown, Harry Black or any local or traveling vendor of tools, no matter if you know positively, or were told, they were made by the most reputable manufacturers in the world. I have been buying tools for over 30 years, not only two kits for myself, but for many of my men, amounting to $1000 or more, and my experience is that standard tools are the best and cheapest in the end, and the ones which a carpenter will not be ashamed to take on a job or to be seen putting in his chest. I have been a foreman of carpenters for over 20 years, and I find I can judge a workman's qualities very closely by his chest and tools, except such as buy second-hand outfits or borrow a kit from some of his kinfolk in order to get a job at first-class wages. In such cases it takes only a few moves to discover the fraud, regardless of his union pin or his union card. A man cannot become a good workman with poor tools. I have always made it a point to give the best work to the man who had the best tools, for in time he made me the best man, or at least his natural taste for good tools and work made him so. A man so stingy or ignorant as to buy only blue saws, or such as are thicker on the back than on the front, or twice as thick at the heel as at the point; and tin squares, with figures on one side only; a 2-bit hammer made of cast iron and a 10-cent whetstone for an oil stone, and then asks the hardwareman to throw in a small box from his back yard for his tool chest, is the man to give a wide berth. After getting his kit (?) he joins the union, obtains a card and goes out in search of work. He presents his card to the foreman, and is told to bring his tools in the morning. When the foreman sees the chest he doesn't ask to see the tools or what kind of work the owner of them can do, but if there is any 3 x 12—24 Rgh. to go in the second, third or fourth floor for joists this union carpenter will get a job as long as the joists hold out; then he will be laid off until some more 3 x 12—Rgh. arrives. Of course, he gets union wages and is a union carpenter all right, but the foreman or contractor cannot pay him for anything but packing joists, because there is no other work he can do with a blue saw. Being a union man, he cannot wheel brick or sand or mix mortar, as he would be "scabbing" on the union hod carriers, and the union bricklayers would all strike; so this union carpenter gets only 3 x 12—24 Rgh. to practice on, and during a lifetime as a union carpenter he never gets a chance to hang a door with that blue saw.

From G. W. G., *Garfield, N. Y.*—In answer to "Apprentice Carpenter," in regard to buying good tools, I heartily indorse his opinion that the best is the cheapest, though there is a big difference in prices on the same kind of goods. Some hardware stores charge 25 to 50 per cent. more than the same goods can be purchased elsewhere. My suggestion is to send for copies of some of the tool catalogues advertised in *Carpentry and Building* and compare their prices with those of the local dealers. In this connection I might mention that vaseline is the best thing I have tried for the purpose of keeping tools free from rust.

Strength of School Room Floors.

From C. A. D., *Penacook, N. H.*—I send herewith a drawing showing the second-floor framing plan of a two-story wooden school building which I am erecting. I claim that the floors are very weak and that it will be impossible to keep a plastered ceiling from falling off the under side of the floor timbers. The rooms are 26 x 30 feet clear span, the floor joists, 30 in number in each room, are 2 x 10 inch spruce running across the 26-foot way and are placed 12 inches on centers. They are strengthened by three belly rod trusses, placed as shown on the plan, Fig. 1. In putting in the truss B, the timbers near the ends of the rods were bored and the rod run through the hole, as shown in Fig. 2. In the center of the building notches were sawed in the under side of the floor timbers to allow the truss rod A to pass under the rod B, as shown in Figs. 2 and 3, and at the same time be high enough to clear the lath and plaster. If it were possible I would like to have the plan referred to Mr. Kidder for his opinion of the floor and trusses and have his reply published in the Correspondence department of the paper.

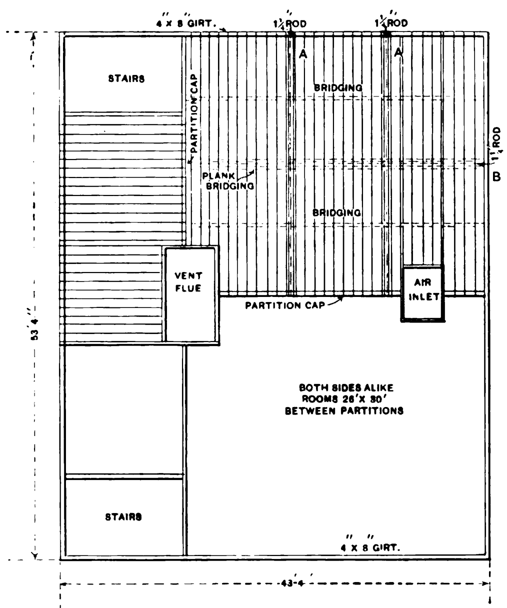


Fig. 1.—Plan Showing Framing of Floors.

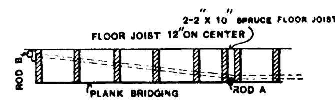


Fig. 2.—Cross Section of Flooring.

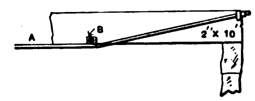


Fig. 3.—Detail of Belly Rod Connection.

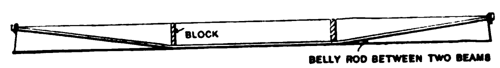


Fig. 4.—Showing Bottom of Floor Beam Strengthened at the Expense of the Top.

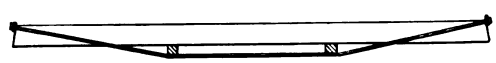


Fig. 5.—Form of Construction Suggested by Mr. Kidder.

Strength of School Room Floors.

Answer.—In accordance with the request of our correspondent, we submitted his drawings to Mr. Kidder, the well-known consulting architect, who furnishes us the following in reply:

I agree with "C. A. D." that the floors are very weak—so much so that I think the rooms should not be used for school purposes until the floors are strengthened in some way. In my opinion, it would have been better to have placed all four rods as shown at A A of Figs. 1, 2 and 3, but even then I think the floor would have been shaky.

The better method would have been to have used 3 x 14 inch spruce joists, placed 14 or 15 inches on centers and cross furred the under side. The timber cannot be materially strengthened by belly rods which do not drop below the beam for the reason that wood is about equally strong in tension and compression, and if the bottom of the beam is strengthened, as in Fig. 4, the top will give way by crushing. It is true that the flooring strengthens the top of the beam to some extent and that a floor trussed in this way, not as indicated in the sketch of "C. A. D," will be stiffer than if no rods were used and also some stronger, but just how much stronger it is impossible to say without actual tests in every case. When the rod drops below the beam, as in Fig. 5, a truss is produced, which is much stronger than the single beam and the increased strength can be calculated with reasonable accuracy. See Part 11 of "Building Construction and Superintendence," page 450.

Slats for a Wooden Ventilator.

From T. W. C., *Atlanta, Ga.*—We are having a discussion as to the best slat to use in a wooden ventilator. I enclose sketches showing several types of slats, also sections, &c. I would like to know from the readers of the paper which is the best slat to use, first, from a mechanical standpoint on first construction, also from the standpoint of durability, and finally, the best from all standpoints. I would state that I put in slat designated as No. 2 in a round house lantern and was jumped on for not using No. 1 or No. 5. I contended that No. 2 was better and cheaper and that if stops for water were used that Nos. 3 and 4 were better than either No. 1 or No. 5. Now No. 1 has the ½-inch half round nailed on the bottom front edge and allows water to soak in between it and the slat; also, the rabbit for the slat being cut entirely across the board allows water to go in behind the face of the board. No. 2 makes close joints all around. What have the readers to say?

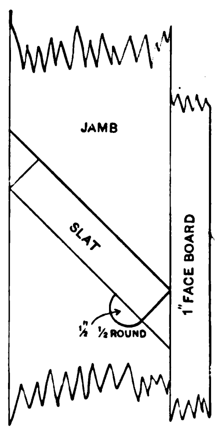


Fig. 1.

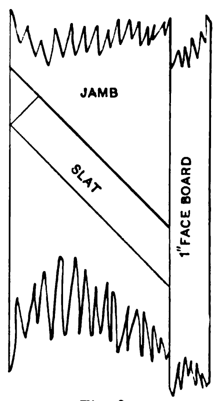


Fig. 2.

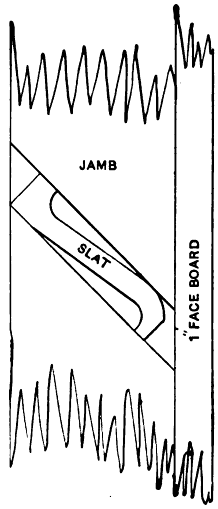


Fig. 5.

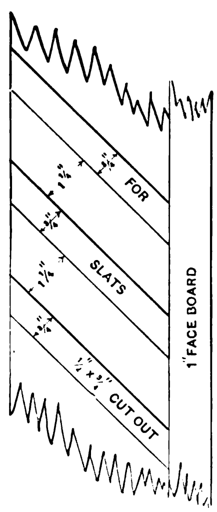


Fig. 6.—Common to All.

Slats For Wooden Ventilators.—Scale, ¼ Inch to the Foot.

Are Mill Men Getting Careless?

From J. M. S., *Wilmington, Del.*—I have been much interested in what has been said on the question of mill work and it may not be regarded as out of place if I give a few lines touching on my own personal experience in connection with the subject under discussion. It seems to me that the mill men are getting more and more careless in turning out their work. Flooring is worked 2 inches, 2½ inches, 3 inches, 3½ inches and up to 6 inches, but it is very seldom it is received all the same width. For instance, I order flooring 2½-inch face and get it in width from 2¼ inches to 2⅝ inches, thus giving the workmen a great deal of bother, and extra time and labor is involved in matching two pieces where it is necessary to space. Architrave moldings are often worked in such a manner that it is impossible to member two pieces. Ten years ago we had no such complaints to make, but now the work seems to get worse each year. I presume the only way to remedy the trouble is for all contractors to refuse to accept any material that is not properly worked.

Rule for Placing Locks and Hinges on Doors.

From C. A. W., *Port Jervis, N. Y.*—In answer to "A. F." of Toronto, Canada, whose inquiry appears in a recent

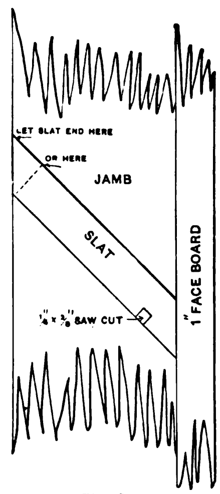


Fig. 3.

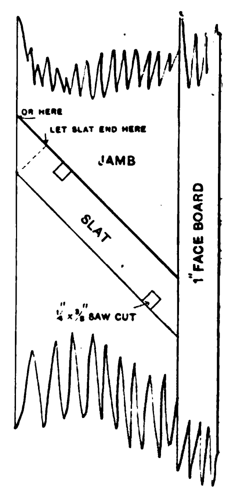


Fig. 4.

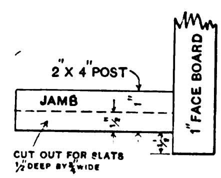


Fig. 7.—Section through Jamb.

issue, I offer the following with regard to placing hinges and locks on doors: Place the top of the upper hinge on a line with the lower part or edge of the top cross stile, and the bottom of the lower hinge on a line with the top of the bottom stile. The center hinge should be placed midway of the two. The reason for this is that the nearer to the top you get the bearing or support, the better, as you will have less strain on hinge and door, while at the same time the effect will be neat in all cases. As to the lock being placed in the middle of the lock rail I think it very poor policy, because you cut away the tenon and weaken the door at that point. I endeavor to keep as near to 3 feet to the center of the knob as possible, and not more than 3 feet 2 inches, nor less than 2 feet 10 inches. I always place the lock just above the lock rail, or if a lock panel is provided place on a line with the center of the lock panel. I always reinforce by driving two extra ten-penny nails to every hinge and strike plate after knowing where the same are to be placed and after making my mortise or gain. This is also done before screwing them in place, which avoids unsightly joints.

Design Wanted for Lodging House.

From C. V. McD., *San Mateo, Cal.*—Will some of the architectural friends of the paper send for publication a sketch of a 50-room lodging house with large dining room and kitchen?

WHAT BUILDERS ARE DOING.

REPORTS, which have reached us since the last issue went to press, indicate a very gratifying degree of activity in the building line in practically all the leading centers. In some instances, the volume of business shows a slight falling off as compared with the corresponding period of last year, but this is more than offset by the striking gains in many of the principal cities of the country. Among the latter may be cited New York City, where operations are being conducted upon a scale, which for the boroughs of Manhattan and the Bronx is for June more than 40 per cent. in excess of that for the same month of 1903, and for the first half of 1904 the record is just about equal to that of the first six months of the year before, excluding the amounts expended for alterations and repairs. Thus far in July the figures are in favor of the current year.

Labor matters have been so adjusted, generally speaking, as to interfere very little with operations the country over, and the outlook, with minor exceptions, is promising for a continuance of present activity all along the line.

Atlanta, Ga.

Although the amount of building projected in Atlanta in 1903 was in excess of anything previously recorded in a corresponding period, the permits which have been granted thus far the present year indicate a volume of business, which in the aggregate will make 1904 a record breaker. For the first six months of this year permits were issued for 1711 building improvements, calling for an estimated outlay of $2,031,105, whereas for the first half of last year there were 1677 permits issued for buildings estimated to cost $1,455,309. The total amount for which building permits were issued during 1903 was $3,161,455, from which it will be seen that there are excellent chances of breaking the record by the time the present year is completed. The work under way and in contemplation includes business structures as well as dwellings and apartment houses. Among the building improvements may be mentioned the First Baptist Church, the contract for which has just been awarded, the figures being placed at $90,000. The structure will be erected in accordance with plans drawn by G. L. Norman of Atlanta.

Baltimore, Md.

The building situation in the city is rapidly assuming a more satisfactory aspect, and operations, especially in the burned district, are increasing day by day. Since the fire permits have been issued for the construction of 174 buildings in the burned district, representing a total frontage of 6000 feet, and involving an estimated expenditure of something over $5,000,000. There are 85 builders, and probably 7000 men, at work in the district, and local architects, as well as many from other cities, have plans in preparation for additional structures. Building operations are under way on 33 streets of the burned district, and the present outlook is that by October 1 business will be resumed at various parts throughout that section of the city. In fact, at the present time, there is more activity in the way of building construction in the burned district than at any time since the terrible conflagration in February. The amount of work in progress is naturally considerably greater than for the corresponding period of last year, but outside of the burned district there is probably less building than was the case a year ago.

The Builders' Exchange Committee on "Permanent Exhibition" is meeting with much encouragement, and hopes to have the organization of the company completed within the near future.

President J. J. Kelly has recently appointed the following standing committees for the ensuing fiscal year:

Membership: P. M. Womble, chairman; James A. Smyser, F. G. Walsh, W. C. Stewart, Jacob Peters, Jacob Klein, Louis F. Young, John A. Smith and Harvey Middleton.

Architects' Plans and Contracts: G. W. Loewenstein, chairman; William Ferguson, C. F. Meislahn, Benjamin Wallis and C. D. Pruden.

Finance: Charles F. Macklin, chairman; Hugh Sisson and Charles E. Elliott.

Legislation: H. H. Duker, chairman; William D. Gill and D. A. Leonard.

Manufacturers: E. L. Bartlett, chairman; D. G. Selden, William C. Sherer, W. H. Evans and A. Kennedy.

Arbitration: G. F. Sloan, chairman; D. W. Thomas, John R. White, James E. Stanfield and L. A. Winder.

Complaint: S. B. Sexton, Jr., chairman; John T. Buckley and James Owens.

Printing, Press and Publication: John S. Bullock, Jr., chairman; Charles A. Hook, Jr., and William N. Rancke.

Rooms and Rules: Israel Griffith, chairman; A. Frank Gilbreth and William Walter Garthe.

Brooklyn, N. Y.

Building operations are being conducted upon a scale which brings the figures for the six months of the present year very close to that for the entire 12 months of 1903, which was a record breaker. According to the report of P. J. Collins, Superintendent of Buildings, the value of buildings completed and projected during the first half of the current year was $21,378,194, while for the entire 12 months of 1903 the value of the building improvements was $26,629,220. From this it will be seen that 1904 is likely to exceed all previous records in the way of building operations. The greatest growth, according to Mr. Collins, is in the neighborhood of Brownsville, where building enterprises are being carried on to such an extent that many contractors find difficulty in securing an adequate supply of skilled mechanics. It is stated that in Brownsville, which, by the way, lies on the outskirts of the borough, has 393 new buildings in course of construction, and 100 have been completed in the last six months. Superintendent Collins expresses the hope that at the present rate of progress the total amount of building operations for the year will closely approximate the $40,000,000 mark.

Buffalo, N. Y.

A very fair volume of business is in progress in the building line, but while the permits issued in June exceeded those of the same month last year the estimated cost of the improvements was somewhat less. This is explained by the fact that in June last year a number of costly buildings were erected. A large percentage of the work now under way and in contemplation consists of dwellings and alterations to existing structures. According to the figures of Deputy Building Commissioner Henry Rumrill, Jr., there were 287 permits issued in June of the current year for building improvements, estimated to cost $594,917, while in June of last year there were 204 permits issued for building improvements, costing $951,894.

When the figures for the first six months of the two years are considered, it is found that the volume of business has not varied much in the aggregate. During the first half of the current year there were 1311 permits issued for building improvements, estimated to cost $3,129,863, as against 957 permits for improvements, involving an estimated outlay of $3,281,864 in the first half of last year.

Chicago, Ill.

There has been a decided tendency toward improvement in building during the recent past, and the figures of the department make a very favorable comparison with corresponding periods of last year. In June there were 809 permits issued for building improvements, having an estimated value of $5,439,700, while in the same month of last year there were 642 permits issued for buildings, involving an estimated outlay of $3,932,950. The contrast is also very striking when the figures for the first six months are considered. According to the Building Department there were 3168 permits issued in the first half of the year for building improvements, estimated to cost $20,088,925, as against 2582 permits for buildings, estimated to cost $17,420,900 in the first six months of last year.

Cincinnati, Ohio.

A review of the situation in the city shows that builders are as busy as at any time for many years past. There are no labor difficulties at present in sight, but it is a fact that skilled mechanics are not in overabundant supply. The only cloud upon the horizon is the liability of trouble with the plumbers after the first of the year, as several of the organizations have intimated that they will not renew present agreements. The amount of building in progress, as intimated above is largely in excess of that of a year ago, this being particularly the case as shown by the figures of the building department for the month of June, when 448 permits were issued for buildings estimated to cost $776,645, as compared with 456 permits for building improvements costing $359,160 in June of last year.

When the figures of the first six months of the two years are considered, it is found that 1904 is ahead of 1903 by a large percentage. During the six months ending June 30, 1904, there were 2244 permits issued for building improvements, estimated to cost $3,175,640, as against 2051 permits covering building operations valued at $2,757,830 in the corresponding period of last year.

Detroit, Mich.

While operations for June were conducted upon a somewhat larger scale than for the same month last year, the showing for the first six months of the current year is slightly below that of the corresponding period of 1903. According to the figures issued from the office of the Fire Marshal, the month of June showed an improvement in the amount expended for building improvements of $150,000 over the same month of last year.

During the first six months of this year there were 1621 permits issued for building improvements estimated to cost $2,803,900, while for the corresponding half of last year there were 1697 permits issued for building improvements involving an estimated outlay of $3,453,400.

Evansville, Ind.

At the present time there is more building in progress in and about the city than for a long time past. The work under way consists of business structures and dwelling houses, and although wages of mechanics are said to average 10 per cent. higher than they did at this time last year, there is still more or less difficulty in obtaining skilled workmen. While the present situation is highly gratifying from many points of view, leading members of the trade are inclined to think that after the Presidential election there will be a reaction.

The Builders' Exchange, of which S. G. Rickwood is president and C. H. Hitch secretary, is in a flourishing condition. The management is desirous of receiving catalogues and samples of building material from manufacturers and dealers, in order that they may have them on exhibition and for reference in the rooms of the exchange.

Kansas City, Mo.

Building has been very active in the city during the past few weeks, and the figures for the month of June show a decided increase as compared with the same month last year. This increase is most striking in connection with brick buildings, the figures showing 54 permits to have been issued for such structures, estimated to cost $487,900, as against 21, costing $125,500, in June of last year. For the month of June there were 470 permits for brick, frame and miscellaneous structures issued by Superintendent S. E. Edwards of the Building Department, calling for an estimated outlay of $968,476, while in June of last year there were 257 permits issued for structures estimated to cost $414,290. From this it will be seen that in June of the current year the volume of building operations was more than 100 per cent. in excess of the corresponding month of 1903. During the first half of this year there were 2061 permits issued for brick, frame and miscellaneous structures, calling for an outlay of $4,206,697, while in the first half of 1903 there were 1845 permits issued for building improvements estimated to cost $4,258,585.

Los Angeles, Cal.

According to figures compiled by the Superintendent of Buildings the total for construction of buildings during the first of the year reached $5,541,656, divided among 3271 permits. June proved the banner month of the year, the total for construction work reaching $1,075,540, covered by 565 permits. In June, 1903, there were 464 permits granted, of a total value of $941,028. Construction of buildings was never more active than now. Among the larger buildings in prospect for the immediate future are the Rowan-Billicke $800,000 hotel on Spring and Fifth streets, the new Hauser & Maier $100,000 packing houses, the $110,000 Merchants' Trust Building on Broadway and second, the Chaffey $70,000 block on Spring street, south of Fourth; the $35,000 Carr Building on South Broadway; also the addition of two stories, to cost $25,000, to the old Chamber of Commerce buildings. These indicate the immediate prospective improvements for the business section of the city.

Lowell, Mass.

The city is experiencing much the same condition of business depression or suppression as other Eastern cities, but the work now under way in the shape of new structures and repairs to buildings and plants proves conclusively that this condition of affairs is not expected to be of long duration. The new coal pockets and improvements in connection with the boiler houses of the Bigelow Carpet Mills and the Merrimac Mfg. Company are now so far completed that the buildings are in commission. The coal pocket of the latter company is constructed entirely of reinforced concrete, has a capacity of 15,000 tons of coal, and was erected by the Eastern Expanded Metal Company of Boston. The Massachusetts Cotton Mills has awarded the contract for the construction of a large mill building, and the Appleton Company is also about to erect a large mill on the site of its old boarding houses, the contract to go to C. H. Nelson of Lowell. The Lawrence Company is placing additional boilers, and the Tremond and Suffolk mills is making important additions to its plant.

H. P. Graves, a Lowell architect, has just completed plans for a residence in which the exterior walls above the first story are to be of cement finish. As this is the first instance of the extensive use of this finish in Lowell, the construction of the building will be watched with much interest. The Vesper Country Club is to erect a new clubhouse at Tyng's Island, which will cost about $20,000. This work, with a brick block, together with the usual amount of cottages, tenement houses, &c., have kept contractors fairly busy. It may be interesting to note in connection with the above that "Dragon Portland" cement was exclusively used on the buildings mentioned for the Bigelow Carpet Company and the Merrimac Mfg. Company, and is now being used on the Massachusetts Cotton Mill building, while "Improved Shield" cement is being used on the new building of the Young Women's Christian Association.

The annual outing of the Builders' Exchange was held at the Nantasket Point House, at Nantasket Point, Hingham, Mass., on Tuesday, July 12. The committee having charge of the affair, which was most enjoyable in every way, consisted of Frank L. Weaver, chairman; James Whittet and Charles F. Varnum.

Milwaukee, Wis.

The prospects are very bright for a number of large business structures and warehouses being erected in the near future, this outlook being based on the large demand for buildings designed for light manufacturing purposes. The work now under way consists, for the most part, of dwellings of which there is a considerable number in course of erection in the outlying districts. The volume of work just at present under way does not make quite as good a showing as at this time last year, although the total is of very fair proportions. During June there were 453 permits issued for building improvements, costing $889,446, while in June of last year there were 321 permits issued for building improvements, estimated to cost $950,775. The showing for the first half of the year is of about the same proportions. There were 1718 permits issued the first six months of the current year, calling for an estimated outlay of $3,648,961, while in the first six months of 1903 there were 1359 permits granted for buildings, costing $4,305,318.

Minneapolis, Minn.

The members of the Builders' and Traders' Exchange, Minneapolis, Minn., formally opened their newly furnished quarters on the fifth floor of the Kasota Block on the evening of Thursday, June 9. Refreshments were served, and business matters discussed in an informal manner. The principal address of the evening was that of Hon. G. P. Flannery, who spoke on "The Government of Our Country." Since the organization of the exchange it has steadily grown in membership and strength, and is now in a most flourishing condition. The rooms in the Kasota Block have been fitted and decorated in a most attractive style, and everything has been carried out with a view to fully meeting the requirements of the organization.

Oakland, Cal.

Contractors and builders declare that they are without sufficient help to construct the many dwellings ordered and those now in the course of erection. Building contracts to the amount of more than $60,000 were let during the first week of July. In nearly every instance the contract calls for a home costing in the neighborhood of $3500. At the present time 116 buildings, valued at $500,000 are now under construction in Oakland. In the suburban town of Berkeley 140 buildings, valued at $1,073,586, are now in course of construction, and in Alameda 20 buildings, valued at $100,000, are being built. The university town of Berkeley, with only 20,000 inhabitants, has now under way and planned for immediate construction a vast amount of building. The bulk of this consists of residences of more than average cost, the estimates ranging from $3000 to $10,000.

Orange, N. J.

The first annual convention of the Master Builders' Association of New Jersey will be held at Long Branch, N. J., Saturday, July 30, the meeting being called for 2 o'clock in the afternoon. The members of the Building Traders' Exchange of Long Branch have invited the visitors to partake of their hospitality for the afternoon and evening, and have arranged for the meeting to be held in the large Town Hall on Broadway. After the meeting it is the intention to take the visitors to Pleasure Bay, on the Shrewsbury River, where a clambake, with all its attractive features, will be served.

The announcement that has been issued by Alex. E. Pearson, secretary of the Master Builders' Association, calls attention to the various trains which those desirous of attending the convention can take, and which will bring them to their destination in good season for the meeting, which will be called promptly on time.

Philadelphia, Pa.

A rather noticeable feature of the building operations in progress in Philadelphia during the half year just brought to a close is the number of dwelling houses which have been put up in various wards in the outlying districts. Out of a total of 7780 operations for which permits were issued, the figures show that 5050 dwelling houses—two, three and four stories in hight—have been undertaken, at a cost of $9,565,950, as compared with only 2690 dwellings, costing $6,191,585, in the corresponding six months of last year. This building activity has been confined for the most part to the Twenty-fourth, Twenty-seventh, Thirty-fourth and Fortieth wards, comprising West Philadelphia, the activity in that section being attributed to the fact that operative builders expect a great demand for dwellings to follow the construction of the subway and elevated roads.

According to the figures of the Bureau of Building Inspection, there were 4210 permits issued for building improvements during the first half of the present year, covering 7780 operations and calling for an estimated outlay of $17,364,955. For the corresponding period last year there were 3656 permits issued, covering 6050 operations and involving an expenditure of $21,606,175. It may be remarked in this connection, however, that these latter figures include the permit which was granted in March of last year for the $5,000,000 Wanamaker store. Eliminating the cost of this building, the figures for the present year show an increase of 654 permits, 1730 operations and $758,780 in cost over the corresponding period of last year. It is pointed out that the increase in the number of permits and operations is due in a great measure to the crusade inaugurated by Mayor Weaver following the Iroquois Theatre fire in Chicago to compel owners to put up fire escapes and to make alterations to halls, theatres, churches and other structures in which large numbers of people congregate. In looking over the figures issued by the bureau another noticeable feature is the marked falling off in the construction of factories and workshops. The first six months of last year showed 84 such structures projected, estimating to cost $1,687,540, whereas for the first half of the present year permits were issued for only 58 such buildings, to cost $1,097,475.

Another feature is the heavy increase in figures for June, 1904, as against the same month last year, when labor troubles were such as to greatly interfere with building operations. This year in June there were 843 permits issued, covering 1691 operations, estimated to cost $5,201,110, while for June last year permits were issued for building improvements estimated to cost $2,383,655. From this it will be seen that the figures in June of this year are more than 100 per cent. greater than for June a year ago.

Pittsburgh, Pa.

That business contraction throughout the city prevails is manifest from the figures of the Bureau of Building Inspection covering the month of June and also for the first six months of the present year, when compared with corresponding periods of 1903. For the month of June the shrinkage is very marked, although the number of permits issued was in excess of those of June a year ago. The value of the building improvements for June, 1904, was estimated at $1,448,180, while in June last year they involved an estimated outlay of $2,534,174.

Taking the figures of Superintendent S. A. Dies for the first six months of the current year, it is found that there were 2087 permits issued for building improvements estimated to cost $6,105,515, whereas for the first half of last year there were 1979 permits issued for building operations, involving an estimated outlay of $9,908,829.

An interesting feature of the building situation was the award of the contract for the erection of the new addition to the Carnegie Library Building to William Miller & Sons Company of Pittsburgh, the contract price being $2,591,993. The contractors bind themselves to have the building finished by February, 1906. The architects, Alden & Harlow, state that there will be about 13,000,000 cubic feet in the building, making the cost, according to the contract price, about 20 cents per cubic foot. To show how close and spirited the bidding was between the contractors, there was only about $240,000 difference between the highest and lowest bidders. The William Miller & Sons Company will be aided in the erection of the structure by 18 subcontractors, and at times work will be in progress day and night. It is estimated that fully 1000 men will be employed from the time the work is actively started. The building will contain 5560 tons of steel, all of which will be furnished by the Carnegie Steel Company. The contract awarded does not include the plumbing and electric work.

Portland, Ore.

Contractors assert that never before was so much building to be done in Portland, and never before were there so many men on hand to do it. Mechanics have been attracted hither in large numbers from the East, and so at the Lewis and Clark Exposition grounds heavy work is being carried on regardless of wages or hours. Nine hours is the regular day's work, and men are said to be working at from $1.75 per day to $3. All over town on private contracts the eight-hour system still prevails, however, but wages vary according to the ideas of those most interested, and union and nonunion carpenters are working together on the same jobs. The most important building project under way, from the citizen's standpoint, is the huge saw mill plant of the Peninsular Lumber Company, on the bank of the Willamette River, at Portsmouth, just below Columbia College. The reduced cost of building materials has done much during the last few weeks to encourage building. It is claimed that the cost of building in Portland is about 16 per cent. lower than it was a year ago.

San Francisco, Cal.

During the fiscal year ending June 30, 1904, there were 1756 new buildings undertaken at an estimated cost of $13,559,427. Permits were taken out for alterations to the number of 601, at an estimated cost of $2,050,031, and, aside from these, free permits were issued to the amount of $451,088, bringing the total value of the building operations during the year to a total of $16,040,546, or about $1,000,000 less than for the previous year, when the value of the building operations amounted to $17,047,748.50. In the latter amount were included the permits for the St. Francis Hotel and the Flood Building, each of which ran over the $1,000,000 mark. The record of the building contracts made during the first six months of the present year, and a comparison with the record for the same period in former years, shows that activity in building has been greater during the past six months than it ever was before. The total value of the 1390 contracts awarded is placed at $8,525,129. There was a reremarkable close correspondence in the number and values of the contracts in April, May and June, when over $5,000,000 worth were let. The aggregate value of the contracts for the six months was $1,380,909 in excess of that of the first half of 1903 and $2,434,469 greater than that of 1902, while it was over $5,000,000 more than in 1901. Among the contracts awarded was one for a seven-story and mansard brick and steel apartment house, to cost about $150,000. The plans are being prepared for a ten-story fire proof building, to be erected on Geary street near Powell and fronting on Union square. The old rookeries at the northeast corner of Clay and Sansome streets are also soon to disappear, and a magnificent business block seven stories in hight, extending from Clay to Merchant streets, is to take their place.

During the month of June the Board of Works issued 197 permits for new buildings, to cost $1,286,261. There were 72 permits for alterations to old structures, costing $186,099. These figures show a decrease from those of May, when 207 new buildings were projected, costing $1,600,492, and 64 alterations, costing $278,146. There were 215 free permits issued. On July 6 the Board of Supervisors finally passed the amended building ordinance limiting the hight of frame buildings to be hereafter erected in this city to 45 feet.

Seattle, Wash.

Since the first day of the present year, up to the close of business on June 30, the city building inspector issued 3700 permits, of the value of $4,371,067, as against 3286 permits, of a value of $3,096,821 for the first six months of 1903. The increase in buildings authorized in the first half of the present year over the same period last year is $1,374,246. The month of June was a record breaker in the history of the city. Over 600 building permits were issued, of a total value of $1,443,574, as against 539 permits, of a total value of $438,767 for June, 1903. One of the reasons for the June footing being so large is that the Alaska Building permit, amounting to $600,000, is included. Leaving this out, however, the month is almost double that of the same month last year. This year there has been a greater number of large buildings undertaken than last year. During the next six months the larger of the railroad building permits will come. The only railroad buildings of any consequence that have so far been presented are the freight depots of the Great Northern & Northern Pacific. The Union Depot permit is yet to be taken out.

St. Louis, Mo.

Contrary to generally preconceived ideas, the amount of building for the month of June shows a very marked increase over the previous month, and also as compared with June of last year. This is the most noticeable in the amount of new brick structures projected, there having been 127 permits issued for such buildings, estimated to cost $912,670, as against 88 permits for brick buildings, to cost $518,878, in June a year ago. In the matter of frame structures there is a fair increase over a year ago. Alterations and repairs have also been upon an apparently large scale, so that the total for new buildings and additions for the month of June of this year amounts to $1,190,549, as against $747,660 in June, 1903.

When the figures for the six months are studied it is found that the total for the half year ending June 30, 1904, is $6,560,023, whereas in the first half of last year permits were issued for building improvements estimated to cost $7,848,910. The greatest activity last year occurred during the months of March and April, when permits were issued calling for an expenditure of nearly $5,000,000, and was doubtless incidental to work in connection with the World's Fair.

St. Paul, Minn.

The building outlook for the remainder of the season is regarded by many as somewhat uncertain, although it is felt that in the aggregate a fair business will result. There is not as large a volume of heavy work as was the case last year, although smaller building operations show a slight increase. Naturally in this section of the country very much depends upon the crops, and if present indications are any guide there should be a favorable yield at harvest time. If these hopes are materialized it will do much to stimulate business.

Secretary A. V. Williams of the Builders Exchange has recently issued a neat little directory of the organization of a size convenient to readily carry in the pocket. It contains not only a list of officers and all standing committees, but an alphabetical list of the members of the exchange, together with their addresses and telephone calls. Following this is a classified list of the members, showing the branches of business in which each is engaged, the entire make-up being such as to render it a valuable work for reference. The concluding pages of the directory are devoted to an alphabetically arranged list of architects of St. Paul.

Tacoma, Wash.

The report of the City Building Inspector for the month of June shows a total of 136 permits issued, the total cost involved being $242,296, an increase of about $10,000 over the month of May preceding. For the first six months of the year the total number of permits issued was 778, involving a total expenditure of $1,021,000. For the fiscal year the total number of permits issued is 778, the aggregate estimated cost of the buildings being $1,021,900. These figures are made up largely from small and medium cost houses built for homes, the record showing but few large buildings, the furniture factory, cracker factory, Northern Pacific boiler shop, the store building of J. B. Stevens and the Northern Pacific hospital building being about the only large buildings in the list.

Notes.

In Loraine, Ohio, the month of June was the most active from a building standpoint since the present system of issuing permits was put into force over two years ago. There has been, it is stated, only one month when the valuation of the building improvements was higher, and that was due to several large buildings being projected, notably the new brewery and the ice plant.

The records of the office of the building inspector of the city of Denver, Col., show that since January 1 more permits than usual have been issued for dwellings and structures intended for business purposes. For the most part, however, the permits cover small houses to be erected in suburban or outlying districts, thus showing that the improvements are by or for the accommodation of people of comparatively small means.

The labor troubles which threatened to interfere with building operations in Miami, Fla., have been settled, and the Carpenters' Union has entered into a written agreement with the Builders' Association for 18 months. The nature of the agreement is an eight-hour day, all sharpening of tools to be done out of working hours; no smoking and no idling. The workmen are to be on the job five minutes before commencing time: have their tools out and ready to go to work the moment the whistle blows.

According to the figures of Superintendent F. L. Brown of the Bureau of Building, Scranton, Pa., the amount of work in progress and projected during the month of June was far in excess of that for the corresponding period of last year. Not very many permits for large buildings were issued, but the greater portion of the work consisted of dwellings and flats. The total number of permits for the month was 101, calling for an estimated outlay of $293,560, this being an increase of 29 in the number of permits and $28,200 in valuation as compared with June last year.

Notwithstanding the fact that the Presidential year is usually regarded as one of contracting business, there is a degree of activity in the building line in Shelbyville, Ind., that partakes very much of the nature of a "boom." A new city hall has just been completed at a cost of $50,000; a church which, when finished, will show an expenditure of about $70,000, is rapidly nearing completion, and an addition to a large furniture factory is under way and a carriage factory to cost $15,000 is expected to be ready for occupancy some time this fall. The Odd Fellows will award the contract for a two-story lodge building to cost $10,000, and it is expected that several large business blocks will soon be under way.

Painting Tarred Paper or Roofing Felt.

A painter, who has tar paper or roofing felt on his shop and does not like the idea of tarring it, writes to the Painters' Magazine and asks why he cannot use metallic brown, yellow ocher or Venetian red, as the paper should be coated with something in order to make it last.

In reply, the editor of the journal in question says: "There is no reason why a good oil paint made from metallic brown or Venetian red should not protect the roofing felt on the shop, but it will be found advantageous to first size the paper with a glue and alum solution, before applying the paint, which will prevent the tar in the paper from striking through the paint and at the same time keep the latter from being absorbed too much. The glue and alum solution may be made by melting one pint of glue in one gallon of water and adding to this one gallon of water in which one pound of alum is dissolved.

The Architect and Concrete Construction.

In this country the use of concrete for buildings is so new that the architectural profession has not yet fully adopted it as a suitable material for all the parts of a building to which it is really adapted, says a writer in a recent issue of *Municipal Engineering*. This is not true in foreign countries, especially in those in which the German language is spoken, and when the natural and proper conservatism of the architect has finally permitted his approval of the new material, its use will spread rapidly in this country also. Notwithstanding the marvelously rapid development of the cement trade in this country, we still use scarcely half the Portland cement per capita which Germany consumes, and the total consumption is as yet less. The successful use of cement and concrete in engineering structures, the evident superiority of good concrete in strength and durability, its comparative cheapness and its adaptability to all uses, conditions and situations, lead the progressive capitalist or builder to ask why so valuable material cannot be used in architectural structures as well as in engineering construction?

There is but one answer to this question: it can be so used, and it is the province of the progressive architect to take up the new material, and by his scientific and artistic treatment of it to make its use successful. Thus far but little has been done by professional architects to adapt cement and concrete to any but the most utilitarian uses in a building. Foundations, cellar walls, sidewalks, vaults, inside walls, floors, roofs, have been made of concrete with more or less success, according to the engineering or mechanical ability of the designer and constructor.

The time has now come for a general extension of the use of concrete for the construction of all parts of structures for which it is adapted, and for the recognition of the fact that there are very few structures for which it is not adapted. The delay of architects of ability and reputation in investigating and guiding the development of the new methods of construction has had its result in forcing those who are mainly interested in cheapness of construction to make their experiments in a wholly inadequate manner and to bring out undeveloped, haphazard architectural forms and methods which serve to show their limitations on the lower side and what should not be attempted, an occasional fortunate design giving some idea of the possibilities which lie in the new methods of construction which the new materials call for.

This blind and unguided feeling after the truth, which is clearly recognized, but the way to which is not clear to the untrained mind, has resulted perhaps in the formation of prejudices in the minds of those whose interests are elsewhere, whose time is taken up with other things, who are fixed in the old ways, or who can see only what is on the surface and, since that is not satisfactory, can see no possibility of producing something which will be satisfactory. Thus large areas of concrete without joint have made some believe that no concrete surface can be made without cracking. Concrete blocks of a fixed size have made some condemn block construction because it was claimed that the material must fit the architecture and the architect should not be required to make his designs to fit the material. Bad surfaces have caused some to declare that durable, handsome, perfect surfaces are impossible in concrete or cement. Execrable imitations of stone, brick or other building materials have caused some to condemn cement as an imitative material which is always a failure.

These are but incidents in the development of the use of this material which are the product of the crude methods used under the conditions forced upon the building trades, partly by the conservatism of architects in taking hold of it, and partly by the remarkably successful and rapid distribution of the little knowledge of first value actually gained, which makes the work to be done many times what the few good men in the business of designing are able to take care of.

Observation of the errors made by incompetent or ignorant constructors and owners makes many architects slow to prepare plans for any work which they are not to superintend personally. This is a laudable caution, but the actual manipulation of concrete is less difficult than that of brick and far less than that of stone, if there is expert direction, and efficient inspection is no more necessary with the one material than with the others. Experience shows, also, that some architects carry their submission to ancient authority so far that they demand materials and methods of construction which were out of date soon after the cement era began in this country—some fifteen or twenty years ago. This is hardly as laudable a form of conservatism.

Demands are coming in by almost every mail for information about where to get plans for the construction of cement buildings. Almost every detail of a building is mentioned by some one, and nearly all are wanting something which will give them guidance in getting structures as nearly all concrete as possible.

What will the architects do to meet this demand? A few men have made successful designs for railroad stations, factories and houses, and many have made cement to a limited extent, but it may truly be said that no one has yet done anything toward satisfying the rapidly growing demand for studies of the application of cement and concrete to the common problems of dwellings, factories, &c., whether solid or in block form.

The demand can only be filled satisfactorily by a good architect, an artist as well as a constructor, who will become thoroughly familiar with the materials used and will develop proper methods of using them, or proper designs for buildings or building materials made of them. For such men there is a large, strictly professional business waiting. Articles in previous numbers of *Municipal Engineering* have indicated the mistakes of vendors of concrete block machines in respect to their neglect of architectural principles and of proper precautions that good product shall be turned out by those with which they place machines.

This article is intended to point out to the competent architect what he can do in correcting these mistakes so far as the production of good buildings, both structurally and architecturally, is concerned. That he will at the same time step into a large professional practice will not be one of the least inducements. Thorough preparation for the work and devotion to the new material for its own sake are necessary to success. Imitation has failed in the past because it was not close enough to deceive, but imitation of the utmost perfection is still imitation and carries the elements of failure. The architecture must suit the material, though the forms which the material may take must be made to fit the details of the architectural design.

Steel Theater Curtains.

Following the Iroquois Theater fire in Chicago, a general investigation was made of means for protecting the audience of a theater from fire on the stage. There were many devices suggested, among them water curtains, but the manufacturers of asbestos curtains still held that theirs was the ideal protection, notwithstanding the fact that the asbestos curtain at the Iroquois Theater proved a failure. Flimsy as it was, it would probably have prevented the spread of the fire to the auditorium long enough to permit the people to get out if it had been possible to get it clear down. It is the contention that almost any curtain, not immediately inflammable, would afford sufficient protection to cover the escape of the audience if it completely shut off any draft of air between the stage and the auditorium. To this end it is believed that steel curtains are most desirable, and considerable attention has been drawn to them of late. The city authorities and the underwriters in Chicago are inclined to insist upon them in some form, and theater managers have shown a willingness to install such curtains; in fact, many already have done so.

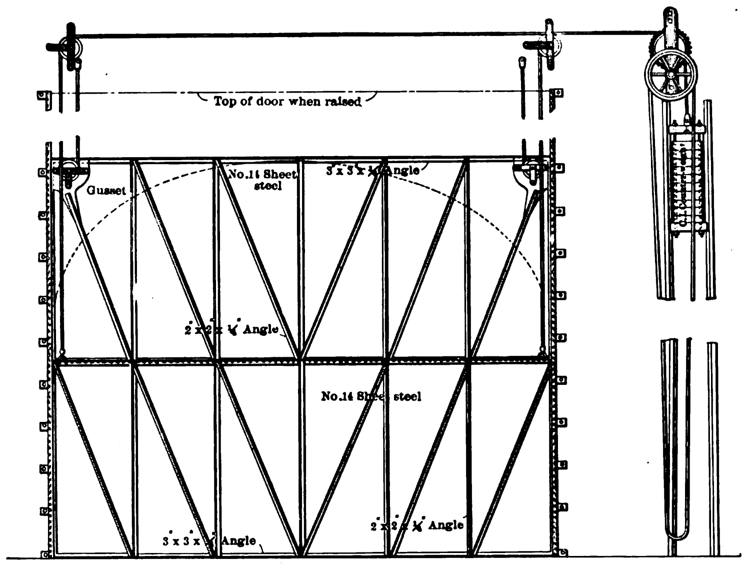


Fig. 1.—Steel Curtain in Two Parts, the Lower Section Being Arranged to Move with Twice the Speed of the Upper One.

Steel Theater Curtains.

The size and shape of the building in many theaters preclude the use of a curtain which will rise in one piece, as it requires a space of 30 to 40 feet above the top of the proscenium arch. For cases of this sort the Variety Mfg. Company of Chicago have devised a curtain that may be made in two or three sections, and raised with the lower section or sections traveling enough faster to cause all to reach the top together. Fig. 1 shows a curtain of this type in two sections, the lower half having double the speed of the upper. The curtain itself is made of 14-gauge flat or corrugated sheet steel, supported by 3 x 3 x ¼ inch steel angles and braced with 2 x 2 x ¼ inch angles. The weight of the sections is counterbalanced sufficiently so that one man, operating a winch on the stage side of the curtain, can easily raise it, and when released it will drop to the stage without force enough to injure it. The curtain slides in steel channel guides at each side, and may be provided with idlers at intervals along the tracks to facilitate its motion and allow for expansion without liability of binding. The Variety Mfg. Company also make a similar curtain in three sections and in one piece. In the case of the compound door one-half of the weight of the upper section is carried by the cable anchored into the wall above, reducing the necessary weight of the counterbalance by 25 per cent. of the total weight of the door, but with the single piece door the counterweight must nearly balance the total weight of the door. It is estimated that the average weight of steel curtains in either of these forms would be about three tons.

Emery Stanford Hall, consulting architect for seven Chicago theaters, has placed in the Academy of Music a curtain of his own design, as illustrated in Fig. 2 and has awarded contracts for the placing of similar curtains in the Bijou and Haymarket theaters to the Sykes Steel Roofing Company and in the Alhambra Theater to William E. Schaeffer of Chicago. Fig. 2 gives the dimensions of the Haymarket curtain. It is Mr. Hall's belief that it is dangerous rather than safe to use a very heavy gauge steel in the curtains, as was shown by an incident in the Auditorium Theater some months ago, when the heavy curtain there in use stuck and could not be released for several hours. Mr. Hall's curtains weigh about 2 tons each, according to the size of the arch, and are made from 24-gauge black corrugated sheets

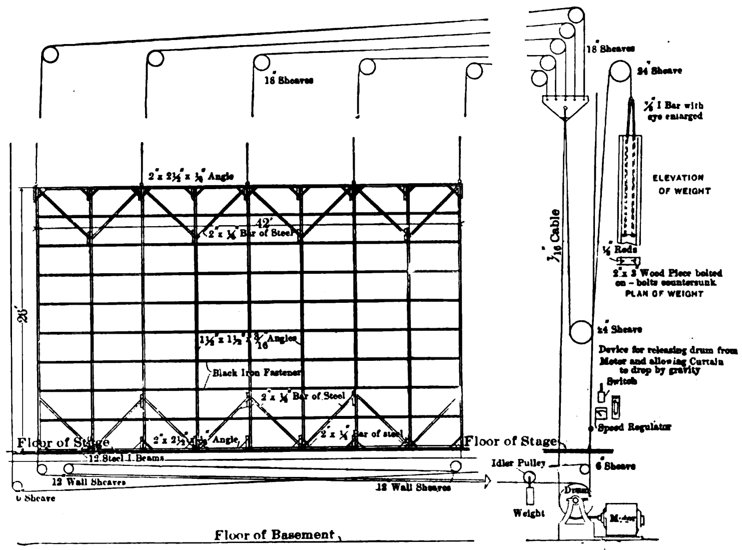


Fig. 2.—Steel Curtain in One Piece; Held Without Guides by Tension Cables at Both Top and Bottom.

Steel Theater Curtains.

protected on the stage side by asbestos. This curtain has no side bearings, but is under tension at all times between upper and lower cables which hold it in place. Those from which it is hung are carried over pulleys high above the stage and support heavy counterweights in the basement which keep them taut, also allowing for expansion and contraction.

Under ordinary circumstances the curtain is raised by a motor connected through a worm gear with the drum around which the cables pass, but in case the motor is out of order, by pulling a controlling rope attached to the lever of the drum the latter is disengaged from the motor and the curtain can be raised by hand. An electric button is placed on every fly door and also at a point in the house, each button having the right of way over the rest of the machinery, so that by touching it the curtain may be instantly lowered. The lowering is effected by counterbalancing weights which weigh 200 pounds less than the curtain, allowing for friction and permitting it to fall by its own weight without shock to the stage floor. The motor which raises the curtain runs at four different speeds and is controlled by switches in the flies.

IMPORTANT contracts for a 15-story brick and steel loft and office building have just been awarded, the structure to occupy the site at 9 and 11 Dey street, New York City. The work is estimated to cost in the neighborhood of $450,000, and will be executed for the New York Telephone Company.

A Concrete-Steel Lighthouse.

A concrete-steel lighthouse has recently been completed by the Russian Government at Nicolaieff to light the canal which joins that town to the Black Sea. It has a thin circular shaft about 110 feet high, which has a diameter of about 6½ feet at the top and straight sides slightly battered to a point about 40 feet above the base where the batter increases, and the sides are curved so as to widen to a diameter of 20.7 feet at the base. This shaft is set on a circular cup-like foundation 8 feet deep with a horizontal footing 28.2 feet in diameter. The side walls of the foundation are battered, and within them there is a circular space 19.7 feet in diameter which is filled with earth and covered by the reinforced concrete floor of the shaft. The shaft is surmounted by a cylindrical chamber 14.8 feet in diameter inside and 9.8 feet high, with reinforced concrete brackets carrying the overhanging floor. On the top of the chamber is a domed lantern about 6.8 feet in diameter and 13 feet high.

The shaft is made without interior divisions, floors or bracing, and contains only a spiral staircase reaching to the upper chamber. The construction throughout of foundation, shaft, chamber, lantern and stairs is of reinforced concrete, made in the proportion of 661 lbs. of Portland cement, 14 cubic feet of coarse sand and 28 cubic feet of washed gravel. The reinforcement in the shaft consists of horizontal circular ¾-inch steel rods about 1 foot apart vertically and ⅞-inch vertical rods about 9 inches apart, wired together at intersections and spliced by short pieces lapped and wired over the joints. The foundation walls are reinforced by rods in the vertical and battered faces and horizontal tie pieces. The footing, which is 30 inches deep, is reinforced by ¼-inch horizontal rods at right angles to each other near the upper and lower surfaces. The brackets supporting the floor of the upper chamber are made integral with the walls of the shaft and the floor, and have their under sides curved to form mouldings. They are reinforced by horizontal and inclined rods wired to the vertical rods in the shaft and by vertical and diagonal rods wired to those in the upper and lower flanges of the brackets. The walls and roof of the chamber and lantern are reinforced with simple vertical and horizontal rods.

The lighthouse was proportioned for a wind pressure of 55 pounds per square foot of the surface. All the reinforced rods were painted with cement grout before being bedded in the concrete. It is stated that the reinforced construction cost 40 per cent. less than a corresponding one entirely of brick or entirely of metal. The brick lighthouse would have weighed 1365 tons against 400 tons, which this one weighs.

Paint for Damp and Moldy Walls.

It is not an uncommon experience to find that dampness on the outside of a building or wall has penetrated through the coatings of paint on the inside, and many have been the troubles of those called upon to overcome the difficulty. A correspondent writing to a recent issue of the *Painters' Magazine* asks for a formula for a paint that will prevent the dampness or mold on the outside of a wall from striking through the paint on the inside, and the reply presented is to the effect that such a paint can be made by first preparing a liquid as follows:

Place 50 pounds air slaked lime, 10 pounds glucose, 2½ pounds powdered alum, 2 gallons boiled linseed oil and 5 pints oil of eucalyptus in a small barrel or tub, and gradually add 8 gallons of warm water, stirring in the meantime, until all is dissolved. If this liquid is too stout to work freely, more warm water is added. Any lime proof pigments, such as zinc oxides, oxide of iron reds, ochers, umbers, lime blue, &c., may be mixed with this liquid and applied on the inside of such walls as mentioned, but at least two coats are required to obtain the desired result. From 3 to 4 pounds of pigment are required to the gallon of liquid, excepting in the case of umber or lime blue, where 1½ to 2 pounds is ample. If this damp resisting paint does not give the result looked for, the remedy must be applied from the outside of the wall.

THE MEXICAN PERMANENT EXPOSITION COMPANY, Mexico City, Mexico, has been organized by a number of citizens of Mexico, who have secured a most favorable Government concession and is now erecting extensive exposition buildings, which will be ready for occupancy on or about October 21. It is the intention of the company to maintain a permanent exhibit in the Mexican capital of such products of other countries as are best adapted to Mexican uses. J. Landero Y Cos is president and E. Hegewisch is secretary. The company has appointed E. H. Talbot of New York commissioner for the United States, with full power to assign space and arrange all details relating to exhibits. Mr. Talbot is honorary member of the Mexican Commission to the St. Louis World's Fair and will be located in the Mexican section, Manufactures Building, St. Louis, Mo., until November 30, where he may be called upon or addressed regarding space or any other matters connected with the Mexican Permanent Exposition.

THE first manual training high school in the Borough of Manhattan, New York City, will be organized in time for the opening of the fall term in September, if all goes well. The classes will occupy the annex of the De Witt Clinton High School, in East Twenty-third street. The Board of Superintendents hopes the Buildings Department will have other accommodations ready to receive the school by the time it outgrows these quarters. The distinguishing feature of the curriculum, which has already been mapped out, is the shop work. In the shops the pupils will be taught pattern making, molding, wood turning, sheet metal work, &c. The classical side of education will not be neglected, however. The pupils will be instructed in English, French, German, Latin, chemistry, physics, mathematics and vocal music. The course will require three years.

THE Indian room at Osborne House, Isle of Wight, England, is considered the finest piece of Oriental work in the world. It was designed by Sam Singh, a famous carver and native of Punjab. Much of the wood work is teak, carved and pierced in the Indian fashion; the colors in the room are scarlet, gold and indigo blue. The pomegranate and lotus are used largely in the decorative scheme, and a large white peacock is spread above the teak wood mantel. Electric lights, shining forth from quaintly shaped lamps of silver, beaten metal and vases of Oriental form, give just the subdued light which sets off the beauty of the room.

Fine Example of Sheet Metal Statuary.

A marked advance has been made in the last few years in the application of sheet metal to decorative architectural work, especially in the form of statuary, and a number of concerns are now turning out work in this field possessing true artistic merit. In the accompanying illustration we show an example of high art metal work for public buildings, consisting of a group 22 feet high, representing Justice, Education and Law, which is the work of Friedley & Voshardt of Chicago, Ill. The group, which is intended for the Riverside County Court House in California, was ordered by E. L. Quinn of Los

Fine Example of Sheet Metal Statuary.

Angeles, who has the contract for all the sheet metal work on the new building. The statues are made from 32-ounce copper, and the group was designed by Paul Mohrman.

Death of A. C. Kanneberg.

The many friends of A. C. Kanneberg of the Kanneberg Roofing & Ceiling Company, Canton, Ohio, will learn with deep regret of his death, which occurred on Saturday afternoon, June 11, at his home, 613 South Cleveland street, in that city. He was born in Winesburg, Ohio, and began his business career in Norwalk, Ohio, where he remained until 1882, when he went to Canton and for six years was business manager of the Snyder Roofing Company.

He was born in Winesburg, Ohio, and began his business career in Norwalk, Ohio, where he remained until 1882, when he went to Canton to take the position of business manager of the Snyder Roofing Company, which position he held for a period of six years. He then, in 1888, organized the Kanneberg Roofing & Ceiling Company, of which he remained the head until the time of his death. He started in business at the very bottom of the ladder, and by his determination and pluck succeeded in giving his company the prominent position it now holds in the metal ceiling and roofing business. His many friends admired him for his great energy and determination to succeed in anything which he undertook. He was a member of the Masonic order, and was highly respected in his community. Mr. Kanneberg is survived by his wife.

The funeral services were held at his late residence on the afternoon of Monday, June 13.

The business of the company named will continue under the same management as during the last three years of Mr. Kanneberg's life.

Prices of Building Materials.

It is the opinion that the prices of materials used in building will, with few exceptions, remain, not motionless, but moving within a narrow compass for the remainder of the year, says a recent issue of the *Record and Guide*. Iron being included in this expectation, there is reason for renewed hope that some large enterprises will appear during the summer, if not unnecessarily frightened by political forebodings. The numerical shortage of large works is the predominating characteristic of the season in the Metropolis, though of small work there is at least a normal supply, if the whole city is considered in the estimate. Undertakings of the mammoth order are exceedingly few, and opportunities for figuring on such work are eagerly sought for, whether they appear in New York or in some other city, by contracting firms making a specialty of large work, who are numerous enough to drive total costs down somewhat below the normal for that kind of construction.

The amount of small work, however, compensates material dealers in a good many lines for a market which, generally speaking, is slow. Such material as lumber, brick, plumbers' supplies, lime, bluestone, and the other elements that go into a suburban dwelling or into a Bronx apartment house, are all going out in at least average quantities, while some are in exceptional demand. Aside from lumber and plumbers' supplies, brick is the only material noticeably higher than usual, and as the market for brick is free for all and beyond the power of serious manipulation, the extraordinary requirement must be accepted as complete testimony to the amount of brick work going on in the city.

The rebuilding of Baltimore has not yet been felt in the labor and material markets here; in fact, the amount and character of the work thus far offered has been disappointing to those general builders whose field is half the nation, and interest is turning away from Baltimore, though perhaps only temporarily, for the largest and best work is yet to come.

Ordinarily about a third of the bricklayers of the metropolitan district are idle, but at present, or for the moment, there are no surplus workmen in this trade, and some employers have had difficulty in getting help enough. But as soon as this state of affairs is known abroad, there will probably be a migration from the surrounding towns, and a return of many New York workmen who have gone to Baltimore and other places, but naturally prefer to earn the larger wage prevailing here.

Brooklyn lumber dealers report marked activity in their trade, which is a consequence of the extraordinary building in the borough. All the yards are busy and the same is true of the lumber business in Long Island City, Staten Island, the Bronx, and the Jersey shore. In Manhattan, business is not so swift, but the retail dealers are not complaining. Everything pretty much is in demand except poplar. In hardwoods the requests are principally for oak, ash, birch, chestnut and gum.

IT is proposed to erect an industrial building at Hartford, Conn., for rent to manufacturing concerns who have not the means to build plants of their own, or who wish only a limited floor space. The Hartford Business Men's Association and the Board of Trade are interested in the project. Plans call for a building 50 x 300 feet and four stories. With annexes 72,000 square feet of floor area will be obtained.

"How to Use, Test and Adjust Architects' Levels" is the subject of a little pamphlet from Kolesch & Co., 138 Fulton street, New York City. It will be found useful to those who have occasion to handle instruments of this class.

A Roof Garden on a Packing House.

A novel thing about a new structure to be built for a bacon and ham packing firm in Cincinnati, Ohio, will be a large roof garden. There will be a lake, oval in shape, 25 x 30 feet in dimension, with fishes in it. In the center of this lake will be a small electric fountain. The lake will be from eighteen inches to two feet in depth. Besides the lake there will be regular grass plots, with trees planted in them and such flowers as thrive in this climate. The height of this garden from the street will be between 75 and 80 feet. In the summer time the place will be covered over with awnings, and everything arranged so that it can be used by the members of the firm, their employees and the business men of that locality as a pleasure resort.

GEORGETOWN, D. C., is the scene of active building operations. Small dwellings and two-flat apartment houses are mostly being constructed.

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RESIDENCE OF MR. E. L. DOHENY, CHESTER PLACE, LOS ANGELES, CALIFORNIA.

SUPPLEMENT CARPENTRY AND BUILDING, AUGUST, 1904.

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CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS

232-238 WILLIAM STREET, NEW YORK.

SEPTEMBER, 1904.

Necessity of Ventilation.

Frequently we hear of people fainting while in attendance at some large meeting, and it is not an unfrequent experience to learn of fatal colds caught through the vicious practice of opening a window to let in a draft of air 50 per cent. colder than that in the church or hall. The old idea that a room or house is ventilated if it is only cold is responsible for much mischief, for cold air may be dangerously contaminated. The problem of ventilation cannot receive too much attention, when considered in connection with buildings where many persons congregate. It is a vital problem in our immense office buildings, with several floors underground; our churches, halls, theaters and schools, especially the latter. Heating a room does not ventilate it. A continual supply of fresh air is needed to ventilate a room properly. Injurious effects could not fail to result from habitual exposure to an atmosphere contaminated by organic and inorganic impurities, such as are found in the products of respiration and the combustion of gas flames, &c., in public halls, theaters, schools and similar places of assembly. The effect of maintaining a higher standard of purity of the air breathed could not better be illustrated than by the following statement of facts: By improved ventilation the death rate has been reduced in children's hospitals from 50 to 5 per cent., and in army hospitals from 23 to 6 per cent., while prison records show, in one case, a reduction from the yearly average of 80 to 8. In the army stables of the German Government better ventilation has reduced the death rate among the horses from 19 to 1.05. Such facts speak for themselves.

Good Ventilation.

Good ventilation is essential, because health depends on diluting the impurities to such an extent that the air may be breathed without injury. The most important of the inorganic impurities in the air is a gas known as carbon dioxide. This gas is present in the atmosphere at all times in the proportion of about 3½ parts to 10,000 parts of air in the country and 4 parts to 10,000 in cities. It has been univerally accepted by experts that a proportion of more than 10 parts of carbon dioxide to 10,000 parts of air is detrimental to health, causing weariness and headache, while even 8 parts to 10,000 will cause a feeling of closeness and stuffiness. The generally accepted standard of respirable purity of air is taken as 6 parts of carbon dioxide in 10,000 parts of air, the presence of carbon dioxide being taken as an index of the extent to which the air has been vitiated by the more dangerous organic impurities due to bodily exhalations. Carbon dioxide is a product of combustion, whether that combustion is slow, as in the chemical processes of the body, from whence it reaches the air through the lungs, or from the burning of gas coal. When generated by the combustion of coal it generally escapes through the chimney flue, but in the case of burning gas the carbon dioxide passes directly into the air that is breathed. An ordinary single gas burner requires about 45 cubic feet of air per minute, and the carbon dioxide produced will seriously vitiate the air of the room unless removed immediately. The removal or dilution of the impurities of the air we breathe can be positively effected at all times, and under any conditions, only by means of a mechanical or fan system of heating and ventilation.

Conditions in Public Buildings.

As showing how dangerous are the atmospheric conditions that obtain in some public buildings, it may be stated that in a well-known Boston theater the figures representing the parts of carbon dioxide to 10,000 parts of air were as follows: Floor, 39.13; first balcony, 48.14 to 42.86; second gallery, 44.72; gallery, 48.14. In a well-known public hall the proportion of carbon dioxide in 10,000 parts of air was found to be 18.48, while in another building, where numbers of young men congregated, the proportion was 36.4 to 32.6. In large cities like New York much of the air that comes into the offices on the lower floors of buildings in some of the narrow cañons, called streets by courtesy, is absolutely unfit to breathe. Some of it, being germ laden, is positively dangerous. Thoroughly pure air is a minus quantity in very many cases, and ventilation generally means drafts. In office buildings of the latest types air is furnished to each room in much the same manner as is gas, electric light and heat. The air is drawn in from the roof, where it is relatively pure and untainted, and is carried downward into the basement, where it is heated and thence distributed, a proper quantity of fresh warm air being distributed to each office. The foul air is drawn up to the roof by exhaust or suction fans and discharged at a point remote from the fresh air intake, so as to obviate contamination of the fresh air supply.

Scarcity of Skilled Workmen.

It is pleasing to record that at one of the recent conferences between workmen and employers the master plumbers of New York secured an arrangement with the journeymen plumbers whereby 250 apprentices will be indentured to the plumbing trade during the next two years. This concession was largely due to the fact that there is an evident scarcity of good journeymen plumbers, and that, under the present conditions, nothing is being done to recruit the force. Only a short time ago the statement was made that the delay in completing schools in New York City to accommodate the children who must start in after vacation was due to the scarcity of workmen in different lines. It was asserted that there was no trouble about getting estimates for the work, but that, as soon as the time limit was put upon it, contractors hesitated, owing to the fact that they were unable to get workmen capable of installing the heating systems and doing other mechanical work. It is gratifying to note this change of attitude on the part of the journeymen plumbers, which can be followed with advantage by the workmen in all of the building trades, without any injury to the man already competent for service. The mutual agreement of the employers and the employees gives promise that the plumbing apprentices who are to be indentured are to be given a fair opportunity to become masters of this trade. In the operation of a plumbing business, in these times, the employer is so engaged that he has little time to give to the instruction or supervision of his apprentices; and as much more of the instruction is received at the hands of the journeymen plumbers it is only fair that they should have been considered in this new arrangement. It is creditable to both parties that a substantial addition to the complement of plumbers is to be made in New York City.

Workmen in Other Cities.

The scarcity of skilled workmen is a matter of much concern in other cities, in which the example set by New York could well be followed. Other lines than the building trades have also suffered very considerably in recent years for lack of competent men. The stove trade is a case in point. In this also it is a pleasure to note that a measure of relief is now in prospect. The stove manufacturers have for several years urged the Iron Molders' Union of North America to permit an increase in the number of apprentices employed in foundries so as to supply the pressing demand for stove molders. The present ratio of apprentices to stove molders is 1 to 8, which is too low. A proposition to change the ratio to 1 to 5 is shortly to be submitted to the union membership for decision. As this is being done by the Executive Board of the Iron Molders' Union, hope is entertained that a majority will vote in favor of the change.

Convention of the Master Builders' Association of New Jersey.

In accordance with the announcement made in our last issue, the first annual convention of the Master Builders' Association of New Jersey was held at Long Branch on July 30, there being present a large representation from various parts of the State. On arriving at Long Branch stages were in waiting to convey the delegates to the Town Hall, where the meeting was called to order by President McGuire.

The session was occupied by reports of various officers and a consideration of matters pertaining to the business of the association. Copies of the New York Arbitration Plan were distributed among the delegates, and a motion that the plan be taken up, section by section, was displaced by one to lay it on the table, which was carried. Under the head of New Business the Montclair delegates reviewed the history of the strike which occurred in that place this spring, stating that for more than six weeks past the "open shop" policy had been in force. The representative of the Slate Roofers' Association formally notified the convention that the journeymen slaters had been on strike since the first of July. The session developed a great deal of enthusiasm on the part of those present, and the meeting adjourned a little after four o'clock in the afternoon.

After the meeting the delegates, reinforced by the members of the Long Branch Builders' Exchange, marched in a body through the city and took conveyances for Pleasure Bay. There, in the words of one of those present, "parched throats were moistened, and all sat down under the blue canopy to enjoy a very fine clambake, provided for the occasion by the Long Branch Association." Mayor of Long Branch Rufus Blodgett was an honored guest and made a short address. After the clambake had been disposed of and other sundry refreshments properly considered the delegates departed for their respective cities to meet again in October.

THERE have recently been filed with the Bureau of Buildings plans for the enlargement of the well-known department store of Siegel, Cooper & Co. on Sixth avenue, Eighteenth to Nineteenth streets. There will be two new stories, covering the eastern section of the building, 202½ feet long and 184 feet wide. The facades of the addition are to conform with the present design and the improvement is estimated to cost $150,000. The architects are DeLemos & Cordes.

Views of a Labor Leader.

In these days of ultra-radical trade unionism it is refreshing to hear such words as these from a labor leader, head of a great labor organization, the Brotherhood of Locomotive Engineers: "On almost every road in the country we work side by side with men who do not belong to our order. No man is forced to join us. We try to show him how he would be benefited by belonging to us and where his interests are, but we never say to him, 'Join us or you cannot earn an honest living by working here.' I do not believe any man ever made a good member in any organization who was forced to join it against his will, for the chances are that when opportunity offers he will prove a traitor and betray you." These words were addressed by Grand Chief Stone to a convention of labor representatives at Fort Worth, Texas. He urged that the closed shop means an interference with the personal liberty guaranteed by the Constitution of the United States. Such ideas from a labor leader are so unusual that they excite wonder. Yet the real wonder is that there should be anything extraordinary in a statement that is so apparently true to all fair minded men. It goes to show that labor is not generally led by those who should be its real leaders, the men of well poised minds, the best type of men in the organizations, but by men whose selfish personal ambitions distort their vision to see things only from the one standpoint of trade unionism at the expense of justice and the general good.

Powers of an Architect.

The Court of Appeals of the District of Columbia held, in the recent case of Fontana *vs.* Robbins, that the general or usual powers of an architect are not of an unlimited character, and that it is competent for the parties contracting, with reference to the work to be done and the manner and conditions under which it is to be executed, to determine for themselves the conditions under which the work may or can be done, and thus exclude the power of the architect and place such conditions beyond his control. The Court held in this case that when a contract for certain interior marble work in connection with a building provided that work under the contract should begin when the inclosing walls were up and the roof on, and be completed within a time stated, it was not within the power of the architect to change the contract in that regard without the consent of the contractor, and require the contractor to proceed with the work before the walls were up and the roof on, and that in such a case it was no defense to a claim by the contractor for damages sustained by him, owing to the failure to have the building in condition for him to perform his contract within the time limited for performance, that he refused a demand made by the architect in charge that he should proceed with his work before the walls were up or the roof on, as required by his contract.

New Government Building in Mexico.

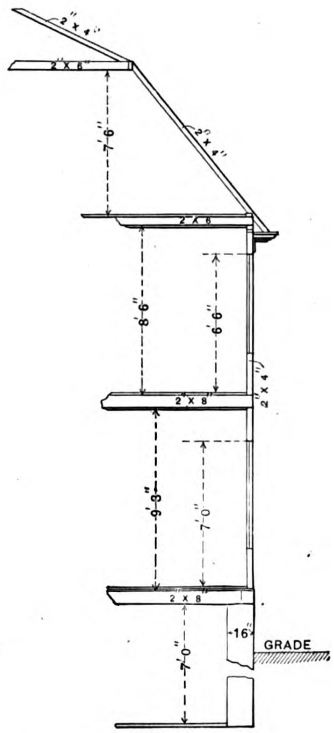
The first contracts have been let for the new Government building to be erected in Mexico City. The building will be 182 x 265 feet, and will be three stories in hight. It will be equipped for the use of the Department of Communications and Public Works, for the Federal Telegraph department and for the Water office. The exterior of the building will be of cut stone, the frame work will be of steel, with cement floors and concrete arches. The building will have a steel grillage foundation resting on concrete platforms. It will be of fire proof construction throughout, and will require 2700 tons of structural steel. The steel is to be delivered by February 1, 1905, and the frame work is to be completed by September 1, 1905. The building is to occupy the site of the present San Andreas Hospital, the removal of which is to begin at once.

DESIGN FOR HOUSE OF MODERATE COST.

We have taken for the subject of our half-tone supplemental plate this month a two-story frame dwelling erected not long since in the Central West in accordance with drawings prepared by W. S. Wylie, at present located in Sterling, Kansas, but formerly of Washington, Iowa. The elevations, floor plans and details presented herewith show the general arrangement of the rooms on the first and second floors and also the construction and style of finish. It will be seen from an inspection of the picture and the elevations that the outside of the house is covered with weather boards and that the roof is shingled.

The floor joists are of hemlock, the studding of yellow pine and the outside sheathing 10-inch white pine shiplap, overlaid with building paper and covered with red cedar lap siding laid 4½ inches to the weather on the first story and 3 inches on the second story, where at the corners the siding is mitered.

Front Elevation.—Scale, ⅛ Inch to the Foot.



Section.

Design For House of Moderate Cost.—W. S. Wylie, Architect, Sterling, Kansas.

The first story floor is double, with paper between the two. The finished floor in the hall is 2¼-inch face quarter sawed white oak. The sitting room and dining room have a 2-foot border of the same material as the hall. All other floors, except those of the kitchen and bathroom, are of 6-inch white pine. The kitchen and bathroom have floors of straight grained yellow pine 4 inches wide.

The finish of the doors and windows in the front hall and stairs is of quartered sawed white oak. The sitting and dining rooms are finished in cypress, while the kitchen and all the rooms on the second floor are in yellow pine.

The bathroom is fitted with roll rim white enameled bathtub, water closet and wash bowl, all plumbing being of the open type. The house is heated with a hot air furnace of the Richardson & Boynton make, and is wired for electric lighting and piped for gas.

The outside painting is three coats hand mixed lead and oil, and the shingles on the gables and all roofs have one coat of Heath & Mulligan moss green shingle stain. All inside finish has one coat of shellac finish and two coats of good varnish left in the gloss. The oak floor is wax finished. All oak finish was filled with paste filler and rubbed off before being put in place.

Heating and Ventilation of Hospitals.

In considering the question of the successful heating and ventilating of hospitals B. E. Taylor, in an article in a recent issue of the *Brickbuilder*, presents the following views:

The successful heating and ventilation of a hospital is a vital problem, and the only absolute rules that can be laid down are those treating, not of manner or detail, but of practical results.

The requirement is, for all northern latitudes, from 3000 to 5000 feet of air per patient each hour, warmed indirectly to at least 70 degrees F., whatever the outside temperature. This means an expensive plant and an enormous coal consumption, also every precaution in the way of double run of sash or double glazing, vaulted walls, &c., to assist as much as possible in preventing the loss of heat through unnecessary radiation.

In warmer climates construction can be simpler and cheaper, and the radiation can be less with more "direct" work, relying largely on natural circulation for ventilation.

Some authorities maintain with considerable force that the sick wards should not be maintained at an unvarying temperature, that nature in its continual change of many degrees from noon to midnight shows that there is a necessity in this direction. If this varying condition is necessary in maintaining health in well people, why not in restoring health?

The perfect heating plant will be in a special building by itself or one having the laundry in a second story. It should be installed under one of the hospital buildings only as a temporary expedient when the finances absolutely preclude a special building.

High pressure steam should be installed in a complete, perfected plant, to be used for power, laundry machinery, electric light, ventilation and sterilizing as well as for heating.

If the institution is too small to employ an experienced engineer, a low pressure steam boiler can be installed for heating and a small high pressure boiler can be used for the other purposes enumerated.

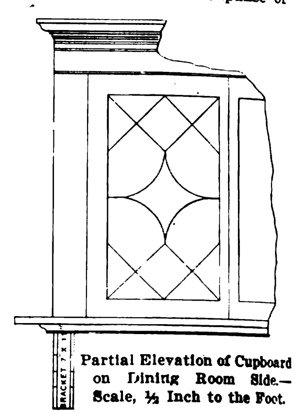
In small hospitals it will generally be found best for economical reasons, both as to installation and maintenance, to install a low pressure system. This will give no power for laundry machinery, which in a very small plant must be omitted, and it will give no high pressure steam for disinfecting, sterilizing or for inducing draft in the vent flues, all of which are quite necessary, but are impossible without considerable expense. The sterilizing can be done quite as successfully by gas, and in the summer the ventilation can be by means of the windows and doors and special flues in toilets, heated by Bunsen burners. Whenever possible it is wise to install a small high pressure boiler in addition to the low pressure heating boiler for the various purposes named above.

Some of the most expensive and elaborate schemes of ventilation are often found to be perfect in theory but very defective in actual use. It takes coal to run a perfect system of heating and ventilation, and the engineer is apt to try to show his great worth by saving coal and by cutting off the electric fans as much as possible. In an institution inspected some time since, where the superintendent was very proud of his ventilating scheme by which the foul air was drawn up into the loft by electric fans and discharged through roof ventilators, it was suggested that sometimes these fans were found entirely cut off, with no ventilation at all. He was sure that his never were, and went up to the loft to investigate, and found, what was apparent from the stagnant air in the wards, that they were not running.

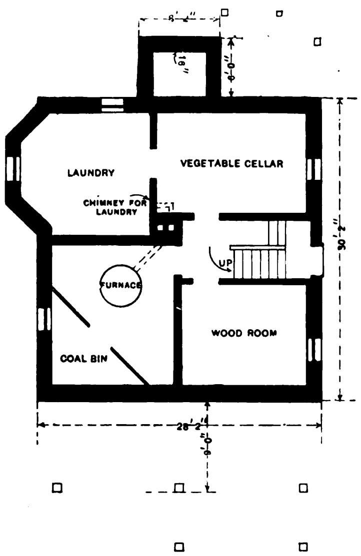
While inspecting last year one of the finest and newest hospitals in a remote section of the country, I found very small hot air inlets and vents and foul air everywhere, and apparently no ventilation at all. Expressing to the engineer a desire to make a study of his heating and ventilating plant, he informed me that they had the most complete and expensive scheme in the entire West, laid out by the best engineers, and that the results were perfect. Replying to my statement that the air seemed bad and the ventilation poor, he said: "These fans will do it and do it quick. Why, you can imagine how thick the air gets in the wards by morning. You can almost cut it with a knife. I start the fans, and in half an hour the air is as pure and sweet as outdoors." To run the fans half an hour, morning and night, may be ventilation, but it ought not to be so considered. What is needed is not fresh pure air in two half hour periods per day, but all the time.

In a small hospital situated in a broad expanse of green lawns, the necessity of taking the air for the heating coils from an elevation is not as necessary as in the city hospital, where the air at the ground level is full of dust and dirt and all manner of impurities. Under these ideal conditions the introduction of the air through wire mesh covered openings directly to the stacks serves the purpose very well, but a dust settling chamber that has the bottom hinged for cleaning is a safeguard, and the stacks should have slides so placed that every portion of the rough dust collecting castings can be thoroughly brushed and cleaned. When the basement under the pavilion is used as a plenum chamber, as is quite commonly the case, the entire room should be finished as smooth as possible with a plastered ceiling, smooth pointed walls covered with a coat of limewash and a coat of cheap water proof enamel, with a smooth cement concrete floor sloping to a catch basin and drain, so that it can be thoroughly cleansed and purified with a hose. Usually the heating and ventilating flues are entirely inaccessible, and are therefore never cleaned. The register faces are screwed in place and never removed. They are generally so constructed as to be specially fitted to catch and hold dust and filth and be almost impossible to thoroughly cleanse, and the flues are loaded with filth that can never be removed.

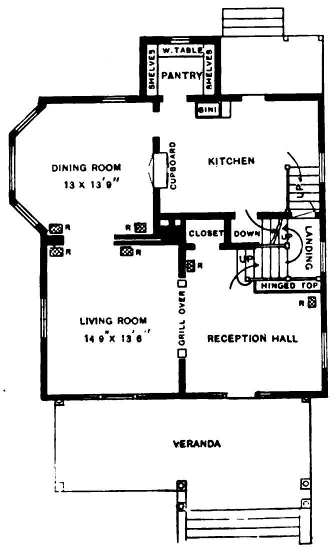
The best practice is to omit, as far as possible, the register face entirely, and thus to open both the heating



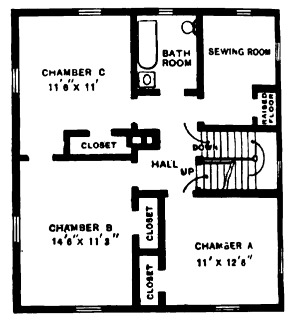
Partial Elevation of Cupboard on Dining Room Side.—Scale, ½ Inch to the Foot.



Foundation.



First Floor.



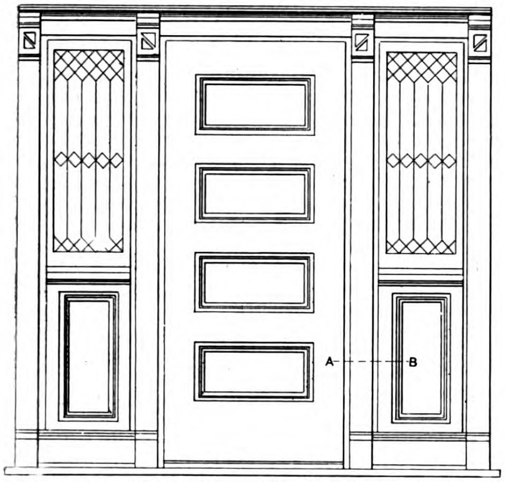
Second Floor.
Scale, 1-16 Inch to the Foot.

Design For House of Moderate Cost.—Floor Plans and Detail of Construction.

flue and the vent flue to inspection and dusting. When the heating flue enters the room, as it should, at least 8 feet from the floor, there is no danger of its being used by patients to throw rubbish into, and the vent flue opening at the floor is much more easily adjusted without a register. The mixing valve under the control of the nurse can be arranged to the amount and quality of the air admitted.

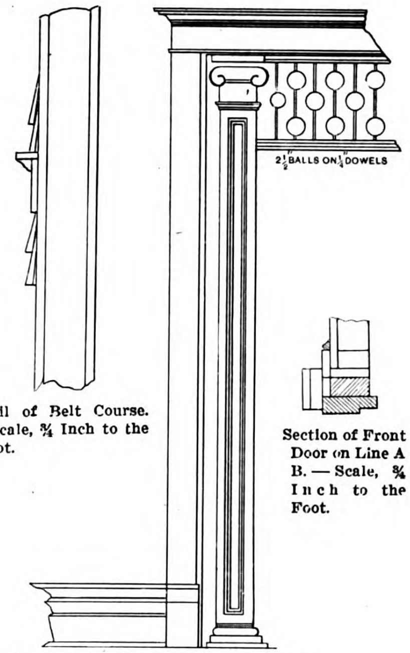
Trials with Tools.

Under the above title a writer in one of the English building papers presents some rather caustic remarks



Elevation of Front Door.—Scale, ⅜ Inch to the Foot.

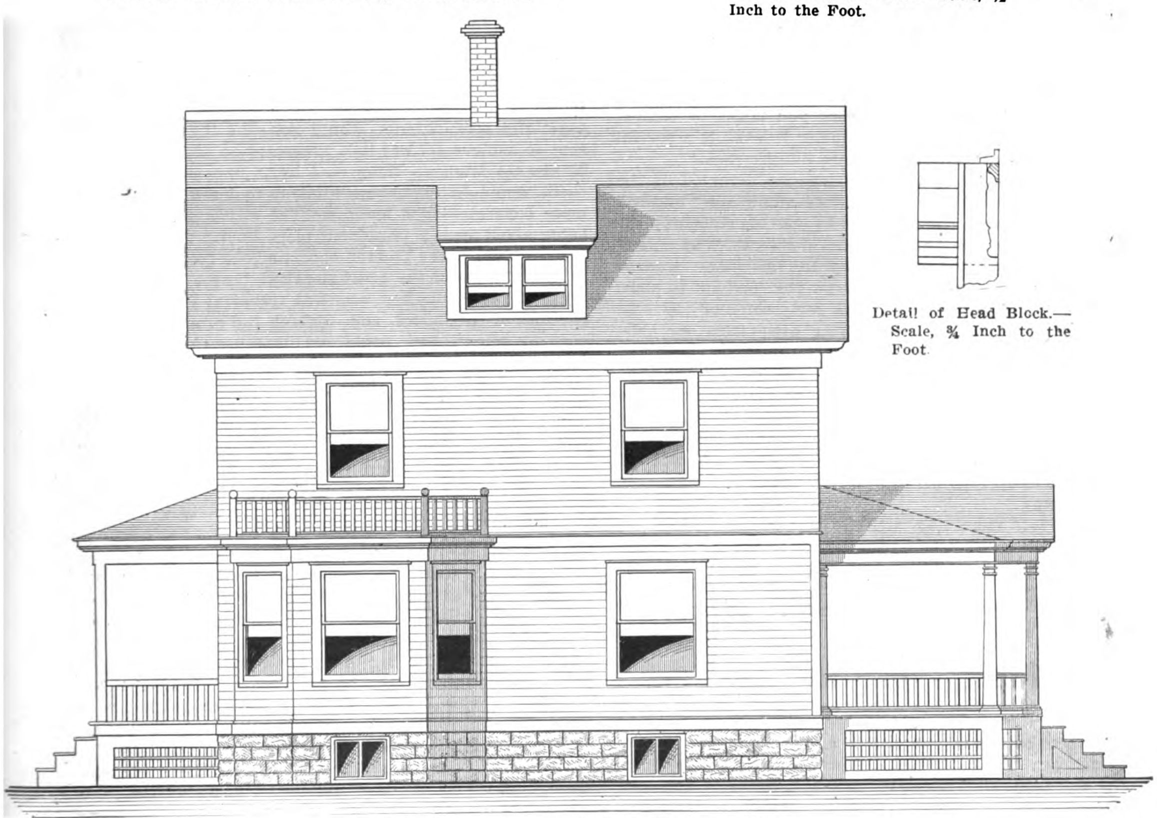
Of all mechanics, none seems to be so little regarded as the carpenter. No one can fail to notice that all the other trades expect everything to be made ready and



Detail of Belt Course.—Scale, ¾ Inch to the Foot.

Detail of Trimmed Opening Between Living Room and Hall.—Scale, ½ Inch to the Foot.

Section of Front Door on Line A B. — Scale, ¾ Inch to the Foot.



Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

Detail of Head Block.—Scale, ¾ Inch to the Foot.

Design For House of Moderate Cost.—Elevation and Details.

concerning the status of the carpenter in the country named and the way in which his tools are used by mechanics in other branches of the trade:

convenient for them by the carpenter, no matter at all what inconvenience and extra work it is to do so for the carpenter. Make things convenient for the carpenter?

Not on your cabinet. In fact, the carpenter is considered legitimate prey for every other human being. Many a time have I had plasterers take a pair of trestles away from me when my back was turned for a moment, although it was plainly evident that I would need them myself in a little while. Plasterers and bricklayers seem to regard it as their rightful prerogative to help themselves to our timber and nails without so much as a thank you. A saw can be picked out of our hand box and run on a nail just for the humor of it. The plumbers think they confer a signal favor on us by taking our 2-inch chisels and cutting them on nails until they resemble dung forks, or take a level and let it fall 10 feet, thus permanently disabling it. No one seems to be aware that carpenter's tools, to be of any value or service, must be in first-class condition. A thoughtless movement, a reckless jamming of a tool, will put it out of commission for satisfactory use, and that the carpenter either has to do without it or spend an hour grinding a chisel or a hand axe never disturbs the average man's equanimity. It never occurs to some people that possibly a carpenter buys tools for his own use.

For the carpenter to refuse to lend his tools is at once to rank him in the category of stony hearted creatures, fit only for pillage and piracy. To explain to the borrower—or rather taker—of tools something of the proper way of caring for a tool, so that it may not be brought back—if, indeed, it is ever returned—so wrecked and metamorphosed and degenerated that the law of nature utterly repudiates it as incompatible with her scheme of things—I say to so explain is to invite a look of unconcealed contempt at the matchless gall of a mere carpenter telling any one anything. Indeed, what avails it to suggest that it would be advisable to avoid nails when the uninitiated cannot discern in what mysterious places these edge destroyers lurk? Most people rejoice when they have found a board particularly well grounded in sand, as it will sharpen the carpenter's plane for him so nicely, especially if you draw the plane backward over the grit. Others supose that to use a spirit level for a pry tends to steady the glasses and strengthen the frame, or to strike it against every stud you touch, or to hold it against a piece while you hammer it level, is a special treatment, guaranteed to enhance its efficiency.

This dependent and inferior position occupied by the carpenter in relation to other trades and to the "taking" public hinges on his own neglect to take his rightful place in the ranks of the world's useful workers. Why should not the carpenter rightfully say to the other trades: "Accommodate, assist and befriend you, yes, but in plain justice, if for nothing more, let reciprocity be the rule between us; let not all the giving come from our side. Our work is as necessary as yours; our life force is as much to us as yours is to you. The extra time we take to make everything easy and pleasant for you has to be done at the expense of what is expected of us by our employers. We would not wrong you, and believe that when you hear what we have to say that you will not refuse to co-operate with us as between equals, and meet us half way."

This self respecting attitude can be maintained together with a spirit of brotherhood and good will to all fair comers, and I believe that it would do much to call forth a proper recognition of our rights and a respect for our trade as an even handed branch of all useful and honorable work.

Advantages of a Trade Education.

In our issue for July we presented some editorial comments on the advantages of a trade education to the young men of the present day, and pointed out some of the objections that are often urged against the youth of the country becoming skilled mechanics rather than adopting some other vocation in life. The views advanced have attracted no little attention on the part of our readers and as indicating the light in which those actively engaged in the mechanical line regard the question of a trade education we present the following comments from a correspondent, who says:

Not long since some surprise was expressed in an editorial that young men, as a rule, should prefer clerkships rather than a career in any of the mechanical trades, especially in view of the fact that the opportunities in the latter are much greater, and the first always overcrowded. The writer has noticed the same tendency, and as a result of his observations has been led to believe that it is due more to the fact that hair oil smells sweeter than machine oil than to any other one cause.

It may happen occasionally that a boy who is really desirous of learning a trade is prevented by the arbitrary course sometimes taken by the labor unions in such matters. But it is safe to say that labor unions are not the most potent cause of this holding aloof from learning a trade, which is so noticeable. Neither can it be said that the hard work is what they most fear, for they will accept clerkships where the hours are long and the drudgery greater than the average mechanic is ever called upon to endure. This is not the case in every instance, but in many it is, and it goes to prove that it is not the hard work the young men object to. When the money making side of the question is considered, no thinking person will for a moment dispute the statement that the mechanical trades offer the best inducements to young men with well developed bodies, sound minds and energy enough to exercise them.

It naturally follows that if the work is no harder and the returns are greater, there must be some other reason why the average youth prefers some other method of earning a living than by working at a trade, and any one who looks into the matter with a view to finding out the reason for such decision will find that, in a majority of instances, it is due to the foolish notion that exists in the minds of many people, that to work with one's hands, and in soiled clothes, or overalls, while not actually degrading, is a shade lower in the social scale than clerking, or any kind of office work that permits of neater dress during business hours, and no danger of soiling the hands.

At the age boys are usually apprenticed to learn a trade they are not as experienced as they are later on, and for that reason are not always capable of choosing the best course. Then, too, they are influenced by absurd trifles for or against any particular trade. If parents, especially poor parents, would get over the silly notion that to achieve success it is necessary to dress well, and to abstain from anything that looks like manual labor, there would be more boys anxious to learn trades, and more boys making a success. The mechanical arts are being given such a prominent place in the world to-day, that no field offers greater opportunities from any point of view. Most of the great so-called "captains of industry" are men who first acquired technical knowledge at the foot of the ladder, and, without the practical experience so gained, they could not have succeeded as they have. The young man who rejects the opportunity to learn a good trade and turns instead to something which he considers easier to learn, or more congenial to follow, will realize, when it is too late, that there is a deal of truth in the old saying that "All is not gold that glitters."

It is a fact well worth considering, that the possibilities are greater now in almost every trade than ever before.

A VERY interesting piece of work in the way of house raising has recently been executed in Brooklyn, N. Y., in connection with Public School No. 85. The structure is located in what is known as the "flooded district," the lower floor being covered with water at times to a depth of several feet whenever there are heavy rains. With a view to remedying this, the building, which is of brick and four stories in hight, has just been raised nearly 3 feet. The estimated weight of the building is 7500 tons, and something like 1000 jack screws were used in the operation of lifting it to its new level. The work was done by 75 men acting simultaneously, and after each turn of the screws the foundations of the building were thoroughly inspected in order to make sure that everything was progressing as it should. The work was done by Miller-Daybill & Co., and is regarded as more of an engineering feat than was the moving back several hundred feet of the Brighton Beach Hotel some years ago, in order to save it from being undermined by the heavy ocean tide.

CONSTRUCTING AN ELLIPTICAL STAIRWAY.*

BY MORRIS WILLIAMS.

In Fig. 12 is represented Block 3, which is shown in Fig. 8 to be the plan of the third piece of wreath, and one that will connect with the level landing rail. The bottom tangent F G of this block will have the same inclination as that of the tangents in the other two blocks, and the top tangent G H will be a level tangent so as to finish level with the level rail of the landing. Their position, as thus indicated, is shown at F' G' and G' H', respectively.

The first consideration will be the hight of the points H' and G' above their respective plans. In other words, it is required to know the hight which this piece of wreath will reach in its span from the joint F of Fig. 8 to the level landing rail at H. It is here shown to contain the hight of four risers to the floor line and the hight of another riser to the center of the landing rail, making a total hight of five risers.

Now from G' draw the inclined tangent G' F'. Its inclination, as already stated, will equal the inclination of all the other inclined tangents, and it is found here by revolving the point F of the plan to F', as shown by the arc F A F'.

To find the angle between the tangents in the face mold draw a line from F square to the plan level tangent G H, parallel also with the level line P Z, which last line is the plan of the minor axis. The line A B will therefore be a level line. Any number of such lines may be drawn, and if transferred to the plane of the wreath will determine points that will be contained in the curve of the face mold. Such a process is known as the "Ordinate Method." It consists in first finding a level line in the plan and a corresponding level line in the plane of the wreath that will stand plumb above the plan line. The process of transferring the plan line to the plane of the wreath has already been explained, where the plan line P Z was so transferred with the object of determining the minor axis of the ellipses. In order to render this point still more clear we will transfer the line A B of the plan to the plane of the wreath. Revolve the point B to B' and on B' erect B' B". Revolve B" to B"' and draw the line B"' A' parallel to the level tangent

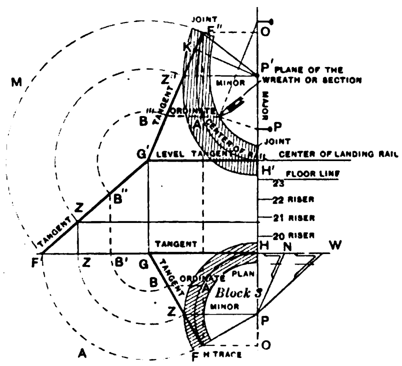


Fig. 12.—Face Mold for Block 3, as Shown in Fig. 8.

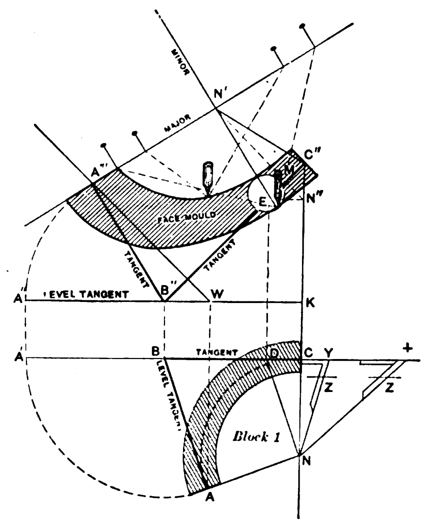


Fig. 14.—Face Mold for Block 1, the Bottom Tangent Being Level and the Upper Tangent Inclined.

Constructing an Elliptical Stairway.

G H and continue this line indefinitely. Now place one leg of the dividers on the point G', extending the other leg to F'. Revolve F', as shown by the arc F' M F", to the point F", cutting the previously drawn indefinite line from F in F". Draw a line from F" to G', which will be the inclined tangent G' F' transferred to its position in the face mold.

The angle between the tangents of the face mold is indicated at G', and as shown is formed by the intersection of the two tangents G' H' and G' F", respectively. Draw the joints of the face mold square to these tangents as at F" and H'.

There is now nothing left to complete the face mold but the drawing of the inside and outside curves, and as these curves are known to be portions of ellipses, it will be necessary to find both the minor and major axis of the ellipses. Commence at P, the center of the plan rail, by drawing the line P Z parallel with the level tangent G H. Then transfer the point Z to the tangent G' F" in the face mold, as shown by the arcs Z Z and Z Z". From Z" draw the line Z" P' parallel with the level tangent G' H' of the face mold. The line Z" P' will be the minor axis and the line P' H' will be the major axis. The point P' will be the center of the ellipse. The curves may now be described, as shown, with the string and pins, thus completing the face mold.

Note the point A on the plan center of rail. A line, A B, is drawn from this point and parallel with the level G' H', making it equal in length to A B of the plan. Note that the point A' in the plane of the wreath is shown to be contained in the center line of the face mold, and that A, its plan, is contained in the center line of the plan rail.

It is evident that any number of points may be transferred to the face mold by this process and that by tracing a curve touching each point the form of the face mold may be described.

To square this wreath it will be necessary to find two bevels, one for each end. To find bevel W of Fig. 12 make P W equal to the length of the major axis H' P'. To find the bevel N make P N equal to the line K P', which is a line drawn square to the tangent G' F" from the point P'. This bevel is to be applied to the end F" of the face mold and parallel with the joint. Note that the line K P' also is parallel to the joint, which clearly demonstrates that the hypotenuse of the triangle which contains the bevel is the square line to the tangent drawn from the center of the ellipses. The same principle is shown in bevel W, the hypotenuse being the length of the same major axis, which in this example is a line square to the level tangent G' H' from the point P', and, as shown, is parallel with the joint H' of the wreath.

In wreath construction the bevels are always applied square to the tangents and therefore parallel with the joints. In the articles to follow we shall demonstrate the treatment of a problem where the rail is constructed in four sections and also in six sections, thus affording an opportunity to show how to overcome all the difficulties

* Continued from page 231, August issue.

usually arising in connection with problems of this character.

We now take up the method of treatment when constructing the rail in four sections. It differs from what has gone before, as is clearly shown in the modified arrangement of the plan tangents, which in this case consists in dividing Block 2 of Fig. 8 into two equal blocks, as shown at E in Fig. 13. The plan tangents of these two blocks are shown at C D, D E, E F and F G, respectively. In the previous treatment there were only two tangents, arranged to span from joint C to G, they being shown here at C X and X G, while the joint E in previous treatment was dispensed with. With this slight modication of the plan tangents the rail may be constructed in four sections.

The first piece will span from the newel to the joint C, the second from C to E, the third from E to G, and the fourth from G to I, all as shown in Fig. 13 of the diagrams. It will be observed that the first and fourth blocks in this treatment are of the same form as in the previous treatment, varying only in a slight difference in the length of the tangents and that the second and third blocks are of the same form as Block 2 in the other treatment, but each being half its dimensions.

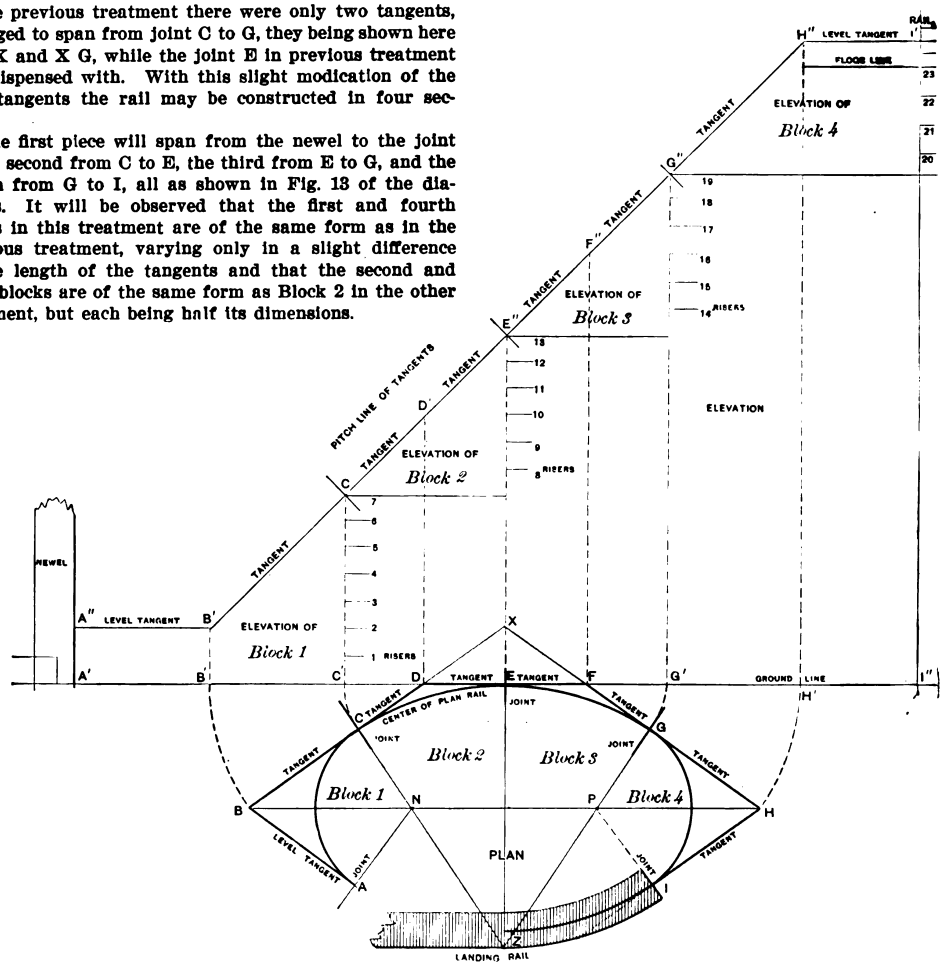


Fig. 13.—Plan and Elevation of an Elliptical Stairway, the Plan Indicating the Method of Treating the Tangents When the Rail is to Be Constructed in Four Sections.

Constructing an Elliptical Stairway.

In Fig. 13 is shown the elevation and inclination of all these tangents combined in one construction. They are shown to span from the newel to the landing rail, the bottom and upper tangents being level and the others equally inclined. The bottom tangent is shown to stand the hight of two risers above the floor line, and the upper tangent to stand the hight of one riser above the floor line of the landing story.

Before developing the face molds, &c., we will explain the construction of Fig. 13, which consists of the plan of center of rail and tangents, the elevation of the complete stairway and the pitch line of all the tangents combined. The tangents D E and E F are shown on the plan to be already in the ground line. To transfer the others, we will proceed as follows: Place one leg of the compasses at the point F and extend the other to G; then revolve the point G to G′ on the ground line. Again fix the compass in F, extend to H and revolve point H to H′ on the ground line. Take the length of the tangent H I from the plan and extend from H′ to I′ on the ground line.

We now have five of the eight plan tangents transferred to the ground line—namely D E, E F, F G, G H and H I. To transfer the remaining three—namely, the tangents, D C, C B and B A—proceed as before by fixing one leg of the compasses in D, extend to C and revolve point C to C′ on the ground line. Again fix one leg of the compasses in D, extend to B and revolve point B to B′ on the ground line. Measure from B′ to A′ the length of the plan tangent A B, thus completing the revolutions of the plan tangents to the ground line. Now unfold all these tangents by erecting perpendicular lines from each point on the ground line—namely, A′, B′, C′, D, E, F, G′, H′ and I′. Now on I′ measure the full length of the story rod, which will contain the sum of 23 risers, thus determining the hight from one floor to the other. Above this line and at a distance equal to one riser draw the center line of the level landing rail and extend it to H″. The line H″ I″ will be the level tangent of Block 4, and the point H″ will be the fixed point wherefrom raking tangents are drawn.

Again, from point B′ on the ground line measure to B″, the hight of two risers, and draw the horizontal line B″ A″, thus fixing the level tangent of Block 1 and point B″ as the other fixed point of the raking tangents. Now draw the pitch line from B″ to H″ and fix the joints at C″, E″, G″ and I″, respectively.

We are now prepared to draw the face mold for each section of the rail, inasmuch as the pitch line of the tangents contains the correct length of all the tangents of the face molds, as well as the relative inclinations, one to the other. Observe that in Fig. 13 we have the plan of the center line of rail, the plan of all the tangents and the plan of four blocks; also the elevation of all the tangents and of the four blocks.

In drawing the face molds all that is necessary is to take the plan of each block and its elevation from this diagram as a basis for the development of the section. Let Fig. 14 represent Block 1, the plan A B C N being taken from Fig. 13; also the pitch of the inclined tangent B″ C″ and the level tangent B″ A″.

To develop the face mold, commence by drawing a line from point A in plan perpendicular to the tangent B C of the plan and continue this line to W. From W draw the line at right angles to the raking tangent B″ C″. Now place one leg of the compasses at the point B″, extend the length of the level tangent to A″ and revolve the point A″ to A‴, cutting the line previously drawn from W in A‴. Connect A‴ and B″, which will be the bottom level tangent A″ B″ transferred into the face mold, and the angle between the tangents is thus determined, as shown at B″. Make the joint at A‴ square to the tangent A‴ B″ and the joint at C″ square to the tangent C′ B′.

To transfer the bottom tangent C D into the face mold, draw from C in the plan the line C W, making it perpendicular to the ground line. From W draw the dotted line W C″ perpendicular to the pitch line of tangents. Now place one leg of the compasses in C′ on the ground line, extend the other to C and revolve the point C to C″, as shown by the arc C Y C″. Connect C″ with D′, thus determining the position of the two tangents in relation to one another, as required in the face mold.

Draw the joint C″ square to the tangent C″ D′ and the joint E′ square to the tangent D′ E′. Draw a line from Z, the center from which the plan rail is described, to D. Erect D D′. Draw D′ Z′ parallel with the ordinate C′ C″ and equal in length to D Z in the plan. This line will be the minor axis, which equals half the width of the plan rail. From D′ draw D′ N′, equal in length to D N of the plan. Take N′ for the center and describe a circle the radius of which is equal to half the width of the plan rail. This circle determines the width of the face mold on the minor axis. Make the width at the two ends equal to twice the length of O P taken from the bevel.

In this manner we have found three points that are contained in both inside and outside curves of the face mold—namely, for the inside the points P X P, and for the outside the points O D′ O. Both curves may now

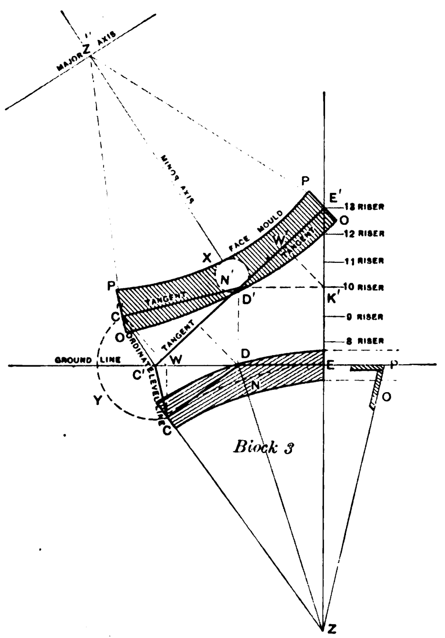


Fig. 15.—Face Mold of Wreath over Block 3, the Two Tangents Being Equally Inclined.

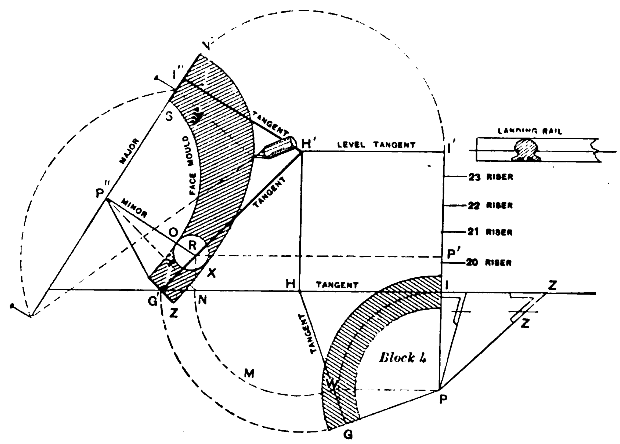


Fig. 16.—Face Mold for the Upper Wreath, One Tangent Being Inclined and the Other Level.

Constructing an Elliptical Stairway.

To find the axis of the ellipses of which the curves of the face molds are portions, proceed by drawing a level line from N, the center wherefrom the plan rail is described. This line is shown by N D. It is a level line, owing to its being parallel to the level plan tangent A B. Upon D erect D E and from E draw E N′ parallel with the tangent A‴ B″, which, as already stated, represents the bottom level tangents in its position in the face mold. Make E N′ equal in length to N D of the plan. This line will be the minor axis. Now draw the major axis through N′ to A‴ at right angles to the minor axis. Take the length Y C from the bevel Y and place it on each side of C″ for the width of the mold at this end. Take the length of Z X from the bevel X and place it on each side of A‴ for the width of the mold at the end A′. The width of the rail on the minor axis is always equal to the width of the plan rail. The inside and outside curves of the face mold may be described, as shown, by means of string and pins, or by any of the other processes that have been already explained. The bevels for this wreath are found as follows: Make C X of the bevel X equal K N″ and connect X with N, as shown. Make C Y of the bevel Y equal N″ M and connect Y with N.

In Fig. 15 is shown a duplicate of Block 2 taken from Fig. 13, the plan being shown at Z C D E Z in both figures. This piece of wreath is to span over six risers, as shown, from E to E′. The plan tangents C D and D E are shown to have equal inclination as at C″ D′ and D′ E′ respectively.

be described by bending a flexible lath and touching the points thus found. In the diagram are found the minor and major axes, but as the curvature of this mold is so small the use of the elliptical axis may be dispensed with. The bevel for this wreath is found by taking the length of W′ K for an altitude; the radius of the plan center of rail for base of a triangle. The bevel will be at the intersection of altitude and hypotenuse, as shown at P. This bevel is to be applied to both ends of the wreath owing to the tangents being equally inclined. A glance at Block 3 will show it to be similar to Block 2 in size and form, therefore the same face mold and level will suffice for both.

In Fig. 16, Block 4 is shown to consist of the plan and the elevation of the upper portion of the rail which connects with the level landing rail. It will be observed that it is of similar nature to the one represented in Fig. 12, each being an acute angle block with an inclined bottom tangent and a level upper tangent.

We will develop the mold in this figure by a different method to that used in connection with Fig. 12, in the hope that the diversity will lead to a better understanding of the lines as used in all the diagrams to develop the face mold and to find the bevels. The plan tangents are shown at G H and H I, respectively. The elevation of the tangents is shown at G′ H′ and H′ I′, respectively. These, as already stated, have been taken from the plan and elevation of Block 4 in Fig. 13.

(To be continued.)

CORRESPONDENCE.

Shingling Around a Chimney.

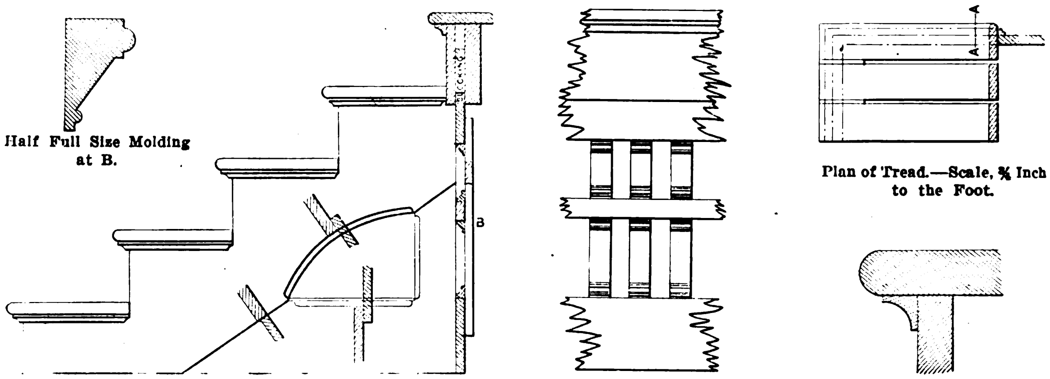
From J. J. D., *Cornwall Station, Cal.*—I wish some reader of the paper would tell me the best way to shingle over that part of the chimney which lies on the roof so that it will be water tight.

Care and Purchase of Tools.

From C. J. C., *Troy, Pa.*—The article by "Blue Hand Saw" in regard to the Care and Purchase of Tools, which appeared in the August issue, is O. K., and I hereby extend my hand to the writer. I find plenty of the same kind of men and few of any other kind.

Constructing Piazza Steps.

From C. A. W., *Port Jervis, N. Y.*—If some of our brother readers would give us more practical knowledge, instead of discussing big day's work, I think we should all be benefited, as I, for one, do not care how much of a racer a man may be, but I do want him to do a good day's work in a first-class manner and in a practical way. I think we could all be benefited on this line if we took more interest in the matter of construction. In order to set the ball rolling, I inclose a blue print showing a method of constructing piazza steps. They should be blocked on treads at least not more than 3½ feet apart, and a jack placed the same distance, so that when constructed, there will not be a puddle of water or a warped tread, but it will be such as to give the dampness a chance to escape; at the same time the tread will always be dry. I should like to hear from others as to the form of construction here shown.



Elevation of Piazza Steps.—Scale, ¾ Inch to the Foot. Elevation of Lattice Work. Plan of Tread.—Scale, ¾ Inch to the Foot. Section at A.—Scale, 3 Inches to the Foot.

Constructing Piazza Steps.—Submitted by "C. A. W."

Flooring for a Second Story Piazza.

From A. M. F., *New York City.*—Will some of the practical contributors of your valuable paper give the readers the benefit of their knowledge on the subject of a proper flooring for a piazza roof when the same is to be used by the tenant of the second floor as a piazza?

Building on the Percentage Basis.

From C. J. CASE, *Troy, Pa.*—When a man enters into a contract to perform a certain piece of work, either in the way of erecting structures or furnishing certain materials and converting them to their prescribed purposes, he is to be duly compensated for his labor, mental and physical, by having transferred to him a certain percentage of the cost, or, more correctly speaking, above the cost of said materials, structure, or other commodities. It therefore stands him in hand to be perfectly honest himself and to know his man well. If his percentage is not too small and he is "wise as a serpent and meek as a lamb," he may come out of the deal free from litigation and strife and not so badly broken up from wear and tear. But he is even then convinced that there are more things in heaven and earth than he knew of when he signed the contract as "party of the first part." The prime factor in the makeup of the average man is "kicks"—strong, hard and relentless, and if so be it that the party of the said first part has procured or shall procure certain portions of the whole, which is embodied in the contract, without an actual outlay of the greater portion of his percentage either in labor or in the coin of the republic, and the party of the second part become cognizant of that fact (and around here they certainly will), why, he puts up a first-class kick at once; says he cannot stand it; that you must cut down on your percentage, and will not even consider the hundred and one things which have cost you perhaps double your percentage. From that time until the termination of the contract the party of the first part who can hold his temper and wear a 7 by 9 smile is a dandy.

In the July issue of *Carpentry and Building* "J. H. J." says that the per cent. on a $10,000 job would be $125, but he does not say upon what basis the percentage is figured. Contractors galore have died in the county poor house, built, perhaps, by their own hands, and if any of them did business on a $125 per cent. for a $10,000 structure they are entitled to no sympathy, except perhaps they furnished the materials, made a profit on them, worked on the job, drew pay, and the $125 was the per cent. on journeymen furnished by them by the day.

Now, considering the eight questions of "M. J." in the July issue, I can say for the first query that a contract should embody each and every item required for the job, whether particular mention is made of it or not.

2. All staging, shores, stays, bolts, rods, crabs, tackle, jacks, chains, &c., used during the construction of the work and not incorporated in the contract are tools, and are usually furnished subject to damage or breakage, and paid for at a certain price per diem or for the period during which they are used.

3. I always have a certain daily pay for my services, and no man ever said I failed to earn it.

4. The office expenses, except perhaps on a very large job, must come out of the general receipts, the same as on architects' percentage.

5. Cash to meet bills payable and your percentage when due on any labor or materials furnished or unpaid at certain stages of the work.

6. In regard to this question, as to whether or not it is usual to withhold any part of the payment until completion, the same as on contract work, I would answer that ordinarily it is.

7. The percentage on a job of $10,000 or more is, in my opinion, governed by conditions, and may vary from 5 to 20 per cent.

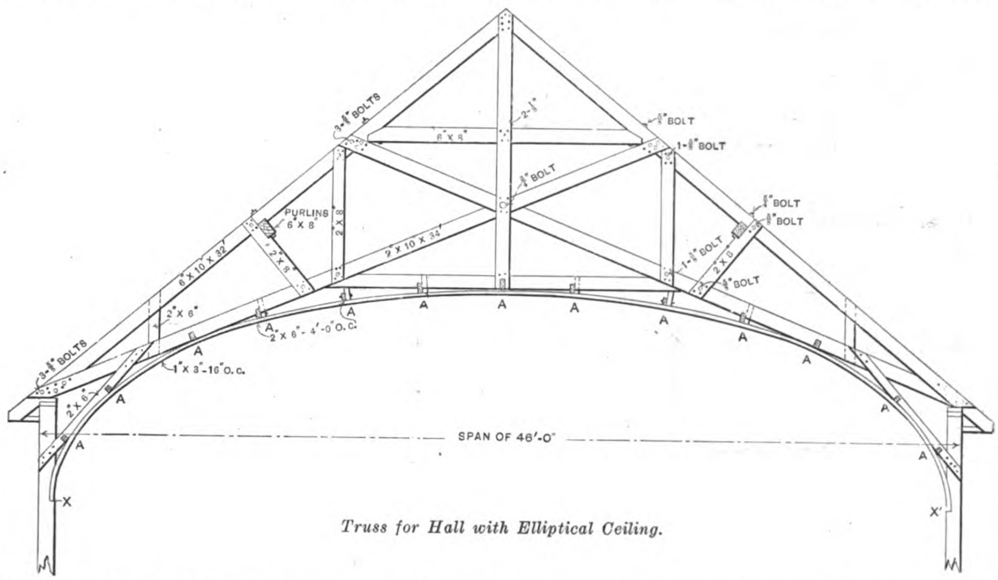
8. As to the percentage varying according to the

amount, I would say it is governed by conditions, but all things being equal, I would say no.

Difficult, dangerous or very fine work should be paid for accordingly. The laborer is worthy of his hire, but he does not always get it.

Truss for Hall with Elliptic Ceiling.

From W. S., *Walcott, Iowa.*—I send herewith a drawing showing a truss suitable for halls, &c., with an elliptic ceiling, and in this connection would state that I have built two halls, both of the same size, 46 x 64 feet, with a stage at the end. I have one of these trusses every 8 feet, cross braced with 2 x 8's on the straining beam to keep the building from swinging in the middle by heavy winds. The pieces A A A, &c., are 2 x 6's, running from one truss to the other and are suspended by 3 x 4's, bolted on the truss and placed 4 feet on centers. The studding are notched, ⅞-inch, at X and X′, to receive the ribs, which are of ⅞ x 3 inch stuff. These are bent and nailed on the 2 x 6's marked A A, &c., and placed 16 inches on centers to receive lath, making a very light, yet strong ceiling. The purlins are 6 x 8, bolted under the principal rafter. There are three 2 x 6 rafters placed between every truss 2 feet on centers.



Truss for Hall with Elliptical Ceiling.

These trusses have given perfect satisfaction thus far, and I send the sketch with descriptive particulars in the hope that the matter may possibly be of interest to some of the readers of the paper. I would like very much to have Mr. Kidder say a few words in the way of criticism regarding the construction of the truss. The pitch of the roof is 10 inches to 1 foot, is covered with ⅞-inch sheathing and 5 to 2 red cedar shingles. The drawing so clearly shows the construction employed that further explanation would seem to be unnecessary.

Rendering Cellar Bottom Water Proof.

From INQUIRER, *N. J.*—We have a vault which was built for fire proof purposes and we are troubled, more or less, with dampness in the interior. The stone in the floor is about 2 feet deep, thrown in roughly with cement run in around the stones. The vault is not in an inclosed building, but is covered with a good roof. The hard brick of which the vault is built is thoroughly painted outside, but the moisture from the ground seems to come up through the cement floor, causing the vault to be damp. What can we put on the floor so that the moisture will not come through?

Note.—With no desire to anticipate the suggestions which we trust our practical readers will offer in reply to the correspondent above, we would say that he has before him a rather difficult problem, very much depending, of course, upon the nature of the soil on which the building rests. Probably the most satisfactory method of obviating his trouble will be to dig a trench around the foundation walls and sufficiently deep to serve as a drain for the cellar. This can be done without very much trouble, provided the vault is so placed that the ground naturally slopes away from it. We very much fear that anything he might put on the floor of the vault would hardly meet the requirements of the case. We shall be glad, however, to hear what our readers have to say on the subject.

Are Mill Men Getting Careless?

From WANDERING WOOD BUTCHER, *Shreveport, La.*—I have read with interest the letters of "C. E. G.," Frederick, Md., and "P. & N.," Loyal, Wis., in reply to "Apprentice Carpenter," and think they squeal before they are hit, as their class of work is not referred to at all, as I understand it, but only mill men who turn out dressed and matched lumber are alluded to. Some of them are without doubt more or less careless in handling their machines, or in having them handled by incompetent men, sometimes even boys whose minds are anywhere but on their work. This I know from personal observation at the mills and from experience in putting material together. Quite recently I received four cars of material from a large mill and the flooring and ceiling were evidently stuck in two different machines and mixed up in loading. It was impossible to separate it in unloading and we only learned the difference when putting it up, as it would not match. This, however, was not all. The ends of every piece were shattered or so ill-shaped as to be useless and had to be cut off and wasted at least 2 feet on a piece. This was due to carelessness of the operator in putting in and taking out the material at the machine. As to the 2 x 4 stuff being sized down to 1⅝ x 3⅝, I would say that is the standard and is all right, for no carpenter could put it together and do a smooth job if it was not sized. There was, however, a time when lumber came from the mills rough and could be relied upon as to size and straightness, but not in these days, especially in the South, where saw mill men are getting careless and depend on the sizer putting the lumber in shape for the market. This is particularly true of the small mills where only rough timber is turned out.

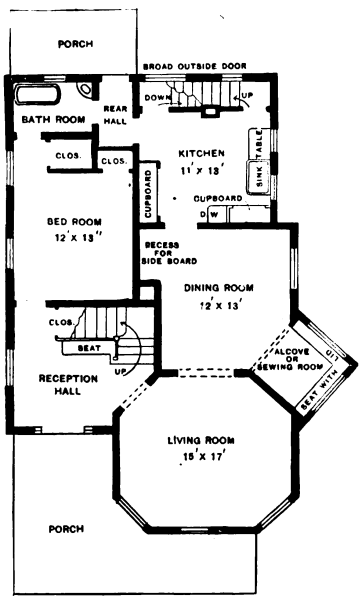
I have just completed a job requiring several carloads of rough timber and it would be hard to say for what it was intended in size—3 x 10-30 would measure at the ends 4 x 11 and 2 x 8 and the center 5 x 12. Other pieces would run the other way; 12 x 12 would measure 11 x 13½ at one point and some other dimensions at another point, and it would be out of square or diamond shape. I have ordered timbers 12 x 16-42 and when I got them they would measure 12 x 18 at one end and 12 x 13 at the other. At the same time they would be out of square and crooked. A few months ago I ordered some timber for railroad track scales, 12 x 18-44. The mill men who took the contract to furnish it could not get the timbers in their mill and had to hew them several times. Then I had to counterhew them again before I could frame them. Now, were these mill men not aware before they took the contract that their mill did not have a capacity for such timber, and why did they not so inform the purchasing agent and let him place the order elsewhere? When speaking of carelessness I think this is the rankest kind, as well as an imposition to ship such material hundreds of miles only to have it rejected and important work delayed. If those mill men were competent and careful and understood the specifications, which were plain and to the point, they could not only save trouble and money for themselves, but their reputation also. As for botches, they are not all made outside of planing mills, for I have had some of those planing mill carpenters who in casing a window turned the stool cap upside down and fitted the bottom sash into the rabbet and then said the frame was too short. This planing mill carpenter told me he made more frames and stuck more stool caps than I ever saw, and had forgotten more about the business than I ever knew. He was a carpenter belonging to my union, and I felt a fraternal regard for him, so I called all the other brothers of our union to see the job and to express their views as to its correctness, with the result that the aforesaid brother took his tool chest on his shoulder and left in search of a planing mill job.

Some Comments on Filing Saws.

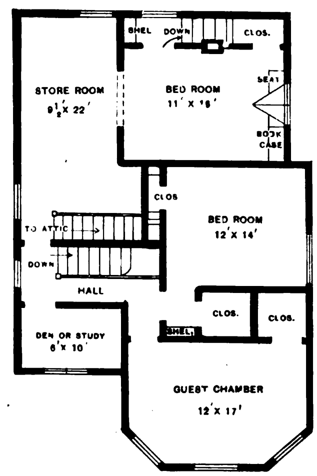
From N. A. R., *Seville, Ohio.*—In looking over some of the back numbers of *Carpentry and Building* I noticed in the issue for August, 1902, a letter from "Young Chip" in regard to filing saws. He says he files with the tool pointing toward the point of the saw, and that older persons have told him it was all wrong. I desire to say that for 50 years I have filed saws both ways, and have had the best success with the file pointing toward the point of the saw. It is difficult to file a tooth up to a sharp edge when filing toward it, but in filing the other way you bring it to a sharp edge. If there is a little wire edge, and it is taken off with a file or whetstone it leaves the edge all the sharper. It takes lots of practice and experience to properly file a saw. For fine work in dry material I use a saw that does not require any set. I have a Disston saw of this class, No. 120, and although it has only eight points to an inch it cuts smoother than some of those having ten points. I file my rip saw nearly straight across. Just because a mechanic is a good workman it does not necessarily follow that he understands how to properly sharpen a saw, for I have known many good workmen who could not file their saws in a way to give the best results.

A Girl's Floor Plans.

From ADDIE M. BLACK, *Wellington, Ohio.*—I send you a house plan of my own design, which my father and myself would be pleased to see published some time in the paper. He has taken *Carpentry and Building* for 22 years, he being a carpenter by trade. He did not see this plan until I had finished it. I made it for an uncle, who thinks of building a home for himself. My little cousin wanted his room in the "tail of the house," as he called it, and with the arrangement shown in the plan. Perhaps, Mr. Editor, you do not publish plans, except when they are used or are drawn by experienced architects. If, however, you do print others, I should like very much to have this one printed when you can do so without crowding out bettter material, and have some of the readers criticise it for my benefit.



First Floor.



Second Floor.

A Girl's Floor Plans.—Scale, 1-16 *Inch to the Foot.*

Best Way to Connect Conductor to Roof Gutter.

From B. B., *Forest, Ohio.*—We should like to know the best way to connect a conductor to a roof gutter—that is, whether or not it is policy to run the drop through the cornice—as we have had trouble with the tube bursting this winter, thereby causing a bad leak through the water following the cornice back to the wall.

Answer.—The surest way to avoid leakage into the building is to run the outlet, or gooseneck, out over the roof and offset back to the wall along the outside face of the cornice. If, however, this method is not feasible or acceptable, owing to the construction of the gutter, or the appearance, the next best way is, first, to run a large tube from the gutter through and to the lower edge of the cornice, or wherever the conductor pierces the exterior face of the cornice, and then run the conductor outlet through this tube. The difference in diameters of the tube and outlet gooseneck need not be large enough to leave an unsightly opening when the conductor emerges from the cornice. A perforated end board can be soldered into the lower end of the tube, the tube being cut off and the end stop conforming to the profile of the cornice, and a hole being cut in the end board to neatly fit the conductor or gooseneck. Both the tube and the gooseneck should flange out and be well soldered to the gutter. This method provides for any leakage through the gooseneck by means of the outer tube, which, of course, would conduct any such water to the outside of the cornice and the building. Another comparatively safe method is to construct that part of the conductor or outlet that passes from the gutter to the outside of the cornice of heavy sheet lead, which can be readily formed or bent to any desired curve, and, being very soft or ductile, will allow for considerable extension caused by ice without bursting. In any case it is best to have the conductor terminate at the top in an open head, or box, for receiving the water from the gutter outlet, so that the outlet may be more accessible and less liable to be choked with ice from the conductor.

A Wrinkle in Cutting Roofing Boards.

From H. M., *Delton, Mich.*—I have been reading *Carpentry and Building* with much interest and find in its columns many suggestions which are of assistance to me in my work. I offer a "wrinkle," which, although it may be old, has been found of much help on a barn job just finished. We nailed some boards on one end of a saw horse forming a sort of square, and then through them bored holes and hinged in a piece of 2 x 4, making use of a bench screw. When cutting roofing we would put in 15 or 20 boards, and by having one end even we could saw the whole bunch with a cross cut saw, which was a great saving in time.

Making a Concrete Porch Floor

From J. F. H., *New Marion, Ind.*—I desire to ask some of the readers of the paper who have had experience in concrete or cement work, the correct way to put down a concrete floor on a porch, the size of the floor being 6 x 16 feet. What brand of cement is best for that kind of work, and how should it be mixed? How much stone will it take to a yard; will surface rock do or should the stone be quarried?

Measuring Tin Roofing.

From E. C. F., *Overbrook, Kan.*—Will you please inform me what custom is employed in measuring tin roofing, especially when counter flashing is employed? For example, a building is 25 feet wide, the roof of which is to be covered with tin, flashing up against the wall 6 inches, with a counter flashing 7 inches wide—3 inches into the wall and 4 inches down over the base flashing. Is it customary to include the 7 inches of counter flashing in the measurement, making the total width of roof 27 feet 2 inches, or would it measure only 26 feet wide? I hold that the counter flashing should be measured in.

Answer.—As the counter flashing is usually made up in the shop, cut on the large shears in 8 or 10 feet lengths and bent on the brake, and painted before being placed on the wall, the usual custom is to figure the roof 26 feet wide, and figure so many lineal feet of counter flashing having 7 inches girth. In large shops, this counter flashing is made up in the shop, during slack times, in thousand feet quantities of IC and IX tin.

Making a Five-Pointed Star with the Steel Square.

From G. A. W., *Vandergrift, Pa.*—Replying to "C. V. F.," who asks how to lay off a five-pointed star with the square: I would divide the diameter into five equal spaces and then draw a second diameter at right angles to the given diameter, extending it beyond the circumference equal to half the diameter as at *b* of Fig. 1. Draw a line from *b* through 2, cutting the circumference at 6; then 6 *a* will be the length of one side. Applying the square, as shown, using 6 inches on the tongue and 21 on the blade, the blade shows the inclination of the other side. I will add that a circle may be divided into any number of equal parts by dividing this diameter into as many equal spaces as is required in the circumference and proceed, as shown in the sketch sent herewith.

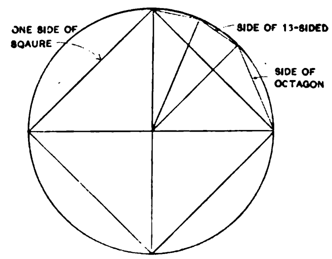


Fig. 4.—Method When Using the Square.

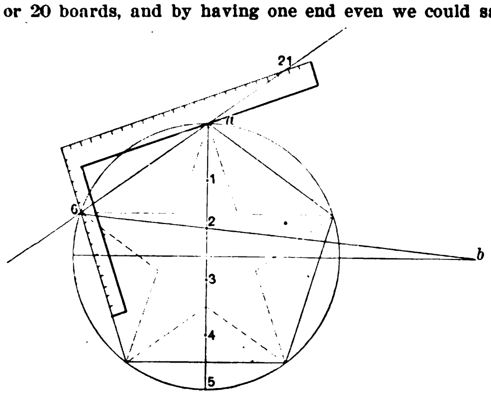


Fig. 1.—Method Suggested by "G. A. W."

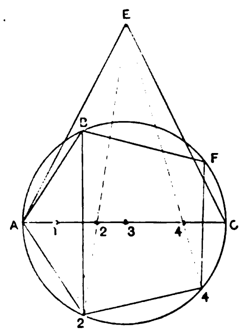


Fig. 2.—Scheme Proposed by "D. P. B."

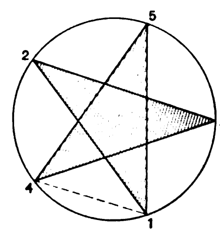


Fig. 3.—Showing the Star Completed.

Making a Five-Pointed Star With the Steel Square.

From D. P. B., *Redford, N. Y.*—Answering "C. V. F.," Knightstown, Ind., will say that to make a five-pointed star it is necessary to construct a pentagon. Take, for example, a circle of 10 inches diameter and divide the diameter into as many equal parts as there are sides to a polygon. Erect an equilateral triangle on the diameter, as shown in Fig. 2, and through each even number, as 2, 4, &c., draw lines, cutting the circle in the points 2, 4, &c. From these points and at right angles to A C, draw lines to the opposite part of the circle. This will give the other points as B F, &c. Having obtained the pentagon, draw the lines in the order mentioned, namely 1 2, 2 3, 3 4, 4 5 and 5 1, all as shown in Fig. 3. There is another way to get the pentagon by using 5 and 7 on the steel square, still another by using 36 degrees on each side of the diameter, which may be obtained by using 12 on the blade and 8 9-16 on the tongue of the square.

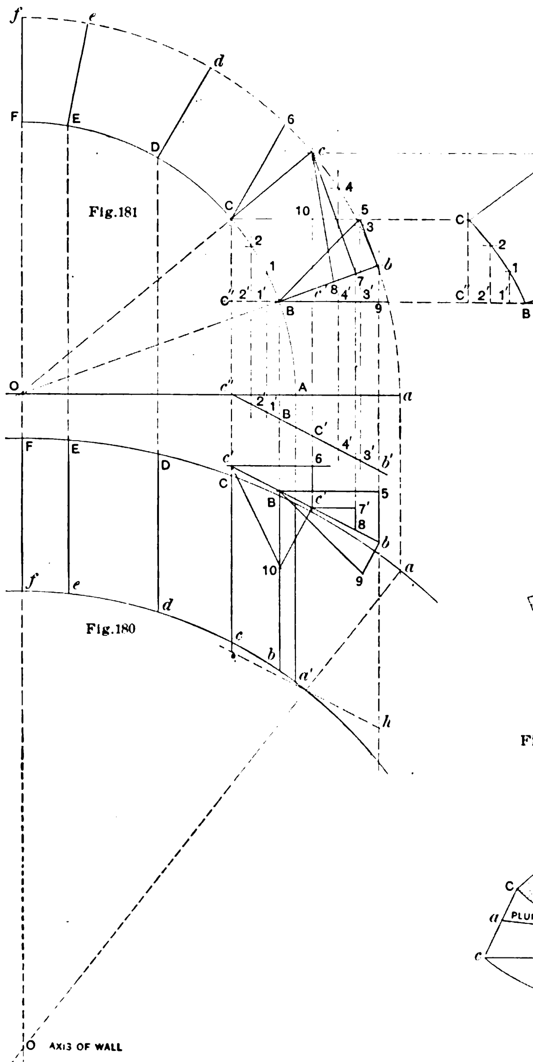
I would say to "Old Subscriber," in the January number of the paper that he may use this method to some extent, as it will apply to any polygon. To use the square he should draw a square in the circle, as shown in Fig. 4, then quarter the square, draw diagonals and bisect the sides indefinitely. The method of angles and radii is not too easy to handle with a square.

LAYING OUT CIRCULAR ARCHES IN CIRCULAR WALLS.*—XX.

By Charles H. Fox.

In this chapter we shall consider the construction of face patterns and templates together with the directions for forming the separate stones which belong to the work. Now in order to form the stones from the smallest possible quantity of rough rock the outer face is first taken as a plane surface, the plan of which is taken oblique with the elements of the soffit. Take for example the construction of the pattern as required in order to give the proper direction to form No. 2 stone. In Fig. 180 draw the plan *c′ b* of the oblique face, tangent with the center element of No. 2 stone, and in Fig 181 divide the curves of right section, as shown in B 1 2, &c., into any number of equal parts. Then parallel with the center line from each point produce lines, as 1 1′, 2 2′, &c., to meet the oblique line of the plan, as shown. To make the explanation as clear as possible the line *c″ b′* of Fig. 180 has been drawn parallel with that of *c′ b*. Now in Fig. 182 set off *c″* 2′ 1′ B, &c., equal with the corresponding projections as given at the oblique line *c″ b′* of the plan. Square up the ordinates, equal in length to that of the corresponding ordinates of Fig. 181, and through the points given in B 1 2 C, &c., trace the curves. Join B *b* and C *c*, and the face mold as required to give the direction to form No. 2 stone may be completed. In a similar manner may the patterns as required for a smilar purpose at each stone be developed.

Templates.—The reader may perhaps assume that a bevel containing the angle given in *c c′ b* of the plan will be the correct one to transfer say, to the lower joint surface to give the direction for forming the oblique face, upon which to mark the face mold just constructed. Such, however, is not the case, as the angle, as given in the plan, is that obtained only at horizontal planes parallel with or drawn through the points B C of No. 2 stone. To obtain the proper angle, we first ascertain the true length of the line, as B *b* of Fig. 181. To do this proceed as follows: Square with the center line through the points B *c′* of the plan draw *c* 6, B 5. Now in Fig. 181 square up *b* 5 and *c* 6, equal in length to that given in the corresponding projections of the plan. Join B 5 and C 6 and the true length of the projections may be obtained. Or similar constructions may be made in the plan as follows: Square up *b* 9 of Fig. 180, equal to that of *b* 9 of Fig. 181, join B 9 and the true



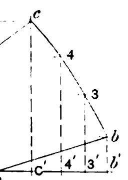
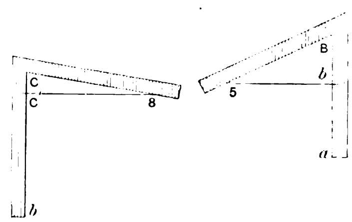


Fig. 180.—Plan of Cylindro-Cylindric Arch.
Fig. 181.—Right Section of Cylindro-Cylindric Arch.
Fig. 182.—Diagram Showing Development of Face Molds.



Figs. 184 and 185.—Two Other Forms of Templates.

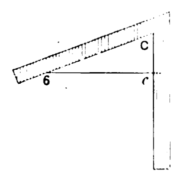


Fig. 183.—A Template.

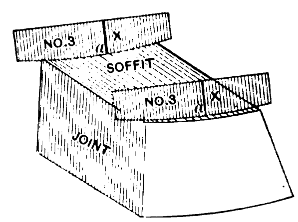


Fig. 186.

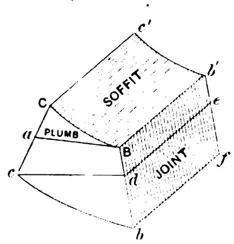


Fig. 187.

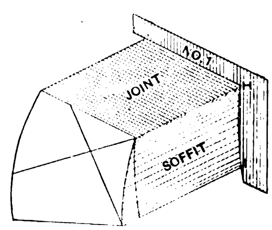


Fig. 188.

Figs. 186, 187 and 188.—Diagrams Illustrating Practical Application of Templates.

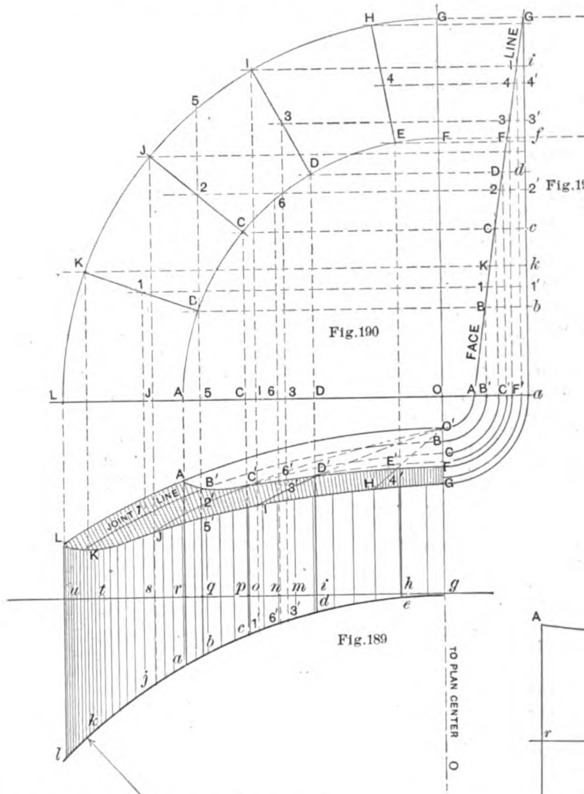
Laying Out Circular Arches in Circular Walls.

length of the projection B *b* of Fig. 181 may be obtained.

Now to construct the template: In Fig. 183 set off C *c* equal with *c* 6 of the plan, then square over *c* 6 indefinitely. Now with C as center and with C 6 of Fig. 181 as a radius cut the line *c* 6 in 6: join C 6, and the template as required to give the proper angle at the upper joint surface may be projected. In a similar manner, as shown in Fig. 185, set off B *b* equal with *b* 5 of the plan, then draw the right angle *a b* 5; then with B as center and B 5 of Fig. 181 as radius cut the line in 5; joining B 5 gives the angle as required at the lower joint surface of No. 2 stone.

In addition to this bevel, another is required to give the angle which the surface of the face may make with that of the joint surface. In Fig. 181, square with the joint line B *b*, draw *c* 7, then parallel with the center or point, at the lower arris of the soffit, at which to apply the joint mold of the lower joint surface. Then at the exterior surface, to the direction as there given by the joint patterns, mark the mold developed for the surface in question. This completes the direction as required in order to form the stone. If the face is "rock," the pitching line is at once obtained, and if clean, the face surface may to its direction be readily worked.

Now to form No. 2, work first the lower joint surface. Mark upon this the cutting line of the soffit surface. To this apply the bevel, Fig. 185, and transfer the angle *b* B 5 correctly. Now square with the joint surface draw a line, as that represented in 7 *c* of Fig. 181 and in *d c* of Fig. 187. Parallel with the soffit line, as B *b'* of Fig. 187, drew *d c*. To these lines apply the template, Fig. 184. Now gauging back at *c* a distance equal to that



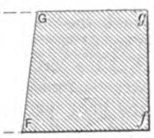


Fig. 191

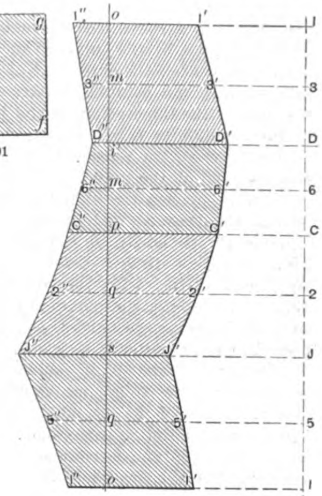


Fig. 194.—Development of Joint, Soffit and Mold for Exterior Bounding Surface which Belongs to No. 3 Stone.

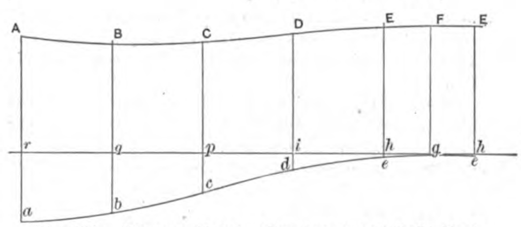


Fig. 189.—Plan of Cono-Cylindric Arch.
Fig. 190.—Right Section of Cono-Cylindric Arch.
Fig. 191.—Right Section at Crown of Arch.
Fig. 192.—Diagram Showing "Batter" of Outer Face.

Fig. 193.—Diagram Showing Development of Soffit Molds.

Laying Out Circular Arches in Circular Walls.

line draw *c c'* and 7 7'. Now at the plan square with the center line draw *c'* 7'. In Fig. 181 set off 7 8 equal to the length given in 7' 8 of the plan; join *c* 8, and the true length of the line may be obtained.

Now in Fig. 184 set off *c c'* equal with 7 8 of the plan, then with *c* as center cut the right angle *b c'* 8 in 8; join *c* 8, and the template required may be completed.

Now to form the stones, first taking the springer. Having as directed above for the similar operation ascertained the plan of the oblique face, corresponding to that given in the line C' *b*, Fig. 180, of No. 2 stone, set a bevel to the angle as given at the plan. Mark the angle upon the cut surface of the lower joint of the stone. Then rough off the face to the direction thus given, and apply the face mold. To its direction form the soffit, joint and exterior surfaces, as for an ordinary arch stone in a plane surface wall. Commencing at the upper joint surface, mark there the mold developed for the surface in question. This gives a point at which to apply the soffit mold of No. 1 stone. This in its turn gives the direction given in *d*, the point may be obtained in *c* at which to draw a line "out of wind" with that given at the lower joint surface by the template of Fig. 185. Rough off the face to the direction as given by the lines in question, and upon the face mark the mold developed for No. 2. The stone may now be completed in the manner No. 1 may be formed, after the application of the face mold. The key, together with the stones adjacent to it, may be formed in a very expeditious manner by making use of Nos. 1 and 3 bevels in the manner shown in the diagrams, Figs. 186 and 188. The construction of these templates is shown in Fig. 173.

We next come to the cono-cylindric arch, which is in effect a cylindric arch in a "batter" circular wall. The angle of the batter of the face is shown by A G of Fig. 192; that is, the batter of the face of the arch from the springing to the crown of the exterior surface equals the horizontal distance as given at *a* A of the diagram. Referring to Fig. 189, O' A L represents the base of plan curve as given at the spring line represented in O L of

Fig. 190, and represents the concave face of the wall. In Fig. 190 is shown the right section of the arch, A L, B K, C J, &c., representing the joint lines.

To find the plan of the curves of intersection of the soffit surface with that of the conical surface of the outer face of the arch proceed as follows: Parallel with the base line O L of Fig. 190 draw B B, C C, &c., meeting the face line A G of Fig. 4, as shown, in the points B C, &c. Then parallel with the center line O G draw B B′, C C′, &c., of Fig. 192. Then with point O of the base line as center rotate the points into the corresponding points of the center line of the plan. Now with the point O′ of Fig. 189, with which the plan curves may be drawn, as the center, draw the arcs B B′, C C′, &c., of the plan. Then parallel with the center line O G, from the points A B C, &c., of Fig. 190, draw A A′, B B′, C C′, &c., meeting the arcs as shown in the points A′ B′ C′, &c., of the plan. A curve traced through the point in question gives the plan of the intersection of the surface of the soffit with that of the outer face of the wall. In a similar manner may the points 1 K, &c., be found, which gives the plan of the intersection of the joint surface with that of the batir outer face. It may be stated that the plan curves of the joint lines will, if produced, pass through the point O′ of the plan.

Now to develop the soffit patterns proceed as follows: In Fig. 193 draw *h r* indefinitely; then set off *h i p*, &c., equal with the length of the arcs E D C., &c., of Fig. 190. Square with *h r* draw *e h* E, *d i* D, *c p* C, &c., equal respectively with the corresponding projections of Fig. 189; through the points obtained in *a b c*, &c., and in A B C, &c., trace curves, as shown, which will complete the soffit patterns required.

To develop the joint molds, say for No. 3 stone, proceed in the following manner: In Fig. 194, at the right line I I, set off I 3 D 6, &c., equal with the corresponding projections of Fig. 190. From each point obtained square over lines, as shown; then set off I I′ *o* I″, 3 3′ *m* 3″, &c., respectively equal to the corresponding projections of the plan. Tracing curves through the points I′ 3′ D′, &c., gives the outer face line; in a similar manner tracing curves through the points I″ 3 D″, &c., gives the inside face line. As may be noted, we have in the diagram, Fig. 194, shown the developed molds as required to give the direction for forming the face surfaces of No. 3 stone. In a similar manner may the molds as required at Nos. 1 2, &c., stones be developed.

To work the stones we first form them as for the cylindro-cylindric arch, as directed in connection with the preceeding diagram. Then applying the patterns corresponding to those of Fig. 194 to the joint, soffit and exterior surfaces, the stones may very readily be brought to the proper shape or form.

Colored Brick.

There has been during the past year or more a very marked tendency to the extensive use of plain red brick in some of our large cities, and we have frequently been asked whether in our opinion bricks of other colors have had their day, or, in other words, whether the better class of architects who are now using red brick in many of their buildings will abandon entirely other colors, says a recent issue of the *Brickbuilder*. Our opinion, based upon knowledge gathered from visits to the offices throughout the country, is that the particular style of brick is influenced a good deal by the prevailing fashions, but that in no case do we find an architect ready to say that he would be satisfied under all conditions with any one style or color. While very many red bricks are being used, the demand for the best of other colored bricks has increased considerably, and we have yet to hear of a single firm which has restricted its work to the use of red brick. On the other hand, many who have used red brick to a large extent for a year or more are again using other colors in some of their more important work. A few years ago a certain style of rough brick was manufactured for use in one of the buildings of Harvard University. The design called for a wall with a great deal of texture, and this was so admirably supplied by the rough dark burned clay that for some styles of buildings the so-called Harvard brick has been very generally adopted. Like all good things its use developed in time into a fad and was carried to excess, but we believe it is fair to say, however, that in very many cases the plain red brick has been used as a substitute for stone rather than as a substitute for brick of other colors, and that the demand for the varied colors has steadily increased year by year.

With the present tendency to introduce color into our architecture, and we believe this to be no passing fad, we feel certain that our best architects will continue to use, as they have in the past, bricks of those colors which have a dignity and fitness for special purposes. It would be idle to specify these colors, for the reason that it is not our purpose in answering these questions to provide a palette from which the architect may choose. We will, however, venture the opinion that well-made clay brick of any of the standard colors or shades now used will in the future find a greater market than has existed in the past, and that no color or style of brick will be adopted to the exclusion of all others.

Test of Reinforced Concrete Floors.

Some very interesting fire tests to determine the merits of different kinds of building materials are being conducted for the Building Department of New York City by Professor Ira H. Woolson of Columbia University. One of these tests on a reinforced concrete floor was made the first week in August, a brick furnace, 15 x 15 feet in size, being built for the purpose. Across the top was constructed a reinforced concrete floor, on which was placed a mass of pig iron, making a weight of 150 pounds to the square foot. A fire was started inside the furnace and allowed to burn under the flooring for a period of four hours, causing an average temperature of 1700 degrees F. A stream of water from a fire engine was then directed on the red hot ceiling. The following day more pig iron was piled on the flooring, until the approximate weight amounted to 600 pounds to the square foot, when it was found by testing with a level that the floor had sagged less than 2 inches. In one small place the iron reinforcements had broken through, but this, according to Professor Woolson, was due to rain having soaked the flooring on the day before, and when the fire was started the generated steam caused the fracture.

Cypress Finish.

It has been remarked that cypress "is not a substitute for white pine," says an exchange. No; and, relatively speaking, for about the same reason that wool or silk is not a substitute for cotton. For after making all due allowance for the high qualities for which white pine is noted, including prices, it remains that as a finishing material its claims are largely comprised in the ease with which it is worked. It is not at all adapted to purposes of natural finish, and if painted the principal thing to commend it for that purpose over other much cheaper woods is in the working of it. And even in this respect cypress suffers little, if anything, by comparison. White pine retains the favor of a certain class of the community for much the same reason that young men pursue the political bias of their sires. There is about as much serious thought and no more analytical consideration bestowed upon the merits of the matter in the one case than in the other.

While white pine interior finish is best painted, it is a positive sin to hide the natural beauties of cypress. Cypress requires no disguise and is improved by none—neither paints nor stains—and for the same reason that the lily needs no adornment. "Beauty unadorned is adorned the most." It is easy to run a jack plane over a white pine board, but nature has done for cypress what no other wood can boast—invested it with every honest virtue essential to easy working, general utility, durability and ornament. There is no finishing wood of equally moderate cost that can approach cypress as an embodiment of so many and equal native virtues. The whole world has an opportunity of verifying these facts for itself at the World's Fair in St. Louis.

WHAT BUILDERS ARE DOING.

REPORTS which have reached us during the past month indicate a continuance of the activity in the building line which has been in progress for several months. Here and there the volume of business is somewhat less than a year ago, but in the majority of cases the amount of work under way shows a gratifying increase, especially in the smaller cities and towns. As we have noted on several occasions an unusual degree of activity has prevailed in the Borough of Brooklyn, New York and in many of the cities on the Pacific Slope. The lull in building operations in the Borough of Manhattan is readily traceable to the present labor situation, which at the hour of going to press shows little prospect of immediate adjustment. Taking the country over, however, the outlook is encouraging, and the volume of business for the entire year should aggregate a total which will compare favorably with previous years.

Buffalo, N. Y.

The members of the building trades have been fairly busy during the summer, and, judging from the number of permits issued by the Building Department, the season will continue to show an encouraging degree of activity. According to the figures of Deputy Commissioner Rumrill there were 226 permits issued in July for building improvements estimated to cost $722,395, while in July of last year only 170 permits were issued for improvements involving an outlay of $438,943.

The annual outing of the employees of the Bureau of Building occurred in July just too late to make any reference to it in our last issue. About 80 employees and their friends went down the Niagara River and around Grand Island. The event of the day was a ball game at Edge Water, the umpire being Deputy Commissioner of Building Henry Rumrill, Jr.

Chicago, Ill.

The value of the building improvements for which permits were issued during the month of July aggregated a larger total than for any corresponding period in the past 12 years. According to the figures of the Building Department there were issued permits for 623 buildings having a frontage of 16,298 feet and involving an estimated expenditure of $3,765,000, as against 548 buildings having a frontage of 15,724 feet and costing $3,191,790 in July of last year.

The figures for the first seven months of the year also make a very gratifying showing when compared with the corresponding period of last year. Permits were issued for the construction of 3915 buildings having a frontage of 104,781 feet and costing in the aggregate $22,614,010. While in the first seven months of 1903 permits were taken out for 3502 buildings having a frontage of 98,184 feet and costing $20,-210,050, this being an increase of 413 buildings, 6597 feet of frontage and $2,403,960 in valuation.

Kansas City, Mo.

Contractors and builders are for the most part busily engaged, and the amount of work projected in July of the current year shows a gratifying increase as compared with the same month a year ago. According to Suprintendent of Buildings S. E. Edwards there were 388 permits issued for building improvements, having a frontage of 6132 feet and estimated to cost $867,565, while in July of last year the value of the improvements amounted to $828,890, thus showing an increase of $38,675 in favor of July of the current year.

Los Angeles, Cal.

Construction work in Los Angeles keeps about even, running about $1,000,000 to the month. During July the activity of the first half of the year was continued. The building permits were in excess of 500, the bulk of the new work undertaken being for a smaller class of buildings. Large expenditures have been made in the improvement of office and store buildings in the down town district. It is noticeable that during recent months no permits have been taken out for buildings exceeding $50,000 in value. During the last six months about 100 brick buildings have been undertaken, the average value of these being about $12,000. Two-story houses and one-story cottages continue to be the most prominent features of the building movement. The construction of apartment houses and flats has fallen off, and it is given out that for the time being this sort of building has been overdone.

Minneapolis, Minn.

The amount of new work projected during the month of July shows a slight falling off as compared with the same month a year ago, although in July, 1903, more permits were issued than in any corresponding month since the boom years of 1889 and 1890. According to the figures of the Building Department there were 383 permits issued in July of the current year calling for an estimated outlay of $466,615, while in July of last year there were 387 permits issued for building improvements costing $520,040.

New York City.

While the developments in the labor world have been such during the past month as to tie up more or less work, yet there is a considerable amount of building in progress, this being more noticeable perhaps in the Boroughs of Brooklyn and the Bronx. In the latter section of Greater New York plans were filed in July for 173 new buildings estimated to cost $3,617,500, whereas in July of last year plans were filed for only 87 new buildings estimated to cost $484,755. The value of new buildings for which plans were filed in the first seven months of the current year were $12,-913,800, which is nearly twice the value of the building improvements for which plans were filed during the entire 12 months of 1903, the total for that period being $6,792,864. Of the 495 buildings for which plans were filed in the Bronx during the first six months of this year, 237 are frame structures, 122 brick tenements, 11 frame tenements and 61 brick dwellings.

Taking the figures for the Boroughs of Manhattan and the Bronx, the two sections which are usually associated together, it is found that for July 269 permits were issued for building improvements costing $9,495,225, against 218 permits for buildings costing $7,967,605 in July last year.

Since January 1 1864 permits have been issued in the Boroughs of Manhattan and the Bronx for building improvements estimated to cost $61,401,535, as against 1158 permits for buildings involving an estimated outlay of $54,815,-360 in the same time a year ago. These figures do not cover the cost of alterations and repairs, which were $7,616,667 and $8,256,246, respectively.

In the Borough of Brooklyn the remarkable degree of activity, to which reference has previously been made, continues, and for July there were 834 permits issued calling for an expenditure of $5,964,288, as compared with 560 permits involving an outlay of $2,144,000 in July of last year. The figures for the period covered from the first of January of the present year up to the middle of August show 3340 permits to have been issued for building improvements estimated to cost $23,162,668, whereas in the corresponding period of 1903 there were 2296 permits issued for buildings costing $13,833,152.

Oakland, Cal.

There is now more building being done in Oakland and in the adjoining towns of Berkeley and Alameda than for any corresponding season within the last ten years. Notwithstanding the fact that many people are out of town during the summer months, there is an actual scarcity of residences for rental purposes, and, with the opening of the public schools, it would seem that the building activity will become even greater than at present. A large number of two-story dwellings and six and seven room cottages of Colonial and Spanish pattern are under way in Alameda. A good portion of the building reported in Oakland and the adjoining towns seems to be due to the overcrowding in San Francisco and to the constantly increasing rents charged in that city.

Portland, Ore.

Building contracts are being steadily let, although this is the vacation season and is usually considered light in the building trade. Flats are going up on both sides of the river and it looks as though this class of dwellings has become permanently popular. Rents for flats range from $30 to $65 per month, according to the number of rooms, the proximity to the business center, &c. During the last week of July permits for five sets of flats, ranging in cost from $3500 upward, were issued. There is also a good demand for warehouse rooms in the wholesale district, and builders are arranging to put up several large warehouses to supply this demand. The most costly residences so far planned for this year will be erected by C. F. Adams on Flanders street at a cost of $20,000, the contracts having just been awarded. Building progress in the business portion of the city has been satisfactory during the past month. The weather has been favorable, and material and labor have been plentiful. Contractors are hurrying work in order to get all the principal structures roofed in before the fall rains begin. It is alleged that construction work now costs approximately 10 per cent. less than it did a year ago. During the last few months there has been a pronounced advancement in the building of medium sized hotels. Most of the new hotel buildings are six-story structures, averaging about 100 rooms each. Two of these hotels have just been completed and another is now under way.

San Francisco, Cal.

The building contracts filed in San Francisco during July numbered 247, aggregating $1,763,939 in value. This consisted of $1,053,771 for frame buildings, $486,687 for brick buildings and $223,481 for alterations. Construction in the city is now at its hight, the figures for July having exceeded those of any other month for years, with the single exception of May, 1904, which exceeded the July figures by only $5000. During the first week of August 66 building contracts were filed, giving a total valuation of $325,963. Plans have been prepared by Mooser & Bolles for a residence for Charles Carpy, president of the French Bank, located on California and Scott streets, to cost $30,000, and a similar amount is to be expended in the remodeling of the United Realty Company's building on Ellis street. A three-story and basement flat building is to be erected by Max Abrams on Howard street at a cost of $17,000, and a large amount of smaller building is also to be undertaken.

The city authorities of San Francisco are now considering the matter of amending the building laws so as to permit of the construction of concrete steel structures. There is much opposition to the proposed amendment, which will not be adopted without careful consideration.

Seattle, Wash.

Plans which were held in abeyance early in the year for various causes are now being completed and a number of valuable contracts will soon be let. Several structures, ranging in cost from $15,000 to $60,000, are expected to be started during August. Excellent progress is being made on the buildings now under way. On the Alaska Building the steel work is now completed to the eleventh story. On the *Post-Intelligencer* Building the workmen are now putting the finishing touches on the third story. The seven-story Hotel Stander is nearing completion and will be ready for occupancy about September 1. N. J. Niquist has had plans drawn for a four-story apartment house on the corner of Fourth avenue and Olive street, which will cost when completed about $25,000.

Tacoma, Wash.

During the month of July a total of 132 building permits were issued, these reaching a total valuation of $135,988, or $10,000 more than for the same month of 1903. The bulk of the permits were for dwelling houses averaging about $1500 each in cost. Four brick buildings were undertaken at a total cost of $26,700. The other work included, besides additions and repairs, two churches, one store, one public hall and a number of smaller buildings. The trend of building seems to be toward medium cost residences for the laboring classes.

Washington, D. C.

The report of Building Inspector Ashford to the Commissioners of the District of Columbia shows that during the month of July 366 permits were issued for building improvements estimated to cost $625,605, and for repairs a total of $116,991, making the aggregate $742,596. The permits cover 153 brick buildings, 15 frame buildings and 47 sheds. For the same month last year there were 371 permits issued calling for an estimated outlay of $682,758.

The Master Builders' Association of the District of Columbia recently held its annual meeting in the Corcoran Building, electing officers for the ensuing year and receiving the reports of the various committees. The attendance was large and representative, and much satisfaction was expressed with the work of the association.

The officers elected for the ensuing year were as follows: President, Samuel J. Prescott; vice-president, James L. Parsons; secretary, George C. Hough, and treasurer, James L. Marshall. The above, with William E. Spier, Joseph Richardson and John McGregor, constitute the Board of Directors.

LAW IN THE BUILDING TRADES.

CONDITION PRECEDENT MUST BE COMPLIED WITH.

Where a building contract makes a certificate of the architect, that the contractor is not properly fulfilling his contract, and that a termination of same is warranted, a condition precedent to the right of the owner to terminate the contract, the condition must be strictly complied with, and it is incumbent upon the owner, on terminating such contract, to show performance of such condition, or a reason for its nonperformance.—Whute *vs.* Mitchell (Ind.), 65 N. E. Rep., 1061.

LIABILITY FOR LIENS OF ORIGINAL CONTRACTOR.

Where one, who was on the bond of a contractor, agreed with the latter and the owner of the building, to complete the work and to receive the compensation, thus being released from liability for the delay of the contractor, he became the assignee of such contractor, and his right to the amount due on the completion of the work was subject to lien that had been perfected against the original contractor.—Smith *vs.* Schile, 80 N. Y. Sup. Rep., 1078.

Where an arbitration clause in a building contract provides for reference of disputes to architects, giving the firm name of the architects, a member of the firm, whose name is not in such firm name, who was the architect in charge of the work, and recognized as such by both parties, is a valid arbitrator, and his finding, acting for the firm, is binding on the parties.—Wymard *vs.* Deeds, 21 Sup. Ct. Pa. Rep., 332.

WHEN OWNER IS NOT LIABLE ON AGREEMENT TO PAY MORE THAN CONTRACT.

Where a person was employed to build a house for a fixed sum, and it appeared before completion of the house that he would be unable to comply with the contract without loss, and he was told by the owner to complete the building and the difference in cost would be paid him, the agreement to pay the additional sum was without consideration, and not enforceable.—Willingham Sash & Door Company *vs.* Drew (Georgia), 45 S. E. Rep., 237.

WHEN OWNER CAN ENTER ADJOINING PREMISES.

Where the owner of a building entered into a contract with an adjoining owner, allowing him to enter on his premises and remove the wall to his building, for the purpose of erecting a new building on the adjoining lot, and the work was done in so careless a manner that injury resulted to his building, no right of action for such negligence would arise against the person employed by such adjoining owner to do the work.—Cobb *vs.* Clark Company (Georgia), 45 S. E. Rep., 305.

BUILDING CONTRACT REQUIRES CLAIM IN WRITING.

Where a building contract required a claim in writing to be presented to the architect by the contractor for any act, neglect or default of the owner or architect, occasioning delay in the completion of the work, such provision did not apply to extra work, which the contractor was required to perform, and to which he assented on proper demand for same.—Reardon *vs.* Cushing (Minnesota), 96 N. W. Rep., 1126.

ACTION BY CONTRACTOR ON A BUILDING CONTRACT.

Where in an action by a contractor on a building contract, it appears that he abandoned the work, unless he has completed the building without any omissions so substantial as to call for damages, he is entitled to nothing on the ground of substantial compliance, save in subordination to the contract permitting the owner to complete the building at the expense of the contractor.—Rowe *vs.* Gerry, 83 N. Y. Supp. Rep., 740.

QUESTION OF FINAL PAYMENT ON CONTRACT.

Where a building contract provided that the final payment should not be made until the buildings were completed, "with a full release of liens," the delivery of the release of liens is a condition precedent to the contractor's right to recover, unless it is shown there are no liens to be released.—Titus *vs.* Gunn (New Jersey), 55 Atl. Rep., 735.

TIME FOR COMPLETING FOUNDATIONS.

Where a contract for the construction for a certain foundation fixed no time for the completion of the work, the work must be completed within a reasonable time.—Lang *vs.* Menasha Paper Company (Wisconsin), 96 N. W. Rep., 393.

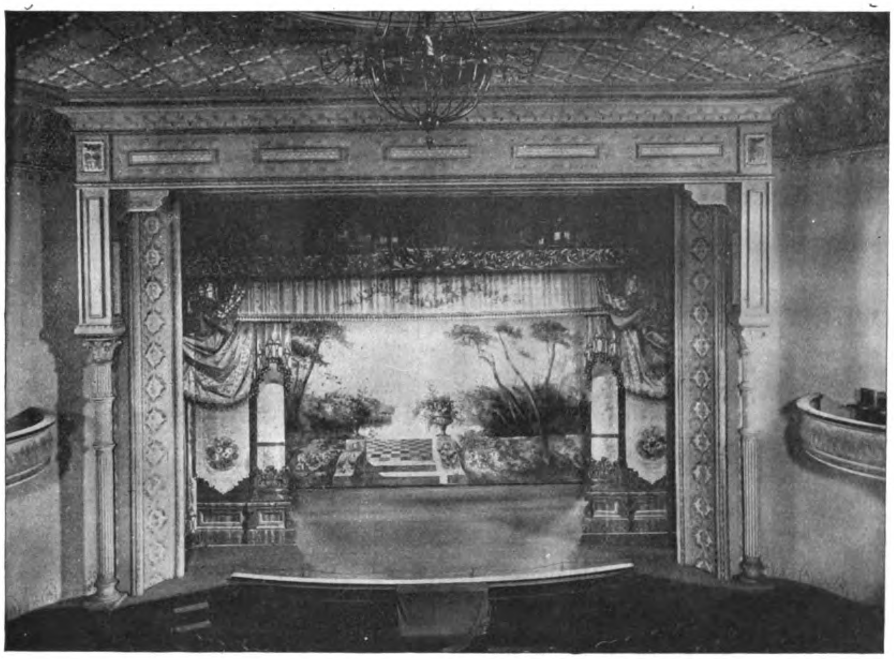
AMONG the improvements contemplated in the lower part of New York City is a 12-story office and bank building, which will occupy a site at the northeast corner of Broadway and Beaver streets. The building will have a frontage on Broadway of nearly 74 feet and a depth of 51 feet and 31 1-3 feet. The façade of the structure will be of limestone and granite, and there will be ornamental bay windows and terra cotta trimmings. The building will cost in the neighborhood of $225,000, and will be erected in accordance with plans prepared by Architect Ernest Flagg for the Produce Exchange Bank.

Sheet Metal Decoration for Theaters.

The use of stamped sheet metal for theater, opera house and hall decoration has been found especially effective in the formation of proscenium arches, stage fronts, opera boxes and balcony fronts. In the accompanying illustration we show the balcony front, proscenium arch and a portion of the ceiling of the opera house at Carlisle, Pa., which is a good example of the decorative possibilities of sheet metal designs as applied in this class of buildings. The stage opening in this case is 27 feet wide and 23 feet high; the face and flare of the jambs of the arch are 3 feet 6 inches wide, and the cornice head and paneled frieze are 3 feet 6 inches high. The outside of the arch is finished with sheet metal fluted columns, 8 inches in diameter, with base and capitals supporting a paneled frieze and soffit and cornice head.

Carlisle is one of the most prosperous of the smaller cities in the beautiful Cumberland Valley of Pennsylvania, and the opera house referred to is one of the best examples of such buildings to be found in that part of the country. The main auditorium, as well as the proscenium arch and balcony front, is finished with the well-known Rococo ceiling design of the Berger Mfg. Company, Canton, Ohio. The building also contains a number of business rooms, offices and lodge rooms, all of which are finished with Berger's sheet metal decoration, the particular design in each room depending upon the use of the same. The management of the opera house is enthusiastic in praise, not only of the decorative features and the highly artistic finish secured, but of the fact that sheet metal, as shown in this work, represents the most permanent and durable construction material which could be secured for such use. Moreover, the sheet metal finish adds to the safety of the structure and its fire proof qualities.

It is pointed out that the classified designs in metal ceilings and side walls of this concern are especially suitable for use in theaters, opera houses and large halls where decorative effects are particularly desired. The embossing of its plates is brought out sharp and distinct, presenting in bold relief the distinctive decorative features of the design, which effect is almost impossible to obtain either in plastic, stucco, staff or any other composition, cost considered. The sheet metal finish costs less and is lighter in weight than other materials. Moreover, it can be applied over wood or plaster walls, and it is as easy of application to old buildings as to new structures. The company has provided the interior finish for a number of other theaters and opera houses, including the opera house at Oneonta, N. Y.; the proscenium arch and interior finish in the auditorium of St. Michael's Hall, Baltimore, Md., and its material is also in use in a number of churches througout the country. It has just issued a fine illustrated catalogue covering this branch of its manufactures.



Sheet Metal Decoration For Theaters.

Cleaning Stone Work and Fronts of Pressed Brick.

In describing the best method of cleaning stone work of smoke and mold a recent issue of the *Painters' Magazine* suggests the application with a long handled fiber brush of a strong solution of caustic soda or pearl ash, which is permitted to remain about 15 minutes and is then thoroughly removed with one or more washes of clear water, for which purpose a hose and a stiff broom will do good service.

To clean finished marble mix with enough water to make a creamy paste 5 pounds sal soda, 2½ pounds bolted whiting and 2½ parts powdered pumice. Apply this to the surface and rub with any suitable brush, then wash off with soap and water, and finally rinse.

Builders' acid, a mixture of muriatic acid and water in equal parts, is used to remove the spots of mortar on brick work, and is also recommended for removing efflorescence on brick, but it is scarcely the proper means of renovating or removing discoloration from smoke or age. At any rate, the acid solution must be followed up by rinsing with clear water, or the bricks will darken to a great extent. A thorough scrubbing with soft soap and water, to which a little ammonia has been added, is the best cleanser for pressed brick. Final rinsing with clear water, of course, is necessary.

To make the brick look fresh and new, however, a wash of the following composition will be of service: One-half pound of good animal glue, soaked in water and then melted in water, say, 8 gallons in all, to which add 1 ounce of bichromate of potash in solution and 10 pounds dark Venetian red and enough yellow ochre to give the desired effect. This is applied as thin as possible with a large wall brush.

Asbestos.

In the important work of protecting life and property from fire, says an exchange, there is a growing appreciation of the value of asbestos and a constant increase in its use. It has a combination of properties unlike that of any other substance found in nature. No other product as yet discovered could take its place. It has been called mineral wool, and also the connecting link between the mineral and the vegetable kingdoms. After the fibers of asbestos have been separated from their mother rock they have a fluffy softness and whiteness much like that of wool or cotton, and by a process very similar to that of ordinary weaving they are converted into cloth. It is a cloth, however, which, owing to its mineral origin, is impervious to fire, and herein lies its value. It is more and more extensively used in this country for fire proof curtains, for firemen's helmets, jackets and leggings, and for gloves and shields for men working at the mouths of furnaces. The texture of the fabric resembles that of canvas, so it is too coarse, as now manufactured, for such delicate materials as those of lace curtains and women's dresses, for which its use has been suggested, but an interesting way in which it is now utilized is in the work of surgeons in making splints and dressing wounds. Cotton and wool must be specially treated to be rendered absolutely clean and antiseptic, while asbestos is naturally so.

A REPORT which has just been issued by the Insurance Engineering Experiment Station, in charge of Prof. Charles L. Norton, deals with the subject of protection of theaters. The matter consists essentially of suggestions for the prevention of loss of life and property by fire in theaters and public halls by methods which may also be applied to school houses, churches, &c.

A New Interlocking Steel Sheet Piling.

The increasing cost of timber is making more general the substitution of steel piling, most of the forms of which are built up of standard structural steel sections now rolled by the steel mills. Important advantages of the steel sheet piling are the saving of time, labor and cost, but particularly in available space, for in order to build a cofferdam from timber it is necessary to sink two separate lines of piling, connect them with planking, separate them with beams and tie them with through rods or braces, filling the space between with clay. Steel angles, beams, channels and zees are now rolled as long as 60 feet, so that it is possible to use sheet metal piling in place of timber even where it is necessary to sink it to a great depth. The metal sheet piling described in this article is intended to replace the double wall construction just referred to with a single interlocking wall, the members of the piling being interlocked at the time they are driven.

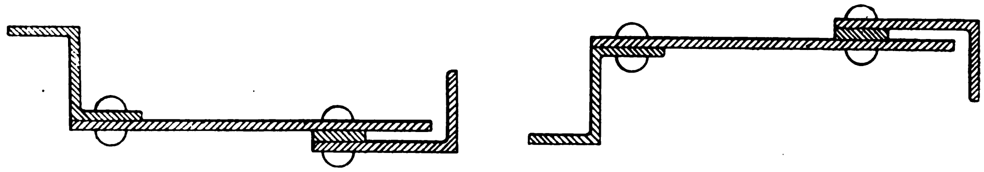


Fig. 1.—Two Continuous Wall Sections Detached.

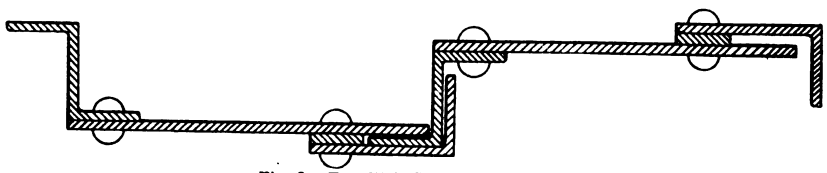


Fig. 2.—Two Wall Sections Interlocked.

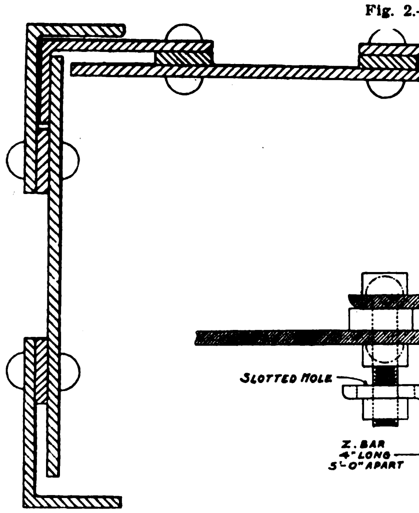


Fig. 3.—A Corner.

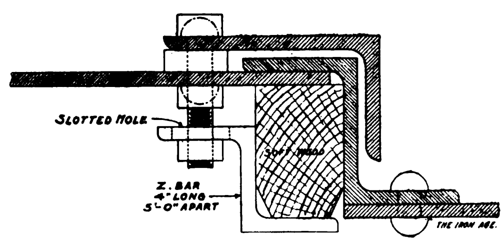


Fig. 5.—Method of Calking.

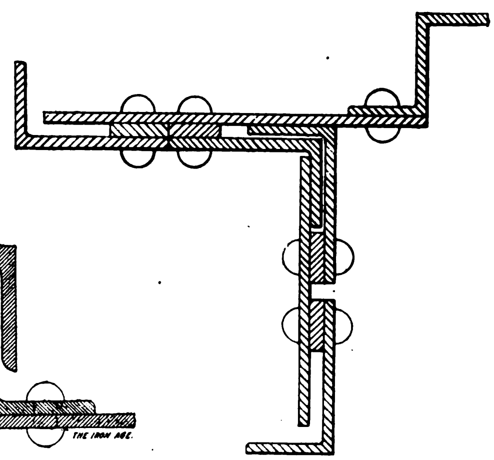


Fig. 4.—A Partition Joint.

A New Interlocking Steel Sheet Piling.

This piling is made of a series of units, as shown in Fig. 1, consisting of a zee bar riveted to one side of the plate and an angle riveted to the other, with a separating strip between the angle and the plate of a thickness to admit the leg of the zee between the longer leg of the angle and the plate. Corners are made by fitting the angle edges of two units together instead of fitting an angle and a zee, and it is necessary for such members to have angles on both edges, as shown in Fig. 3, if it is desired to reverse the sequence of angles and zees. Junctions of dividing partitions with the main wall are made as illustrated in Fig. 4. In general, standard piling will consist of 4-inch zee bars, 6 x 3½ inch angles and 15-inch plates, all ⅜ inch thick and of any required length.

A fortunate feature of this form of steel sheet piling is that when driven in ordinary soil, such as clay and quicksand, enough of it works into the joints to make them practically water tight. Where the soil is of such a gravelly character that it will not calk the seams, or when the piling is driven in clear water, a strip of soft wood is inserted in the angle where the piles join, as shown in Fig. 5, and is held there by zee bar clips bolted 5 feet apart. The wooden strip swells when wet and makes a water proof joint.

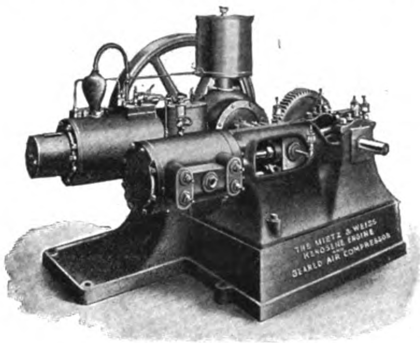
It is said that this piling can be pulled and redriven a number of times, and when it has outlived its usefulness can be sold at a high scrap value. It is driven with an ordinary pile driver, a block or cushion being interposed between the head of a member and the hammer of the pile driver.

Piling of this character is adapted to the construction of retaining walls, foundations, cofferdams, submarine work and to parts of mine shafts where quicksand and water are encountered. In erecting buildings where one foundation is to be excavated considerably below that of an adjoining structure, the sheet piling can be driven close to the foundation of the old structure, effectively preventing the weakening of that foundation by adjoining excavation and making it unnecessary to build heavily braced sustaining walls for the new structure. In such a case the steel sheet piling would remain in position permanently.

The piling described is the invention of H. Wittekind, a Chicago engineer, formerly associated with Jenney & Mundie, and is manufactured by the H. Wittekind Interlocking Metal Piling Company, Cable Building, Chicago.

The Oil Engine in Building Contruction.

In the work of erecting steel buildings the oil engine has become a valuable adjunct to provide power for compressing air for the operation of pneumatic tools, especially riveters. On account of the dangerous nature of its fuel a gasoline engine would not be permitted on such work in most cities, and a steam compressor is neces-



The Oil Engine in Building Construction.

sarily rather expensive, as it requires almost constant attention on the part of an engineer, takes up more room, and, being heavier, is more costly to set up. The accompanying illustration shows a neat set, consisting of a Mietz & Weiss kerosene engine, manufactured by August Mietz, 128 Mott street, New York City, mounted upon the same base with a Clayton air compressor. A bronze pinion on the engine shaft meshes with a large gear on the compressor, affording a very smooth running transmission. The engine is of 10 horse-power and drives an 8 x 8 inch compressor, giving 70 cubic feet of free air per minute against 80 pounds pressure. The outfit is in operation at the building now being erected at Park avenue and Forty-second street, New York City, by Ritchie, Brown & Donnelly. It is stated that the compressor provides ample power for six pneumatic riveters with an oil consumption of from 7 to 7½ gallons per ten-hour day.

IT is estimated that the 658 dwellings to be erected in the new town of South Altoona by the Knickerbocker Land Company will require in the neighborhood of 10,000,000 brick.

New Publications.

American Trade Index, 1904. 702 pages. Bound in cloth. Published by the National Association of Manufacturers of the United States of America. Price to purchasers in the United States, $5 per copy.

This is the sixth annual edition of a descriptive and classified directory of the National Association of Manufacturers, arranged for the convenience of foreign buyers. It contains the names of nearly 3000 American manufacturers, whose products cover almost the entire field of productive industry. The book is distributed gratuitously to prominent importers, wholesale dealers, manufacturers, &c., in countries outside of the United States who are interested in purchasing or handling American goods. The contents are printed in English, German, French and Spanish. The arrangement followed first gives an alphabetical list of the members, with a statement of all the products manufactured by each, and, second, an alphabetical list of the articles produced, with the names of the various manufacturers producing them under these headings. The list of manufacturers is an unusually select one, as the members of the association are largely the leading business concerns in their lines.

The Steel Square Pocket Book.—By D. L. Stoddard, 110 pages. Size, 3½ x 5¼ inches. Bound in stiff board covers with side title in silver lettters. Illustrated with 112 diagrams. Published by the Industrial Publication Company. Price, 50 cents, postpaid.

This little work consists of an account of the way in which the author makes use of the steel square in his daily work. It is in effect a series of articles written for various publications, one of them being *Carpentry and Building*, and the matter afterward arranged in convenient book form for reference. The aim of the author has been to make the illustrations so readily understood that their import can be grasped at a glance, and thus render the work of the greatest possible benefit to the average building mechanic. The author states that while he presents various methods of applying the square, many of them, as well as the illustrations, he points out, are original, so far as he is aware. The size of the book is such as to make it convenient for the pocket, and at the close is an index alphabetically arranged, which greatly facilitates reference.

ACCORDING to an official statement of the New York State Department of Labor, recently issued, the first quarter of 1904 was characterized by an unusual amount of idleness among organized wage workers. The outdoor trades—building and engineering work—suffered from the extreme severity of the winter, and there was some depression in the iron and steel and wood working industries. The proportion of unionists idle during the first three months of 1904 was 14.6 per cent., as contrasted with 5.5 per cent. in the corresponding period of 1903—the best year of the last decade. Of the 55,710 workers who did not work at all in January, February or March, 34,365 belonged to the building trades and 10,631 to the transport trades—chiefly lake navigation. Nearly all of this idleness was due to weather conditions, as projected building operations compared favorably with those of previous years. At the end of March no fewer than 25,723 union workers were idle on acccount of disputes, and the total number idle for all causes was 103,996, or 27.2 per cent. of the number reporting, as compared with 12.1 per cent. a year previous. At the end of March the number of labor organizations recorded by the Bureau of Labor Statistics was 2556, a decrease of 27 from last September.

THE new house for the Lambs Club, the foundations for which have just been completed at what will be Nos. 128 and 130 West Forty-fourth street, New York City, will be a six-story structure, covering an area 37½ x 90½ feet, and will cost in the neighborhood of $400,000. The architects are McKim, Mead & White, and the general contractors are True & McKeefree of New York City.

The New York Trade School.

The twenty-fourth year of the New York Trade School, First avenue, Sixty-seventh and Sixty-eighth streets, New York City, will commence on October 10, when the evening classes in carpentry, bricklaying, plastering, plumbing, house, fresco and sign painting, sheet metal work, steam and hot water fitting and electrical work will open. The day classes in house and sign painting begin on December 5, 1904, as do the classes in bricklaying, cornice, skylight and metal work, electrical work and plumbing. The day steam and hot water fitting class will open on January 4, 1905. In addition to the trade classes, the school in the coming term will again conduct a course of lectures for electrical workmen and a course for steam engineers, consisting of ten lectures. These courses are designed to provide information that will be of value to the journeyman in his practical work.

Since the New York Trade School was founded, 10,864 young men have attended the institution, and during the past four years the annual attendance has averaged over 600 pupils.

Applications for admission to the school will be received beginning October 3, from which date the office of the school will be open during the evening, as well as the day. Young men residing in or near New York City are requested to call in person, while those living out of town can make application by mail. No young man, however, should come to New York without first ascertaining if admission to the school can be secured.

The catalogue for the twenty-fourth season, which has been issued, is an attractive publication, giving many half-tone engravings showing the various departments of the institution and the different trade classes in operation, with examples of work done by the pupils. Full details are given of the various day and evening classes conducted at the school, with information regarding examinations, fees, Trade School committees and other matters of interest.

Important Legal Decision Regarding Rights of Employers.

Another of the already long list of judicial decisions establishing the rights of the employer has been handed down at Vancouver, B. C., in a suit alleging conspiracy brought by labor unions against the Vancouver Employers' Association. The Vancouver Engineering Works posted rules changing their shops from union to open. The employees went on strike, and the Employers' Association, comprising the prominent employers of labor in the city, refused to employ the strikers, whereupon charges of conspiracy were made on the ground that the strikers were deprived of work. The case was heard before a special jury, which decided that, as the intention of the Employers' Association was to assist the Vancouver Engineering Works to obtain an open shop and not to injure the men, the action was not a conspiracy, but an incidental misfortune necessitated by proper action in the pursuit of the betterment of trade conditions. The case is all the more interesting as showing that the Canadian courts quite agree with those of the United States in their understanding of the equity that should govern the relations between employer and employee.

FRANK DUFFY, secretary of the United Brotherhood of Carpenters and Joiners, has recently sent out the official transportation circular for the thirteenth biennial convention of the Brotherhood, which is to be held at Milwaukee, Wis., September 19 to October 2, inclusive. The circular consists of a four-page folder, on the front page of which is a general view of the passenger station of the Chicago, Milwaukee & St. Paul Railway at Milwaukee, while on the second page are illustrations of buildings and points of interest in and about the city. The circular gives much valuable information relative to the question of transportation from leading railroad centers. An elaborate programme has been prepared for the convention, which will include steamboat excursions on the lake and visits to many of the beautiful resorts, which are readily accessible from the city of Milwaukee. The idea is for the delegates to congregate in Chicago and then go in a body to Milwaukee. The fourth page of the folder is devoted to a map of the Chicago, Milwaukee & St. Paul Railroad.

The Radiator in House Heating.

Housekeepers with an artistic eye have generally resigned themselves to the radiator as a necessary evil, but Alice M. Kellogg, writing in the *Delineator* for September on "The Heating of the House," sees more in this Philistine piece of furniture than has been accorded it. She shows two illustrations, the first of a dining room radiator, fitted on top with a neat oven in which plates and food are placed to keep warm, and which thus acts as a kind of hot sideboard. The second radiator has been made ornamental to an artist's studio by hanging it with Japanese silk curtains and placing a shelf upon it for bric-a-brac. "If the radiator stands out too prominently," adds Miss Kellogg, "a single paneled screen may be placed before it."

WHAT is said to have been the second largest contract ever awarded for fire proofing material was recently placed by the Pittsburgh Terminal Railroad & Coal Company with the National Fire Proofing Company. The contract calls for 1,000,000 feet, which is an amount much greater than that used in any steel office building yet erected. The material will be for the new warehouse that the Terminal Company will erect on the South Side in Pittsburgh. The building will in reality be a series of apartments, all practically separate and numbering 47 in the aggregate. They will be absolutely fire proof and as such will be constructed almost entirely of fire proofing.

CONTENTS.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS
232-238 WILLIAM STREET, NEW YORK.

OCTOBER, 1904.

THE Boston office of *Carpentry and Building*, Walter C. English, manager, has been removed to Room 1004 Compton Building, 161 Devonshire street, a location within 100 yards of Washington street and 50 yards of the post office.

The Increasing Use of Concrete.

Many engineers and architects are of the opinion that the use of concrete is being carried much too far. While freely admitting its advantages as a structural material they maintain that its indiscriminate employment in building and engineering operations is certainly not to be commended. In particular locations and under peculiar conditions it possesses advantages over any form of masonry. This is true as regards rapidity of erection and economy. On the contrary, in some cases the expense attending its placing is so great as to render its use prohibitive. One unique advantage it does have—it is not affected harmfully by the gases of the atmosphere; in fact, if we can judge by the specimens of cement laid by the ancient Romans, it grows harder and more durable as time passes. The same cannot be said of some qualities of building stone and of some kinds of brick. One principal—and perhaps the governing—consideration in its use is the cost of erecting the necessary form. In a retaining wall, such as many railroads are now building, this is a simple and inexpensive matter, and concrete is therefore cheaper than any form of cut stone. But in many cases of this character it would be cheaper to use rough masonry for a filling than to continue the concrete throughout. It becomes a close race, as to cost, when the form becomes at all intricate, or when it is difficult to erect. The cost of the raw material being very nearly alike in both instances, the selection would be controlled by the amount of labor required. Concrete can be placed by unskilled help, and unless this is offset by other questions its use would appear to be desirable from an economical standpoint. The fact that a concrete wall or pier, no matter what its size or situation, is not liable to crack is important.

Cheap Concrete Walls.

One of the cheapest walls of which we have any knowledge is that of a factory building. The side walls are about 600 feet in length by 15 feet in hight and only 2 inches thick. In building these the first operation was to stretch expanded metal between the columns carrying the roof. The cement was laid on each side of this so as to bury the metal. No form was needed, the amount of material was small, and the work was rapidly executed by ordinary help. It appears to be the more or less common practice to mix cement of high grade with what can be most easily and cheaply obtained. Cinders, gravel and broken stone all have their uses, the proximity of the material controlling the kind of mixture. There is comparative unanimity of opinion concerning the proportions of sand, gravel and cement. The sand and stone are used in such relative quantities as to fill, in union with the cement, all the interstices and produce a block free from "blow holes." The amount of each is, of course, affected by the result desired and the service expected.

Vacation Work for Students

Each succeeding vacation sees more college undergraduates foregoing the pleasures of summer months passed in idleness in order to temporarily enter the employ of manufacturing and other business establishments. The purpose is in many cases to earn money with which to pay the expenses of education, just as it has always been the means of helping young men to work out the ambition to secure a thorough education. But it is more than that to-day. Young men who have no need of such financial assistance, whose parents can furnish all the necessary funds for their maintenance, are showing an inclination to put their long period of summer rest to better account. They seek admittance to establishments where they can learn the practical side of business. Oftentimes they go into the shop and work by the day, generally for very small wages. A fortnight of the three months of vacation may be reserved for rest and pleasure. The average college undergraduate does not work hard enough to make three months' rest a necessary break on the year. Every man needs a vacation, but many young men of from 19 to 23 years consider that it is a good deal better for them to work a part of their summer. They feel that these periods of contact with practical business will count quite materially when commencement has passed, and they are seeking the openings that will shape their later careers. The polytechnic undergraduate usually needs a good deal more vacation than the college man, because the curriculum of the technical school is necessarily a severe one, and by the time examinations are ended the young men need rest and recreation. Yet many, very many of them plunge into work, and if it be manual labor the necessary brain rest may go with it. The incentive generally goes along with the spirit of the day, to get to work and work hard and well.

The Shower Bath.

The high class bathtub never before enjoyed the deserved popularity it now commands. The American manufacturer has taken up this great convenience of the modern household, and under his sympathetic treatment it presents a grace of contour, a perfection of finish and a serviceability that were never reached in the imported bathtub, which it has driven entirely from the market, whether in the form of enameled iron or solid earthenware. In view of the fact that the modern bathtub is now at the hight of its general appreciation, it may seem premature to suggest that the not far distant future will see it replaced by the shower bath. Yet this opinion is advanced by an observer in close touch with this branch of trade and the trend of the times in the plumbing field. It is a fact that the catalogues of plumbing fixtures issued within the past year or two include shower bath equipment, either for use in connection with bathtubs or independent of them, and, whereas, a few years ago, the manufacturers of these fixtures could be counted upon the fingers of one hand, quite a large number of the brass goods makers have now taken up the manufacture of some form of shower bath fixture. Some special equipment or modification of existing apparatus is all that is necessary to avoid wetting the hair of women and enabling them to enjoy the refreshing effect of the shower bath at any agreeable temperature. Many persons become familiar with the shower bath at clubs or bathing establishments, and prefer them to a plunge. The private apartments of the presidents or principal officers of some important institutions are provided with the shower bath, and it is often resorted to previous to taking up some important work, where the vigorous energy of the worker is needed to dispose of the task. That the shower is increasing in favor is sufficiently clear for the enterprising plumber to acquire a mastery of every detail of its installation under all possible conditions. It is too soon, however, for the manufacturers of the popular bathtubs to look for any reduction in the demand for these popular adjuncts to the family health and comfort, and the plumber can look forward to many years of profitable employment in their installation, even though he may find additional profit in setting up shower bath fixtures.

Stanford University Library Building.

The corner stone of the library building at Leland Stanford, Jr., University, Palo Alto, Cal., will be laid some time during October. The library building is the last of the larger buildings planned in the original building scheme of the university. In style of architecture the new library will combine the Spanish of the quadrangle buildings with the Romanesque and Grecian of the gym-be two stories, surmounted by a huge glass dome with a diameter of 70 feet. The basement will be finished in concrete, and will be fitted with a book bindery, packing rooms and iron stacks, which will be used for Government documents. Two entrances, one at either end of the front, will lead into the first floor of the structure, the wings of which will be taken up with waiting and conversation rooms, the cataloguing department and general reference rooms.

On the first floor, directly under the dome, will be the reading and study room, which will form a large circle in the center of the main structure. The semicircle addition in the rear of the main building will be used as the stack room, and will have a shelving capacity of at least nasium and chemistry buildings, and in general appearance will be much less simple than any of the other structures of the university.

The ground dimensions of the main structure are 306 feet in length by 194 feet in depth, while a circular addition attached to the rear center of the main building will have a diameter of 132 feet. In hight the structure will 100,000 volumes. The corridors and rooms will be tiled with mosaic flooring, and the stairways leading from the first to the second stories will be done in marble. The third floor will be devoted to seminar-rooms and special libraries of various departments of the university. But two contracts for the divisions of work on the main building have so far been awarded. One of these, for the foundations, was for $25,000, and the other, for the stone and brick work, was let at a contract price of $217,241. It is estimated that the interior decorations and complete equipment will make the entire library building cost in the neighborhood of $600,000.

THE new dry goods store which has just been completed in the city of Pittsburgh has created no little comment by reason of the size of the structure, exclusively devoted to the dry goods business. The building is 12 stories in hight, constructed of white enameled terra cotta, a material which is claimed to be especially suitable for the smoky atmosphere of the city, as it is easily cleaned, while its porcelain surface gives it the appearance of ivory from a short distance. The interior of the building is finished in mahogany, and on several of the floors this, as well as the fixtures, is inlaid with holly.

An Important Heating Decision.

The recent decision of the District Court in St. Paul, Minn., that a heating plant installed in strict accordance with the contract does not have to give satisfaction in its working, is inclined to make owners less insistent upon a cheap job. Too often the owner thinks that omissions here and there can be made without affecting the heating value of the plant, or if it does, the contractor can be required to make the plant work. There were two cases in the litigation, suit being brought by a St. Paul heating firm. In the first case, the plaintiffs sued to recover $211 for installing a hot water heating plant in a dwelling owned by the defendants at White Bear village. In the second case, the amount demanded was $151 for supplying a heating plant for the defendant's bank at White Bear village.

In both cases, judgment was given for the plaintiffs. It was pointed out by the court that the written contract for the heating plants described the apparaus to be furnished and named the price, but made no reference to the effectiveness of the respective plants for heating the dwelling or the bank. The defense argued that such effectiveness was implied, but the court did not admit the implication. It might be justly maintained, said the judge, that a contract for apparatus, in the absence of distinct description, implied that the apparatus would be of good quality, just as a contract for installing the apparatus would imply that the actual work of installation should be well done. No complaint had been made, however, that the apparatus was inferior or that it was improperly installed. Everything had been furnished in strict accordance with the contract. If the house owner had desired a larger plant or a different apparatus, that was a subject for contractual specification. He had got what he had ordered.

The Sante Fe Railway Hospital.

Plans have been completed and the preliminary contracts will soon be let for the new hospital to be erected by the Atchison, Topeka & Santa Fé Railway Company on Boyle Heights, Los Angeles, Cal. The complete hospital will embody seven separate buildings, including one three-story building for administrative purposes, having a frontage of 78 feet and a depth of 54 feet; two ward buildings, 24 x 70 feet, one being two stories and one three stories in hight; two buildings, 34 x 44 feet, and two stories high for the surgical and medical staff; one building, 32 x 68 feet, one-story high for dining room and kitchen purposes, and one building, 18 x 48 feet, two stories high, for bakery, store room and laundry purposes. The seven buildings will be connected by covered passage ways. The various floors of the various buildings will be connected with automatic elevators. Heating and ventilating will be such as is used in the most recent Eastern hospital construction.

Structural Building Trades Alliance.

One of the results of the first annual convention of the Structural Building Trades Alliance recently held at Indianapolis, Ind., was the adoption of a plan for the arbitration of labor difficulties in the structural building crafts of the country. The plan provides for trade agreements between the international officers and the different crafts and the contractor or contractors with whom a local union may be involved in trouble. It provides for arbitration when differences arise to be so carried out that there will be no cessation of work pending a settlement of the trouble.

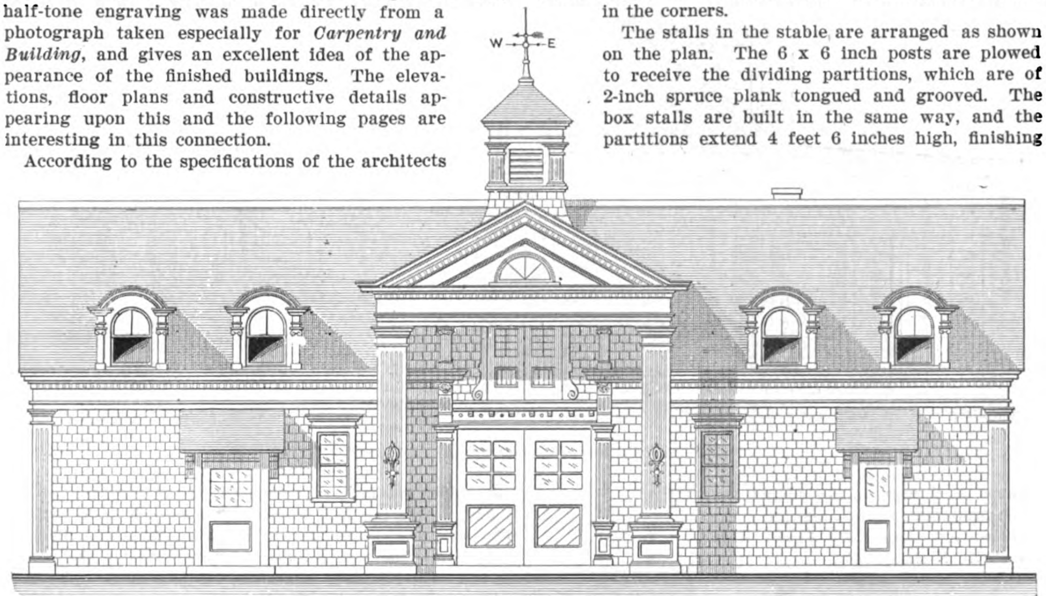
At the convention the officers elected for the ensuing year were: President, Frank Buchanan of Chicago; first vice-president, James Kirby of Chicago; second vice-president, A. D. Bambridge of Minneapolis, Minn.; secretary-treasurer, William J. Spencer of Chicago.

The next convention will be held in the city of Buffalo, N. Y.

A CARRIAGE HOUSE AND STABLE.

SCATTERED throughout the country, especially in the smaller cities and towns as well as in suburban places, are attractive stables and carriage houses almost without number, possessing in their arrangement and external treatment features which cannot fail to interest a large class of architects and builders. These buildings are in many instances the adjuncts of country residences of men doing business in the large cities, and they are therefore typical of the progress of the times as regards convenience and comfort in structures of this nature. We have taken for the subject of our supplemental plate this month a typical example, which in its construction and arrangement embodies many features likely to attract the attention of those living in suburban places. The small building at the left is an automobile house, the plans of which we hope to publish in the succeeding issue. The half-tone engraving was made directly from a photograph taken especially for *Carpentry and Building*, and gives an excellent idea of the appearance of the finished buildings. The elevations, floor plans and constructive details appearing upon this and the following pages are interesting in this connection.

According to the specifications of the architects



Front Elevation.—Scale, 3-32 Inch to the Foot.

A Carriage House and Stable.—J. A. Oakley & Son, Architects, Elizabeth, N. J.

the foundation walls and piers are of brick laid in lime cement mortar with headers every sixth course. All timber used in the building, except for trusses, is of hemlock, the sills being 4 x 8 inches, laid on flat; the posts 4 x 6 inches, the outside and inside studs 3 x 4 inches doubled; the floor beams for the cow stable and tool house, as well as the second floor beams, 2 x 12 inches, placed 16 inches on centers; the collar beams, the rafters and ceiling beams for wash room and tool house 2 x 6 inches, placed 20 inches on centers, and the ribbon strips 1 x 6 inches.

The outside walls of the building, as well as the roof of the rear extension, are covered with hemlock sheathing boards, over which is a layer of good building paper, this, in turn, being covered with 18-inch red cedar shingles laid 5½ inches to the weather. The ventilator which surmounts the building is of white pine, the frames having 1¼ x 8 inch louvre boards, set at a bevel with fluted pilasters of 1¼-inch pine at the corners and cap and base. The main roof, as well as that of the ventilator, is covered with hemlock shingle lath properly spaced and nailed, and then covered with 18-inch red cedar shingles laid 5½ inches to the weather. The roofs of the dormer windows have 1 x 2 inch furring strips laid close together and then covered with tin. The door and window frames are of white pine, and fitted with double hung sash. All outside finish is of white pine.

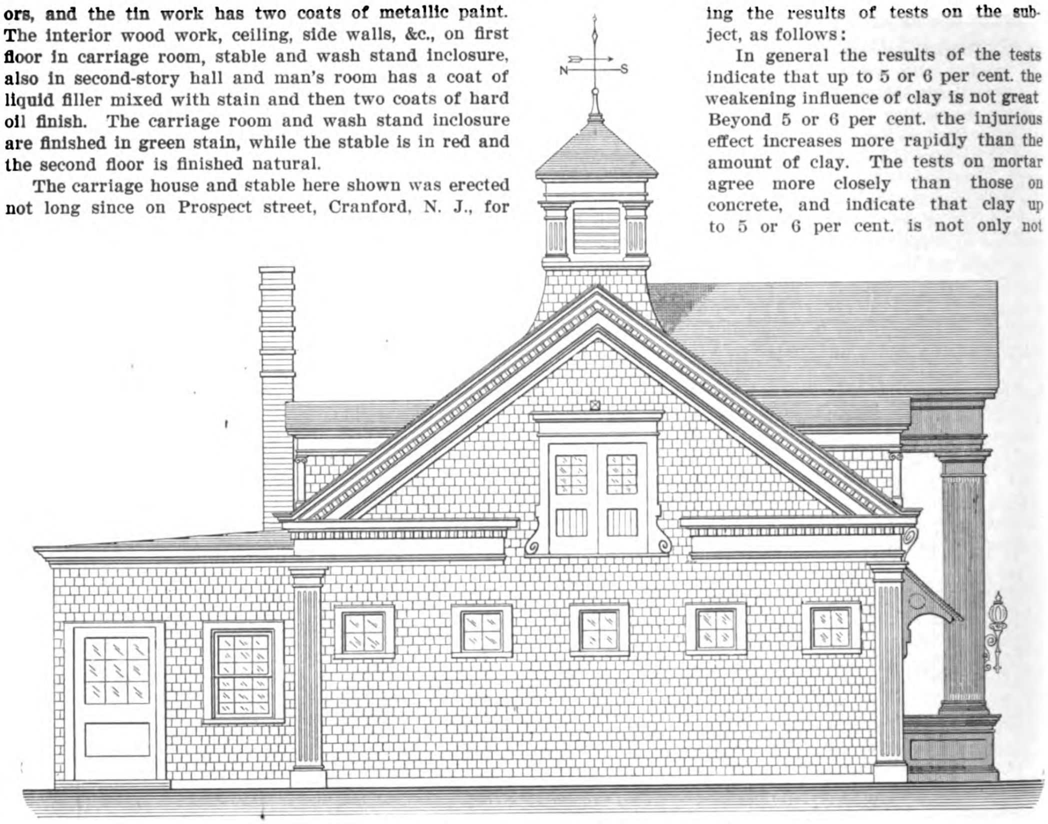
The floors of the cow stable and workshop are 1¼ x 5 inch tongued and grooved white pine flooring blind nailed to the beams. The second-story floors are of ⅞ x 4½ tongued and grooved North Carolina pine flooring blind nailed to each bearing. A row of 2 x 3 inch hemlock bridging is in the center of each row of floor beams, well nailed at each end. All the partitions have plates, doubled and spiked together with a row of bridging in the center. All windows and doors throughout, except in the hay loft, have ⅞ x 5 inch edge beaded casing of white pine mitered and well nailed. The stairs from the carriage room to the man's apartments on the second floor are of white pine with ⅞-inch risers and 1¼-inch strings and threads. The entire side walls and ceiling in the carriage room, stable, tool house, wash room, also up the stairs, as well as in the second-story hall and man's room, are covered with ⅞ x 3½ edge beaded North Carolina pine boards blind nailed with a quarter round in the corners.

The stalls in the stable are arranged as shown on the plan. The 6 x 6 inch posts are plowed to receive the dividing partitions, which are of 2-inch spruce plank tongued and grooved. The box stalls are built in the same way, and the partitions extend 4 feet 6 inches high, finishing with cap and molding. On the top are heavy gauge wire guards with ⅜ x 1 inch frames. The standing stalls have dividing partitions 4½ feet high with iron guards on top. These stalls have portable slat floors made of 2 x 3 inch spruce, bolted together with long iron rods and have 1-inch separators. The rolling doors to the box stalls are 2¼ inches thick, and are hung with Coburn barn door hangers. All the work around the stable, except the slat floors, is dressed. The iron stable gutter, 6 inches wide, with lattice top, connects with the sewer. The entire first floor of the stable, carriage room and wash stand inclosure has a concrete floor consisting of about 8 inches of cinders, broken stone and Rosendale cement in the proportions of 4 to 1, on top of which is a coat 1 inch thick of Atlas Portland cement and sharp sand in the proportions of 3 to 1. The top coat is lined off in 10-inch squares. The run ways are also of cement concrete. Under the stairs leading to the second floor is a John Douglas "Leader" combination washout low down porcelain water closet with oak seat and cover, also copper lined oak tank with proper water and sewer connections.

The stable is wired for electric lights, there being an outlet for switch for each ceiling light located near the small entrance door near the stairs. In the carriage room at each ceiling outlet is a five-light cluster with white porcelain shade.

The exterior wood work has two coats of paint in colors, and the tin work has two coats of metallic paint. The interior wood work, ceiling, side walls, &c., on first floor in carriage room, stable and wash stand inclosure, also in second-story hall and man's room has a coat of liquid filler mixed with stain and then two coats of hard oil finish. The carriage room and wash stand inclosure are finished in green stain, while the stable is in red and the second floor is finished natural.

The carriage house and stable here shown was erected not long since on Prospect street, Cranford, N. J., for Thomas A. Sperry, in accordance with plans prepared by J. A. Oakley & Son, architects, of 1201 East Broad street, Elizabeth, N. J.

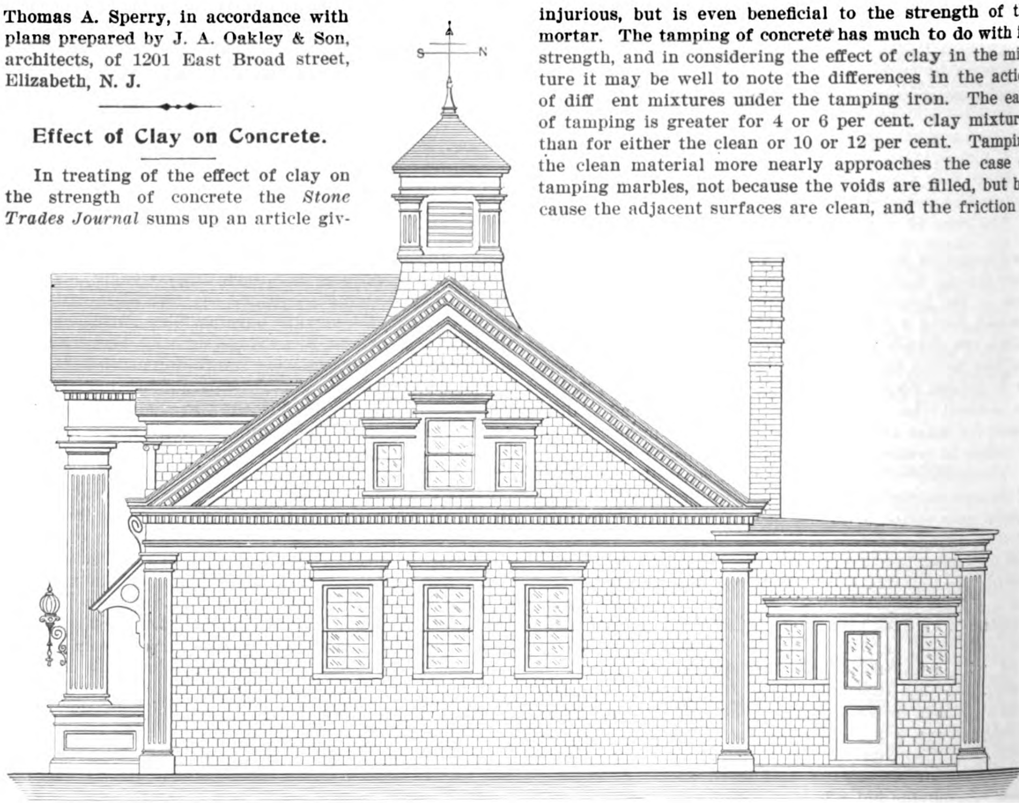


Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

Effect of Clay on Concrete.

In treating of the effect of clay on the strength of concrete the *Stone Trades Journal* sums up an article giving the results of tests on the subject, as follows:

In general the results of the tests indicate that up to 5 or 6 per cent. the weakening influence of clay is not great Beyond 5 or 6 per cent. the injurious effect increases more rapidly than the amount of clay. The tests on mortar agree more closely than those on concrete, and indicate that clay up to 5 or 6 per cent. is not only not injurious, but is even beneficial to the strength of the mortar. The tamping of concrete has much to do with its strength, and in considering the effect of clay in the mixture it may be well to note the differences in the action of diff ent mixtures under the tamping iron. The ease of tamping is greater for 4 or 6 per cent. clay mixtures than for either the clean or 10 or 12 per cent. Tamping the clean material more nearly approaches the case of tamping marbles, not because the voids are filled, but because the adjacent surfaces are clean, and the friction is



Side (Right) Elevation.—Scale, ⅛ Inch to the Foot

A Carriage House and Stable.

thus reduced so that it becomes difficult to compact the mass. In the 10 or 12 per cent. mixtures clay is present in excess of the amount required to prevent the slipping of the aggregate under the tamper, and as a result some of the clay is forced toward the surface and clings to the tamper, so that tamping becomes a difficult task as well as a disagreeable one. From these experiments it may be concluded that since the strength of concrete is not much impaired by even 6 per cent. clay, and since the cost of cleaning sand and gravel to contain only a small per cent. is very great, it is probably more economical to use a little more concrete in the work for the sake of avoiding the trouble and expense of removing all the clay contained in the materials available. In other words, these tests indicate that it is unwise to specify for any concrete work a minimum of less than 4 or possibly 5 per cent. clay in the sand and gravel used, when any considerable expense would be incurred to obtain cleaner material.

St. Paul's Cathedral.

In the very heart of the city, conspicuously situated on a slight eminence, stands London's most prominent building, the beautiful St. Paul's Cathedral. For nearly 1300 years a church has occupied this site, Ethelbert having founded one there as early as 610. For 477 years this original church remained standing, or until it was destroyed by fire in 1087.

A new edifice then was commenced in the Norman style. It occupied 40 years in building, and, according to William of Malmesbury, "could contain the utmost conceivable multitude of worshipers." But what with additions of various kinds, the cathedral was not declared completed until 1315.

The hight of the steeple then was 520 feet, and the total length of the church was 720 feet, a great many feet longer than the longest church now in England. At that time the spire was of timber covered with lead, and was 8 feet higher than the world renowned cathedral of Cologne, the largest specimen of Gothic architecture in the world. In 1561 this spire was struck by lightning and was destroyed, and in the fire that ensued the church was damaged, and remained in a dilapidated condition until the reign of Charles I.

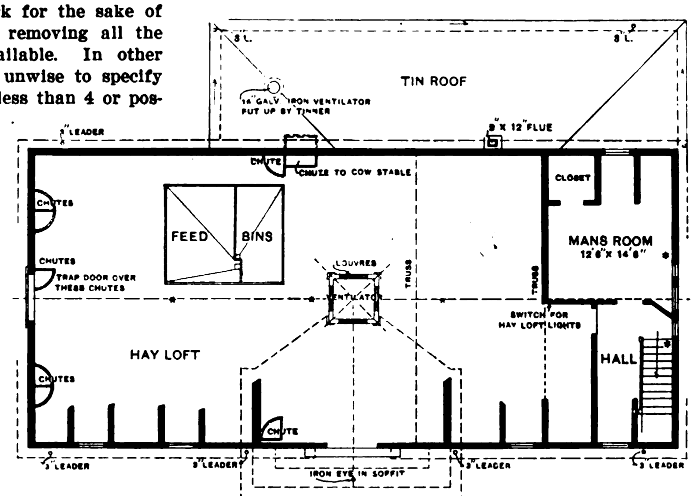
The work of restoration under the great architect, Inigo Jones, had not been completed when the structure was destroyed in the great fire of 1666. Before this the famous St. Paul's cross had been removed, where great religious disputations were held and papal bulls promulgated. Here the bull of the pope against Martin Luther was read in the presence of Cardinal Wolsey.

The present St. Paul's was erected in the years between 1675-1697 from the designs of Sir Christopher Wren. It is in the form of a Latin cross, and resembles St. Peter's at Rome, though much smaller. It cost what would be computed in our money to-day as nearly $3,740,000, but which represented a far greater purchasing power in those times. It is 500 feet long, and its breadth at the transepts is 250 feet. It is the third largest church in Christendom, being exceeded in size only by St. Peter's at Rome and the cathedral of Milan.

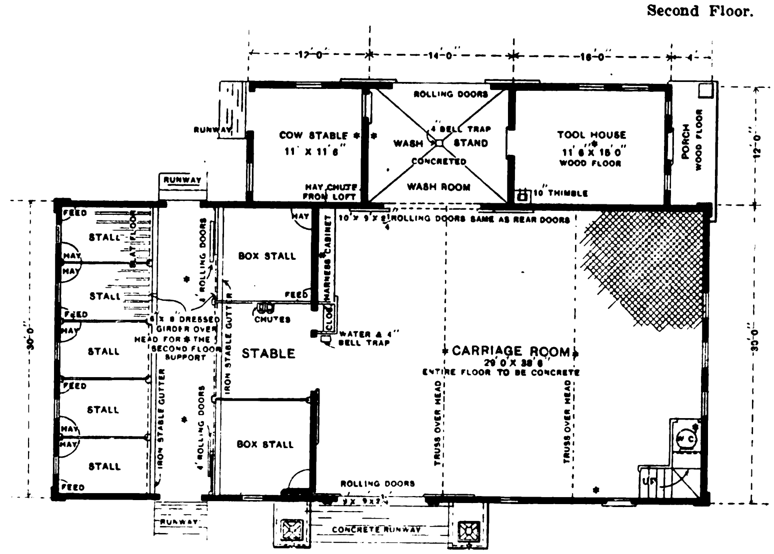
The dome, which separates the two transepts and the nave and the choir, rises to a hight of 365 feet, and is of wood covered with lead. It supports a lantern, on top of which is a ball surmounted by a cross, the ball and cross weighing 8960 pounds, and bringing the extreme hight of the highest point of the structure to 404 feet. The ball is 6 feet in diameter, and can hold from 10 to 12 persons.

The principal front to the west consists of a double portico of Corinthian pillars, flanked by campanile towers 120 feet high. In front of the west façade stands a statue of Queen Anne, with England, Ireland, France and America at her feet. In the campanile tower is the largest bell in England.

Wren received £200 a year while working on St. Paul's, but his designs for the decoration of the vast interior were never carried out.



Second Floor.



Main Floor.

A Carriage House and Stable.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

Protection Against Fire With Hot Air Systems.

BY C. W.

Because only an occasional fire is heard of in connection with hot air heating systems, usually as the result of poor work in setting the furnaces, while they are sold by tens of thousands every year and countless numbers of these heaters are in use, is no reason why furnaces should be installed without proper care, or that a few simple, inexpensive precautions, such as are suggested below, should not be invariably adopted, that will afford practical assurance of safety from all risk of fire.

Portable hot air furnaces should be set at least 16 inches from any wood work or ceiling, unless they are protected by a metal shield, in which case they may be set not less than 8 inches from wood work or ceiling. Whenever it is necessary to set a portable furnace on a wood floor, the latter should be protected by a course of brick laid in cement mortar, the brickwork extending at least 20 inches in front of the ash pit.

For a distance of 3 feet from the furnace the cold air box should be of metal or brick.

Wooden beams above the furnace should be protected by IX bright tin, suspended at a distance of 1 inch below the beams and projecting 2 feet beyond the furnace casing all around. The top of the furnace bonnet should be filled in with mineral wool or some other nonconducting material.

Brick set hot air furnaces should have two covers, with an air space of 4 inches between them, the inner cover of the hot air chamber being a brick arch, or two courses of brick laid on galvanized iron or tin and supported by iron bars. The outer cover or top of the furnace should be made of brick or metal supported by iron bars, and constructed so as to be perfectly tight. The walls of brick set furnaces should be built hollow—viz., an inner and an outer wall, each 4 inches thick, properly bonded together, with an air space of not less than 2 inches between them. All brick set furnaces should be set at least 4 inches from any wood work.

Pipes used for the distribution of hot air from a furnace should be made of bright tin, the joints being double seamed, but not soldered. If not otherwise protected, the pipes should be painted.

Wherever hot air pipes pass through wood or other partitions a double tin sleeve should be used, the wood work being covered by tin or asbestos. Tin is preferable, because mice frequently destroy the protective qualities of asbestos by gnawing it to secure material for nests in which to raise their young.

Horizontal pipes, or leaders, should be kept 6 inches below the floor beams or ceiling, unless plastered or protected by a metal shield, in which case the distance may be reduced to 3 inches. Where hot air pipes pass through studding or any wooden partitions, they should be protected by a double collar of metal with 1-inch air space and holes for ventilation, or be surrounded by 4 inches of brick work.

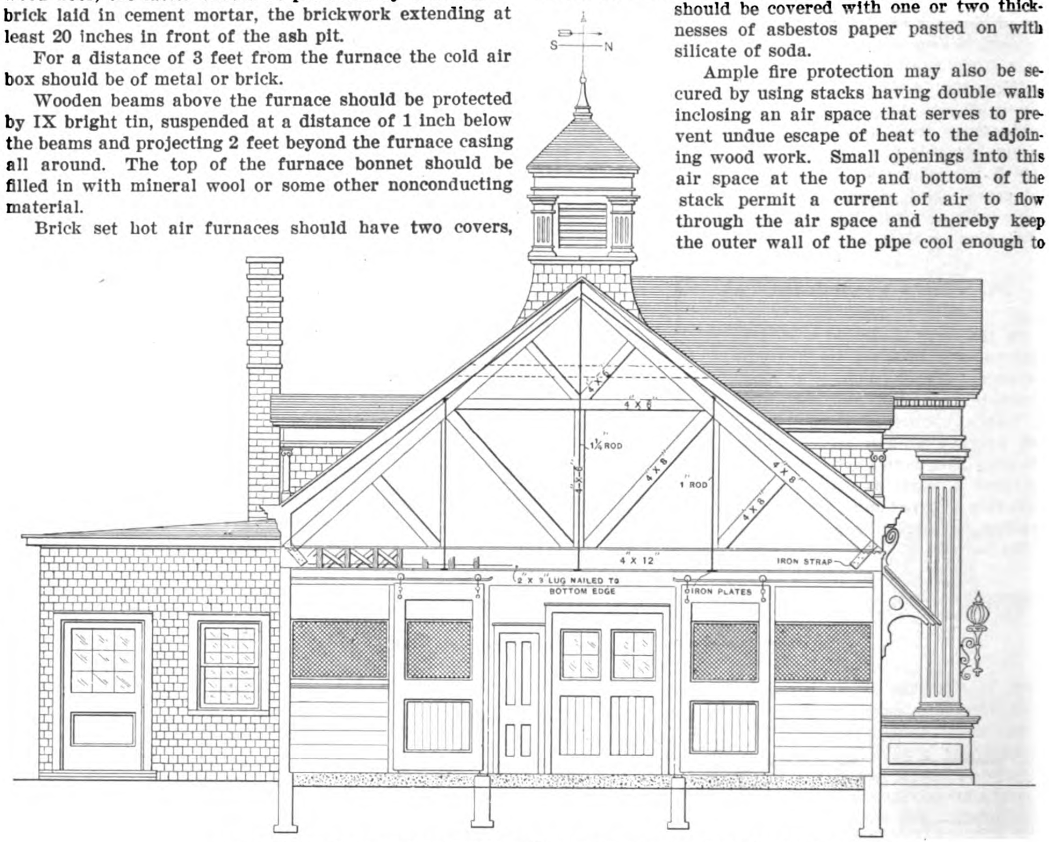
The leaders should be covered with one thickness of fluted air cell or asbestos covering, the edges overlapping about 1 inch and pasted together, the joints at the end of each section being protected by sheet metal bands.

The sides of the studding and all wood work adjoining the stacks should be protected from the effect of heat by tin and asbestos, the space between the studding being spanned by expanded metal lath, securely nailed in place. Stacks in inside partitions should be covered with asbestos and 1-inch hair felt, wired in place. All stacks should be covered with one or two thicknesses of asbestos paper pasted on with silicate of soda.

Ample fire protection may also be secured by using stacks having double walls inclosing an air space that serves to prevent undue escape of heat to the adjoining wood work. Small openings into this air space at the top and bottom of the stack permit a current of air to flow through the air space and thereby keep the outer wall of the pipe cool enough to prevent the ignition of shavings or other inflammable material that may come in contact with the pipe.

Register boxes should be made of tin, with a flange on top to fit in the rabbet in the border, and the register should rest on the tin flange. There should be an open space of not less than 1 inch on all sides of a box. When but one register is connected to a furnace, as in such heating, the register should have no valves.

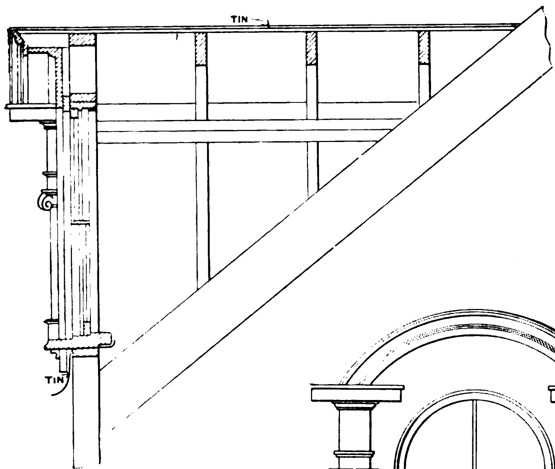
Registers directly over a brick set furnace should be supported by a brick shaft from the cover of the furnace, with a metal pipe inside. Registers placed in any wood floor should have either stone or iron borders.



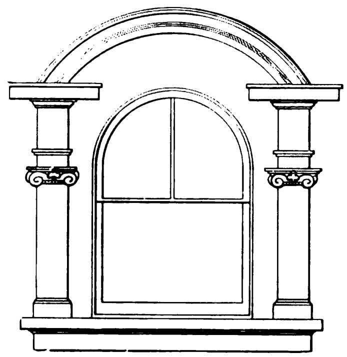
Vertical Cross Section of the Building, Showing Truss, &c.—Scale, ⅛ Inch to the Foot.

A Carriage House and Stable.

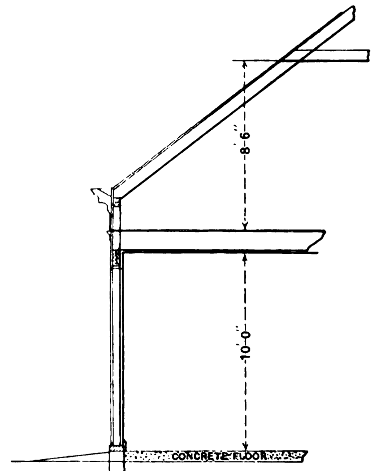
What is said to be the largest tree in the world is reported from Tulare County, Cal. This giant sequoia measures 36 feet in diameter and 113 feet in circumference 4 feet from the ground. According to the press dispatches announcing the find, the mill man who discovered this majestic forest monarch will turn it into lumber. This is unquestionably a commercial age, and dollars and cents largely constitute the criterion by which almost everything is judged, yet it certainly seems that some means should be provided to prevent the destruction of such a patriarch. For 4000, possibly 5000, years this sturdy, symmetrical shaft has reared its green head, braving alike the lightning's bolts, the fury of the tempest and the fierce rays of the run, standing to-day as the most inspiring example of that great, pulsating life that seeks expression everywhere in nature.



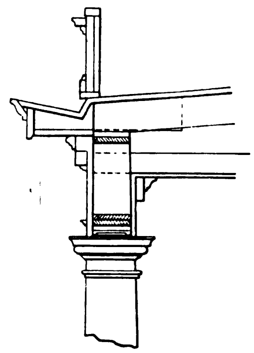
Section of Front Dormers.—Scale, ⅜ Inch to the Foot.



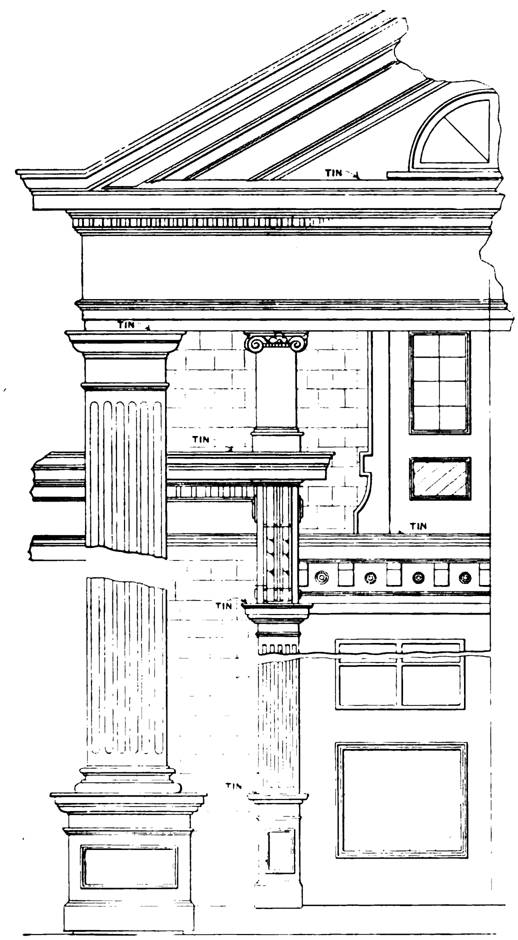
Front Elevation of Dormers.—Scale, ⅜ Inch to the Foot.



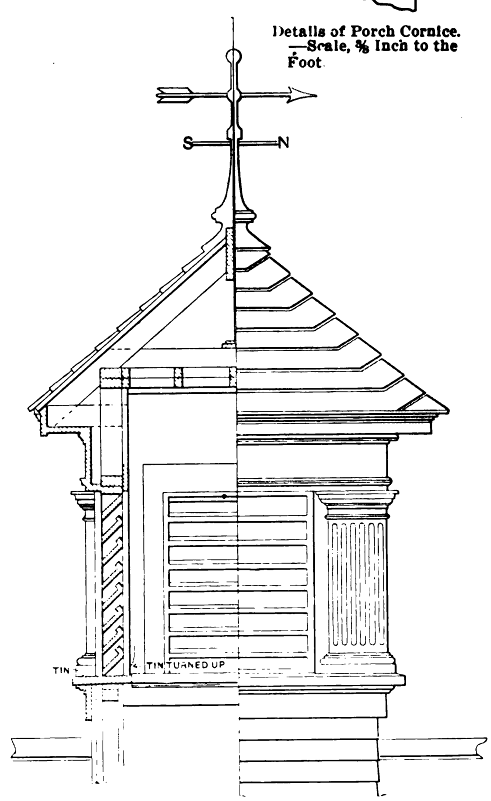
Section of Building, Showing Hights of Stories.—Scale, ⅛ Inch to the Foot.



Details of Porch Cornice.—Scale, ⅜ Inch to the Foot.



Partial Elevation of Main Entrance.—Scale, ¼ Inch to the Foot.



Half Section and Elevation of Ventilator.—Scale, ⅜ Inch to the Foot.

Miscellaneous Constructive Details of Carriage House and Stable.

Making Built Up Columns.

The subject of built up columns is, and always has been, one for good, sober thought; that is, how to make built up or staved porch columns cheap, and at the same time make them well. There are many different methods of manufacturing them; but they all look alike in the completed article, and when the painter gets through with them one would not know whether they were the ordinary bevel, tongue and groove or the so called lock joint. There are many ways of making tongue and groove stave columns, just as there are many joints in tongue and groove flooring. It amounts to about the same thing in both cases. There are also many kinds of lock joints, or, rather, so called lock joints.

I shall try to explain the simplest lock joint, which is at the same time a very effective one, says a contributor to a recent issue of the *Woodworker*. Fig. 1 is a section of the column. Many manufacturers pride themselves on how many columns they can build up in a day. The writer has seen two bench men spend about seven hours getting the stock ready and joining it, then gluing the staves, and the column had to be patched after it was turned. In another instance I heard a manufacturer boast about putting three columns together in one day of eight hours, and they were not lock joint, either. These so-called lock joint stave porch columns can be made almost as quickly as the men can handle the stock and handle it very little. The jointing is done on an ordinary rip saw

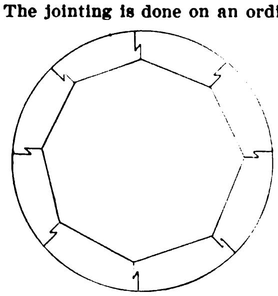


Fig. 1.—Cross Section of Column.

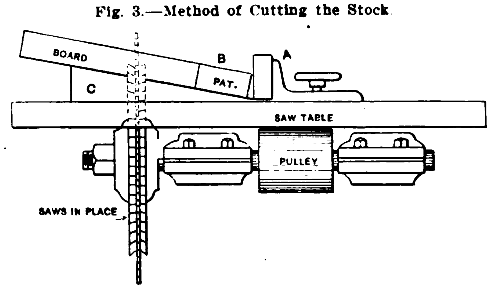


Fig. 2.—Apparatus for Making Columns

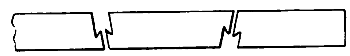


Fig. 3.—Method of Cutting the Stock

Making Built Up Columns.

machine. The ripping is done and the lock joint made at the same operation. Fig. 2 explains this better than can be done in words. This skeleton shows an ordinary rip saw set between two bevel shaped groove saws. A shows the saw gage just as on any ordinary saw table. B shows the pattern, which is perfectly straight in its cut and can be either tapered or straight, according to the style of column wanted; the beveled staves are the easiest put together. C is a false top put on the saw table to correspond with the bevel of the cut or radial lines, which differ in the number of pieces the column is made of. The pattern B and gage A are best when they are about the same length as the stave to be cut. Made thus, the work will be straight and true, which could hardly be the case if these two parts were short.

All that is necessary, now, is to cut the stock to the right lengths and go ahead, ripping it just the same as you would any other piece with a pattern. Turn it around and rip the other piece, as is shown in Fig. 3. This, I believe, is quite plain. Now all that is necessary is to get the desired number of pieces, 8, 10 or 12 to a column. The writer believes that unless the stock is thick twelve staves are best, for then they keep the circle better, and thus their thickness.

A few words about gluing up staved columns. In looking through different trade papers and catalogues, and watching men work, one sees all kinds of schemes for handling these staves preparatory to putting on chain clamps or ropes, which are drawn up tightly with a stick, by twisting. Most all these schemes are illogical and out of place, for it is quite a job to handle so many pieces and not have them fall together just at the moment when the last piece is being put in place—how nice!

Now, why handle this stock this way? Why not take a few lessons from the cooper: spread the glue on the staves, then stand them on end and drive a hoop or two down on them, the same as the cooper would do to a barrel? These hoops press the column so that it will be round, the pressure coming just in the places to make a tight joint. After this has been done, chain clamps or ropes may be used to advantage.

By this simple and easy method the writer has seen a man and one boy glue a column of twelve staves in the short space of ten minutes, and make a good job of it, too.

Staved columns are in the market to stay. Good solid timber is hard to get these days, and is too expensive. It costs more and takes longer to turn solid columns, and the liability to checking and cracking is against them. These columns will always be in demand, hence machine wood workers will do well to study up on the subject.

Glazing Measurements.

In measuring for glazing it is customary to call any part of an inch a full inch, and to measure the glass in each opening in a single dimension, says a writer in an English exchange. Take the size of external openings minus 2 inches of the width and 6 inches of the hight. Sheet, plate and other kinds of glass are taken by the foot superficial. For sheet glass state weight per root super., and the quality and squares not exceeding 2 feet superficial are taken in "small squares," and above this in size in variations of 2 feet as "not exceeding 4 feet superficial," "6 feet superficial," &c. The various sizes are thus kept separate. Glass cut to shape should be kept separate, taking extreme sizes; if circular cut, describe "circular cut one edge," &c. Very small squares are numbered. For fluted sheet glass state weight and number of flutes per inch. All glass over ⅛-inch thickness should be stated. Polished plate glass is measured in the same way, and billed in variations of 1 foot in a square up to 10 feet; beyond this at 2 feet. Any special thickness should be stated. For lead lights, it is best to state a prime cost price, the contractor to supply all dimensions, templates, &c.

Sheet glass is the ordinary kind of glass used, and is made in 15, 21, 26, 32, 36 and 42 ounce thicknesses, and in three qualities: "best," "seconds" and "thirds." There are limits of size in each of these substances; thus, for 21-ounce glass the extreme length made is 85 inches and width 49 inches, or 22 feet extreme area, and the same size is made for glass up to 32 ounces; 36-ounce glass and 42-ounce are made in larger sheets. Sheet glass is charged according to the superficial contents up to a certain limit; beyond, the charge is according to length and width of sheet. The cheapest way is to let out the glazing to a glass merchant at so much per foot complete. Irregular shaped sheet glass should be kept separate, as "cut to shape." The quality of glass usually supplied by all good firms of glass merchants is what is known as "good ordinary glazing quality." Most contractors let the glass to a merchant at an agreed price per foot complete, which would include taking the sashes from workshop and returning them glazed.

CABINET WORK FOR THE CARPENTER—HALL STANDS.

BY PAUL D. OTTER.

THE hall tree or stand becomes a necessity not only within the spacious entrance of the house, but variations for limited space may be constructed, which will give greater dignity than the cleat provided with hat hooks so often seen in contracted hallways. Considerable ingenuity may be expressed in designing along the lines of the "much-in-little" idea, and from a saleable standpoint compactness, with a varied range of usefulness, should be borne in mind.

The mirror is a desirable addition—the ladies not only finding it indispensable in getting a last look, but indifferent man, from an unconscious look, may realize he is ready to depart for business, and that he would look better to exchange his skull cap for a street hat.

When considering the hall tree of some pretension, a closed-in box under the formal seat usually made, will be found the best place for overshoes. At the sides a curved device of wood or metal should be secured, in ends of the middle slat may be secured large metal rings for the umbrellas and sticks, or there may be a large ring at the side of the seat, as shown in the drawing. Reinforce the horizontal panel or back rest by battens glued and screwed on each side of the banisters or uprights thus insuring the slat from splintering. Modifications of this may be made by having the legs of square stock built on the same plan with panels between, and a bottom, making it into a box for overshoes. This is a piece of furniture which looks particularly appropriate when finished in weathered oak.

In Fig 2 is shown a piece of furniture by which great convenience is secured all around and inside, within limited space. The construction of this, as well as that shown in Figs. 3 and 4, is straightforward and readily enlarged to working detail.

In making a drawing of Fig. 4, first construct the plan at the seat line, within a diagonally cut square, the sides of which are 30 inches. Draw the plan of cabinet

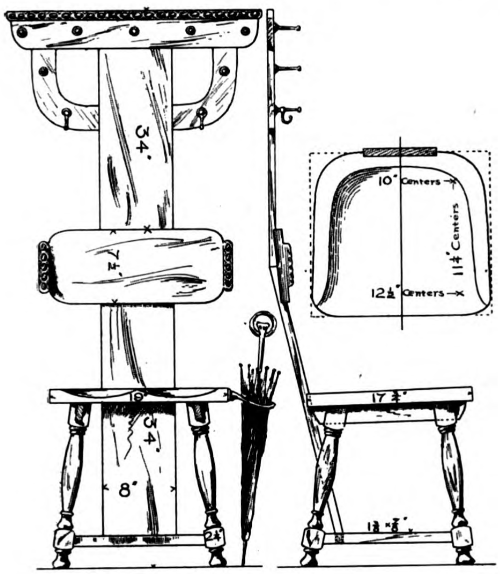


Fig. 1.—Front, Side and Plan Views of a Convenient Hall Tree.

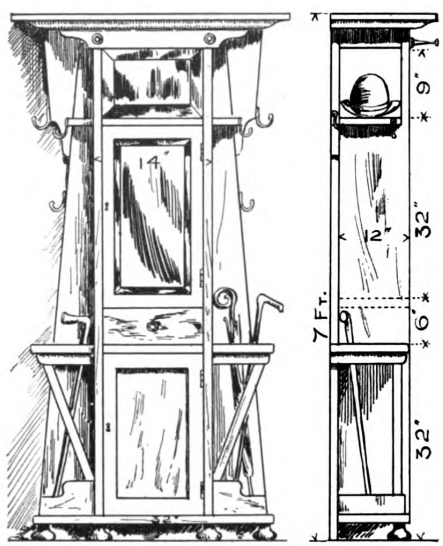


Fig. 2.—Front and Side Elevations of a Hall Stand.

Some Designs for Hall Stands.

which umbrellas and walking sticks may be placed, their ends resting in a hollowed metal disk formed and fastened to the construction. As the hall stand is really a mute servant, ever ready to relieve one of street encumbrances, it therefore should be treated with consideration and made to assume a "good front" as the guest enters the hallway. By the exercise of a little thought directed to this part of the house before the final finishing, the carpenter or contractor may develop many ideas which will accentuate the expression "the first impression is everything." A little extra use of finishing material enables him to make the hall tree a part of the house free from the objection of portable furniture in contracted quarters.

The built-in china closet, sideboard and refrigerator are examples of space saving which appeal strongly to the purchaser or the prospective tenant. This is just in passing over the subject, as many will be interested in some befitting scheme for the wraps and hats of many hallways, unprovided with more than a stand or old hooks. In the accompanying illustrations is shown in Fig. 1 a serviceable hall piece for small space, or for the second flat hall landing, should one live in the benighted country of flats. The mediæval style of the chair makes a desirable base to extend the banister and terminate it with a cross bar for hat and coat pins. Back and at the above the seat, within a similar triangle, the sides of which are 23 inches. In detailing the seat, have the depth 14 inches from the rear edge, of which a plain board, tapering in its length of 54 inches, 7 inches less where it joins the underside of cabinet, thus giving an incline to the back. The front of the cabinet is 11 inches high, and the total hight of the stand is 7 feet. Sufficient measurement and suggestion are given so that the length of the underdrawer is optional. The seat may be made to lift up, being hinged at the back and doing away with a drawer and pulls.

Concrete in Building Construction.

For some time past concrete as a building material has been receiving a great deal of attention in the columns of the trade papers, but the subject appears by no means to have been exhausted. It is interesting to note the following views regarding concrete as a building material, which appeared in a recent issue of the *Mississippi Valley Lumberman*, a journal devoted, as its title indicates, to the interests of the lumber trade:

While lumber is still, and will be for many years to come, the chief building material for the construction of buildings outside the fire limits in the cities, there is always a search for something that will do as well, and which can be procured at less expense if possible. It is not true that the cost of lumber has advanced any more than the values of other things in the past few years, but there is a popular prejudice to that effect, and the results are something the same as though it were true. The retail prices have not advanced as much as the wholesale prices, principally because they did not fall as much during the hard times, and hence the retailers are not making as large a margin on what they sell as they were ten years ago. For this reason they are becoming interested in other building materials, on which there is a better profit, and, in turn, they are endeavoring to interest their customers.

One of the best substitutes for lumber, as well as one of the cheapest to put on the market, is concrete. It has added value of being fire proof. The principal ingredient of concrete blocks is sand, and sand can be secured almost anywhere. The fire proof feature is doing more for this form of construction than any other argument. Recent great conflagrations have emphasized the necessity for the use of some material that will resist fire, especially in city building, and concrete blocks appear to fill the bill the best of anything now on the market. Its use for residence building, outside of foundations, has not become very general as yet, but things are moving in that direction, and before many years houses built of concrete blocks will be comparatively common.

Terra cotta was the first step away from the use of wood for many parts of the construction of buildings, but it appears that the terra cotta manufacturers are themselves beginning to substitute concrete, by substituting thinner tile in floor arches so as to leave more room for a heavier deposit of Portland cement, which is the cohesive ingredient of concrete blocks. In many of the large buildings now being erected, concrete covering for the steel columns is being used instead of brick, which superseded the use of terra cotta, and is proving a better protection against corrosion. The next step will be the use of concrete for floor construction. This is already done to some extent, but not as commonly as it will be in the near future. From use as a principal part of large buildings, where fire proofing is demanded, it will spread to the residence sections of the cities, and to the country towns. That builders in the town are becoming interested is evidenced by the increased sale of outfits for the manufacture of concrete blocks. The allurements held out by the manufacturers of these outfits, in the shape of the possibilities for profit, are bearing fruit, and it will not be long before every town will boast of at least one plant for the manufacture of this building material. The retail lumberman is the natural dealer in this, and should look well to the possibilities for trade in concrete building blocks, and at the same time see that he has the best that can be secured. An outfit that will enable him to make these blocks in attractive form is not expensive, when the percentage of profit is taken into the reckoning, and as an adjunct to a lumber yard it will prove a wise expenditure of money.

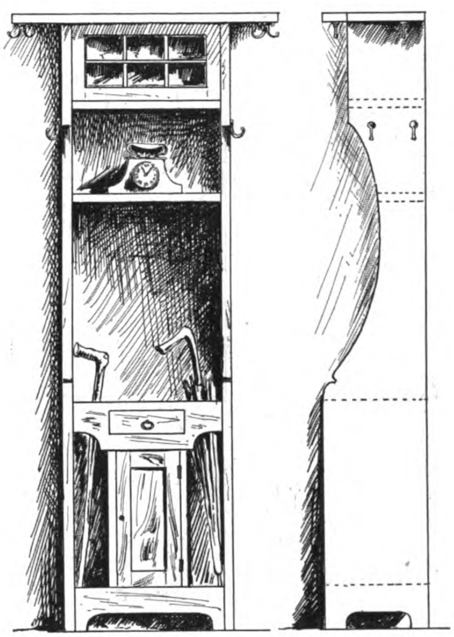


Fig. 3.—Front and Side Views of Another Hall Stand.

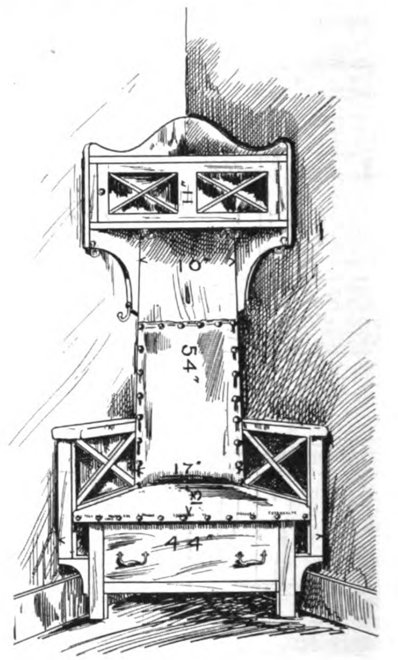


Fig. 4.—A Corner Stand and Seat.

Some Designs for Hall Stands.

Vertical Grain Flooring.

In a recent issue of one of the daily papers appeared the following relative to the above material: "Vertical grain yellow pine flooring is sawed from logs that have been quartered, as quartered oak is sawed. Flooring sawed in the ordinary way, with its grain lying flat, is more or less liable to splinter; vertical grain flooring, sawed from quartered timber, has its grain on edge, the rings that mark the timber's growth showing in parallel lines, for which reason vertical grain flooring has sometimes been called comb grain flooring.

"Vertical grain flooring does not splinter, but will wear smooth down to the beams on which it is laid, and it makes a very durable and handsome flooring besides.

"Vertical grain yellow pine flooring is laid in places where the floors are subjected to great wear and where freedom from splinters is especially desirable. It has been used for schoolroom flooring and it is used in stores and office buildings and in fine kitchens. It costs more, of course, than ordinary flooring. With the regular flooring at $27 to $30 a thousand vertical grain flooring would cost $52.50 to $54.50 a thousand.

"Maple flooring, costing $40 to $45 a thousand, is now also used to fill the same requirements for a good floor, but there are people who still prefer the vertical grain yellow pine."

ASBESTOS, said to be of long fiber and good quality, has been discovered at Woodstock, Vt.

COMPETITION IN TWO-FAMILY HOUSES.

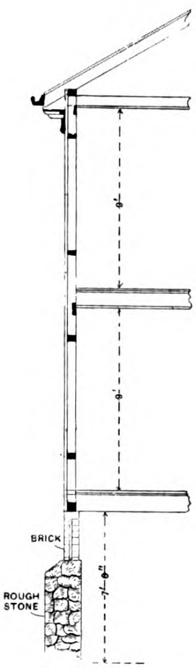
THIRD-PRIZE DESIGN.

We take pleasure in presenting to the attention of our readers the drawings awarded third prize in the competition in two-family houses, and submitted under a *nom de plume* consisting of the word "Detached" in a double circle, by William H. Harvey of 311 Main street, Worcester, Mass. The general scheme of arrangement of rooms here shown is in a way typical of a number of the designs contributed in this contest. It will be recalled that in our April issue we announced that the contest for the third prize was exceedingly close and interesting, there being a number of plans closely approximating each other in merit, and it was only by a few points of superiority that the committee finally awarded the prize as stated. An inspection of the plans shows three principal rooms directly accessible from the front hall, while the position of the bathroom is such as to be readily reached from either of the main sleeping rooms without the necessity of passing through any other room.

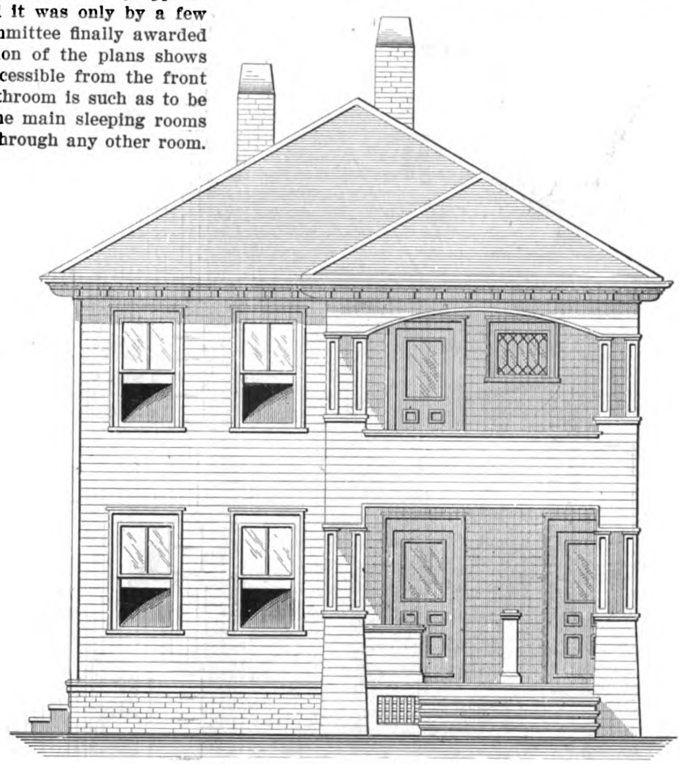
Iron Work.—Provide iron posts or 3-inch tubing for pia supports (in ground), resting on flat stones. Provide coal sifter and pipe from second floor to ash pit. Cover exposed wood work in ash pit with tin. Cover rear piazza roof with good roofing tin, well laid.

Concrete.—Cover the floors of the heater rooms in cellar with a good coating of tar concrete in proper manner.

Lathing and Plastering.—Lath with good spruce lath and cover same with one good coat of best sand, lime and hair mortar of proper proportions, and well applied. Finish with a good coat of lime putty skin. All plastering to extend to floor. This applies to all walls and ceilings of each story.



Section.



Front Elevation.—Scale, 1/8 Inch to the Foot.

Competition in Two-Family Houses.—Third-Prize Design.—William H. Harvey, Architect, Worcester, Mass.

Accompanying the drawings are the following specifications and estimate of cost:

Specifications.

All of the several works about the building, including the labor and materials, are to be of the best merchantable descriptions.

Excavate under the entire building as indicated by plans, and use material therefrom for grading about building.

Foundations.—To be built according to plans with good quarried building stone, laid dry, well bonded, and pointed on inside with lime mortar finished with coat of lime, whitewash over all stone and brick work in cellar. Place bed stones of ample size for chimneys, posts and piers.

Brick Work.—The underpinning brick work, chimneys, partitions and ash pit to be built with good merchantable hard burned common brick, laid in best of lime mortar. Underpinning to be a 10-inch wall with 2-inch dead air space. Walls in cellar laid up 8 inches thick. Chimney flues to be plastered from bottom to top and outside from cellar to roof boards. Provide thimbles for cellar, and all rooms where chimneys pass through, and ash door in bottom of flues. Provide for and make with pressed brick places for gas log in each dining room, and run vent pipe to chimney flue. Top out chimneys above roof, as shown, and plaster slant of top with Portland cement mortar.

Carpenter Work.

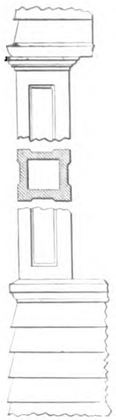
The frame and partitions to be of good merchantable spruce of sizes indicated on plans and sections. Put 8 x 9 inch girder under main partition in first floor, double floor joist running with partitions. All partitions to have caps, all floors to be bridged. All ceilings furred for lath. Provide all needful grounds and beads.

Boarding.—The entire outside of building, including all roofs, to be covered with No. 2 matched spruce well laid and nailed. Lay under floors with square edged hemlock boards, well nailed to each bearing. (Attic unfinished.)

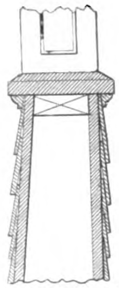
Upper Floors.—Where not otherwise provided for, to be of good quality of spruce flooring well laid and nailed. Lay rift grain matched North Carolina pine floors in kitchens, bathrooms, pantries, passes and rear halls, all well laid and blind nailed.

Clapboarding.—The exterior walls to be covered with first quality 5-inch spruce clapboards, laid 3½ inches to weather (mitered at corners around front piazza), and all well laid and nailed, over one thickness of good building paper.

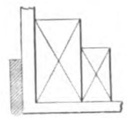
Slate.—The roofs to be covered with tar paper, overlaid with the best black slate, laid not over 6 inches to weather, well laid, nailed and flashed with tin in valleys, and with lead around chimneys.



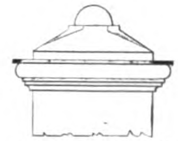
Detail Front Piazza Columns.—Scale, ½ Inch to the Foot.



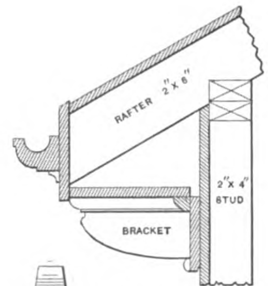
Section through Front Piazza Base.—Scale, ½ Inch to the Foot.



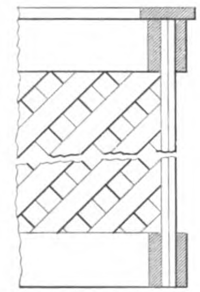
Section through Corner Boards.—Scale, 1 Inch to the Foot.



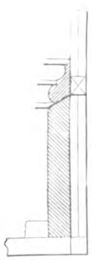
Detail of Top of Newel Post.—Scale, 1½ Inches to the Foot.



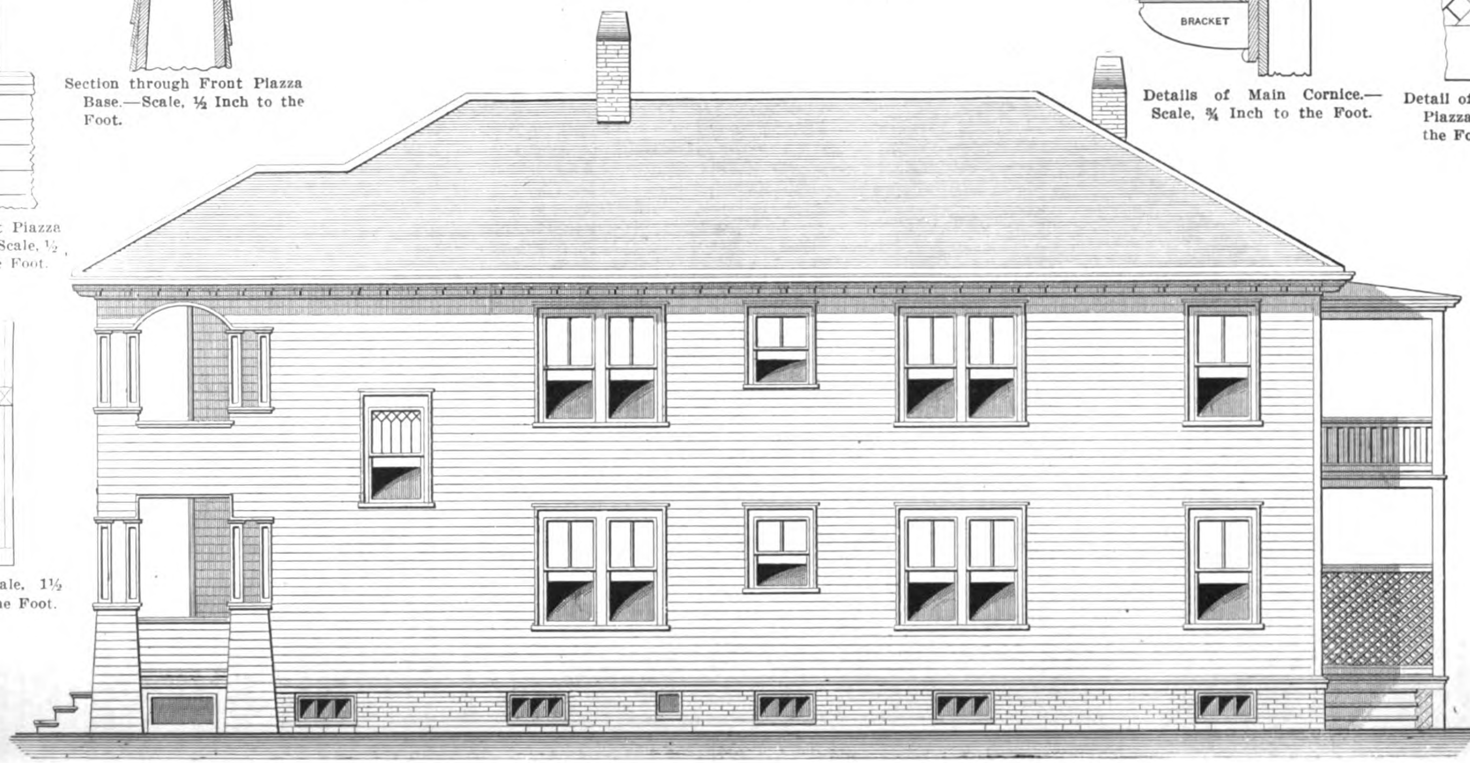
Details of Main Cornice.—Scale, ¾ Inch to the Foot.



Detail of Lattice Screen, Rear Piazza.—Scale, 1 Inch to the Foot.



Base. — Scale, 1½ Inches to the Foot.



Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

Competition in Two-Family Houses.—Third-Prize Design.—Elevation and Details.

Outside Finish.

To be wrought according to details, from good native pine, well seasoned and of good clear quality. All moldings to be of stock patterns. Construct piazzas and balcony as shown, ceilings matched and beaded North Carolina pine. Floors to be 1⅛-inch clear spruce.

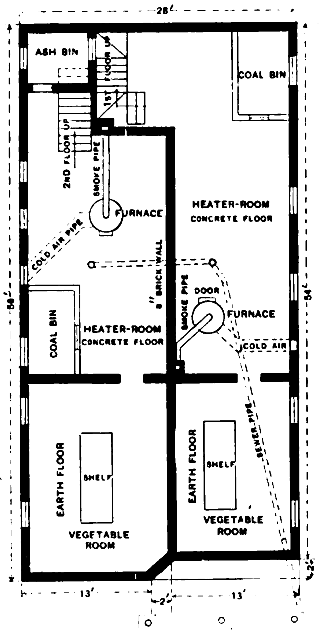
Window Frames.—To be of such styles as shown on elevations, and constructed in the usual manner. All stock pattern. Above cellar fitted with 1⅜-inch molded sash, glazed with first quality double thick glass in large lights, single thick in small lights, and fitted with one half rolling double shutter blinds where shown. All sliding sash weighted. Cellar frames of 2-inch plank with 1¼-inch sashes glazed with common glass.

Interior Finish.

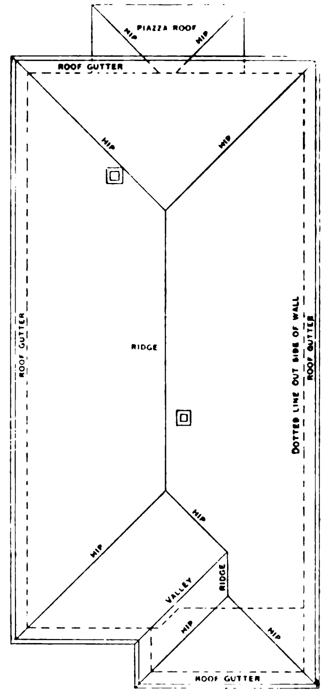
To be made from first quality of North Carolina pine throughout, and put up after the plaster is dry. All to be as per details or of stock patterns where detail is omitted.

Doors, 1½ inch, as per detail, same kind of wood as finish. Fit up pantries as shown, and with shelving inclosed with doors. Provide drawers.

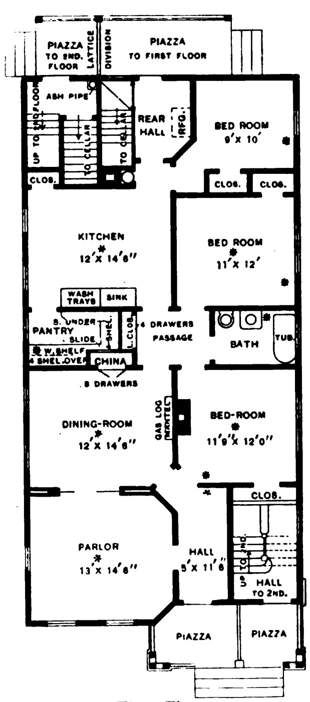
China closet to be fitted with usual shelves, drawers,



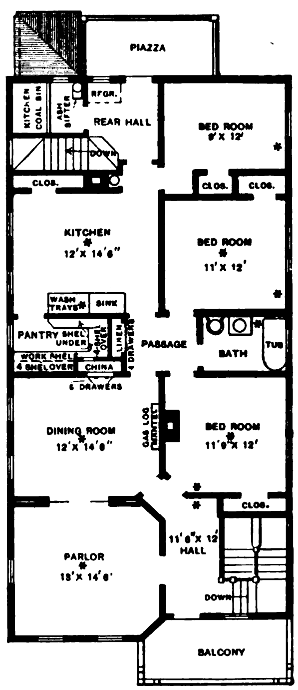
Foundation.



Roof Outline.



First Floor.



Second Floor.

Competition in Two-Family Houses.—Third-Prize Design.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

glass panel doors, as per detail. Place slide connecting with pantry. Build linen closet with shelves inclosed with doors, case of drawers under Fit up sink and wash trays as shown, trays to have cover.

Do all carpenter work in connection with plumbing and all cutting and fitting for other craftsmen.

All closets to have shelves and cleats with hooks.

Wainscot walls of rear halls and stairs, kitchens and bathrooms with sheathing, and cap with molding, as per details.

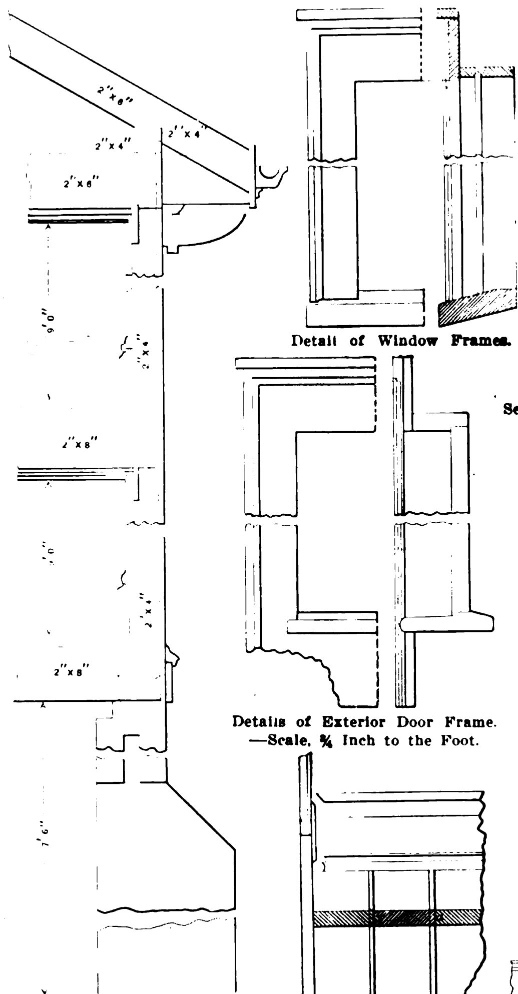
Build front stairs as per details, landing posts 4 x 4 inches turned.

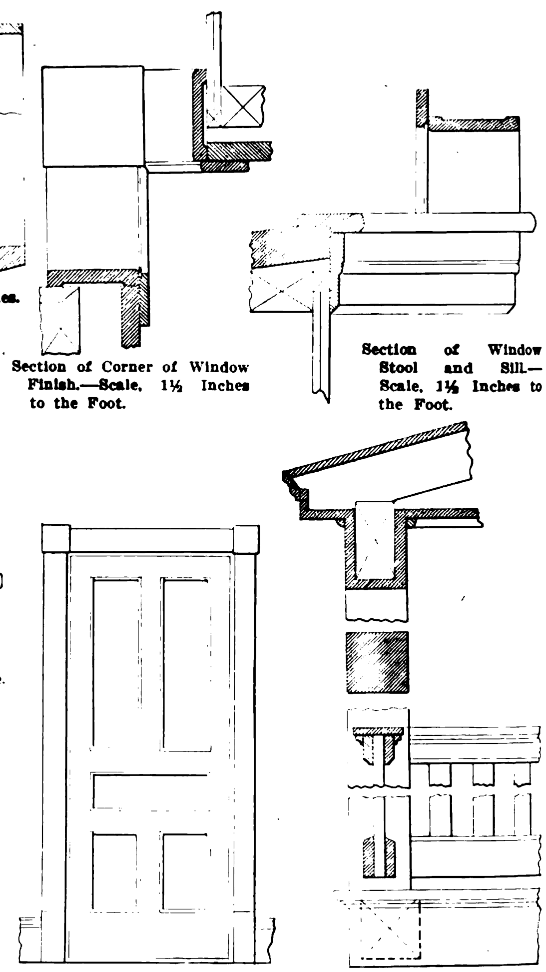
Back stairs box flight, birch treads.

rected. Putty stop all nail holes, &c., in proper manner. The interior to be finished to show grain of wood. To have first a coat of stain finishing with one coat of shellac and one coat of "Deadlac." Putty all nail holes. Clean all wood, and make a neat job throughout. The North Carolina pine floors to have a coat of grain sealer and two coats of floor wax, well rubbed in. Thresholds finished same as floors.

Plumbing.

To consist of the following fixtures, all completely installed in each tenement ready for use, with all street connections made. One steel clad copper bathtub, one earthen ware wash basin, one siphon water closet, one two-part soapstone wash tray, one kitchen sink, one hot water boiler, one refrigerator waste. All trapped into main waste to sewer, and supplied with hot and cold





Detail of Window Frames.

Details of Exterior Door Frame. —Scale, ¾ Inch to the Foot.

Section of Main Walls and Cornice.—Scale, ½ Inch to the Foot.

Detail of Wainscoting.—Scale. 1½ Inches to the Foot.

Section of Corner of Window Finish.—Scale, 1½ Inches to the Foot.

Section of Window Stool and Sill.—Scale, 1½ Inches to the Foot.

Elevation of Inside Doors.—Scale, ⅜ Inch to the Foot.

Details of Rear Piazza.—Scale, ¾ Inch to the Foot.

Competition in Two-Family Houses.—Third-Prize Design.—Miscellaneous Constructive Details.

Cellar stairs to be made of good spruce. All stairs on three 2-inch plank stringers.

Outside steps made of pine, 2-inch treads, ⅞-inch risers, sheathed ends.

Base in all rooms ¾ x 8 inches, with 2-inch base mold. Closet base plain, 6 inches, with bevel on top edge. Partitions in cellar of wood, made with matched pine common on 2 x 4 inch studs, doors of same cleated.

Hanging shelves made of pine common, placed as shown.

Coal bins made of matched spruce. Put in removable slides.

Mantels.—Allow for mantels, all set in place, $40.

Hardware.—Contractor to provide all required nails, spikes, screws, sash cords, window weights, pulleys, as may be needed. Contractor to allow for hardware, not mentioned above, for the general trim, $80.

Painting.

Paint all outside wood work with two coats of Billings & King's ready mixed paint in two colors, as di-

water via galvanized iron pipe where not exposed to view. The hot water pipes and all other exposed water supply pipes to be of brass. The trimmings to the several fixtures to be the best nickel plated work.

The hot water boilers supplied through a copper lined wood tank placed in attic, and tank from street main.

Water meter to be provided and connected with main supply and water run to fixtures. Provide and place two sill cocks where directed. Place refrigerator waste and extend outside of building.

Each tenement plumbed separately.

It is to be understood that all the work is to be done agreeable to the local plumbing ordinances.

Gas Piping.

Pipe each tenement separately for gas in the best manner, with outlets where shown on plans and according to rules and regulations of local gas company.

Heating.

Each tenement to be heated with a hot air furnace of ample dimensions capable of properly heating each tenement throughout in the coldest winter weather, fitted in a first-class manner with all required fresh air and heat conveying pipes necessary. The pipes to be run to all rooms and front halls, omitting kitchen, rear halls, pantries each floor.

Each tenement piped separately. Provide and set registers in the several rooms in a neat manner.

Detailed Estimate of Cost.

The estimate of cost as furnished by the author is as follows:

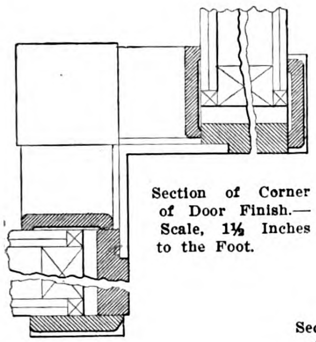
STONE MASON WORK.

Excavating	$53.60
Foundation walls	82.60
Grading	40.00
Amount	$176.20
Brick underpinning walls and chimneys	$180.00
Gas logs	40.00

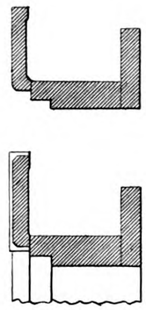
Front piazza	60.00
Outside steps	15.00
Cellar frames	11.00
Cellar sash	8.00
Window frames	50.00
Window sash and glass	80.00
Window weights and cords	19.00
Blinds	33.00
Outdor frames	15.00
Outside doors	22.00
Amount	$1,179.00

INTERIOR WORK.

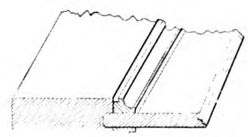
Top floors	$95.00
Door finish	88.00
Window finish	35.00
Interior doors	116.00
Base and mold	28.00
Wainscot and cap	62.00
Pantry and china closet	50.00
Linen and clothes closets	25.00
Front stairs	34.00
Rear stairs	20.00
Cellar stairs	14.00
Mantels	40.00
Cutting for mechanics	25.00
Nails and carting	35.00
Amount	$667.00



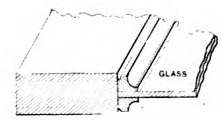
Section of Corner of Door Finish.—Scale, 1½ Inches to the Foot.



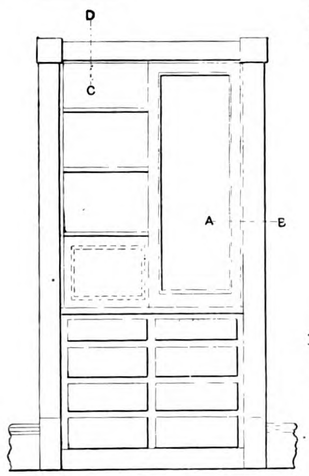
Sections of China Closet through A B and C D.—Scale, 1½ Inches to the Foot.



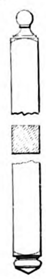
Section of Front Door at C D.



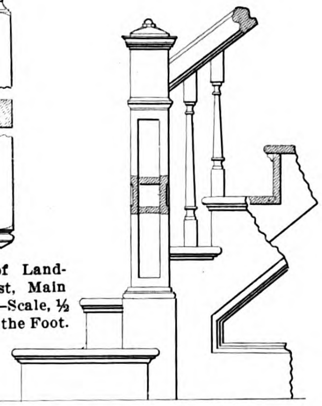
Section at A B.



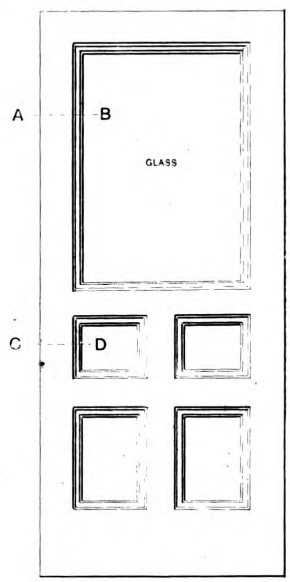
Elevation of China Closet.—Scale, ⅜ Inch to the Foot.



Detail of Landing Post, Main Stairs.—Scale, ½ Inch to the Foot.



Detail of Front Stairs.—Scale, ½ Inch to the Foot.



Elevation of Outside Front Door.—Scale, ½ Inch to the Foot.

Competition in Two-Family Houses.—Third-Prize Design.— Miscellaneous Constructive Details.

Painting and whitewashing	25.00
Concreting cellar	60.00
Chimney thimble and doors	8.00
Amount	$313.00

PLASTER WORK.

Lathing	$135.00
Plastering	257.00
Amount	$392.00

CARPENTER WORK.

Frame, spruce timber	$240.00
⅞-inch matched spruce boards	114.00
⅞-inch hemlock boards	56.00
Grounds and beads	10.00
Furring and bridging	15.00
Iron posts	6.00
Slating roof	133.00
Tinning and flashing	18.00
Gutters and conductors	55.00
Ash chute and sifter	9.00
Metal ceiling	6.00
Cellar partitions and shelves	15.00
Coal bins	10.00
Sheathing paper	18.00
Rear piazza	50.00
Clapboards	70.00
Outside finish	51.00

MISCELLANEOUS.

Electric work	$15.00
Hardware allowance	80.00
Painting	230.00
Plumbing	475.00
Sewer pipe	25.00
Water and meter	20.00
Gas piping	20.00
Gas supply main	20.00
Heating apparatus	245.00
Amount	$1,130.00
Carpenter labor	$750.00

RECAPITULATION.

Stone work	$176.20
Brick work	313.00
Plastering	392.00
Carpenter work	1,179.00
Interior work	667.00
Miscellaneous	1,130.00
Carpenter labor	750.00
Total amount	$4,607.20

The builders' certificate was signed by Joseph Titreault, 43 Plantation street, Worcester, Mass.

Methods of Finishing Floors.

At the thirteenth annual convention of the Ohio State Association of Master House Painters and Decorators, held in Cincinnati about the middle of July of the current year, one of the interesting papers presented for discussion was that of W. D. O'Connor, on various methods of finishing floors, which in part is as follows:

In taking up this subject I would say that I have discovered two things which I think are the most essential outside of the material. The first is to see that the floor is absolutely solid—that is, that there is no give to it when trod upon, for in a new floor it will crack the finish and in an old one it will break and work out of the cracks whatever had been used to fill them. Second, it must be seen that the floor is perfectly smooth, clean and dry.

Now we are ready to apply the finish that has been decided upon, of which there are several, each of which has its good points, and of which I might mention shellac, varnish and wax finish, each of which, if properly done, will give good results. But for myself I prefer the wax finish, for with the proper care I think it can be kept in better condition and will give more service than the others, and if the floor itself stay intact will get better as the years go by by simply cleaning and rewaxing.

The great trouble with any finish for floors is that the people expect too much of them. If they would only stop and think that the finished floors were not so much to be walked upon, but to look nice where the rug or carpet did not cover them, we would not have near so much trouble with them that we do.

Now, as to the best methods to produce these finishes as applied on different woods of which floors are made. If hard woods and close grained, such as maple and hard pine, my way is as follows: If maple—after getting the floor in shape, as before stated, I apply a thin coat of good floor varnish; allow plenty of time to dry; sandpaper and apply a full round coat and a third coat in the same manner. When, if it is to be rubbed, I use crude oil and pumice after it has become thoroughly hard. If the floor is pine I follow the same plan, except I give a coat of shellac first, as I find it better on account of the pitch the wood contains. If it is to be a shellac finish I simply apply the number of coats called for and finish as suggested. If wax, upon maple, I wax upon the bare wood, and if pine, shellac first and wax afterward, using the wax thin and polishing well. If oak or any open grained woods are to be finished, I first fill with a good paste filler and follow with whatever finish I intend to use—wax, shellac or varnish.

One of the best jobs I ever did was six years ago, and it is still in good condition to-day. It was filled twice, one day apart, then a very thin coat of grain alcohol shellac, followed by two heavy coats of the Patterson-Sargent Company's Nisoron floor varnish, and was rubbed with crude oil and pumice to a smooth surface. It has been cleaned up with a little crude oil a few times since, but nothing else has been done to it.

Now, as to painted or grained floors, the same preparatory conditions will apply. I then proceed as follows: I apply a priming coat of lead and linseed oil and turpentine, mixed about half and half, with a little japan dryer. After seeing that all cracks, &c., are closed up I give another coat of lead with about 20 per cent. of zinc and the tinting color, mixed flat. I also add a trifle of varnish as a binder. This to be followed by a third coat of the same mixture, which can either be left as it is or varnished and finished as you wish and will give good results; it can also be stippled or grained in distemper on this ground before varnishing.

These I have been talking about have been, of course, new floors, which, in my estimation, are not near as hard a problem as old ones. In these days of rush and hurry we don't have time to wait for lumber to be dried and seasoned, as in the olden time, but it is cut, put into a kiln and dried much the same as you would squeeze the water out of a sponge. Consequently it comes and goes with each change of the weather until it finally gets seasoned, and, coming back to the subject, this is where I think those unsightly joints and cracks come from that are the nightmare of so many of us.

To refinish an old floor, the first requisite is to get rid of the old finish, or what is left of it, and right here is where your trouble will begin. There are two ways of doing this, and they are to use the plane and scraper or a remover of some kind, of which there are quite a number in the market, each one better than the other—at least that is what the manufacturers tell us—and I here want to sound a warning to those who use a remover to get rid of the finish—the next thing to do is to get rid of the remover, and if it is not done thoroughly you will have trouble without end on that particular floor. After we have got rid of the finish I look it over the same as a new one and proceed in the same manner, except as to the manner of filling or closing the cracks. The material to do this with is still a mooted question with me, having tried whiting putty, lead putty, plaster of paris and glue, paste filler, ground paint skins made into a putty and the patent crack fillers that are on the market with variable success, the trouble being, as before mentioned, the shrinking and swelling of the boards, either letting the putty fall out in winter when the furnaces are in full blast or squeezed out in summer when the lumber reabsorbs the moisture present in the atmosphere.

In conclusion, I would say that I think all floors in any house ought to be finished in some way as a cleanly and sanitary act, and when doing them nothing but the very best material should be used, as the day of carpets is passing away and floors will be brought to our attention more than ever, and the idea that any old thing will do for a floor is passing with it. As a last word, I might say that the best methods of finishing floors are good material, better work, best results.

Artificial Stones for Building Purposes.

It is stated that German cement manufactures are now turning their attention to the manufacture of artificial stones for building purposes, and that concrete and beton are rapidly replacing stone and brick in all kinds of work, particularly for foundations, bridges, columns, &c. The façade of a Government building just completed in Stettin is of artificial stone, and private dwellings and flat buildings are being embellished with figures and designs of artificial stone. Many experiments are now being made with beton, and it is predicted that it will be the building material of the future, the claim being made that it is the least susceptible to fire of all materials now used for building purposes, is cheap, and is very durable.

Inlaid Oak.

An artistic display in the German section of the Varied Industries Building is the inlaid oak room decorated by Carl Spindler. This room is on the south side of the open court. It is an oblong shaped apartment, and is decorated throughout with inlaid oak. Landscapes, buildings and animals are all represented in wood, and the wood is natural and unpainted. It took hundreds of varieties to obtain these effects, most of the woods coming from German South Africa. The room is wainscoted all around to a hight of about 7 feet. The wainscot is carved oak for 5 feet and then comes a series of oblong panels in inlaid effects, showing landscapes, waterscapes, churches and cottages. All the colors are faithfully depicted, and when one remembers that each shade required a different variety of wood the effects obtained are wonderful.

The room is furnished in light oak with chairs, tables and a desk, all inlaid with pictures like the wainscoting. On the desk stand several large plaques representing female figures and heads, with every color and every effect of light and shade shown in inlaid wood. This inlaying differs from the kind usually met with in that the woods are in their natural condition and color when laid in. The whole panel, as in mosaics, is varnished when it is complete.

CONSTRUCTING AN ELLIPTICAL STAIRWAY.*

By Morris Williams.

To develop the face mold of Block 4, as referred to in the last issue, proceed by drawing a level line from P, of Fig. 16, the center of the plan rail, to W. In this figure it is made parallel with the level tangent H I. The same line is shown in Fig. 15 to have been drawn from Z to D and to be a diagonal line of the plan. In Fig. 14 again it is shown at N D, and as being parallel with the bottom level tangents B A. The reason for this diversified direction is found in the fact that it is a level line, and as such its direction in the plan is governed by the inclination of the tangents in the elevation. In Fig. 16 it is drawn parallel with the level tangent H' I'. Therefore it will be a level line, but in Fig. 15 we have no level tangents to direct us, consequently in such cases a level line must be found, as at C C' in Fig. 15, and the line we have under consideration will have to be drawn parallel with the same. These remarks are presented with a view to emphasizing the importance of the lines that are drawn from the centers of the plan rails in all the diagrams. In all cases they represent level lines, and, as previously stated, owing to their being level lines drawn from the center of the plan rail, they stand for the plan of the minor axis.

We will now transfer this line to the face mold. Revolve point W, as shown by the arc W N M, to N, and on N erect N R. From N draw the dotted line N P'' square to the raking tangent G' H'. From R draw a line to P'' equal in length to the line P W of the plan. The line R P'' will be the minor axis of the face mold and its plan will be the line P W. In the transferring process of the line P W from the plan to the face mold, it is evident that owing to its being a level line and also the plan of the minor axis the latter will also be a level line. After finding in this manner a level line in the face mold and that line being also the minor axis the remaining process of completing the face mold will offer no difficulties.

Draw a line from H' parallel with the minor axis, as at H' I'', making it equal in length to the level tangent H' I'. In this manner we have transferred the level tangent H' I' from the elevation to the face mold, and at the same time have determined the angle between the tangents of the face mold as shown at G' H' I'. Now make the joint at G' square with the tangents G' H' and the joint at I'' square with the tangent I'' H'.

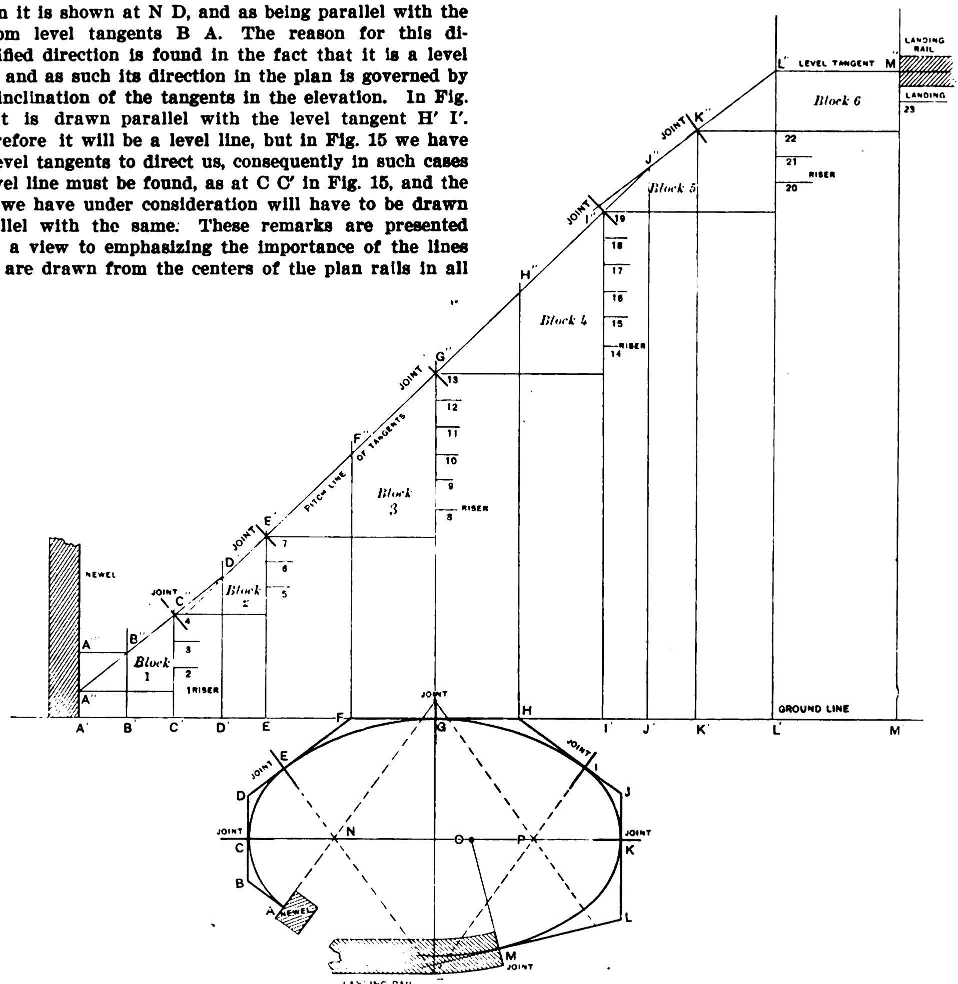


Fig. 17.—Plan, Elevation and Inclination of Tangents for a Rail of an Elliptical Stairway Made in Six Sections.

Constructing an Elliptical Stairway.

The major axis will be a line drawn through P'' square to the minor axis, as shown. All that now remains is to draw the curves, and here is shown how to find the foci, which are points on the major axis to which to fix the pins so as to draw the curves by means of a string or trammel. Let P'' X represent the length of the semiminor axis for the outside curve, and P'' Z the length of the semimajor axis. Take X for the center, and with the length of the semimajor axis P'' Z for a radius describe an arc to cut the major axis where the pins are shown; fix the pins at the points thus found, fasten the string to each pin and stretch it out, sweeping the curve from Z to Z. By similar process the inside curve is also described, its semiaxes being P'' O and P'' S. This completes the treatment of the rail in four portions, and, as previously intimated, it varies with the treatment of it in three portions merely in the modification of the plan tangents.

* Continued from page 255, September issue.

We will now proceed to demonstrate the method of treatment in case it is determined to construct the rail in six portions. Here again the variation in treatment consists in the modification of the plan tangents, as is evidenced in the drawing, Fig. 17. It will be observed that the plan contains six blocks of various dimensions, and that all of them have an obtuse angle between their respective tangents. The elevation of these tangents is shown in the figure to assume various inclinations. The six joints are indicated at C, E, G, I, K and M, respectively. The joint at M connects the upper wreath with the level landing rail, thus determining the upper tangent, L M, to be a level tangent, as in the treatment already demonstrated.

It is the purpose to treat block No. 1, as shown in the elevation, first with the bottom tangent level, and second with the same tangent inclined. Let Fig. 18 represent the plan and elevation of block No. 1, the bottom tangent A B to be level. From A draw the line A W, and from W draw the line W A square to the inclined tangent B' C.' Connect A''' B', which will be the bottom tangent transferred to the face mold, and when in this

To find the bevels, make C Z equal O M and connect Z N'; the bevel is shown at Z. Again make C X equal X' O and connect X N, when the bevel will be at X. The bevel X is to be applied to the end A''' of the wreath and the bevel Z to the end C'.

Let Fig. 19 represent the same block with the bottom tangent A B inclining instead of being level as in Fig. 18. The inclination of the two tangents of this block is shown in the elevation of Fig. 17 at A'' B'' C''. The point A'' connects with the newel at a hight from the floor line equal to the hight of one riser. From A of the plan, Fig. 19, draw the line A W, and from W square to the inclination of the tangents A' B' C' draw the line W A''. Fix one leg of the compasses in B' and extend the other to A' the length of the bottom tangent; turn over to cut the line W A' in A''. Connect A'' with B', which will give the bottom tangent transferred in the face mold. This position of the bottom tangent in relation to its cotangent, B' C', determines the angle between the tangents in the face mold, and consequently the joints of the face mold may be drawn square to each relative tangent, as shown at A'' and C.

From N in the plan draw the diagonal line N B, which

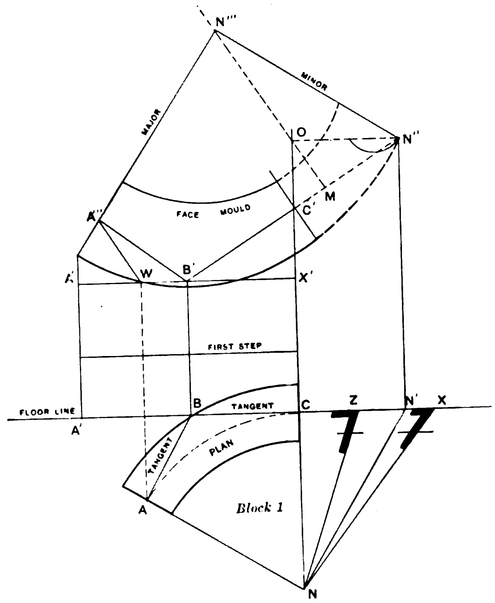


Fig 18.—Diagram Illustrating Method of Drawing the Face Mold for Block 1 of Fig. 17, with the Upper Tangent Inclined and the Bottom Tangent Level.

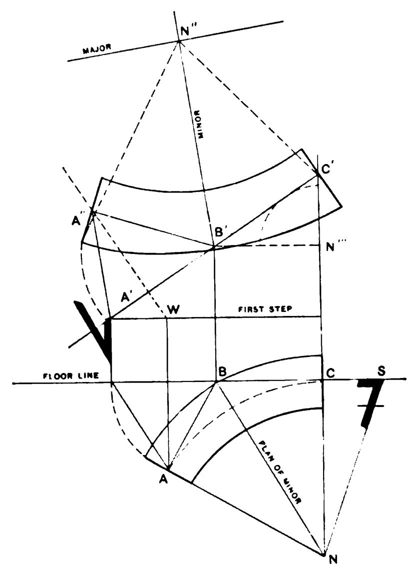


Fig. 19.—Diagram Showing Block 1 of Fig. 17, with the Two Tangents Equally Inclined.

Constructing an Elliptical Stairway.

position in relation to its cotangent B' C' it determines the angle between the tangents as required in the face mold, and shown at A''' B' C'. Draw the joint at C' square to the tangent C' B' and the joint A''' square to the tangent A''' B'.

To draw the inside and outside curves it is required to find the minor and major axes, and to do this it is necessary to start directly in the center N of the plan. From N draw the line N N' parallel with the level plan tangent A B. This line N N' will be the plan of the minor axis, and that because it is a level line drawn from the center from which the plan curve of the rail is described. It is a level line owing to its being parallel with the level tangent A B.

Having in this manner determined the plan of the minor axis, all that now remains to be done is to transfer it to the face mold. On N' erect N' N'', from N'' draw the line N'' O, and through the point O draw the line M O N'' at right angles to the raking tangent B' C'. Take N'' for center and the length of the plan line N N'' for radius, describe an arc cutting the line M O N''' in N'''. The line N'' N''' will be the minor axis; connect N''' A''', which will be the major axis. The curves may now be described as was demonstrated in connection with Fig. 16.

will be the plan of the minor axis. Let it be understood that in every case where the tangents of a wreath are inclined as in this case the plan of the minor axis will assume a diagonal with the plan of the block. On B erect B B', and from B' draw the line B' N'' parallel with the line A' A''. Make B' N'' equal in length to N B in the plan; the line N'' B' will be the minor axis, while the major is drawn at right angles to it, as clearly indicated in the diagram.

One bevel only will be required for this wreath, owing to the tangents being equally inclined. It is found, as shown, by extending the compasses from the point N''' to touch the tangent B' C'. Take this dimension and place it from C to S; connect S N; the bevel is shown at S, and is to be applied at both ends of the wreath.

In Fig. 20 is presented the plan and elevation of block No. 2, taken from Fig. 17. Note that the plan is an exact copy of that in Fig. 17, and also that the elevation is an exact duplicate of the elevation in the same diagram. Note also that the pitch of the tangents in both figures has a different inclination, and that the bottom tangent C' D' is shown to have the same pitch or inclination as the upper tangent B' C' in block No. 1, and that equalization of inclination in respect to these two tangents is made necessary owing to the joint which connects the two wreaths represented in these blocks.

The joint shown in the elevation of Fig. 17 at C' is made square to both tangents B' C' of block No. 1 and C' D' of block No. 2; hence the necessity of having the two tangents equally inclined. Respecting the upper tangent D' E' of block No. 2, it is evident, as indicated in the elevation, that its inclination also is arbitrarily fixed by similar conditions. It is here shown that D' is a fixed point, having been determined by the inclination of the bottom tangent C' D'; the same is true of the point E' in that it is determined by the hight this piece of wreath arises in its span from C' to E', which, as shown in Fig. 17, is equal to the hight of the three risers 5, 6, 7; thus the point E' is fixed. The tangent D' E' will consequently have to incline from E' to D', which is a much steeper inclination than that of the bottom tangent C' D'. The problem now, as represented in Fig. 17, consists in developing the face mold and finding the bevels for a piece of wreath standing over and above an obtuse angle base block having two unequal inclined tangents.

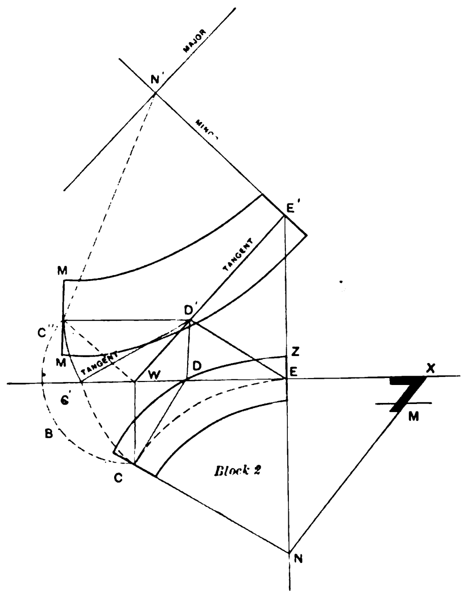


Fig. 20.—Diagram Showing How to Draw the Face Mold for Block 2 of Fig. 17.

Constructing an Elliptical Stairway.

Reverting to Fig. 20, we will proceed to solve this problem. The plan is shown in this figure at N C D E N, and the elevation of the tangents at C' D' and D' E', respectively. Now, as in all the other figures, draw a line from C in the plan to W, and from W square to the upper tangent D' E' draw the line W C''. Fix one leg of the compasses at W and extend the other to C in the plan. Revolve the point C to C'', as shown by the arc C B C''; connect C'' and D', which will be the bottom tangent in its position as required in the face mold.

The angle between this tangent and its cotangent D' E' is shown at D' E' C''; make the joint at C'' and E' square to the tangents, as shown at C'' and E', respectively.

The minor axis for this mold will be a line drawn square to the upper tangent E' D' from the point E', as shown, and the major axis a line drawn through the point N'. The distance between E' and N' on the minor axis is equal to N E of the plan. To find the bevel take the length from Z to E' and place it from E to X, connecting X and N. The bevel is at X, and is to be applied to the end C'' of the wreath. The end E' will need no bevel owing to its coincidence with the minor axis, as shown in the diagram. The width of the mold at E' will be the same as of the plan rail, and its width at C'' is taken from the bevel. The distance X M of the bevel is placed on each side of C'', as shown at C'' M. Now the curves may be described by means of either of the methods already outlined.

The next piece of wreath will be in Fig. 17, to cover the span from joint E'' to joint G'', as represented in plan and elevation of block No. 3.

It will be observed that the curve of the plan in this block is described from the center Z instead of, as in the preceding two blocks, from the center N. The inclination of the two tangents is shown in the elevation of the block to be equal, and furthermore that it also equals the inclination of the upper tangent D' E' of the preceding piece of wreath, which is to be jointed to it, as shown in the elevation at the joint E'' of Fig. 17.

(To be continued.)

Employer Not Liable for Injury to Employee by Fall of Temporary Arch.

A workman was injured by the falling of a temporary arch while engaged in putting in terra cotta arches between iron girders or floor beams. The construction of the arches required the use of a temporary arch upon which to lay the bricks of terra cotta which formed the permanent arch. The temporary, or false, arch, which was furnished by an independent contractor, was made of iron ribs adjustable to the size desired, and covered with wooden lattice work, and when in place it was suspended at either end by a notch cut in a hanger which fitted upon the flange of the iron girder, and was securely fastened to the girder by a screw clamp in the hanger. A scaffolding was furnished on each side of the arch for the brick, cement and workmen; but the men were in the habit of standing upon the temporary arch, instead of upon the scaffolding, while laying the terra cotta bricks.

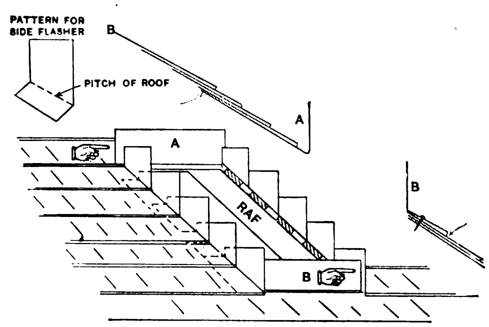
There was no evidence of structural defect in the arch which fell, and the natural inference from the evidence was, therefore, the Second Appellate Division of the Supreme Court of New York says (Haughey *vs.* Thatcher, 85 New York Supplement, 935), that the fall was occasioned by either some negligence in the act of setting the arch in the first place, or in dealing with it after it was set by the workmen in the process of working on the building. In neither case would the negligence be chargeable to the employer in the absence of knowledge, express or implied, or in the absence of proof that it resulted from incompetent servants or from an insufficient number of servants. Under these circumstances the doctrine of *res ipsa loquitur* (the matter speaks for itself) did not apply, as that rule can only be invoked, as between master and servant, if at all, where the facts not only warrant an inference of negligence, but also establish that such negligence was that of the master.

Nor does the court think that the temporary arch could be regarded as a scaffold, within the meaning of Section 18 of the labor law, so that the negligence of the employer was to be assumed from the mere fact that it fell. It says that its primary purpose was to support and shape the permanent arch until that arch should be set and hardened sufficiently to justify the removal of the temporary structure. It no more became a scaffold because of the habit of men stepping on it while at work than would a wall or beam temporarily constructed to hold up some part of the structure during its creation because it might be used by the men to steady or sustain their weight for personal convenience in working. It might very well be that the employer, if aware that the men did so use the temporary arch, would be required to make it strong enough to support their weight, in addition to whatever other weight it was designed to bear, and that he would be liable for negligence in that regard upon proof that it was inadequate by reason of negligence lawfully attributable to him; but that doctrine would not extend the case to the stringent liability of the labor law. For the purpose of this case the temporary arch might be fairly regarded as neither a place nor an appliance furnished to the workman to work in or with, but during the time it was designed to remain in place to shape and support the final structure it should be regarded as a component part of the building.

CORRESPONDENCE

Shingling Around a Chimney.

From J. E. R., North Chatham, N. Y.—I inclose a little drawing which may help "J. J. D." of Cornwall Station, Cal., whose inquiry appeared in the September issue of the paper. After the chimney hole is cut I tack pieces of 6-inch hemlock boards around inside of the opening, allowing them to stick up 5 inches above the roof boards. I then proceed to shingle and flash against the box so formed. Boards are tacked over the opening while the work is in progress in order to keep out the storm. When the mason lays the chimney he knocks out the boards and behold the flashers stand upright and in position to be bent into the courses as the chimney goes up. Referring to the sketch which I send, the tin at A should go up under the fourth course of shingles, and should



Shingling Around a Chimney.

extend beyond the side flashers 1 inch; the tin at B should go down under the last course. At B the side flashers should extend down ½ inch. The drawing so clearly indicates the construction employed that further comment would seem to be unnecessary. I should like very much to hear from other readers of the paper and to know how they would do a job of this kind.

Laying Tar and Gravel Roofs.

From F. C., *Van Buren, Maine.*—I am a subscriber to *Carpentry and Building*, and would like very much to have some one tell me how to make a tar and gravel roof. I am about to lay one, and as there is no one here in the business, I am obliged to do work myself. I therefore come to the readers of the paper for points as to the best method of doing the work.

Note.—With no desire to anticipate the discussion which we trust the above inquiry will develop among our readers, we would state that one plan of laying a satisfactory tar and gravel roof is to first put down four ply carbonized roofing felt, well mopped between laps, and covered on the top with a good coat of coal tar and rosin in the proportions of half and half. After this has been done, cover with clean gravel that will screen through a ½ inch mesh wire screen.

A well known writer in discussing this question in an earlier volume of the paper said:

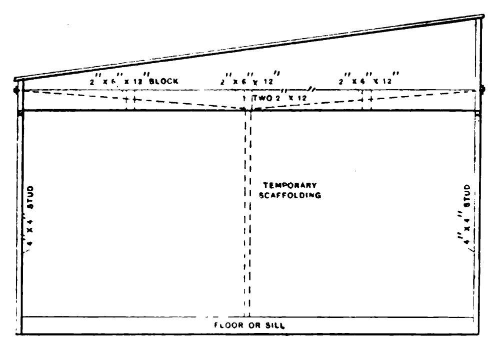
There is no reason why a gravel roof should not be a good one, if only proper care and good materials are used in its construction, at least it should be good for the money expended on it when compared with the cost of tin, galvanized or copper roofs. Of course a gravel roof is only suited for a low pitch or flat roof, as on a steep roof the gravel would eventually wash off and leave the paper or canvas exposed to the weather. Ordinary coal tar answers fairly well for a top coat before the gravel is spread on, if the roof is very flat. If the roof has a good pitch it is a good idea to mix 8 or 10 pounds of common rosin with the pitch while it is boiling, stirring the mass well with a stick before it is taken out of the boiler.

To prepare the roof before covering with tar after it is boarded tightly with matched stuff, the following rules should be observed: In all cases the grain of the roofing boards should run in the direction of the pitch—never across it—and all joints should be driven close and tight. The boards should be planed on the top side, and should be free from shakes or knot holes. Swab the whole roof over with a thick wash of Portland cement mixed with water to the consistency of thick paint. Let the roof dry for a few hours, then lay on a coat of good roofing paper—tarred paper preferred—having a lap of about one-third of the width of the paper. Over this give a thin coat of hot tar, in which ground asbestos, mica or Portland cement has been mixed, in the proportion of one bucketful of cement to four of hot pitch. Let stand until dry and hard. Over this lay another coat of roofing paper, and on this lay a thickness of rough sacking, which must be tacked down here and there with broad headed tinned nails, such as tinsmiths use in roofing. On this sacking lay a thick coat of the tar while hot, and then sprinkle coarse sand and fine gravel on the hot tar and leave to harden. The tar must contain the proportion of asbestos, mica or cement as described in the foregoing.

When the tar or pitch hardens it holds the gravel in place, and the rough sacking over the paper strengthens the whole roof covering and binds the whole together, and to a very large extent prevents the roof from cracking or blistering, faults which are common to gravel roofs and which cause a great deal of trouble and annoyance. A roof covered in the manner described will make a good serviceable one, and one that will hold for from seven to nine years, when it may be made good again by a generous coat of the prepared pitch and another layer of fine gravel. Metal roofers do not take kindly to roofs of this kind, but there are instances when no other kind of roof is available, and to meet these instances the above method is offered.

Strength of Floor Beams for Public Hall.

From J. F. T., *Ballard, Wash.*—I have been a reader of *Carpentry and Building* for about 12 years, and feel greatly interested in its columns. I have, however, never replied to any of the queries which have appeared in the Correspondence department, but as I notice an article from "S. L. C." of North Loup, Neb., about the strength of floor beams for public hall, I send a sketch which I hope may be interesting in this connection. It relates to a machine shop I built in a Southern State about ten years ago, and which is still standing, although nearly nine years since a cyclone swept over that section, laying waste nearly everything in the way of buildings, trees, fences, &c., in its path. The machine shop is 30 feet wide and 80 feet long. The blocks marked 2 x 6 were put in flatwise, and then holes bored through two



Strength of Floor Beams for Public Hall.

of the blocks toward the ends of the 12-inch joist. A groove was then cut in the bottom of the second block, deep enough to bury the ¾-inch iron rod, which is provided with a swivel, or turn buckle, placed near the center. After passing the rod through to the outside of the 4 x 4 studs, which should be placed at or opposite every truss, or about 8 feet apart, the carpenter can fill in the other joist between each truss and then bridge them. He should, however, never forget to put up a temporary scaffold underneath his joist while getting them in position. Where this hog chain, or tie rod, as it may be called, comes through the outside of a building there should be a piece of ½-inch iron, together with a heavy washer, on each before the chain is tightened up by means of a swivel or turn buckle. In erecting my scaffold in the center, I raised the center of the joist about 2 inches above the level of the ends and that aided very much, for after the blocks are bored and nailed onto one of the joist the rod can be placed through them, and then the other 2 x 12 can be spiked.

Some Comments Suggested by "What Constitutes a Day's Work for a Carpenter."

From L. JEROME AIMAR.—Although the question of "What constitutes a day's work?" for the carpenter has been aired to some extent through the columns of *Carpentry and Building*, and notwithstanding the suggestion to drop the subject, I for one would like to see the controversy—for such it has become—extended indefinitely for many reasons.

I am not in a position to know the circulation of the "Old Blue Book," nor the number of subscribers upon your mailing list, but I will hazard a guess that said list contains the names of a large number of "master builders." As a journeyman I looked upon *Carpentry and Building* as being the organ of the journeymen exclusively. When I became a "master" I found just as much to interest me as previously. Whether this arose from the fact of its tone having been changed or from the change in my own situation, I have never been able to decide. Be that as it may, it can have but little bearing upon the subject in hand.

That times, men, materials, conditions and methods have changed since then there can be no doubt; I mean since the first issue of the book. These changes must be taken into consideration as bearing upon the subject. That they must concern us is quite evident, for it is these very changes which leave the question an open one and worthy of discussion.

In the first place let us go back, say, a generation. In doing so we find that at that time the average working day for all mechanics was ten hours. That the wages were very much lower then than now, despite the assertions of some to the contrary. The work was much heavier and more laborious than at present, and many more tools were required in doing a piece of work. I could continue to cite what the journeyman of the present day would look upon as hardships, but, say, "old boys," do you remember the jolly times we used to enjoy when we were sent out in the country on a job? The innocent "monkey shines" we used to cut up? Did we feel that we were worked to death because we were turned out by the cook before dawn to gulp down a couple of quarts of good old harmless hot coffee and walk a mile or two and be "spiking" down shingles as were shingles before "Old Yaller" showed himself?

Did we ever go on strike because the sun went down before we drove our last nail? Did we want to yell "scab" at "Billy" because he reached the ridge before us, and we had to saw off the tops of his shingles before we could finish our side? And did "Billy," after giving us the "ha! ha!" jump over on our side and help us out, and did we not on the very next roof beat him and his partner all to pieces? Did any one ever hint that we were doing more than a day's work or that "the boss" was becoming a "capitalist" through our foolishness? Were we so tired out that some of us did not throw our hatchet down and jump after it from the staging, and did we jump every fence on our way home and trip each other up all the way to camp? Come out of your shells and contradict me if I am not telling the truth. You will have the opportunity next month, and I am willing to leave it to you whether I am giving the young men a "fairy tale" or not.

When I look back, boys, and mind the time "Jack" spoiled the door, after working so faithfully all day on it, and after "jollying" him until he blushed like a girl, how we hunted up two old kerosene lamps and made the rip saws hum and the shavings fly, and how the "boss" slipped in on us, seeing the lights, and, after being let in on the joke, how he enjoyed it as much as any of us. And, by the way, did we think to charge him overtime for that night's work? Well, well; how was it possible to be so brotherly and yet not be cognizant of such an "institution" as the "Brotherhood"? Strange to think that, instead of a "working card," when we turned in with a new gang, the fellows were far more interested in the size, design and equipment of our tool chest, which three of them assisted us to carry up in the shop at noon. And how large an amount "Jim's" and "Jerry's" little $10 per looked alongside of our $7.50, which the new man would get until his period of probation had expired. And how much larger than theirs did our $10 look when that period had passed?

Not a continuous stream of "Pints," flowing in at the rate of 2640 per man, per week, the average some of us would like to see maintained, could begin to replace the fun we got out of the single "Black Bottle" the proprietor of the still filled for us, the time we were sent up there to reshingle his roof, and how about the cedar and spruce chips we chewed to take the "Smell" off before we got home.

The job in the country that had such charms for us, especially where we were allowed to carry an old "muzzle loader," is looked upon by the journeyman of the present day with no feelings of pleasure. He figures that he must turn out so much earlier if it is not so far but that he might make it on his wheel, and that he will get home so much later. The fact that he possesses the means of skimming over the ground like a bird does not appeal to him at all. He looks upon it as being just so much extra work for which he receives no pay, yet he will race all over town after supper and after midnight perhaps.

Now that the "Trolley" has taken the place of the wheel, he thinks that the "Boss" should pay his fares, and he takes the last car that would get him on the job, barring accidents. If he is late and the foreman says anything to him, or "docks" him, he is up on his ear at once, and perhaps quits the job on the spot. The foreman, who has his plans laid for the day, finds himself working at a disadvantage. That night, Charley's mate, finding that Charley is not coming back, throws up his job also. Saturday night, when the rest of the crew meets Charley, he tells them of a job, "right in town," where men are wanted. Away goes the rest of the gang. Perhaps a couple of "jack-legs" who are not sure of getting a job elsewhere, having worked for Charley's new "Boss" before, show up. The foreman being away looking up a new lot of men, and they not feeling competent to lay out any of the work, fritter away the day on a little porch roof that could easily be finished in a couple of hours. They have no scruples about drawing full pay for their day's work, because it is not their fault the foreman is away. Again we might suppose that another old hand or two might be upon the work putting in good time and service, but they fear if they set the other fellows to work, they are apt to go wrong and swear that they were instructed wrongly. Or they may refuse to be instructed by the other fellows, for have we not heard often enough, "You are not my boss," when one man undertakes to instruct another. Next day the new men turn in and nothing is accomplished. They don't know where to find the materials, are not familiar with the details of the work, and so another day is lost. No use charging it to "Charley's" account.

The men get the cornice completed and are ready to shingle. They go down and dump their finishing nails into the keg of spikes, and find that "Charley" has dumped his pockets of eight-penny nails into the shingle nails. A half hour is lost resorting them out. Finally they carry up a bunch of shingles, break them open in such a manner that most of them fall to the ground, while the remainder fall inside of the building and into the cellar.

Next a workman goes down for a chisel, using the same to pare each and every shingle. He puts the chisel down where it rolls off the roof to the ground. Next he picks up his hammer, puts down the shingle, turns it over, reaches for a nail and his nail pocket capsizes. He makes a grab for the nails, the wind blows the shingle across the road or down the well, and then the whistle blows. Time to quit, and again we are left in doubt as to what constitutes a day's work.

Is it any wonder when we tell a fellow like this that we have carried up on the roof of a barn, from 25 to 30 bunches of shingles, 250 to the bunch, perched ourselves down beside them and nailed them on that roof, one at a time (no matter how many seconds that might figure out for each shingle; time and again have we done this)—I say, is it any wonder he thinks we are giving him "ghost stories?" Such as he cannot conceive how it can be possible. I will be candid and tell him that, in the first place, we were on that roof at 7 o'clock in the morning (terrible to think of!). We quit at 6 o'clock at night (terrible to think of!). But we stout old "hearties," with no other liquid flowing in our veins except good "red blood," what did we care about the hours? Sometimes the frost, early in the mornings, would nip us a trifle and this accounts for the difference between the 25 and 30 bunches. But, boys, I want to tell you, when we went on that roof we went to lay shingles, and it was as much like a farmer trying to get in his hay on a summer afternoon in advance of an approaching thunder storm as anything you ever saw in your life. The "Walking Delegate" would have disjointed himself trying to locate us long enough to examine our "working cards," had we been obliged to carry that badge of honor (?). At that time the phrase "The dignity of Labor" had not been coined, hence we were not particular as regards the figure we cut, hanging on by one ear hooked over the ridge pole.

I am perfectly willing to admit that there were some men at that time who could not keep up with the procession, and consequently were not paid as much per day as the others—an arrangement which we all thought and looked upon as being perfectly fair, just as fair in fact as it is to-day for us to refuse to pay the best price for second best goods, even though we do receive uniform pay whether we are capable or not. If it were ever possible to figure out "what constituted a day's work," then was the time.

Now about the 12 and 15 door a day man! What the average day's work for a man in this line was, I have no recollection, but I do remember a man coming in upon a large job we once had and "lumping" the doors, as we called it. He was on the job two or three days, and after he had left we all went over after supper to criticise his work, and I remember having heard our best men say that they were beaten out of sight, both as to quality and quantity. They pronounced his work perfect, and the "Boss" said he had finished in a perfect manner more than twice as many as our best men could have accomplished in the same time.

Once since then I have worked on a job with the same man, and no matter what work he was set to do he appeared to be greased; but fitting and hanging doors was his "hobby." I should tell you, perhaps, that I did not recognize him as the same man who had hung our doors until he had rigged himself out for hanging doors on this job; then I recognized his movements at once. He possessed tools which he used for this purpose only, and I might say a uniform as well, which he donned, and which consisted of a pair of yellow overalls and a blue cap with leather visor, which he turned behind as soon as he began to work. I knew him then at once. He stripped to his undershirt and slipped his feet into what appeared to be a pair of boots cut off above the ankles. In he started with that oily motion of his. It seems that he would turn in upon a job until it was ready for the doors, when he would invariably lump them. Of course, this would be impossible at the present day.

Now many of the readers have cried: We have met people who have met others who have met the men who could do this kind of things, but none who could do the feats themselves. Well, then, let me tell you what I have accomplished in that line. Four times in my life I have set out to do up my slick friend. I have put my tools in perfect order the day before, arose bright and early the next morning, turned my cap hind side before, as he did, and sailed in with the firm belief that I would do my 12 doors before night—ten hours constituting a day's work. Three times I made it. The first time, and also the second, my first two doors were not hung as well as I would like to have seen them hung. The third time, my first three doors were perfect, but feeling that I was loosing ground, I made a spurt and botched my fourth and fifth doors. I then took it easier and was surprised to come out ahead by a few minutes. The fourth time I got stuck on my tenth door, although all of them were hung and fitted perfectly. If I had tackled these doors on consecutive days I am quite sure I would have equaled our "Artful Dodger."

From the foregoing we must conclude that 12 doors *do not* constitute a day's work. On the other hand, I once sent a man to hang a screen door. His time was three-quarters of a day. The next day I received a postal card requesting me to come and see what I thought the job was worth and remove the door. That door is lying around my shop yet, with the hinge marks on all sides of it, where this man hung and rehung it on that one job. Judging by this instance, we might conclude that it required more than three-quarters of a day to hang one door. How can we strike an average? Can you tell me?

We can figure that so many feet of lumber will cover a given surface. We make allowances for waste, the matching, &c., of flooring or other material. Our calculations prove correct. Given the same piece of work at another time and we find our figures are available, just as before. We compute the number of sash, doors or blinds required on a given plan. Go over them any number of times—the same result. Space our timbers so many inches on centers, and should we have to duplicate the job our figures will hold good. So many bricks will lay up so much wall. No element of doubt entering into the question.

Go out and hire a man, two men, ten men. We are not left in doubt very long as to what constitutes a day's pay. Turn them into work. The sun will not go down upon us before we are made aware how many hours constitute a day's work; but when it comes to the *quantity* of work that we might reasonably expect to see accomplished in that time, it remains an unknown quantity.

The more I look at it the more unreasonable the problem appears to me. Why is it that we cannot feel just as positive about this question as we are that 60 minutes will make an hour and eight of those hours constitute a day's work? Or that ten cents make a dime, ten dimes make one dollar, and that so many of those dollars constitute a day's pay? And again, how is it that, if the rate is $4 per day, we are compelled to render no less than 400 cents in payment for that time? Yet we can have no reason to expect that we will receive 480 minutes work for our 400 cents. When you find the reason for having to give the man who can accomplish just half as much as another 400 cents for his day's work, or a sum equal to that received by the more competent man, which is actually giving him twice as much for his poor day's accomplishments, then will you have the reason for having to pay a certain sum and an arbitrary price for an uncertain amount of work or service.

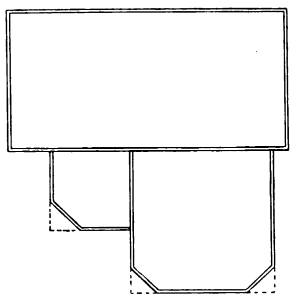
After all I have said, where are we? Just where we started. Now then, let us see where the fault lies, for fault there must be. Years ago a few men began to agitate the question of "labor unions." At first it amounted to nothing. After a while the unions became established, but their power was little felt. So many workmen remained outside of the unions that they counteracted any good or harm that might result from such organizations, but they kept at it until they became powerful enough to compel men to seek membership in their ranks, after which it was an easy matter to dictate terms, even to the employers. Then demands were made for increase in the wage, and next came demands for shorter hours, *ad libitum*. Success crowned their efforts. Other rules were enforced, such as who should do certain work on the buildings, rates for overtime, holidays, &c., but that one question, so important to the employer. was left out entirely. How can a business be carried on successfully with such an unknown quantity pervading it? Is it possible to render an estimate upon which we might depend with any degree of certainty under such conditions? I can't see it. Can you?

Why not take up this question once for all? If we have no data upon which to base a calculation, let us proceed to establish a precedent. Our workmen having dictated every other question, why not let them dictate the amount of work of the different kinds that shall constitute a day's work? Let them make it one door a week, a bunch of shingles a month, a square of flooring a year, any old thing, just so we may know where we are at. Let me advise, though, not to sit and wait for them to do what concerns ourselves so vitally. It is not to be expected of them. It does not interest them at present, but it will eventually.

One thing more and I am through. Did you, brother architect or contractor, ever have in your employ a lot of men of which you had reason to be proud. and did you find, say, after six months, that those men deliberately squandered your time and patience because they found you an "Easy Boss?" If so, "Didn't it Jar You."

A Problem in Roof Framing.

From A. S. W., *Shawnee, W. Va.*—I send inclosed floor plan of a story and a half house, which I am thinking of building, and am troubled as to the framing of the roof. Will some of the many readers of the paper help me out by furnishing a roof plan adapted to the diagram sent herewith?



Problem in Roof Framing.

Planed or Sawed Joints.

From OLD CHIP, *Bakersfield, Cal.*—In regard to the question raised by "Curious," of Newport, Ky., the only thing I can do is to express my preference, as doubtless mechanics will differ on this subject, as they do on most others where a variety of methods can be employed. My preference is for the saw joint, though I would not put the block plane entirely out of reach. There are emergencies where it is almost indispensable. My preference is for the saw, but I want to choose the saw. I would not select an old, rusty briar called a farmer's saw, which has lain out in the hog lot since last fall, but rather a saw with a thin blade of the highest grade of steel and as bright as a new silver dollar, and filed with very little draught for finish work. My experience teaches me that a mechanic needs to be a past master to obtain the best results with a saw. He has to educate his eye, muscles and nerves so as to have his whole being under control and at perfect command.

Flat Seam Roofing on Steep Roofs.

From D. F. M., *Quebec, Can.*—Will you kindly inform me through the columns of the paper how I can put on a flat seam tin roof, having two-third pitch, so that the horizontal seams across the roof can be soldered without starting to lay the roof from the top down?

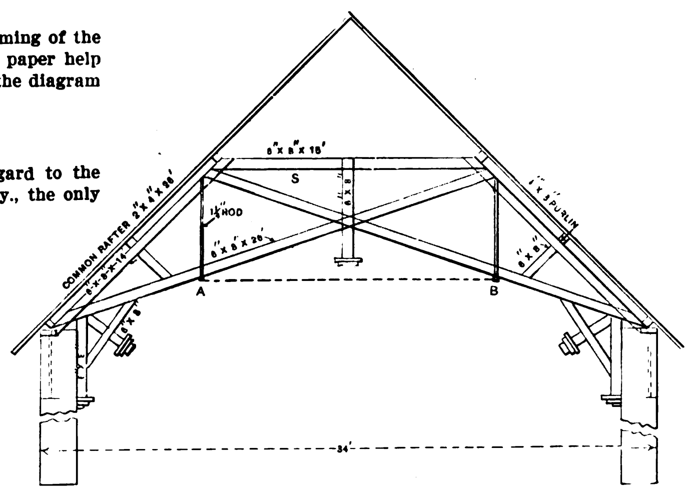
Answer.—If the horizontal seams must be soldered the sheets will have to be laid from the top down. This brings the edge of the seam toward the top and forms a guide when drawing the soldering copper over the seam, and allows the solder to flow into the locks, whereas if the sheets were laid from the bottom up, and the seams had to be soldered, the solder would flow away from the lock and be of no value. As the roof in question has two-thirds pitch, and would give a rise of 16 feet on a span of 24 feet, we cannot understand why our correspondent would want to solder the seams on so steep a roof.

The usual practice in laying flat seam tin roofing on steep roofs is as follows: Start the roof at the eaves, locking sheet by sheet, having not less than ⅜-inch edge, being careful that the sheets lock well. When the entire roof is laid and before closing the seams, paint the seams with a good mixture of white lead in boiled linseed oil, applying it thickly with a small tool brush so that the seam is soaked well. Then close the seams with a mallet in the usual manner and give another coat of white lead, slightly thinner than the first, over the seams. When this has dried paint the entire roof as usual, which will make a perfectly tight job, without soldering any seams except the flashings.

Criticism of Truss Construction.

From FRANK E. KIDDER, *Denver, Col.*—Referring to the communication of "C. C. J.," Fort Davis, Texas, in the August issue of the paper, I would say that the form of truss shown, while a true truss, is not a desirable one, owing to the enormous strain developed in the straining beam S. For the span and spacing given, taken in connection with a shingle roof, I think the truss will stand up, but the straining beam should be braced laterally by a beam running from truss to truss. The only duty of the center post is to brace the straining beam, in order to prevent its buckling up or down, and this should be made of two plank, bolted to the straining beam and tie beams. The straining beam should not be cut at its center.

The strength of the truss will be very greatly increased by placing a rod from A to B, as indicated by the dotted line, and there will then be no danger of the truss settling to any appreciable extent.



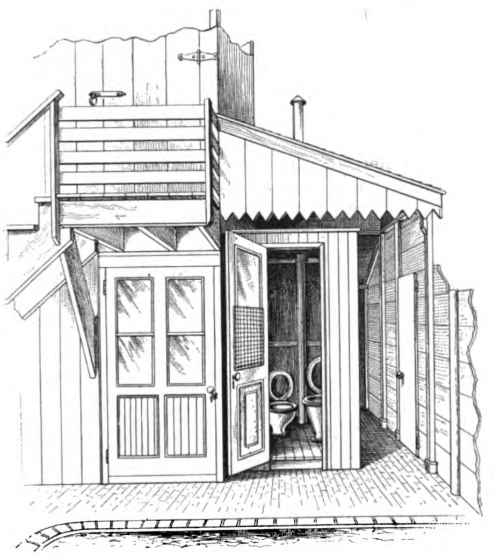
Criticism of Truss Construction.

AN interesting piece of work has recently been completed in Pittsburgh, which is probably without an exact parallel in the history of building operations, at least in the city of Pittsburgh. A four-story structure was cut in half, and after 6 feet had been removed from the length of the structure, the halves were joined and a new wall placed in position, and all without interfering with the business of the establishment. It is stated that many contractors in the city refused to put in bids for the work, which was necessitated by the widening of the avenue in the east end. Finally A. C. Moore of 112 Carver street undertook the work, and is carrying it to a successful issue.

A Good Outhouse Arrangement.

BY JOHN G. SAMUEL.

The pages of *Carpentry and Building* are usually filled with matter of more importance than that which I present, but as only by excellence of detail can one secure an admirable whole, the characteristics of a carefully planned minor feature should be interesting. Being the son of a carpenter I have long cherished the idea of arranging the outhouses of a modest home to suit my fancy. The sketch presented herewith illustrates in part the result of an opportunity to exercise my own judgment without interference. The premises are adjacent to a public alley at the rear and side. The building embodies a coal room, not shown, a second floor for lumber, bench, old furniture and general storage, a room for tools, hardware and articles in general of a kindred nature well worth taking care of, a kindling shed and privy house. The platform for loft stairs is formed on three joists that cross the building and project 4 feet. Its floor protects the entrance to the tool room just below. The



A Good Outhouse Arrangement.

tool room door has four panes to give light. The kindling shed is at the rear of the privy house. The passage to it was intended to be left open, but stray dogs sleeping inside compelled the addition of a door. The privy house occupies a portion of the kindling shed, and is set back of the shed skirting 2 feet to keep it dry and pleasant during bad weather. The little house proper has but three sides, the fourth side being merely a stud frame, through which are four 3-inch wood screws into the side of the tool room to keep it in place. If it is necessary to empty the vault the house can be lifted or tilted back by removing the screws. The vent pipe has a slip joint under the shed roof so as to be able to disconnect it easily.

Instead of having a wood riser with open floor and wood seat with large holes through which children can drop chickens, cats, dippers, &c., and through which even a small child has been known to fall, there are two regular enameled iron Philadelphia hoppers with self raising wood seats. One of these hoppers is the low pattern for children; the other, the high type. After 18 months' experience the iron hoppers prove to be very superior to the box seat in many ways. There is no water connection to them, but the fouling surface is about one-fifth of that in a box seat, and not absorbent. It is all in view. It is easily cleaned, and the whole floor is open to the air and easy of access to scrub. The seats are always up in the air and keep dry and clean. They cannot be left down by children. The area of the vent is greater than that of the two holes combined, and there is a good draft down the holes and up the vent all the time. The cost of an equivalent jump off seat and provision for it is but little less. Certain renewals and repairs to the box seat and supports make the cost eventually more. The holes are but 3 inches across, so only small things can be poked down by children. The door to the little house has a large glass for light by day, and at night the kitchen lights shine in, so the place is not dark. A piece of coarse mesh wire prevents any one from looking in unless very close to the door.

The health officers who have called inspecting vaults express themselves in terms of praise of this arrangement, and wonder why it is not generally employed. The workmanship of the structure shown is poor, and the material mostly odds and ends, but the principles of the arrangement are set forth distinctly, and the writer believes they will be of more than ordinary interest to many of the readers of the paper.

Wages and Hours of Labor in Building Trades.

In the July report of the United States Bureau of Labor, of the Department of Commerce and Labor, an elaborate statement is presented of the wages and hours of labor in the principal industries of the country. We give below an extract from the report, showing the comparative wages and hours of labor in the building trades for the years 1903 and 1890, together with the percentage of increase or decrease in 1903 as compared with 1890. This comparison will be of especial interest at the present time, when the subject of labor in the building trades is so much to the front. In the subjoined list the wages column represents cents per hour and the hour column hours per week:

	Wages.			Hours.		
			Increase.			Decrease.
Building trades.	1903.	1890.	Per ct.	1903.	1890.	Per ct.
Bricklayers	55	43	27	48	53	10
Carpenters	36	27	33	49	56	12
Cornice makers	41	29	41	48	55	12
Gas fitters	42	30	37	49	56	12
Hod carriers	29	23	27	48	53	9
Inside wiremen	41	26	57	49	56	13
Laborers	17	15	11	56	59	5
Lathers	38	32	18	46	55	17
Painters	35	27	29	49	55	12
Paper hangers	36	28	28	50	56	11
Plasterers	53	37	44	47	54	12
Plumbers	44	35	26	49	54	10
Roofers, gravel and tar	26	22	17	57	58	2
Roofers, slate and tile	42	33	27	49	54	10
Roofers, tin	35	27	26	50	56	10
Steam fitters	43	32	33	48	55	13
Stone masons	45	37	21	50	55	9
Stone setters	50	40	26	49	54	9
Structural iron workers	41	25	66	51	57	10

Arab Architecture.

A writer in one of our English exchanges, in discussing the architecture of the Arabs, states that it bears a certain resemblance to that of Byzantium. It uses the columns to support arches and imitates the method of resting domes upon pendentives disposed in square. But it is distinguished from the Byzantine by the employment of the ogee and the horseshoe arch, lighter in effect than the semicircular form, and by the strange but graceful innovation in the shape of pendentives supporting the dome, which have given to the form of construction in which they are employed the name of *voûte à stalactites.*

The bare walls without openings that Saracenic exteriors present are necessary to resist the power of the sun; the interiors, on the other hand, present a profuseness of ornament of the most exquisite and refined kind, which, though every sort of animal representation is excluded, depends for its effect upon variety of colors and materials. This form of architecture is replete with all that is fanciful; it often displays much grace and elegance, though rather of an artificial kind, and with more richness than dignity. It pleases the eye by the variety of forms and colors, by the play of light and shade, but it does not enrich the intellect with any defined or precise idea.

WHAT BUILDERS ARE DOING.

THERE has been no very radical change in the building situation throughout the country since our last issue, reports coming to hand showing a continuation of the activity which prevailed through the season. As has been heretofore noted the increase in the volume of operations, as compared with a year ago, has been most apparent in the smaller cities and towns of the country, but this does not mean that there has been a heavy shrinkage in any direction. There have been comparative few labor disturbances outside of New York, and even here the tendency is toward a gradual resumption of operations. Taking the country over, the situation warrants the opinion that the total figures will make a most favorable comparison with any recent corresponding period.

Baltimore, Md.

According to programme the outing of the Builders' Exchange was held at Kiefer's Park, Middle River, on Monday, September 5, there being present about 200 members and their friends, who thoroughly enjoyed the occasion. Prominent among the invited guests were representatives of the Chamber of Commerce and Real Estate Exchange of Baltimore, the Master Builders' Exchange of Philadelphia and the Master Builders' Association of Washington, D. C. The trip to the park was made in special trolley cars, which left the Exchange Building about 12.30, and, arriving at the grounds, the members and their friends sat down to a lunch of steamed crabs, after which they scattered, each seeking the amusement most to his liking. Prizes were offered for various contests, and there was vocal and instrumental music, as well as dancing, for those who enjoyed diversions of that kind.

A baseball game was started between the builders and the material men, and when playing stopped for dinner three innings had been completed, the score standing 28 to 10 in favor of the builders.

A number of speeches were made during the afternoon, the opening address being by ex-President S. B. Sexton, who urged the necessity of organization on the part of employers. He was followed by John J. Kelly, president of the exchange, who spoke of the great conflagration of last February and pointed out that although Baltimore seemed slow at first in commencing rebuilding, everything was now progressing satisfactorily. R. C. Sandlass described what he considered an ideal exchange, and Secretary John M. Hering urged every one allied with the building trades to become a member of the exchange. Brief remarks were also made by ex-President John H. Short and Frank G. Boyd, one of the directors and chairman of the committee in charge of the outing, who spoke in favor of the builders and material men organizing.

The call to dinner came at 6.30, and this stopped the games in progress, as well as the speech making. The dinner consisted of fish, crabs, chicken and various other delicacies, which were served on tables set in the open air.

The dinner concluded the festivities, and the members and their friends returned to the city well pleased with their jollification. The exchange has held many indoor meetings of a social and business nature, but this was its first outing, and the success of which will no doubt lead to its becoming an annual affair. The committee having charge of the outing consisted of F. G. Boyd, chairman; Isaac S. Filbert and Harry L. Starr.

The exchange is growing in numbers and influence and it is thought that the membership will be doubled before the next annual meeting in June, 1905.

The movement looking to a permanent exhibition of building materials is rapidly gathering headway, and the importance of the project is such that plans have been prepared for a proposed new building to be erected expressly for such an exhibition. It is planned that the structure be put up in the central portion of the city conveniently located to the City Hall and public offices. The proopsed new building will be three stories and basement in hight and will occupy a lot 50 by 80 feet in size.

Egerton Brown of New York has just been elected assistant to Secretary John M. Hering, whose duties have increased to such an extent as to make this action necessary.

Secretary Hering has just issued a unique folder printed in colors and intended to supply a great deal of information that is constantly in demand regarding the Builders' Exchange. The folder tells what membership in it costs, the benefits to be derived from association with it, when the sessions are held and where the rooms are located.

Boston, Mass.

The amount of building which is in progress in the city, while of fair volume, is not up to the figures of a year ago. The falling off is more noticeable in the number of permits issued for brick or stone structures rather than in connection with frame buildings. The annual report of the Building Department, which has just been issued for the fiscal year, shows that the value of the buildings completed amounted to $18,242,570. Of this total, over $15,000,000 represents the value of brick or stone buildings, while less than $3,000,000 was expended for frame structures. Taking the amount expended for alterations and additions, the total is brought up to $23,157,874. As there were 736 buildings erected, as compared with 1047 costing $9,022,340 in the previous fiscal year, it shows that a much more costly class of structure was erected during the period covered by the last report of the department.

Brooklyn, N. Y.

There has been something of a lull in building operations in the city and suburbs during the past month, the labor troubles in the Borough of Manhattan causing a more or less uncertain feeling to prevail in building circles. It is thought, however, that the depression will be only temporary, as the outlook for the remaining months of the year is of an encouraging nature, and it is thought that the figures for the 12 months will make a record. According to the report of the Bureau of Building for the month of August plans were filed for 173 new brick structures estimated to cost $1,955,000 and for 214 new frame buildings to cost $701,945, while there were 330 permits issued for alterations estimated to cost $303,300, making a total for the month of $2,960,245. In August last year the permits issued for frame and brick structures, as well as for alterations, reached a total valuation of $3,098,944.

Chicago, Ill.

One of the features of the building situation is the increased demand for factories and warehouses, due in large measure to the growing confidence in industrial lines and the prospects of a large volume of business in the near future. Architects are having more or less inquiries along these lines, and in many instances drawings are on the boards for buildings which it is expected will be carried to completion in the near future. Taking the city over, there is a steadily increasing volume of operations as compared with a year ago. For the month of August the figures of the Building Department show permits to have been issued for the construction of 717 buildings, with 20,190 feet frontage, involving an estimated cost of $3,548,280, an increase over the same month a year ago of 169 buildings, 8198 feet frontage and $731,780 in cost. This is the largest record for August in the history of Chicago with two exceptions, and those were during the boom building era just preceding the World's Fair. It is now almost certain that the year 1904 will surpass either 1891 or 1892, the period in which so many millions were expended for World's Fair structures. A comparison of the first eight months of 1903 and 1904 is as follows:

	Buildings.	Frontage.—Feet.	Cost.
1904	4,632	124,971	$26,162,290
1903	4,040	111,176	22,707,400
Gain	592	13,795	$4,454,890

This revival in building is in the face of the fact that common brick, through the actions of a local monopoly, is on an average $3 a thousand higher in price than a year ago, and that because of the constantly increasing restrictions on the day's work by building trades unions it is estimated that it costs from 10 to 15 per cent. more to build a residence or flat building than it did in 1903. The only structures that are considerably cheaper are the huge steel buildings that are fabricated at the shops, the saving in steel being more than enough to offset the increased cost of brick and labor.

Kansas City, Mo.

The amount of building projected during the month of August shows a very gratifying increase when compared with the figures for the same month of last year. There were 496 permits issued from the office of S. E. Edwards, Superintendent of Building, covering improvements having a frontage of 6636 feet and estimated to cost $810,270. In the corresponding month of 1903 there were 282 permits issued for buildings having a frontage of 2913 feet and involving an estimated outlay of $493,620. In classifying the buildings for which permits were issued during August of the current year it is found that 52 permits were for brick structures having a frontage of 2332 feet and costing $383,450; that 160 permits were for frame buildings having a frontage of 4304 feet and costing $299,675, while 284 permits were for miscellaneous improvements involving an outlay of $127,145.

Los Angeles, Cal.

Building in Los Angeles continues to compare very favorably with last year. During the month of August 690 permits were issued, of an aggregate valuation of $1,182,111, as compared with 602 permits valued at $1,127,819 in August, 1903, and 428 permits valued at $777,712 for August, 1902. Of the permits issued during the month just closed 553 were for new buildings, with a valuation of $1,074,851, and 137 were for additions, of the valuation of $107,260. During the month of August various classes of buildings undertaken were as follows: Two four-story brick buildings, valued at $62,000; five three-story brick buildings, valued at $117,690; five two-story brick buildings, valued at $62,136; 90 two-story frame buildings, valued at $387,883; 20 one and one-half story frame buildings, valued at $40,455; 327 one-story frame buildings, valued at $31,159; 13 frame flats, valued at $53,119; 15 sheds, valued at $8870; ten alterations to brick buildings, to cost $43,040; 127 additions to frame buildings, to cost $64,220; seven apartment houses, to cost $64,800, and one church, to cost $9930. During the first week of September 76 dwellings and eight business blocks were completed. The work now under way is progressing satisfactorily, and builders are well satisfied with the outlook. At the present time there seems to be an abundance of labor for the work.

New York City.

The principal topic of discussion in building circles the past month has been the situation as it exists between employers and employed. Conferences have been held from time to time with a view to adjusting the differences, but at the hour of going to press no definite results have been reached, although the opinion prevails that it will not be long before a resumption of operations will be under full headway, owing to the fact that more or less work is now being done and additions to the number of workers are constantly being made. The situation, however, changes so rapidly from day to day that it is impossible to predict the end with any certainty. It is claimed that fully one-half of the men locked out are now at work and that in many respects work in the building industry is proceeding as though no lockout existed and no men were on strike. According to Lewis Harding, chairman of the Press Committee of the Building Trades Employers' Association, there are "50 per cent. of the electricians at work, 25 per cent. of the plasterers, 20 per cent. of the carpenters, 30 per cent. of the plumbers and 20 per cent. of the tile layers." In his opinion the fight will be over in a very short time.

As affording an idea of the volume of operations in progress it may be stated that during August 243 permits were issued fcr improvements estimated to cost $6,476,615, as against 157 permits for buildings to cost $8,848,350 in August last year. Up to the date of going to press there had been issued since January 1 in the Boroughs of Manhattan and the Bronx a trifle over 2100 permits for building improvements, involving an estimated outlay of about $57,000,000, not including $8,000,000 for alterations, while for the corresponding period of last year 1306 permits were issued calling for an outlay of $62,508,960, to which must be added a trifle over $9,000,000 for alterations.

Philadelphia, Pa.

Building operations continue on an increasing scale, and comparisons made with corresponding periods of last year are of a most favorable nature. The report of the Bureau of Building Inspection for the month of August shows that 747 permits were issued, covering 1168 operations and involving an estimated outlay of $2,187,480, while for August of last year 670 permits were issued, covering 1042 operations and estimated to cost $1,895,965. The bulk of the operations was in connection with dwelling houses, for which over $1,000,000 was involved. Alterations and additions called for nearly $350,000; manufactures, $140,000; improvements in connection with charitable institutions, $228,000, and municipal buildings, $103,000. The Thirty-third Ward took the lead in the amount expended for the month, figures being $375,440.

A permit has just been granted for the buildings for the W. L. Elkins Masonic Home for Orphan Girls at Broad street and Hunting Park avenue. The buildings will be two and three stories high, all fire proof constructions, with exterior walls of brick, stone and terra cotta. The cost has been placed at $200,000, and the plans have been prepared by Horace Trumbauer.

Pittsburgh, Pa.

The renewed activity in building operations noted for some time past still continues, and although none of the enterprises under way are on a large scale, the total is considerable in the aggregate. One of the permits just taken out is that by G. N. Powell for ten brick veneered dwellings in the Twentieth Ward to cost $55,000; ground is being broken for an apartment house at the corner of Ross and Mills streets, Wilkinsburg, to cost $40,000, and another one to go up on the opposite corner is to cost $50,000. At Wood and Elliott streets, the same borough, a three-story apartment house is to be erected to cost $30,000, and a fourth on West and Kelly streets is to cost $20,000. The South Avenue Methodist Episcopal Church is about putting up a new building to cost $20,000. The contracts have been awarded by Architects D. H. Burnham & Co. for constructing a five-story brick business block at Liberty street and Oliver avenue for the Henry W. Oliver Estate, which will cost $60,000. Another improvement is a brick stable and storage warehouse in Allegheny, to cost $75,000.

The builders of the city of Pittsburgh were recently somewhat surprised by the resignation of R. K. Stephenson as assistant secretary of the Builders' Exchange League. He has accepted the position of secretary of the Building Trades Employers' Association of New York. A year ago last January Mr. Stephenson accepted the position of business agent of the Master Builders' Association of Pittsburgh, and later the duties of business agent of the Builders' League were added. When the two bodies consolidated last year as the Builders' Exchange League he was elected business agent of the combined organization. On May 22 of the present year he was elected assistant secretary of the league, which is the same as secretary. The rules of the organization necessitating the office of secretary to be held by a member, E. J. Detrick was elected.

Portland, Ore.

Building continues active in Portland, and it is claimed that practically all of the entire available force in the building trades is now employed. Dwellings, stores and warehouses still form the leading features in the building movement. The buildings for the Lewis & Clark Exposition are now nearing completion, but the effect of the exposition work on other buildings still continues. There is a good demand for all sorts of buildings in the vicinity of the fair grounds, and it is believed that this will continue until after the fair is opened.

San Francisco, Cal.

So far there has been no change from the activity which prevailed throughout the spring and early summer. Builders are now inclined to believe that the year will continue active and that at the close it will be found there has been no falling off as compared with the year previous. Henry E. Bothin has made contracts for the erection of two brick factories for occupancy by the Crescent Feather Company at and adjoining the southwest corner of Harrison and Nineteenth streets. One of them is to be two and the other three stories high. They will be built on plans by Frank S. Van Trees and cost between $20,000 and $25,000. A two-story brick store and apartment building is to be constructed by J. R. Hite on McAllister street, near Jones, at an outlay of $21,000. Work will soon be commenced on the San Francisco Nursery for Homeless Children on Lake street, between Fourteenth and Fifteenth avenues. It will cost $30,000.

San Francisco builders are greatly interested, both directly and indirectly in a decision of the California State Supreme Court declaring valid nine out of ten bond issues voted on by the electors about a year ago and aggregating over $17,000,000. The nine propositions approved by the higher court were: New city and county hospital, $1,000,000; new sewer system, $7,250,000; new school buildings, $3,595,000; repairing and improving accepted streets, $1,621,000; new county jail and addition to Hall of Justice, $697,000; Public Library building and site, $1,647,000; children's playgrounds, $740,000; acquiring land to connect Golden Gate Park and Presidio, $330,000; acquiring lands for Mission Park, $293,000; total, $17,174,000.

Tacoma, Wash.

During the month of August the number of building permits issued in Tacoma was 167 for buildings valued at $195,375, as compared with 149 permits valued at $120,401 for August, 1903. Of the permits issued, 79 were for new dwellings valued at $89,100; two were for flour mills, valued at $46,000; two were for brick buildings, valued at $20,000; two were for warehouses, valued at $6400, and the remainder were for miscellaneous buildings, repairs, alterations, foundations, &c. In the matter of dwellings, August, 1904, runs a little behind the same month for 1903. During August, 1903, 90 permits for dwellings were issued, these having a total valuation of $96,135.

Washington, D. C.

The annual report of Building Inspector Ashford, which shows that after deducting the $5,000,000 appropriated by the railroads for the Union Station, the value of building operations in the District of Columbia during the last fiscal year decreased more than $3,500,000. Including the $5,000,000 for the Union Station, the figures show for 1904 a total valuation of building improvements of $12,033,916, and for repairs $928,904 were expended, these figures comparing with $9,796,969 and $1,737,333 for 1903.

During the year the District Government expended $367,680 on buildings, which include the completion of ten school buildings and additions, two police stations, truck house, a new morgue, a cell construction in the police court and in the old and new workhouse. The number of permits issued by the office of the Building Inspector decreased during the year from 6480 to 6253.

LAYING OUT CIRCULAR ARCHES IN CIRCULAR WALLS *—XXI.

BY CHARLES H. FOX.

WE shall now give attention to the cylindro-conic arch, the soffit of which in a circular wall is a uniform conic surface. In practice, the surface of a right cone is taken to form the soffit surface of the arch; although in cases where the length of the opening exceeds twice that of the rise of the arch the surface of an oblique cone may be employed to form the surface of the soffit of the arch. In general, however, the axis of the

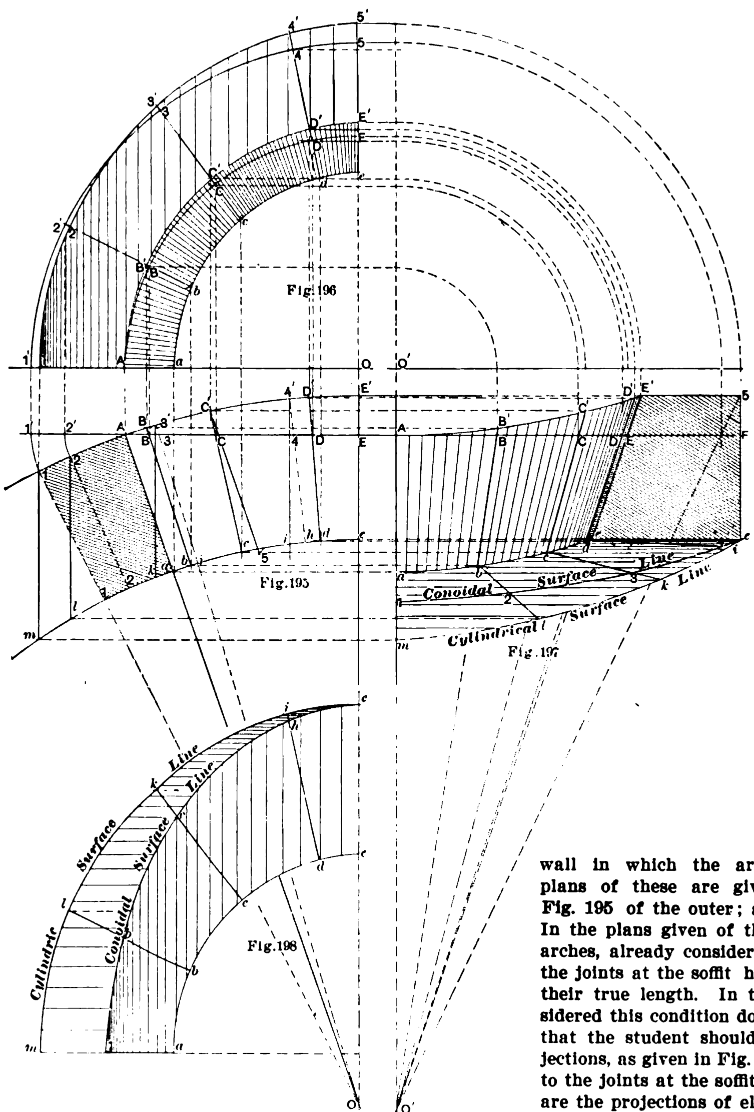


Fig. 195.—Plan Diagrams Relating to Cylindric Conic Arch.
Fig. 196.—Elevation of Outer Face and Soffit.
Fig. 197.—Orthographic View of Soffit and Inside Face.
Fig. 198.—Elevation of Inside Face and Conoidal Exterior Bounding Surface.

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conic surface is contained in a horizontal plane, perpendicular with the vertical plane, which may contain the vertical axis of the concentric cylinders which form the outer and inside faces of the wall in which the arch may be constructed. Also the point in which the axes of the conic and cylindric surfaces meet, or intersect, is taken as the vertex of the uniform conic surface which may form the soffit. This point is termed the focus of the joints. It takes this name because the face joints not only radiate toward the face center, as that of O, of Fig. 196, but also from this vertex or focus. It may be stated, however, that this condition is not a compulsory one; that is, it may, according to circumstances, be altered to suit other conditions that may have to be considered.

In the case of an arch in a wall, the face curves of which may be drawn with a short radius, by removing the focus point, making the length of the elements of the cone greater than that of the radius with which the face curves may be drawn, a greater length of opening may be given to the arch at the inside than would be obtained by the other method. In general, when speaking of a cone, we assume it to be standing upon its base, and the section of the base is taken as the plan, and the triangular figure of the cone taken as the elevation. In the diagrams presented herewith the reverse condition obtains; that is, the base of the cone employed becomes the elevation, as shown by A, B, C, &c., of Fig. 196, and the triangular figure, as that of O A E O of Fig. 195, becomes the plan. The opening line, as A E of Fig. 195, is taken as the base of the conic section. Properly speaking, the opening line is the trace at the horizontal plane of the vertical plane represented in A F of Fig. 197, which contains the right section or directing curve of the soffit. The surface of the soffit is intersected with two concentric cylindrical surfaces, which form the outer and inside faces of the wall in which the arch may be constructed. The plans of these are given respectively in 1 C′ E′ of Fig. 195 of the outer; and in *m c e* of the inside face. In the plans given of the radiant and cylindro-cylindric arches, already considered, the elements which belong to the joints at the soffit have been projected in the plan in their true length. In the constructions to be now considered this condition does not obtain, and it is important that the student should note this difference: The projections, as given in Fig. 195, of the elements which belong to the joints at the soffit, as those given in B′ *b*, C′ *c*, &c., are the projections of elements which are inclined to the two planes—viz., the horizontal and the vertical planes of projection. Therefore, they are not projected at the plan in their true length. One element, that of A′ *a* of the plan, is the only one that is projected in its true length. Another point that may be noted: the elements are not of a uniform length, that is, the length of the element, as E′ *e* of Fig. 197, is greater than that of the elements D′ *d*, C′ *c*, &c., of Figs. 195, 196 and 197. It may also be noted that the point E′, at the intersection of the highest element E′ *e* of the soffit with the outer face, is higher than that of the point E of the directing curve. The reason of this is obvious on inspection of the drawings. The opening line A E of the plan is the trace of the plane which contains the directing curve; the point E of the crown of the soffit projects a distance, E E′, beyond the plane in question. It therefore follows that, owing to the inclination O *e* E′ of the element considered, as shown in Fig. 197, the point E′ of the outer face of the element is necessarily higher than that of the point E of the directing curve. The same remark applies equally to the points D D′, C C′, &c., of the diagrams. The method by means of which the points, as B′, C′, D′, &c., may be projected, will be explained at the diagrams to follow, as also the method by means of which the points as a, b, c, &c., of the intersection of the soffit surface with the surface of the inside face, may be projected.

Joint surfaces are planes normal with the curve of the directrix of the soffit, and of which the lines, as a 1, be appreciated on referring to the plan, where A a 1, 1 gives the section of the lower joint of the springer, as required if the stones are formed to the conoidal, and A a m 1 the similar section as required if the cylindrical surface be adopted at the exterior of the arch. The diagrams Figs. 196 and 197 also show the saving of stone as obtained by adopting the conoidal instead of that usually employed, the "cylindrical" method of construction.

In Fig. 199 is given the plan; F 1 represents the outer, and k 3″ the inside face curves. These are drawn with

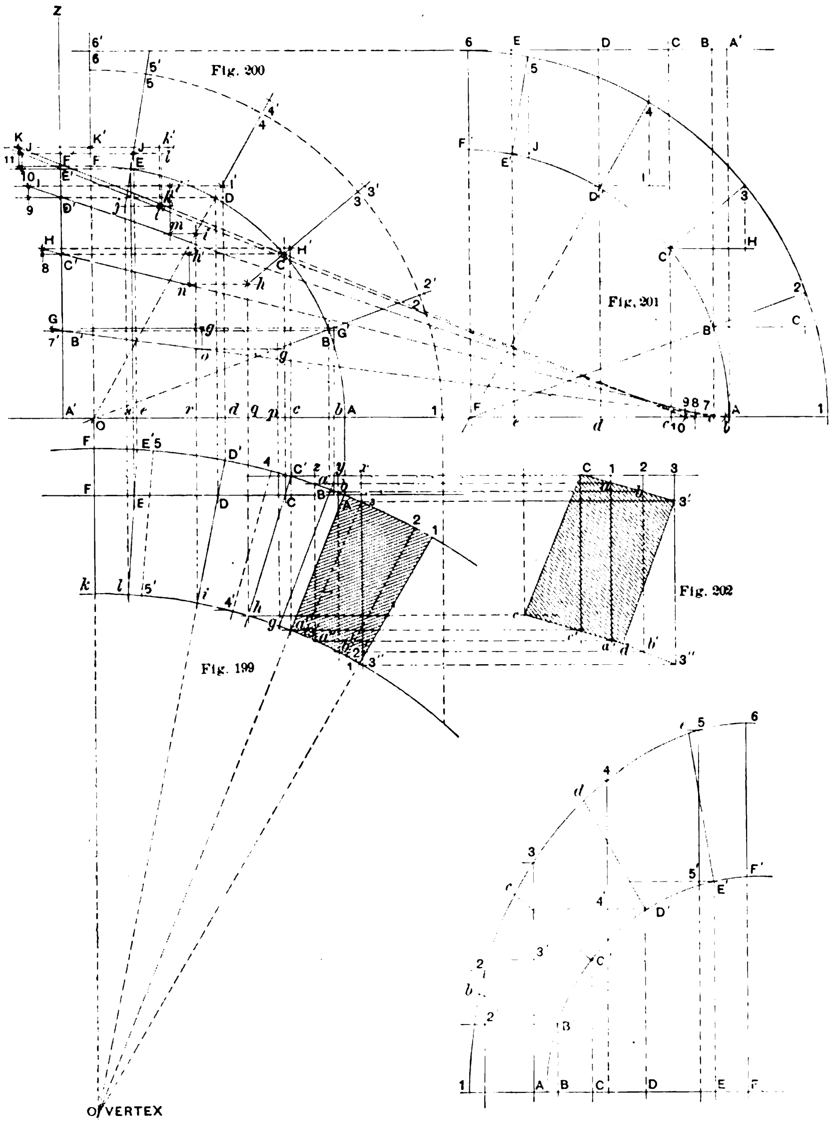

Fig. 199.—Plan.
Fig. 200.—Elevation of Directing Curve and Joint Lines.
Fig. 201.—Development of Outer Face Molds.
Fig. 202.—Development of Joint Molds.
Fig. 203.—Development of Inside Face Molds

Laying Out Circular Arches in Circular Walls.—XXI.

b 2, of Fig. 196; A a m, B b l, &c., of Fig. 197, and A a 1_1 1, B′ b 2_1 2, &c., of the plan are the projections.

The exterior bounding surface may be taken either as a cylindrical surface, similar to the like surface of the cylindro-cylindric arch, or as a conoidal surface, similar to the like surface of the radiant arches already considered. We think the latter method the better one, as the arch stones may be constructed from a much less quantity of rough stock than that required by the former one. For this reason we will explain only the one construction, that of the conoidal. The saving of stock may be the center O. It has already been explained that the point O is also the projection of the focus in which the elements of the soffit surface meet. In Fig. 200 is shown the curve directrix of the soffit, divided in the points A, B, C, &c., to correspond to the number of stones that the arch may contain. Joining the points in question with the face center O, the projection of the joint surfaces may be obtained. To ascertain the points in which the surfaces of the joints intersect the surfaces of the face and soffit proceed as follows: Take as example the joint surface represented in h 3 of Fig. 200. First project C of

Fig. 200 into the point C of the opening line of the plan and draw the radial O C C'; then at any point, as that of A' of Fig. 200, square with the base line produced, draw A' Z; then parallel with the base line draw C C' 8; set off C 8 and C' *h*, equal respectively with C C' and C *h* of the radial C' C of the plan. Now parallel with the center line O 6' draw 8 H and *h n*. Now at the base line produced set off A' 7, equal with O C, that part of the radial included within the axis O and the opening line A F of the plan. Now, drawing the right line 7 C' H through C' we obtain in H *n* the projection of the element which belongs to the soffit at the joint surface considered. Now parallel with the base line draw H H' and *n h*, and we may obtain in H' *h* the vertical projection, or elevation, of the soffit line in question. Assuming A 1 to the width desired of the arch stones at the face, set off H' 3' equal to A 1, and the elevation of the joint surface considered is given in *h* H' 3' of Fig. 200. In a similar manner may the projections be obtained of the joint surfaces which belong to the elements O 2', O 4', &c., of Fig. 200, noticing that the vertex point may be obtained by making A' 7, A' 9, &c., respectively equal with that portion of the radials O B, O D, &c., included within the axis O and the opening line A F of the plan.

Now to develop the face molds proceed as follows: Take any line, as that of A' 6 of Fig. 201, and on it set off A', B, C, &c., equal with A, B', C', &c., of the outer face line of the plan. Square with A' 6 draw A' A, B B', C C', &c., and then set off *b* B', *c* C', *d* D', &c., equal respectively with *b* G', *c* H', *d* I', &c., of Fig. 200; through the points given in A, B', C', &c., of Fig. 201 trace the developed curve of the soffit. Then drawing F 2, F 3, &c., through the points B', C', &c., the projection of the joint lines may be obtained. Now make A 1, B 2, C 3, &c., equal with A 1 of Fig. 200, tracing a curve through the points given in 1, 2, 3, &c., which gives the developed curve of the exterior bounding surface.

In Fig. 203 set off A, B, C, &c., equal with *a'*, *g*, *h*, &c., of the inside face curve of the plan, erect the perpendiculars, and set off B B', C C', &c., equal respectively with *p*-*g*, *q*-*h*, &c., of Fig. 200; a curve traced through A, B', C', &c., gives the developed soffit line.

Now to find the points through which to trace the curve of the exterior bounding surface we proceed as follows: As the exterior bounding surface is a conoidal one, similar to the corresponding surface of the radiant arch, the method as adopted for the similar construction at the inside face molds of the plates preceding may again be employed. First find the projections G, H, I, &c., of Fig. 201. Then at the outer face curve of the plan set off A 1, B'' 2, C' 3, &c., equal respectively with A 1, B' G, C' H, &c., of Fig. 201; draw the radials 2 2' O, 3 3' O, &c. Now in Fig. 203 set off A 1, B' 2, C' 3, &c., equal respectively with *a'* 1', *g* 2', *h* 3' &c., of the inside face curve of the plan. Erect the perpendiculars 2' 2, 3' 3, &c.; now make the points 2, 3, &c., at a hight above the base line equal to that of the hight of the corresponding points of perpendiculars 2' 2, 3' 3, &c., and set off the hights of the points 2, 3, &c., above the base line equal to that of the points 2, 3, &c., of Fig. 201 above the base line F 1. Through the points given in 1, 2, 3, &c., trace the developed curve of the exterior surface. Now draw the joint lines F B' *b*, F C' *c*, &c., which will complete the patterns.

Now to construct the joint molds. Take, as example, that as required at the joint surface of *h* H' 3' of Fig. 200. First, in Fig. 199, square with the opening line, draw *x* 3 3''; then divide C *x* into any number of equal parts, as shown in *x y z;* then parallel with the center line, through each point, draw lines, as C *a'*, *z a a''*, *y b b'*, &c. Now produce the opening line, as shown, to point 3' of Fig. 202; then parallel with the opening line, from the points C', *a*, *b*, 3 of the outer and from the points *h*, *a'*, *b'*, 3'' of the inside face, produce lines as shown in the diagram, Fig. 202. Now at any point, as C of Fig. 202, draw C *c* parallel with the spring line O A of Fig. 199; then set off C 3' equal with C' 3 of Fig. 201; divide C 3' into the same number of equal parts that C' *x* of the plan may have been divided into and square with the opening line produced draw the ordinates C *c'*, 1 *a a'*, 2 *b b'* &c., equal to the corresponding ordinates C *a'*, &c., of the plan. Through the points given in C *a b* 3' and *c c' a' b'* trace curves, as shown. Then set off *c d*, equal with the length C 9 of the joint line of the corresponding surface of the inside face molds; joining 3 *d* gives the joint mold as required at the joint surface considered.

The Necessity of Moisture in Heated Houses.

At the tenth annual meeting of the American Society of Heating and Ventilating Engineers, held in New York City recently, one of the papers presented was that by Professor R. C. Carpenter, dealing with the necessity of moisture in heated houses. This is a subject in which many of our readers are interested, and we therefore present the following extracts:

It is a well-known fact that heated air has a greater capacity to absorb moisture than cool air; thus, as an illustration, a cubic foot of air at a temperature of 10 degrees F. is capable of absorbing to the point of maximum saturation 1.1 grains of water. If the same quantity of air be heated to a temperature of 70 degrees, it becomes capable of absorbing 7.94 grains, or something more than seven times the former weight of water. It is customary to characterize the relative humidity of air as a percentage of the amount required to saturate it for any given condition, and this is determined by scientific calculation based on the difference in temperature between two thermometers in the same room, one of which has its bulb exposed to saturated air and the other to dry air.

It follows from these qualities of air that if cold air—*i. e.*, air at low temperature—be introduced into a room and afterward heated, that, although the total weight of moisture may remain unchanged, its capacity for absorbing moisture will be very largely increased and its relative humidity will be very greatly diminished. It is established, I think, with reasonable certainty, although there seems to be very little scientific data available on the subject, that the inmates of a room are more comfortable when the relative humidity of the inside air does not differ greatly from that to which they are accustomed outside. This is probably due to the fact that the capacity of evaporation of air increases as the relative humidity diminishes, and this is of such a nature as to absorb any free moisture from the body; this causes the skin to become dry, the body feverish, and is likely to cause unpleasant sensations, such as itching and pricking. The process of evaporation is also a cooling one, and its effect is to draw heat from the human body somewhat in proportion to its rapidity; this tends to lower the temperature of the body, and by so doing causes a demand for a higher temperature in the room than would have been required had the relative humidity remained unchanged.

The moisture required to maintain the relative humidity the same as the outside air may be of considerable amount. Thus, supposing saturated air at 10 degrees F. be introduced into a room at the rate of 1000 cubic feet per hour, we find by consulting tables that in order to maintain the air at the saturated condition we shall need to introduce, if the air be warmed to 70 degrees, about 6.8 grains of water for each cubic foot, or for the 1000 cubic feet we would need 6800 grains, or practically one pound per hour. It, however, is probably never desirable to maintain the air at a condition of absolute saturation, but it is generally thought to be desirable to maintain its relative humidity at a point approximating 50 per cent. of saturation, or within 10 to 15 points of the ordinary relative humidity of the outside air. If this condition were produced, about 50 per cent. as much water would be needed as indicated in the previous calculation—namely, about ½ pound of water per 1000 cubic feet of space per hour. A building containing 10,000 cubic feet of space would, by this calculation, need to have something like 5 pounds of water, or say 2½ quarts, evaporated per hour in order to maintain the degree of humidity somewhat near that usually found in the outside air. This calculation is interesting as showing that large amounts of water may be needed to preserve the relative humidity the same as that of the outside air during the processes of heating.

I am of the opinion that popularly the hot air furnace is credited with removing more moisture from the air which it warms than is the case with the steam or hot water radiator. From the effects, however, which I have frequently observed as to the drying out of furniture and the shrinkage of woodwork generally, I am inclined to believe that this opinion is somewhat in error, and I think that accurate measurements will fail to prove the hot air furnace to be a greater sinner in this respect than our other systems of heating. The hot air furnace is usually provided with a water pan so located that an opportunity is presented for the air to absorb moisture; but the experience with the pan, as usually constructed, has in most cases proved that it was entirely inadequate to accomplish any useful result. It is very seldom that any attempt is made in the case of steam or hot water heating to supply the necessary moisture required to keep the air at a uniform degree of humidity, although it may often be necessary.

I think that there can be no doubt that the human body requires, in order to be comfortable, a higher temperature if the relative humidity of the air is low than if it approximates the humidity of the ordinary outside air, and that consequently we should find that means for increasing the amount of moisture in a room up to the proper degree of saturation would enable us to be comfortable at a lower temperature and thus economize in our fuel requirement. It would be an interesting question to know what effect the dry air in our inhabited rooms has upon the health of the occupants. I think we will find much difference of opinion regarding this proposition. It is a well known fact that dry air is extremely favorable for the cure of certain diseases, and I believe, also, that it quite certain that it is not quite so favorable a medium for the propagation of disease bacteria as moist air, but nevertheless I do not think it is healthy for a normal person; but regarding this I have little data which could be considered as conclusive.

Finishing Maple Doors.

In reply to the inquiry raised by one of their correspondents as to how maple doors should be prepared and why sandpapering is recommended between coats of hard oil a recent issue of the *Painters' Magazine* offers the following suggestions, which may possibly be of interest to some of our readers:

If you refer to natural finish of hard maple or bird's-eye maple, we would say that there is no filler required and that it should be finished in its own color—that is, kept as light as possible by the use of white shellac varnish for first and second coat and a very pale maple or ivory varnish for the finishing coat or coats. When hard it may be polished with fine effect, but sandpapering is not required, unless the shellac varnish has not been applied evenly. Nor is sandpapering required on any kind of work that is treated with hard oil, unless the latter has become sandy from one cause or another.

Graining doors, &c., in imitation of maple needs much care and attention. The ground is a light cream tint, made with white lead and yellow ocher. The graining color is made of equal parts raw sienna and raw umber. Wipe out the lights that make the curl and blend lengthwise of the curl. Varnish with a thin, pale varnish.

Among the interesting tests recently made under the personal direction of Prof. Ira H. Woolson of the Department of Mechanical Engineering, Columbia University, New York City, was one designed to obtain data as to the fire resisting qualities of trussed metal lath partitions. A small building about 15 x 10 x 10 was constructed at the Columbia Fire Testing Station, on one side wall of which Kings-Windsor cement plaster had been used on metal lath without iron uprights, and on the opposite side wall lime mortar gauged with Portland cement constituted the partitions. Oak and pitch pine logs with well seasoned boards were used as fire materials, and the temperature was forced to 1700 degrees F., the fire being maintained for one hour. At the end of this time the hose was played upon the interior side walls under the test, and beyond some scaling of surface plaster they remained intact. The test was regarded as an exceedingly severe one, and was made for the purpose of determining the availability of metal lath partitions in New York City buildings. We understand that since the fire these partitions have been very favorably received in the rebuilt district of Baltimore.

Handsome Bronze Doors for Boston Public Library.

The Boston Public Library is about being fitted with three pairs of handsome sculptured bronze doors, which represent the efforts of Daniel Chester French, who has had the work in hand for several years past. These doors, which during the early part of September were on exhibition at the John Williams Bronze Foundry, 556 West Twenty-seventh street, New York City, differ from the usual bronze doors of many panels in that they consist simply of large reliefs of separate figures. The subjects represented are Music and Poetry, Knowledge and Wisdom, Truth and Inspiration. These allegoric figures, enveloped in much graceful drapery, are attractive in their low relief, and will probably rank among the most notable examples of that form of sculpture. The work is of a highly interesting character, and appeals most strongly not only to patrons of art, but to all who are concerned in the beautifying and embellishment of buildings designed for public use.

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FRAME STABLE AND CARRIAGE HOUSE OF MR. T. A. SPERRY, PROSPECT STREET, CRANFORD, N. J.

J. A. OAKLEY & SON, ARCHITECTS.

SUPPLEMENT CARPENTRY AND BUILDING, OCTOBER, 1904.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

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The Rebuilding of Baltimore.

Reports from Baltimore show that the traces of the great fire, which destroyed seventy acres of buildings in the heart of the business district of the city early in February of the present year, are rapidly being wiped out. Surprising progress has been already made in the rebuilding of the burnt district, which now presents a scene of great activity. New buildings are going up in every direction and some have already been completed and are receiving their tenants. A number of the large skyscrapers which survived the fire, but with more or less damage to the masonry and the interior, have been repaired and refitted and are again in as good condition as before the conflagration. It is expected that before the end of the year fully one-half of the new buildings in the devastated district will be completed and occupied. According to the figures of the Baltimore Building Department, the construction work now in hand exceeds $7,600,000 in value, and a great deal more is in contemplation. One important feature of the reconstruction of Baltimore's business quarter is the steps that are being taken to improve the district by widening the formerly narrow streets and providing open spaces, which work is being done under the supervision and direction of the Burnt District Commission, appointed by the Mayor immediately after the great fire. It is estimated that between 20,000 and 25,000 workmen are now actively employed in the work of construction, and the long list of building permits published each week in the Baltimore papers indicates that this number will be steadily increased for some time to come. The great improvements that are being made indicate that the business portion of the city of Baltimore will be a far finer and better quarter than before the fire. Baltimore will rise out of its ashes a greater and more attractive city, at least architecturally, as has been the case with Chicago, Boston, Galveston, Jacksonville and other large centers of population which have been called upon to experience appalling diasters by fire and flood in the past.

Master Builders' Labor Programme.

The differences which are constantly developing between workmen and employers, not only in the building and allied industries, but in almost every branch of trade, have tended to render the labor question a never-ending topic of discussion. Efforts are continually being made looking to a solution of the problem by bringing about a better understanding between labor and capital, and it is gratifying to note that much progress in this direction has been made during the past few years. One result of this frequent agitation of the subject is seen in the growing tendency among employers to organize as a matter of self-protection and to adopt measures which often have the effect of bringing about an adjustment of differences before the situation has become so strained as to cause an actual rupture of relations. The latest phase of the labor question and one which cannot fail to command the interest of contracting builders all over the country is the "Programme in Labor Issues" unanimously adopted at a meeting of the Master Builders' Association of the City of Boston, held the first week in October. The document sets forth in clear and comprehensive language the attitude of the association toward the unions and outlines the policy to be pursued in cases of labor disturbances. It is well known that Boston, in common with other large cities of the country, has suffered great inconvenience and loss in the past by reason of strikes in the building trades, and it is owing to this fact that the association, the membership of which comprises the leading builders of the city, has voted to support a line of policy which represents the results of nearly 30 years' experience in labor matters. It is felt by those who have been instrumental in the framing of the general principles enunciated that the new lines mapped out will be found to develop a marked advance in these perplexing issues. The new programme, which we print in another column, provides that no persons or combinations shall be permitted to dictate how a business shall be conducted excepting the persons in control of the business and that absolute freedom of choice in the employment of workmen is essential not alone to the employer but to the employee as well.

Registered Workmen.

Perhaps the most striking feature of the policy outlined is that whereby the members of the association are to file with its secretary the names of "such workmen as they may consider worthy of recognition by the association by virtue of skill, interest manifested in work, good habits and reliability." These are to be known as "registered workmen," who shall be entitled to hearings on matters relating to the common interests of workmen and employers. For this purpose conferences are to be held at stated intervals between the registered workmen and the members of the association for the purpose of reaching decisions in regard to matters of mutual concern. This plan, as already intimated at the outset, is the climax of personal concentrated effort during a period of nearly a lifetime, and its outcome will be watched with the deepest interest. Its success will doubtless depend largely upon the spirit and manner in which the various clauses of the programme are interpreted in practice, but should time show that a reasonable measure of the good expected to result from it has been accomplished it will be copied far and near by every employer of labor throughout the length and breadth of the land.

Growth of Manual Training Schools.

The public school system of the country has been repeatedly charged with the sin of unfitting the rising generation from working with its hands, while it fitted it for nothing in particular. This charge is most frequently lodged against our public high schools, which annually graduate thousands of young people with aspirations toward the professions, who finally find their ways into cheap clerical positions, because there is nothing else that they know how to do. To correct this evil, for evil it is, wise boards of education in the larger cities and towns are making provision for manual training departments to existing public schools, and in some instances to separate public manual training schools. It has resulted in the training of the hand and eye, developing the judgment of the American youth, instilling into their minds the dignity and worth of manual labor, and fitting them, upon graduation, to step onto one of the lower rounds of our industrial ladder, with the attitude toward useful work and the skill and taste that will permit them to rise to greater hights. It is true that most of these young graduates will, for a time, find it difficult to secure work in our shops and mills because of the dominance of the labor union system and its unreasonable rulings in regard to apprentices; but that is only a transient condition which is steadily growing less serious; and the very presence of the alert young minds and trained willing hands of graduates of these manual training schools, clamoring for employment, will tend, year by year, to lessen the arbitrary power of trades unionism. We may even hope that this new force will hasten the coming of the industrial millennium when personal skill, industry and good habits, rather than a celluloid button, will be the open sesame to the doors of employment in the trades and industries.

Convention of the Texas Builders' Exchange.

The fifth annual convention of the Texas Builders' Exchange was held in the Business Men's Club Rooms, Waco, Texas, on September 12, 13 and 14, Vice-President Davis E. Sayre being in the chair. The Credentials Committee announced delegates present from San Antonio, Dallas, Galveston, Beaumont, Cleburne and Houston, the delegates representing the Exchanges in Fort Worth, Austin, Denison, Palestine and Amarillo not having arrived when the session opened.

Communications were received from the Builders' Exchange at Shreveport, La., and from the Building Contractors' Council of Chicago, Ill. The report of the secretary and treasurer was presented, also that of the auditing committee. There being no Builders' Exchange in Waco, a committee of four was appointed to assist the local contractors in perfecting an organization. The committee consisted of Fred Hartel, H. C. Oppermann of Galveston and P. T. Shields and W. N. Hagy of San Antonio. An invitation to a trolley ride around the city to visit all points of interest, tendered by W. S. Ratheff, representing the street railway company of Waco, was accepted by the presiding officer on behalf of the delegates. It was announced that there would be "a smoker" in the club rooms at 8 o'clock in the evening, and as there was no further business the session adjourned until the following morning at 10 o'clock.

The second day's session was given up to a consideration of various matters of trade interest, including discussions of technical papers, reports, &c. A traveling organizer was appointed to work under the direction of the president and the secretary, and a motion prevailed that a State cabinet composed of the president, vice-president, secretary and treasurer be created, the cabinet to control the business of the State Exchange and report annually at the meeting. W. N. Hagy of San Antonio, J. T. Booth of Beaumont, Thomas Beggs of Dallas, E. J. Zimmerman of Cleburne and Fred Hartel of Galveston were confirmed as the new committee on legislation, the members named, according to the custom of the organization, having been nominated by their respective exchanges.

The officers elected for the ensuing year were: President, P. T. Shields of San Antonio; vice-president, M. C. Osborne of Cleburne; secretary and treasurer, H. C. Oppermann of Galveston, and sergeant at arms, Thomas Beggs of Dallas.

At the session on Wednesday, September 14, the new officers were duly installed, Mr. Shields, the newly elected president, addressing the convention. An auditing committee was appointed by the chairman to serve for the ensuing year, and under the head of "Good of the Order" several brilliant speeches were made by enthusiastic members from the local exchange.

It was decided that the next annual convention should be held in San Antonio, the date of the meeting being left to the discretion of the president.

New Station for Wabash Railroad.

(With Supplemental Plate.)

With a view to affording such of our readers as may be interested in the subject an idea of the construction of important buildings in the larger cities of the country, and at the same time show the manner in which the work of putting up the encasing masonry is carried on, we have taken as the basis of one of our half-tone supplemental plates this month what is known as the Wabash Railroad Terminal in Pittsburgh, Pa. The structure is intended to be used not only as a railroad station but the upper floors will be utilized as offices for the railroad company. The picture from which our half-tone was made practically tells its own story, clearly showing as it does the manner of arranging the scaffolding, that for the lower stories being of a form doubtless familiar to builders all over the country, while the masonry work of the upper stories is carried forward from a swinging scaffolding suspended from the lookouts clearly indicated at the top of the structure.

The masonry of the first story of the structure is of Maine granite, the second story is of Bedford limestone, while the upper stories are of Kittanning repressed brick with terra cotta trimmings, the cornice being of terra cotta. In the construction of the building probably about 2650 tons of structural steel were employed. The arrangement of the building is such that railroad trains enter on an elevated steel structure at the level of the second floor. The first, mezzanine, second and intermediate floors are devoted to waiting rooms, ticket office, check rooms, etc. The first floors are finished in oak and the second and third in marble, scagliola and mahogany. The plans of the building were prepared by Theodore C. Link, with offices in the Fitzsimmons Building, Pittsburgh, Pa. The builders were the George A. Fuller Company and the contractors for the steel work were the Pennsylvania Steel Company. Not the least interesting feature in connection with the building is the fact that the structural steel was treated with Dixon's silica-graphite paint as a protection against corrosion.

Death of a Worcester Architect

J. William Patston, a prominent architect of Worcester, Mass., died very suddenly at his residence in that city October 6, aged 43 years. He was a native of Providence, R. I., where he studied architecture under William H. Hall. He removed to Worcester twenty years ago and was first employed by A. P. Cutting and later by Fuller & Delano, during which time he superintended the construction of important buildings. Later he practiced his profession by himself and was for a time in partnership with Charles H. Lincoln. Of late years he has been associated with A. J. Marble, his father-in-law. The list of important buildings which he designed is a long one, including a number of important business blocks and manufacturing establishments, a recent work being the $400,000 addition to the Slater Woolen Company's plant at Webster, Mass. The number of residences erected from his plans is a large one. His position as an architect is shown in the fact that for three years he was the principal of the architectural classes of the Worcester County Mechanics' Association. He was prominent as an Odd Fellow, being a member of Anchoria Lodge of Worcester; was an officer of Worcester Lodge of Elks, a member of Worcester Chapter of Architects, and of various clubs. He leaves a widow.

AT the recent meeting of the United Brotherhood of Carpenters and Joiners in Milwaukee, Wis., Frank Duffy was re-elected general secretary.

A HOUSE AT TAMPA, FLORIDA.

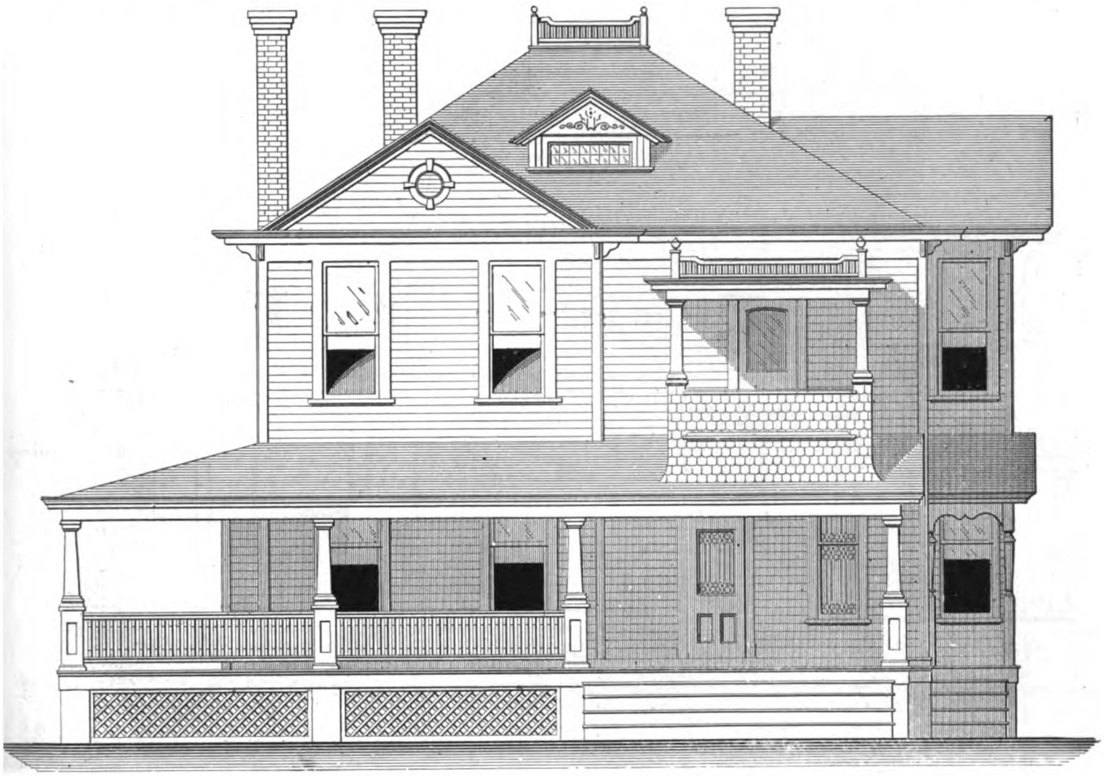
THE house which we have selected as the basis of one of the two half-tone supplemental plates which accompany this issue is located in a section of the country where climatic conditions vary in a marked degree from those where the winters are most severe. It is of frame construction and is presented as an interesting example of a style of dwelling to be found in Tampa, Florida. The picture is a direct reproduction from a photograph and shows the appearance of the completed building, while the elevations and details presented upon this and the following pages show the general construction employed.

According to the specifications of the architect, the structure is of "Balloon" frame, well spiked together, and with wind braces cut in wherever practical. The partition joists and long header joists are doubled and the studding is doubled at all door and window openings. All rooms exceeding 12 feet in width have two rows of bridging and rooms less than 12 feet in width have one row of 1 x 3 inch bridging. The sills of the building are 6 x 8 inches; the first and second floor joists 2 x 10, spaced 16 inches on centers; the attic joists are 2 x 8 inches, the studding 2 x 4 inches, also spaced 16 inches on centers; the common rafters 2 x 4, spaced 24 inches on centers, and the hip and valley rafters 2 x 6 inches. The lath for supporting the shingles are 1 x 3 inches, with 4-inch spaces. The frame of the house is covered with 6-inch novelty siding and the main roofs with cypress shingles 5 inches wide and laid 5 inches to the weather. On the porch roofs the shingles are laid 4 inches to the weather. The front porch is ceiled overhead with matched ceiling 3 inches wide and blind nailed. The hips are run with alternate laps "in the old fashioned way."

The first floor is double, the working floor being 1 x 8 inch dressed material laid diagonally with two nails to each bearing, while the finished floor is ⅞ x 2½ inches quarter sawn tongued and grooved yellow pine blind nailed to every bearing. The porch floor is 1¼ x 4 inch square edge material, the edges being painted before the floor was laid. All doors are No. 1 cypress with five horizontal panels, Ogee stiles and rails, blind mortised 1⅜ inches. The front door is 1¾ inches thick, with glass panel. All sashes are cypress check, railed and glazed with double strength glass, except the jib window in the dining room, which is glazed with polished plate and art glass transom. The staircase windows are also glazed with art glass. All sashes are hung on braided cord and balanced with cast iron weights. Russell & Irwin's flush lifts are used on the sashes.

The hall and dining room are wainscoted 3 feet 6 inches high with black cypress panels, the main staircase except treads being of the same material. All hardware is of bronze finish. The bathroom and kitchen are wainscoted 5 feet high, with alternately reeded and plain matched boards, finishing with mold and cap with quarter round at the floor. The house is piped for gas from city main, and wired for electric lighting in conformity with insurance regulations. All exterior wood work, including porch floors, are painted with two coats American white lead and linseed oil in colors to suit. All interior finish has a coat of paste wood filler and two coats of Berry Brothers' hard oil finish. The outside of bathtub, flushing tank and sink have three coats of white enamel paint. All wood work in the parlor has five coats enamel white paint carefully rubbed, while the wainscoting in bathroom and kitchen is finished with three coats of Berry Brothers' hard oil.

The two-story frame house here shown is located on Hyde Park avenue, Tampa, Florida, and was erected not long since for A. A. Wood in accordance with plans prepared by and under the supervision of C. E. Jay, architect, of the place named.



Front Elevation.—Scale, ⅛ Inch to the Foot.

A House at Tampa, Fla.—C. E. Jay, Architect.

The Steel-Concrete Work of the Harvard Stadium.

A most interesting piece of work from whatever standpoint it may be viewed was the construction of the "Stadium" for Harvard University at Cambridge, Mass. There are many details concerning this piece of steel-concrete work which are of special interest to our readers, and it is for this reason that we take the space to present the following extracts from a paper by L. J. Johnson read before the Boston Society of Civil Engineers and published in the *Journal* of the Association of Engineering Societies:

Although the Harvard Stadium is well known in its general character to many members of this society it may be well at the outset to recall briefly some of its main features. The Stadium is a steel-concrete and steel grand stand, U-shaped in plan, to accommodate some 23,000 spectators at football and other games on Soldiers' Field in the Brighton district of Boston. It is intended to furnish a permanent, fire proof and architectually pleasing structure in place of the short lived and unsightly wooden grand stands hitherto in use. The structure consists essentially of five parallel rows of steel-concrete girders, columns and piers, extending around the U from tip to tip, and supporting a system of steel beams and trusses crossing them transversely. This transverse steel work in turn supports lines of steel-concrete slabs running around the U and forming the seating surface.

The steel-concrete work includes, besides all the columns, piers, main girders, floors and the seating surface above mentioned, the outside and end walls, the staircases and all parapets and railings. The foundations are all of concrete, some reinforced, some plain. All parts exposed directly to the weather are of steel-concrete.

The developed strength of the U at the outside row is 1390 feet, and the uniform width across from front to back of the wings of the U is 98 feet. The area actually under cover is some 120,000 square feet, about 40 per cent. of which is devoted to the semicircular end, and the rest to the two straight wings. The lowest seat is about 8 feet and the highest about 48 feet above finished grade. The number of rows of seats is 31.

The over-all length of the Stadium is 575 feet and the width is 420 feet, both exclusive of some small towers to occur at each tip of the U and a flight of two or three steps to extend the whole length of the outside. The highest part of the structure now finished is about 53 feet above the ground, but the addition of the covering for the upper promenade will make the final hight 71 feet.

Most of the concrete work was cast in place in wooden forms in the ordinary way, but the slabs of which the seating surface is composed were of a special mixture and were cast in sand molds upon the ground in units weighing about 1200 pounds each, and after hardening were hoisted into place and set upon the supports which were meanwhile being prepared for them. The concrete cast in the wooden forms is to be picked so as to remove the board marks, while the seat slabs have a satisfactory surface given by the sand mold. The steel reinforcement in all the concrete consisted of Ransome cold-twisted square steel bars (ranging in size from ¼ inch to an inch), supplemented in the seat slabs with a special wire netting with rectangular meshes, electrically welded at the joints.

The concrete was mixed by machinery, two Smith mixers operated by gasoline engines constituting the plant for the purpose.

Constants for use in the concrete design were taken at figures to be regarded as suitable for ordinary Portland cement concrete of 1 : 3 : 6 mixture, though the concrete used was of varying mixtures, always considerably richer than 1 : 3 : 6. An attempt was made to use concrete of special mixtures for special places in the work, but this was found to be impracticable under the conditions—except, as above stated, in the case of the seat slabs.

Three grand divisions of the work went on simultaneously—the casting of the standing concrete (work going on on both wings at once), the manufacture of the structural steel work and of the concrete slabs. The re-

A House at Tampa, Fla.—Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

sults of these three operations were assembled by the setting of the steel work and the slabs.

The Boston Bridge Works had the contract for the manufacture and erection of the structural steel; but the steel-concrete work was done by day labor, the Aberthaw Construction Company being employed as purchasing agents and as field executives to devise, install and operate the steel-concrete construction plant.

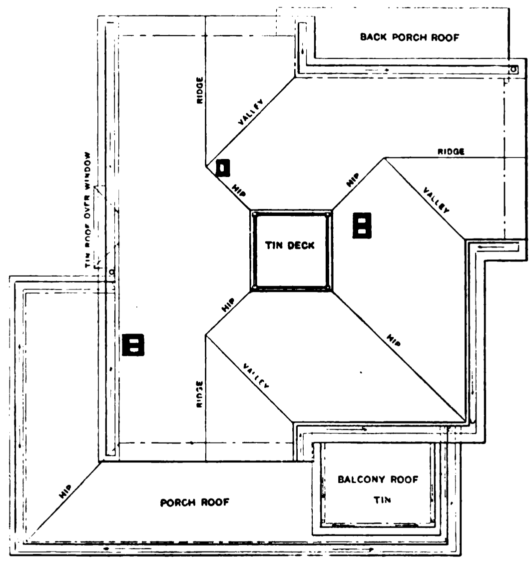
The Harvard Athletic Association furnished the general and detailed designs for the entire structure, the architecture being in the hands of C. F. McKim and G. B. de Gersdorff of New York; the engineering design was the work of J. R. Worcester and the writer, and the whole was under the direction of Professor I. N. Hollis.

The foundations are of the simplest character, as borings showed only hard gravel and clay to a depth of at least 40 feet. They are mere concrete or steel-concrete blocks laid on the natural ground just below frost, so proportioned as to keep the maximum pressure on the ground from exceeding 7000 pounds per square foot.

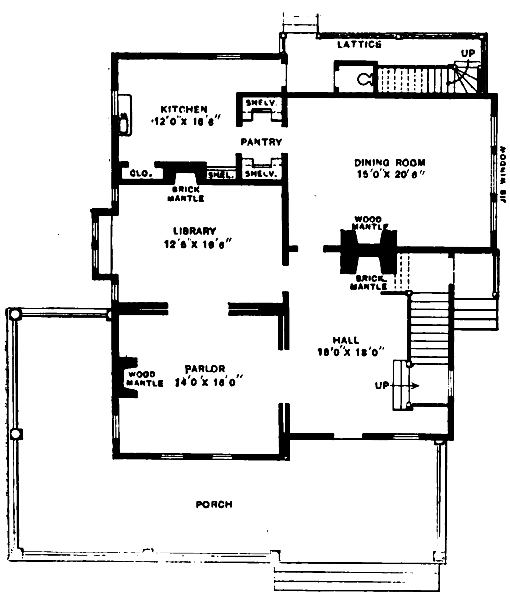
The methods and principles followed in the design of the remainder of the concrete work may conveniently be taken up under three general heads, viz.: First, columns; second, girders (simple and cantilever), and third, walls and parapets.

Columns.

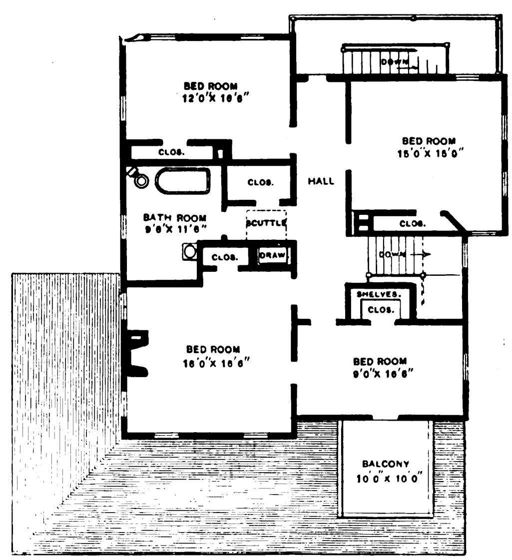
All the columns contain twisted rods in the form of verticals at the corners, with or without horizontal hoops at close intervals. This reinforcement consisted of ⅝ and ½ inch rods, depending on the size of the columns, one such rod being placed near each corner of the column. pounds per square inch to the maximum combined live and dead load, increasing the results thus obtained whenever necessary to keep the ratio of the length to least side of column down to about twelve, or to give round numbers for dimensions of the section. The structural



Outline of Roof Plan.



First Floor.



Second Floor.

A House at Tampa, Fla.—Floor Plans.—Scale, 1-16 Inch to the Foot.

In order to guard against the risk of such slender rods buckling when too near the surface square hoops of ¼-inch rods encompass them in horizontal planes at intervals, keeping their free or unsupported lengths within reasonable limits.

The columns proper range in size from 14 x 14 inches to 24 x 33 inches. Besides these, and designed in the same general way, with corner vertical rods and horizontal hoops, except that they are hollow, are the piers showing in the outside wall and already mentioned, which are externally 66 x 36 inches, the walls along the 66-inch side being 4 inches thick and the other two 6 to 8 inches thick, the 8 and 6 inch ends being counted on as furnishing the whole compressive strength.

The cross sections of the columns were determined by applying an allowable compressive stress of 350 to 400 steel work and concrete girders and struts were arranged to aid in keeping down the ratio of length to least side.

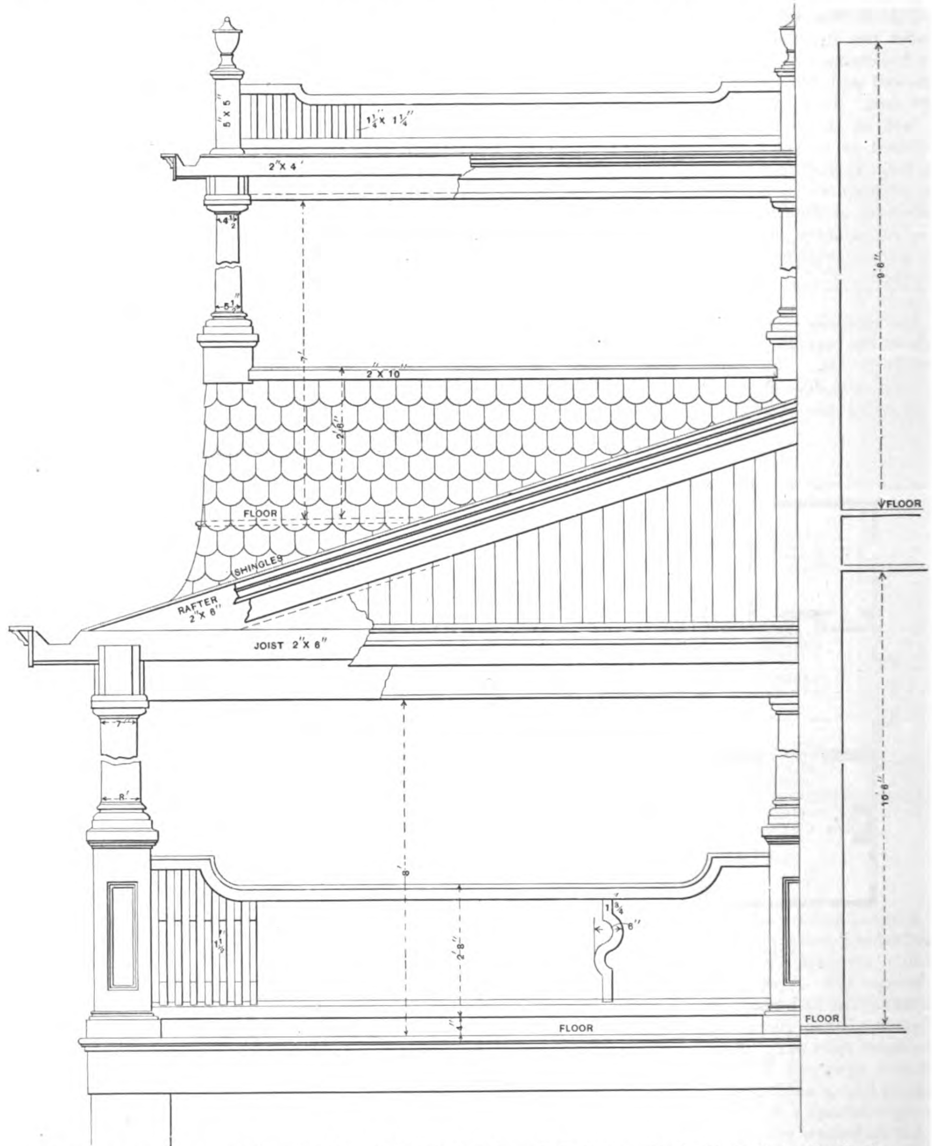
Girders.

Out of the multitude of methods advanced for the design of steel-concrete girders one based upon the observations of Prof. W. K. Hatt was adopted throughout the work.

The steel-concrete beam work included simple girders, 24 feet 9 inches in span, with sections 16 x 47 inches, 18 x 45 inches, 22 x 60 inches and 24 x 60 inches, and two systems of curved (radius 190 feet) cantilever girders in row D with sections 18 x 45 inches and 24 x 60 inches respectively. The cantilever system permitted the retention of the same cross section throughout the curve in this line of girders as was used on the tangent, and to some extent counterbalanced the rotary effect of the curvature of the girder. The ends of cantilevers and of suspended spans being critical points subject to very severe shear, they were stepped so as to reduce the effective concrete area as little as possible and armored with special care. The stirrups used here were of special construction, placed in an inclined position, and were designed to resist the whole vertical shear.

The cantilever ends tend to act as joints at which the shrinkage stresses are relieved. The first suspended span to be built shortened in hardening and slipped on the treads of one of the stepped ends so as to show a crack throughout the extent of the risers of the joint, and in slipping spalled the corners of the steps slightly. After this four 1-inch rods were put in at mid-hight of the girder and lengthwise with it, crossing the joint and extending into both the cantilever end and suspended span far enough to develop the strength of the rods with a view to prevent this slipping and, so far as seen, the result has been a success. Shrinkage joints are thus kept about 115 feet apart in this line. At the ends of these intervals are opportunities for shrinkage to take place harmlessly. Besides using the rods the steps were finished off with a troweled surface truly level, so as to leave things in shape for a harmless slip should the rods prove ineffective. It was at one time planned to use two ¼-inch steel plates lubricated with graphite at each of these treads to facilitate sliding and to prevent spalling, but it did not finally seem necessary to go to such a length.

These lines of cantilever girders were subject to a very complex set of loads and were much cut up by promenade floor beams and passageways for stairs. The girders in row C, on the curve, were all straight—a series of chords—but they support the ends of trusses and are hence much larger than the girders of the same row on the tangent, their section being 22 x 60 inches as against 16 x 47 inches.



A House at Tampa, Fla.—Details of Front Porch and Balcony.—Scale, ⅜ Inch to the Foot.

The promenade floors were made of slabs of inverted trough section about 8 feet 3 inches wide and some 20 feet in span, cast alternately in place, thus providing shrinkage joints at the edge of every slab; the thickness of the body of the slab is 4½ inches, exclusive of the granolithic finish, and the flanges are 6 x 18, making practically a 4½-inch flat floor resting on 12 x 18 joists 8 feet 3 inches on centers and 17 feet in span.

The seat slabs are a series of shapes set up so as to form a flight of treads and risers. They are of crusher-dust concrete (poured at a consistency of cream) reinforced by a ½-inch rod at the base of each riser and electrically welded steel wire netting with rectangular mesh furnishing straight wires 0.162 inch in diameter, 5 inches on centers, running across the treads and up the risers. The wires running the other way are somewhat smaller and closer together. In the treads this netting furnishes the ordinary tensile reinforcement for the span from riser to riser, besides hanging one edge of the tread to the base of the riser, and in the risers it furnished vertical reinforcement against shear, for the risers constituted a series of joists running from one steel beam to the next, the span being usually 8 feet 3 inches.

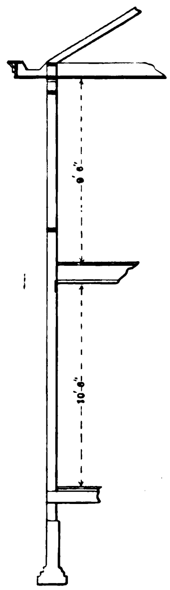
These slabs were cast in small units of about 8 cubic feet each to facilitate handling and to provide amply against shrinkage cracks. They were some 4800 in number and, including those on the curves, required 95 different patterns, counting rights and lefts as alike, and in many cases counting as alike such patterns as varied only slightly in length. On the semicircle they were made curved, but a constant radius was used for all, regardless of their distance from the center. The true radii would have had 31 different values, ranging from 115 to 189 feet, but 166 feet 8 inches was chosen as a convenient mean to use for them all.

The handling which all these slabs underwent in storing and placing formed an automatic system of testing, which was considered a distinct advantage of the method of manufacture. They were cast with ⅛-inch allowance for end joints, but the sand casting proving to be a less accurate process than was expected, more or less picking and clipping had to be resorted to in setting them. An additional and probably more important cause for such modifications was inaccuracy in the steel setting.

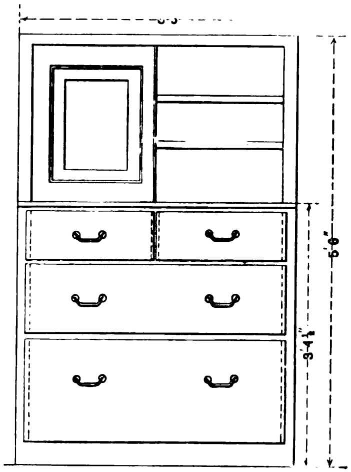
The treads of these slabs are an illustration of concrete reinforced with a small percentage of steel and accordingly rated for strength from the point of view of the steel. The strength is ample almost to excess, even with this small allowance of steel, yet thinner sections of concrete were not seriously considered, 3¼ inches on the average being adjudged a suitable minimum from the point of view of resistance to abrasion, shocks, &c., and the omission of the steel netting altogether was, of course, not seriously entertained—even though the concrete might, by counting on its tensile strength, be figured out as strong enough.

Walls and Parapets.

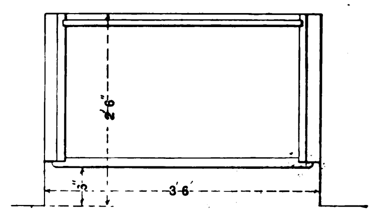
The special problem in the design of the walls and parapets which will be considered here is how best to provide for shrinking so as to minimize the evil of cracking from this cause or from temperature changes. One way is frankly to leave joints at short intervals free to open, using steel reinforcements between these joints to compel all the cracking effect to appear, if at all, at the joints left. These joints are supposed to open in tolerably straight, clean cracks, less unsightly than random cracks would be. They are unsightly enough, however, and it is difficult to make the cracks turn out as straight as expected. There is, therefore, a strong incentive to resort to the other method of treatment and attempt to prevent all cracks from temperature and shrinkage changes by



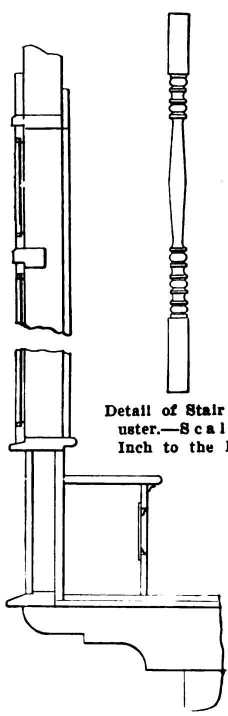
Section.—Scale, ⅛ Inch to the Foot.



Closet and Drawers in Bathroom Passage. —Scale, ½ Inch to the Foot.

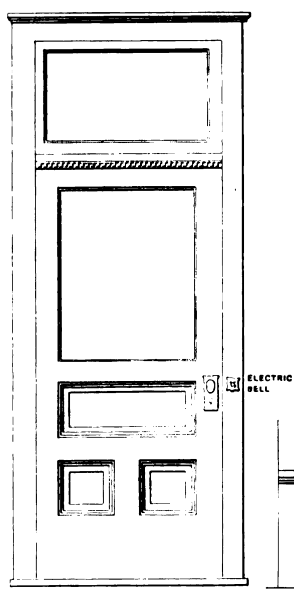


Plan.—Scale, ½ Inch to the Foot.

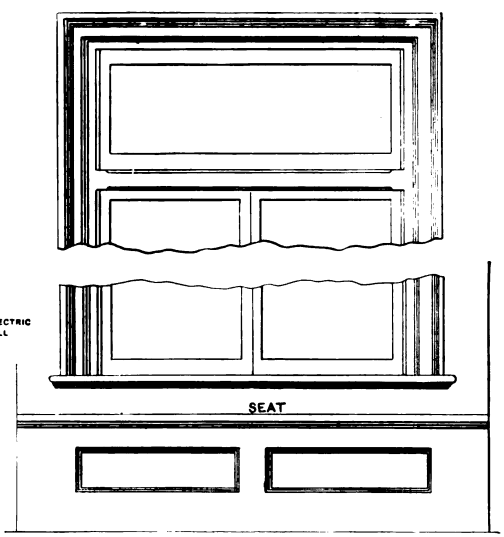


Section through Window and Seat in Library.—Scale, ½ Inch to the Foot.

Detail of Stair Baluster.—Scale, 1 Inch to the Foot.



Elevation of Front Door.—Scale, ⅜ Inch to the Foot.



Elevation of Window and Seat in Library.—Scale, ½ Inch to the Foot.

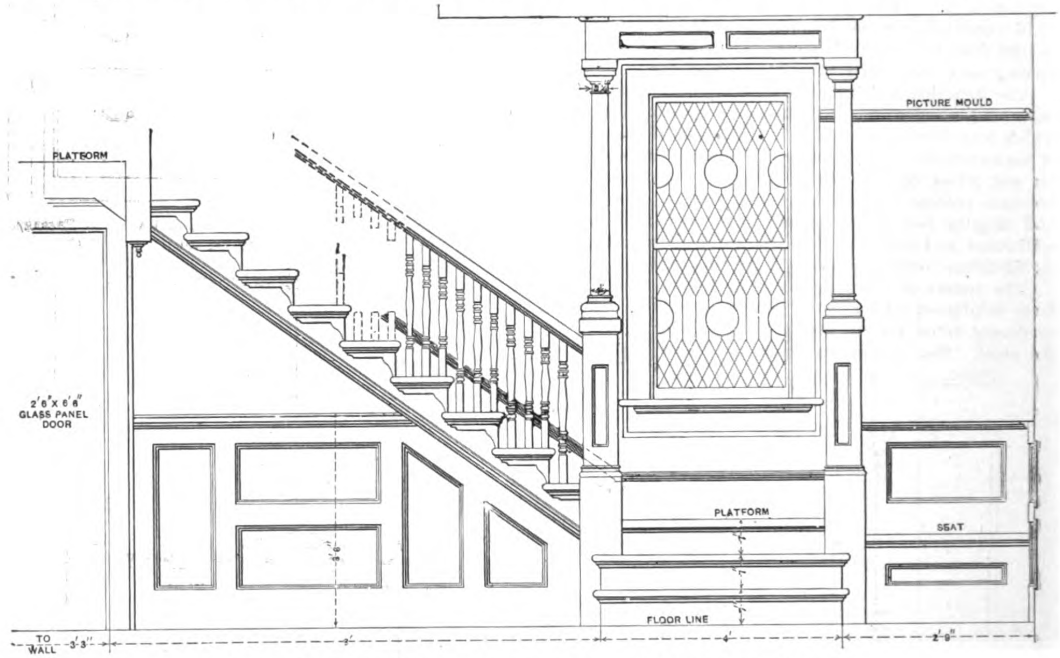
Miscellaneous Constructive Details of House at Tampa, Fla.

the aid of proper reinforcement with steel. M. Considère's experiments afford a rational basis for expecting success from such a venture, reinforced concrete having been shown by him to be capable of stretching, without showing cracks, to an extent far greater than that of plain concrete. A. L. Johnson reports actual success in building a concrete wall 300 feet long, 8 inches thick and exposed on both sides to the weather without any joints, and with no cracks appearing in the first year, or up to the time of his report.

In the outside wall of row E of the Stadium there was nothing else to do but to depend upon steel reinforcements to prevent shrinkage cracks. It was a place where cracks of any kind would be most objectionable. Expansion joints were left at intervals of 16½ feet, as in the front parapet, but they had to be placed over the center of the piers, in spite of its being realized that the friction from the weight of the superimposed mass would probably prevent all sliding, and thus prevent such joints from being effective. The amount of shrinkage to be expected in setting, or cooling to the minimum temperature, was estimated not to exceed about 0.0005 to 0.0006 of the length. Professor Hatt found that 1 : 2 : 4 concrete with 1 per cent. reinforcement would stretch 0.00088 before cracking. Considère and A. L. Johnson lead us to suppose that this stretch may be considerably more. At any rate, the margin seemed sufficient, and as the two faces of the wall in question were only 4 inches thick, 1 per cent. reinforcement was quite feasible—only a ½-inch rod every 6 inches being required—and was adopted. Thus far, after several months from the completion of the first of this work, neither crack nor opening of the joints in the whole extent of the two lines of nearly 1400 linear feet each (with one or two insignificant exceptions) has come to the writer's notice. The joints not opening show that the concrete between them must have stretched as expected. The results of the winter's exposure are looked forward to with much interest.

The front parapet was executed upon the principle first mentioned, shrinkage joints being left every 16½ feet, which opened perceptibly immediately upon the hardening of the concrete, and now constitute open joints sometimes a sixteenth of an inch in width, changing as the temperature rises and falls.

The experience with the back wall being reassuring, and the tying together of Row D into continuous sections of about 115 feet each causing no harm, it was determined to apply the same principle to the broad expanse of the end walls, which forms the finish at the tips of the U. These walls are some 75 feet long and from 9 to 50 feet high. They are in the main mere curtain walls only 4 inches thick, supported by a series of columns with which they are monolithic. These walls are armored freely with ¼-inch rods—less care being taken to keep the percentage up to 1 per cent. than was observed in the back wall, the smaller area involved being regarded as justification for venturing below the 1 per cent.



Elevation of Main Staircase as Viewed from Parlor.—Scale, ⅜ Inch to the Foot.

A House at Tampa, Fla.

Elasticity of Framework of Wooden Houses.

The severe windstorm which recently swept over St. Paul and Minneapolis afforded occasion for no little comment in the daily newspapers and trade press by reason of its effect upon the buildings in its path. In discussing the "elasticity inherent in wooden framing of different sorts," as developed by the storm, the *Western Architect* says: "Houses partly built, sheathed and roof-boarded, but without sash, doors or plastering, were so sprung as to push the newly laid chimneys considerably, yet the framework returned in whole or in part to the first position, as was to be seen by its relation to the chimneys —all without any sliding as a whole of the framework on the foundations. A wooden church spire surmounting a high stone tower, the wood frame however beginning well down in the stonework, appears intact and plumb in every way, while the upper part of the stonework is considerably shaken up. In this case it is probable that the bolting and joints or the framing were loosened by shrinkage, allowing somewhat more movement of the spire under pressure than if the framework had been newly finished.

IT is stated that the only woman ever admitted to membership in a Master Carpenters' Association is Miss Louise Catherine Hinck, of Montclair, N. J. She received her preliminary education at Hanover, Germany, and graduated with high honors at Vassar College, and finally received several degrees at the New York University Law School. Her greatest interest, however, seems to be in connection with the planning and building of houses.

CONSTRUCTING AN ELLIPTICAL STAIRWAY.*

BY MORRIS WILLIAMS.

THE method of developing the face mold, &c., is illustrated in diagram, Fig. 21. The plan and elevation of the block in this diagram are taken from Fig. 17, the reference letters in both cases being made to correspond. Now, as in all the preceding figures, the first process is to draw a line from the point G of the plan to W, and a square line to the inclined tangents from W to G''', then with G' as center and with radius G' G describe the arc G S G''', as shown; connect G''' with H', which will be the bottom tangent in its position in the face mold. Make the joints square to the tangents, as shown at G''' and I'.

Inasmuch as the curves in this mold are so small, it will be useless to bother with the axis of the ellipses, &c., so we will make use of the very simple method of describing them, which consists merely in finding a single point that will be contained in the center line of the face mold, as at 2. Fix on the point 2 in the center of the rail, as shown in the plan, and make H' 2 in the face mold equal to H 2 in the plan. On 2 in the face mold describe a circle having a radius one-half the plan rail. This determines the width of the mold at this point. To find the width at the ends G''' and I' take the length X S from the bevel and place it on each side of both G''' and I' in the face mold, as shown at S'' S'' and S' S'. Now, by bending a flexible lath to touch the points thus found, the curves of both inside and outside of the mold may be described.

The bevel for this wreath is found by placing one leg of the compasses in Z', extending the other to touch the inclined upper tangent, as shown by the dotted arc, placing the length of this extension from I to X, and connect X with Z, the center from which the plan curve is described. The bevel is shown at X.

From an inspection of the diagram it will be found that block 4 in Fig. 17 is a duplicate of block 3; consequently, the same mold will suffice for both wreaths. We will therefore omit this block and proceed to demonstrate the development of block 5 of Fig. 17, which will also be found to be almost a duplicate of block 2, shown in the same figure. The difference between the two is in the inclinations of the tangents. In block 2 the bottom tangent C' D' is shown to incline less than the upper tangent D' E', while in block 5 the bottom tangent I' J' inclines more than the upper tangent J' K'.

In Fig. 22 is demonstrated the method of unfolding the face mold for block 5, the plan and elevation of which are shown in Fig. 17. From I of the plan, Fig. 22, draw the line I W; from W and square to the upper tangent J' K' draw the line W I''; place one leg of the compasses at Z and revolve the point I of the plan to I'', as shown by the arc I' H I''; now connect I'' with J', and the line thus drawn will be the bottom tangent in its position as required in the face mold.

To find the minor axis, draw a line from P, the center of the plan rail, parallel with the ordinate line I Z, which will cut the ground line at N. On N erect a perpendicular to O, cutting the prolonged portion of the upper tangent J' K' in O. From O draw an indefinite line parallel to the ordinate Z I''; make O P'' on this line equal to the length of P N of the plan. The line O P'' will be the minor axis. Make P'' X on the minor axis equal to P X of the plan; make the width of the mold at X the same as the width of the plan rail; the width at the ends is taken from the bevels. Describe the curves by the operation described in one demonstration of Fig. 21.

To find the bevels, draw the line O P' across the elevation and a line from J' to K. Now place one leg of the dividers in P' and extend the other to touch the line J' K, and turn over as shown by the arc to C. Make K A equal to P' C and connect A with P, the center from which the plan rail is struck. The bevel will be at A.

Again, take P' as center and extend the compasses so as to touch the upper tangent J' K''; turn over, as shown, to D. Take the length P' D and place it, as shown, from

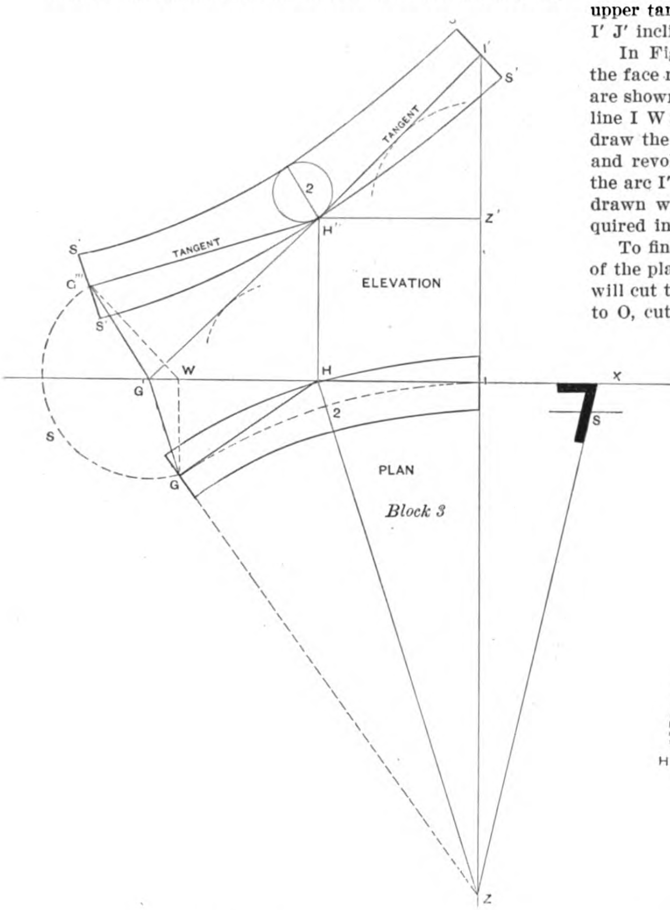


Fig. 21.—Method of Developing Face Mold.

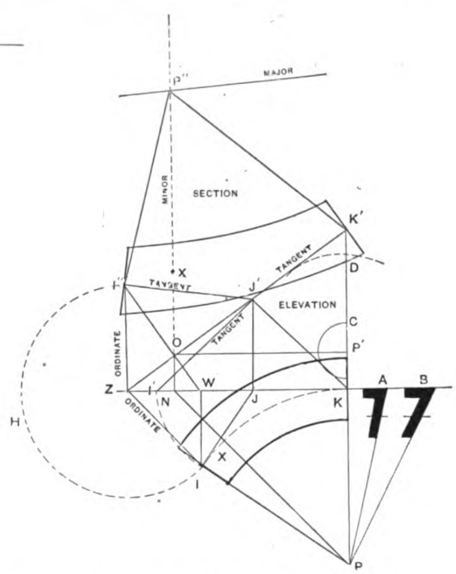


Fig. 22.—Method of Unfolding Face Mold for Block 5.

Constructing an Elliptical Stairway.

* Continued from page 285, October issue.

K to B; connect B with P, the center of the plan rail. The bevel will be at B. Note that the point P' represents the hight of P of the plan in the oblique plane, in which the wreath is assumed to rest in its span from I to K. The hight of the point K in the same plane is shown at K' and the hight of J is shown at J'. The point I, as shown, is assumed to be in the ground line.

Thus is shown in the plane of the wreath the exact hight of each point represented in the plan. When it is considered that the hight of these points determines the inclination of the plane and that the inclination of the plane determines the bevels to square the wreath, it is evident that a knowledge of how to determine the projections of the points in the plan is absolutely necessary to an intelligent understanding of the method of finding the bevels in wreath construction. We are told that finding

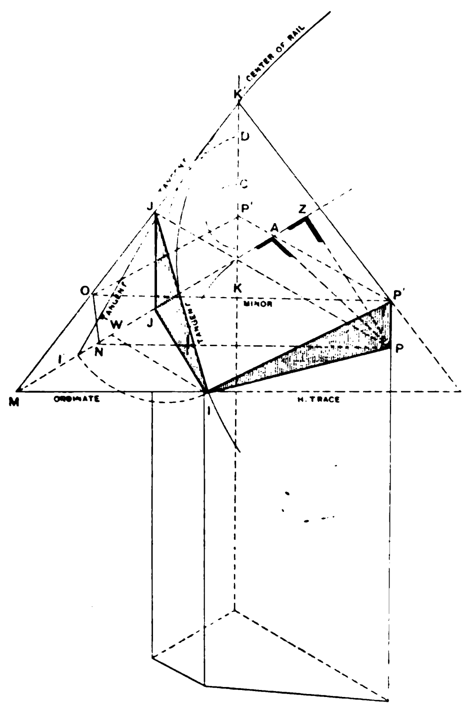


Fig. 23.—Illustrating Block 5 as it Appears in Fig. 22.

Constructing an Elliptical Stairway.

the bevels is the most difficult part of hand railing, and undoubtedly it is, apart from a clear conception of the nature of the oblique plane of the wreath in its relation to its plan. Where every point and line of the plan after being projected into the oblique plane and the inclination of the lines as determined by the relative hights of the projected points from the plan into such plane are known, there is no more difficulty in finding bevels in hand railing than there is in finding the cuts for a common rafter in roof framing. The apparent difficulty to find hand rail bevels exist, as above stated, in the necessity of a clear perception of the oblique plane. In roof framing the plane is determined by its run and rise. We present Fig. 23 with a view to illustrating block 5, as it appears in Fig. 22. By comparing the two diagrams it will be an easy matter for the reader to obtain a clear idea, first, of the oblique plane as exhibited in Fig. 23, and, second, of the method of its development as shown in Fig. 22; in the third place the method of determining the bevels as shown at A and B in the two figures. The reference letters in the two diagrams are made to coincide, so that all projected points and lines of the plan in Fig. 22 are clearly defined in the elevation, Fig. 23. Take, for example, the point P of the plan, Fig. 22, and we find its elevation in the oblique plane of the wreath at P' of Fig. 23. Again, take the point K—its elevation is shown at K' in both figures—and by connecting K' with P' the line K' P', as shown in Fig. 23, defines the upper side of the oblique plane of the wreath in one direction. The elevation of the line K J is shown in both figures, as at K' J', to define the upper side of the plane in another direction. The lowest sides of the plane in both directions are defined in Fig. 23 by the lines P' I and J' I', respectively. Thus, as exhibited in Fig. 23, the oblique plane is clearly defined at I J' K' P'. It is evident that if the oblique plane as defined in Fig. 22 were as clearly defined as it is in Fig. 23 there would be no difficulty in determining the angle of its inclination, or, in other words, to find the bevels to square the wreath.

(*To be continued.*)

Ownership of Architects' Plans.

An important test case, raising afresh the architect's right to retain plans, which was supposed to have been settled against the profession nearly four and thirty years ago, will be tried in the King's Bench Division at the end of October, the case being among those placed high in the list for hearing after the long vacation, says a recent issue of the London *Building News*. The action is brought by a building owner for whom some property at Paddington was converted into flats, against the architect for the return to him of all plans, specifications, papers, and minutes, including all copies of such general particulars relating to the work. The building owner also demands of the defendant architect the "return of all estimates, tenders, contracts, bills of quantities, and copies of letters to and from the client relating to the plans, specifications or contracts." The architect, who was employed at the usual 5 per cent. commission on the amount of the accepted tender, deems it his duty in the interests of the profession to refuse to deliver up the plans, the whole of the contract having been completed and the fees paid. We understand that many well-known architects and surveyors have been subpoenaed in the action. In the case of "Ebdy vs. McGowan," very fully reported by us in our issue of November 18, 1870, and heard in the Court of Exchequer by the Lord Chief Baron and Barons Martin, Bramwell and Pigott, the plans were prepared for a vicarage, but were never carried out. John P. Seddon, the secretary to the R. I. B. A., and the late Mr. Fogarty were called to prove the custom of the profession to return the plans whether the works were executed or abandoned; while, on the other hand, Mr. Smirke deposed that when the works were completed it was the practice of architects to retain the plans; but when the building was not constructed the plans were offered to the client as a matter of right. The Lord Chief Baron withdrew the question of custom from the jury, and the Court unanimously gave judgment against the architect's claim. The late A. S. Ayrton, when First Commissioner of Works, refused, it will be remembered, to give up to Mr. Barry, Jr., Sir Charles Barry's plans for the Houses of Parliament, and we are not aware that that claim was brought into a court of law. Just fourteen years later, in the case of "Gooding vs. the Local Board of Ealing," Justice Mathew decided against an architect's claim to recover plans submitted to a local sanitary authority and not approved by them. The issue of the present action will be awaited with interest by architects and building owners.

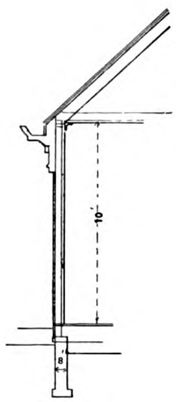
Chicago's New Theater.

The new Majestic Theater and office building which is about to be erected in Chicago is notable in that it will be the first playhouse constructed under the provisions of the new theater ordinance. The drawings which have been completed call for the office building proper to be 20 stories in hight and cover an area 82 x 60 feet. The theatre will form a rear extension and will have a seating capacity of 2025. The total cost of the improvements is placed at $1.000.000. The foundations were sunk by means of 17 caissons, bed rock being struck at a depth of 105 feet below the level of the street.

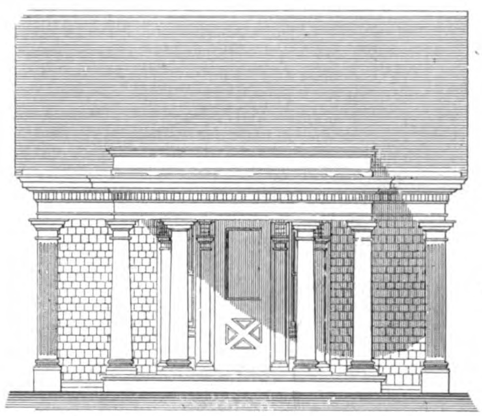
DESIGN FOR AN AUTOMOBILE HOUSE.

IT is well known that during the past two or three years the automobile has grown very rapidly in popular favor among well to do people, and that its use as a vehicle of pleasure seems to be steadily gaining throughout the country. Often those owning fine stables of carriage horses appear to find the "auto" convenient for touring and rapidly going about, so that it is not surprising to find in connection with carriage houses provision for vehicles of the character indicated. This is more especially true perhaps in the case of those having country residences, where the opportunity for using a "runabout" or "touring car" is less restricted than in the large cities, although the streets of the latter are more or less alive with them at all times. In our supplemental plate last month we showed in connection with the carriage house and stable of Thomas A. Sperry of Prospect street, Cranford, N. J., a picture of his automobile house, and in this number we present the elevations and floor plan of it, together with a few details showing the construction employed.

It will be observed from an inspection of the plan that the building consists essentially of one large room, entrance to which is gained from the porch at the front or from the runway at the side. Directly in the rear is a small work room fitted with the necessary appliances for making repairs to the machinery of automobiles.



Section.

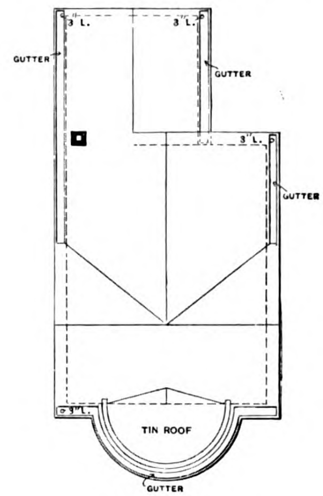


Front Elevation.—Scale, 1/8 Inch to the Foot.

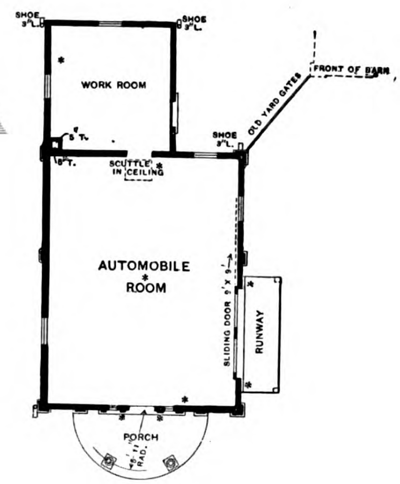
Design for an Automobile House.

According to the specifications of the architects, J. A. Oakley & Son, Elizabeth, N. J., the building is of frame construction, the plates being double and the sill laid flat on the foundation walls. The girders in the first floor are framed so as to be flush with the joists and have a 2 x 3 inch lug nailed to the beam edges on both sides; the floor joists being cut over them. All timber is of hemlock and all lumber is of white pine. The sills are 4 x 6 inches, the girders 6 x 8 inches, the first-floor joists 2 x 10 inches, placed 16 inches on centers; the outside studs 2 x 4 inches, the posts 4 x 6 inches, the rafters 2 x 6 inches, placed 24 inches on centers, and the ceiling joists are 2 x 6 inches, placed 20 inches on centers. The outside of the frame is covered with hemlock ship-lap sheathing boards put on level, over which is placed a layer of two-ply building paper, this in turn being covered with 18-inch California red cedar shingles laid 5¼ inches to the weather. The roof, except the porch, is covered with 18-inch red cedar "Perfection" shingles laid 5½ inches to the weather and supported on 1 x 2 inch hemlock sheathing lath properly spaced. The porch floor is laid at righ angles to the building and consists of ⅞ x 4 inch tongued and grooved white pine blind nailed to the joists. The front porch has 12 x 12 inch turned white pine "staved" columns, which taper to 10 x 10 inches at the top. The porch is ceiled with ½-inch edge and center-beaded North Carolina pine tongued and grooved boards blind nailed to the ceiling joists. The floors of the building are of ⅞ x 3½ inch tongued and grooved North Carolina pine blind nailed to the joists. The double door is supported on Coburn overhead barn door hangers with fiber wheels.

The door is built with 1¼-inch stiles and is backed with ⅞ x 3½ inch tongued and grooved white pine boards. The front and rear doors are made as shown, and both



Roof Plan.



Main Floor.
Scale, 1-16 Inch to the Foot.

are hung on 4 x 4 loose pin butts. The inside walls and ceilings in the building are covered with ½ x 3 inch edge and center beaded North Carolina pine boards blind nailed to bearings. The exterior of the building has two coats of paint in colors and the shingles on the roof are stained with an approved creosote shingle stain. All the tin work has two coats of Princess metallic paint.

HARNESSING the wind to generate electricity for farm use is no longer a novelty. The first of these windmills were used experimentally to generate electricity for lighting houses and barns; success has since stimulated attempts to use them for more ambitious projects. To-day a good many are being run to generate power to operate small motors. The use of windmill power for generating electricity was tried successfully two years ago in

Europe, and now at Hamburg and Leipsic are electrical plants which derive their motive power entirely from the wind. The windmills are strongly built, and are designed to take the wind at any angle. The regulation of the motor is effected by an automatic switch, which cuts out the battery when the wind falls to a low pressure.

House Built in a Day.

The unusual feat of building a five-room cottage, including foundation, plastering and putting on one coat of paint, in a day of ten hours with a cost to the owner of nothing more, outside of the material, than a chicken dinner for the workingmen was performed a few weeks ago in the little hamlet of Maple Grove, near Evansville, Ind., says an Indianapolis paper. The man for whom the cottage was built was Homer Rose and the men who did him the kindness were fellow employees. The work was superintended by Dee Bacher, a contracting carpenter.

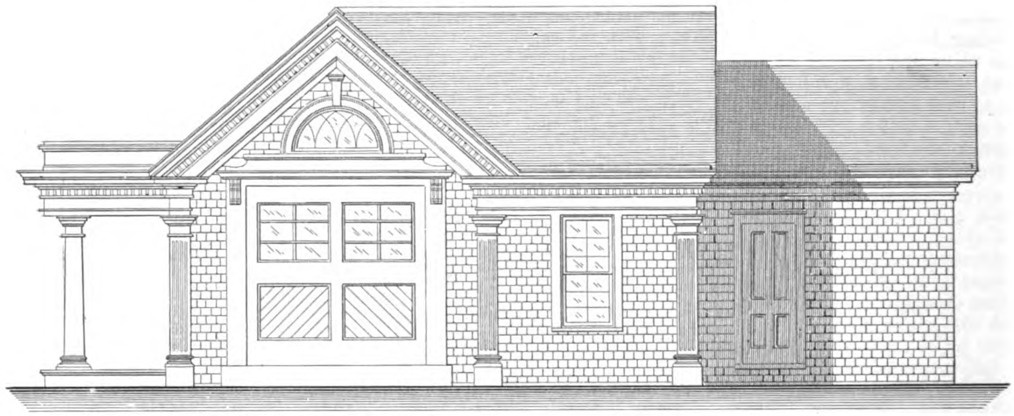
Mr. Rose has had lumber and other material on the ground for months. After these were bought he discovered that he could not go on with his house for lack of means. Mr. Bacher called his men around him one evening and asked for volunteers for one day to build the Rose cottage. Many thought it would be impossible to build it in one workday, but the contractor declared that he could accomplish the feat if the men in his employ would do the work. Twenty-six carpenters, masons and painters agreed to give one day if Mr. Rose would furnish a chicken dinner, and a time was fixed when all should report at the site of the proposed building.

Every man appeared on time. The brick masons went to work laying the foundation, while the carpenters busied themselves in cutting the joists, studding and sills. Every man was assigned to a particular part of the work, and the house began to go up with a rush. Hundreds of persons gathered about and watched the workmen. Each of the latter urged his fellows on, and when noon came the frame work was all up and the chimney had been started.

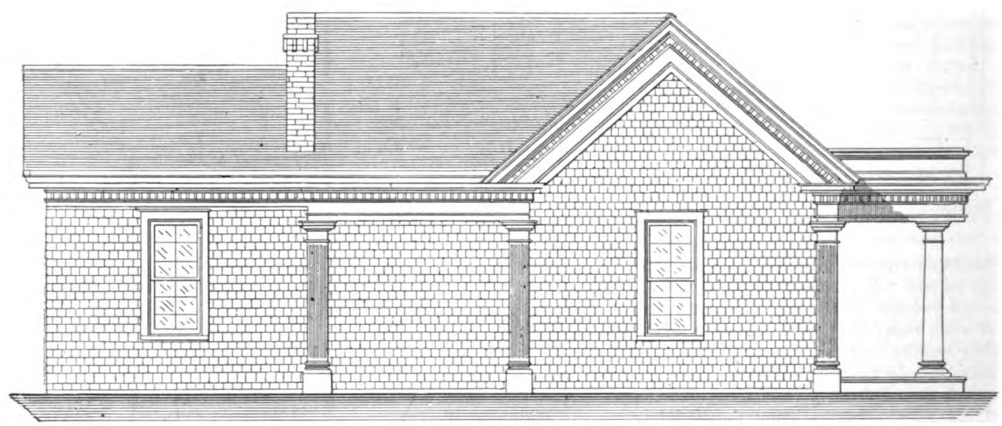
Then came the dinner. Mrs. Rose, assisted by some of her neighbors, had fried two dozen chickens. There were ten loaves of bread, four dozen ears of boiled corn, nearly a bushel of mashed potatoes and bowl after bowl of gravy. The dessert consisted of peach cobbler and various kinds of pies. The contractor had to call off his men for fear that they would eat so much that they would not be able to finish the job.

As soon as the frames were set for the windows and doors the sashes were fitted and the lights put in. By this time, however, the laths had been put on the inside and the sheathing and weather boarding was being placed on the outside and the chimney was being run up by the masons, all at the same time. Before the roof was on the plasterers were at work, and at exactly 6 o'clock the cottage was finished, all but the second coat of paint and the skim coat of plaster, neither of which could be put on until the first coat had dried.

Mr. Bacher complimented his men when the job was complete. He said that while he had done some "hurry" work in his time he had never known a house to be begun and completed in a day. The cottage contains five well lighted rooms and a large attic. Everything, even to putting on the hinges and locks, was done before the men were called off at 6 o'clock, and Mr. Bacher declares that



Side (Right) Elevation.



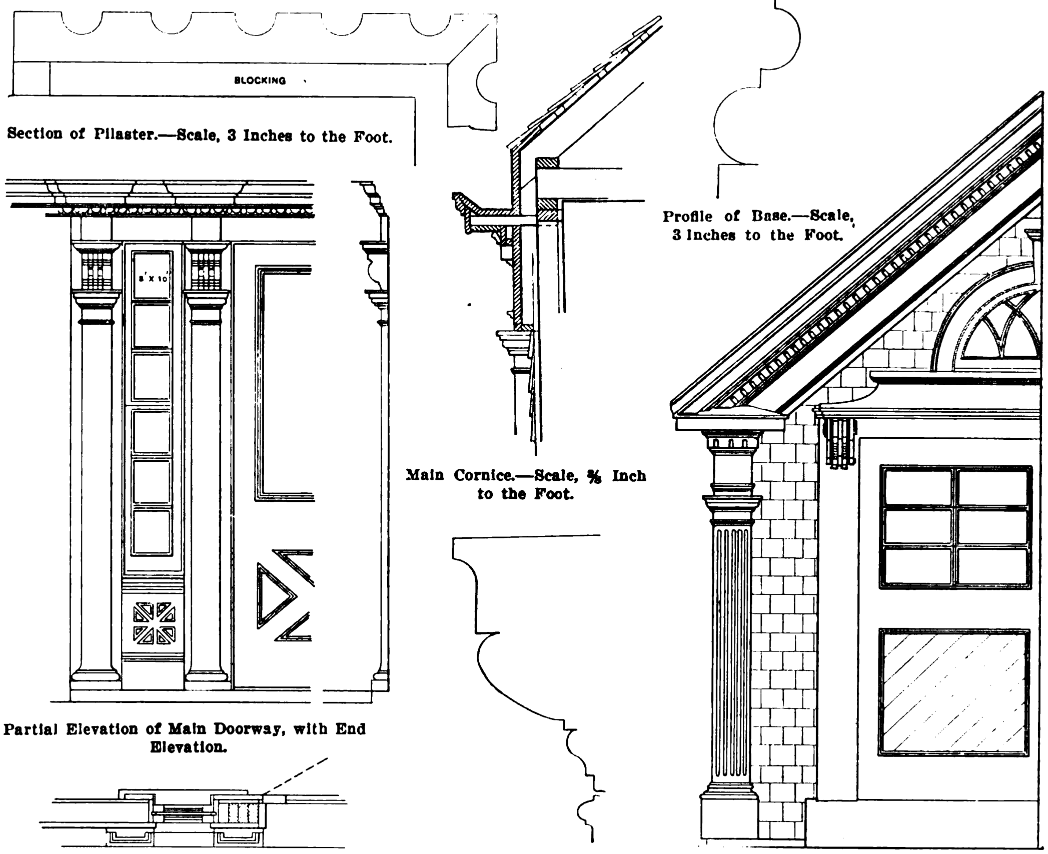
Side (Left) Elevation.

Design for an Automobile House.—Elevations.—Scale, 1/8 Inch to the Foot.

he could have completed the work an hour earlier had not the men eaten so freely at dinner.

Technical Schools in Germany.

The British Consul at Stuttgart has recently reported upon the technical instruction now given in connection with the wood working industries of Germany, and what he has to say is of more or less interest to members of the trade in this country. Almost all trades' schools and the larger continuation schools contain special classes for carpenters, furniture makers, turners and other wood workers; but in these classes, as well as in the schools organized by the Wood Workers' Guilds, much more attention is devoted to drawing than to actual practical instructions in the different processes of wood working.



Section of Pilaster.—Scale, 3 Inches to the Foot.

Profile of Base.—Scale, 3 Inches to the Foot.

Main Cornice.—Scale, ⅝ Inch to the Foot.

Partial Elevation of Main Doorway, with End Elevation.

Plan. Scale, ⅝ Inch to the Foot.

Profile of Column and Pilaster Cap.—Scale, 3 Inches to the Foot.

Partial Elevation of Doors at Side.—Scale, ¼ Inch to the Foot.

Design for an Automobile House.

The first independent special technical schools for wood carving were established in the wooded districts of Bavaria. As far back as the year 1838 the attention of the Bavarian Government was drawn to the fact that the wood carving industries in the districts of Oberammergau and Berchtesgaden, which had flourished for several centries, were in a languishing condition. This led to the foundation of the first special technical school at Berchtesgaden, which was followed by a number of other schools founded on the same pattern, but with a more extensive curriculum. The drawing and wood carving school at Partenkirchen, opened in 1869, is the art trade institute of the surrounding district, founded for the purpose of fostering the wood carving industry which has already existed there for several centuries. A special feature is the wood working business attached to the school. This business, which is only carried on as far as it seems necessary in the interests of the school, was commenced in order to increase the opportunities for practical work and to afford the older pupils an opportunity of earning money. The objects manufactured include decorative furniture and other household articles of every kind and style. The business is carried on entirely apart from the school in a commercial manner, with separate accounts and bookkeeping.

The Berlin school of carpentry and cabinet making was founded for the benefit of apprentices and journeymen engaged in these occupations. Its special object is to contend against the one-sided specialization which is gaining ground in these trades, and it consequently endeavors to give its pupils thorough all round practice instruction in all the branches and details of their calling, supplemented by a little theory and some measure of business knowledge. The school stands in the closest connection with the carpentry and cabinet making industries in Berlin, to which it has rendered signal service. The conditions of entrance are not onerous. The technical school at Fürth was started for the promotion of the local wood carving, carpentering and wood turning industries. It is intended for the combined practical and theoretical instruction of boys who have passed through the public elementary schools, and aims frankly at substituting for the usual period of apprenticeship workshop instruction supplemented by theoretical subjects given in the school. The place is under the control of the Bavarian Ministry of Education. The foundation of a wood carving school at Furtwangen was found to be necessary in order to raise the artistic level of the industry of the Black Forest. The institution is supported by the Ministry, the district and other authorities, and receives altogether about $5000 a year. It does not carry on any business as at other carving schools, in the sense that orders are received and executed.

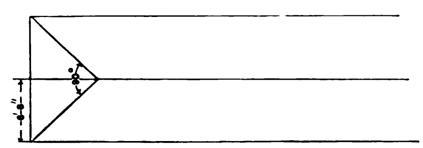
CORRESPONDENCE.

What Is a Philadelphia Gutter?

From Perplexed, *Xenia Ohio.*—I have recently been perplexed as to a piece of work I was called upon to execute in connection with house construction. The architect specified that the building should have a "Philadelphia gutter," and I am at a loss to know just how to do the job. Will some of the readers who have had experience in this particular line throw light on the subject?

Finding Lengths of Rafters with the Steel Square.

From D. P. A., *West Chester, N. Y.*—In a recent issue of the paper a correspondent asked for a method of obtaining the lengths of hip and valley rafters when the run and rise of the common rafters involved fractions



Finding Lengths of Rafters With the Steel Square.

of a foot, as, for example, 4 feet 6 inches rise and 6 feet 8 inches run. The principle involved in obtaining the lengths is the same as if the rise and run were indicated by whole numbers. First we reduce the fractions of a foot to a scale of 1 inch equals 1 foot; that is, reduce then to fractions of an inch. For instance, reducing 4 feet 6 inches to 1 inch scale on the steel square shows it to equal 4½ inches (6=6-12 ft.=½ ft), which reduced to 1-inch scale equals ½, and so it is with other fractional denominations. For example: 6 feet 8 inches=6 31-32, or nearly 6⅝ inches. By taking 4½ inches on the tongue of the square and 6⅝ inches on the blade, the distance across will give the length of the common rafter, which in this case is 8 inches, or when scaled is 8 feet and 0 inches. If the seats of the base are equal to each other, as in the diagram presented herewith, one-half the span taken on the blade and tongue will give the length of seat, which taken on the blade and the rise on the tongue will give the length of hip as the result. The above may be proved by calculations.

Cleaning Brick or Stone Fronts.

From Old Beginner, *Rochester, N. Y.*—Those painters must be doing their best to drum up trade when they advocate making a solution of caustic soda or pearl ash to clean brick or stone fronts. I should have liked to have them see the machine which we had here a while, called the sand blast cleaning apparatus. One of our large buildings which had the inside burnt out in the great fire which visited this city last February had to be cleaned on the outside also, as it was pretty well blackened. The sand blast is what they used. It made such a good job both of brick and granite that a person who had never before seen the building would have declared it was a new structure. One of our banks here put on an addition and then cleaned up the old one. I do not know what was used, but it was done after the style of the painters mentioned in the September issue of the paper. It is very easy to tell the old building from the new one. I do not doubt that had it been cleaned with the sand blast a better job would have been made of it. I think also the owners would have found it more economical, as I am pretty sure that time is saved by using the sand blast.

In criticising the floor plan submitted by the young lady from Wellington, Ohio, I should think that if she had a door opening from the rear hall into the bedroom on the first floor where the closet is it would prove much more convenient than being obliged to go around through the dining room and reception hall in case the bathroom was occupied.

I am very glad indeed that there is such a paper as *Carpentry and Building*, as it has a tendency to make a person a good critic. I have obtained a lot of good information from the paper and in addition have often been much encouraged to continue in the work which I have undertaken.

Sound Proof Partitions.

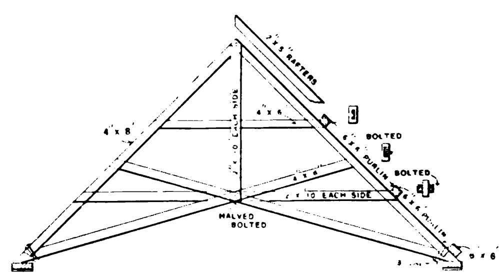
From W. F. W., *Lincoln, Neb.*—I would like to ask a question with regard to the sound proof qualities of a plastered partition. Will a double row of studding in plastered partition walls, between two tenements in a double house, each row being plastered on one side only, and put far enough apart so that each partition is entirely separate, keep the sound from passing through better than a wall with one row of studding plastered on both sides?

Note.—While the question raised by our correspondent does not admit of extended discussion, as it is obvious that the double partition with the rows of studding entirely separated from each other will constitute a better sound proof construction than one row of studding plastered on both sides, we shall be glad to have our readers give their record of experience in cases of this kind. It is quite probable that many of them have constructed partitions in such a way as to render them sound proof, and what they may have to say is likely to be interesting not only to the correspondent making the inquiry above, but also to readers in general.

We might suggest in this connection that if "W. F. W." would construct his partition of a single row of studding and then before plastering fill in the spaces between with some non-sound conducting material he would greatly increase the sound resisting qualities of the partition.

Criticism of Scissors Truss Construction.

From C. J. C., *Troy, Pa.*—Referring to the truss submitted by "C. C. J. of Port Davis, Texas," in the August issue, and concerning which he desires an expression of opinion on the part of the readers, I would say that I much prefer carrying the principal rafters to the cone of the roof and then placing the horizontal cross tie at the point where the end or auxiliary struts cross in the center, as this point of the truss is the pivot or hinge upon which the whole thing works. My idea of such a construction is shown by the sketch inclosed herewith. Criticising "C. C. J.'s" truss, I do not consider his 1¼-inch rod of any use as he shows it unless he cuts in a strut where his rod is for the purpose of utilizing it to draw up on. There is seldom a spread in a roof where he shows the rod. A few weeks ago I bolted a roof 38 feet



Criticism of Scissors Truss Construction.

span, which was constructed a few years ago, and which had spread 14 inches at the plates. The construction of that roof was according to the sketch here shown. The roof had no cross tie and was plastered 4 feet up the main rafter.

Truss for Hall with Elliptic Ceiling.

From Frank E. Kidder, *Denver, Col.*—My attention has been drawn to the communication of "W. S." of Walcott, Iowa, on page 257 of the September issue of *Carpentry and Building*, and in commenting upon his design I would state that it is built on correct lines, and is probably safe for any ordinary roof loads. The only criticism I have to offer is that the joints are not strong enough to develop the strength of the timber, or, in other words, by making the joints stronger the strength of the truss would be much increased. This is especially true of the joints where the horizontal tie beam joins the inclined ties.

Shingling Around a Chimney.

From C. K. S., *Wayland, Iowa.*—I have read with interest the inquiry and comments which have appeared in a recent issue relative to the method of shingling around a chimney, and would say that when I began to learn my trade I was told that a chimney should always come out at the comb of the roof. Since I have been doing all my own architectural work and endeavoring to introduce modern construction in the way of house building, I have found it difficult and practically impossible to make the chimney sufficiently slanting to come out at the ridge and at the same time draw satisfactorily when the house is tenanted. As a consequence we have used a system similar to that referred to by "J. E. R.," which is very good, although it has not proven entirely satisfactory. The tin laid in the way described will soon rust through, so we have commenced to adopt the scheme of throwing up a gable back of every chimney and using the tin shingles for side flashing, and since we have been doing this we have not had a single complaint about leaky chimneys. If any of the readers have any trouble I would suggest they try the gable method, but be sure and use the same width of valley tin that is used in any other valley.

Solutions to Problem in Roof Framing.

From YOUNG STUDENT *Philadelphia, Pa.*—In reply to the inquiry of "A. S. W.," Shawanee, W. Va., I would call attention to the fact that he does not state whether he wants gable ends or a hip roof, but I send herewith plans of both kinds, which I trust may be of interest. Referring to the diagram, Fig. 1 represents the plan of the roof, with gable ends, with the plate running out over the angle corners, while Fig. 2 is a plan of a hip roof, with the plate also running out over the angle corners, the dotted lines indicating the hips when the plate does not run out to a square angle. I have been a reader of the paper for more than three years and am much pleased with it.

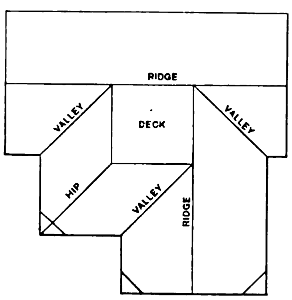


Fig. 1.—Roof with Gable Ends.

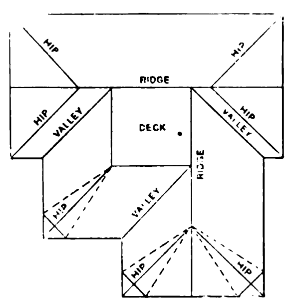


Fig. 2.—Roof with Hips and Deck.

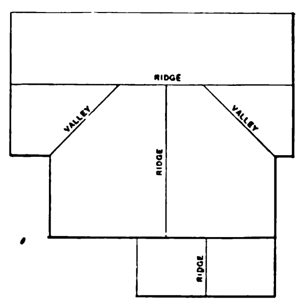


Fig. 3.—Plan Submitted by "X. S."

Solutions to Problem in Roof Framing.

From X. S., *Indianapolis Ind.*—I send herewith a sketch (Fig. 3) in reply to the query of "A. S. W." in the October issue of the paper. It speaks for itself, so comment is unnecessary.

From H. T. W., *Crawfordsville, Ind.*—I send to-day a roof plan (Fig. 4) for "A. S. W.," who presented a request in the last issue of the paper. As the distance from A to B equals that from C to D, the hips have to come to a point at the highest part of the roof.

Note.—We have a solution of the problem similar to the above from C. E. Jay of Tampa, Florida.

Laying Tar and Slag or Gravel Roofs.

From T. W. C., *Birmingham, Ala.*—Replying to the inquiry of "F. C." in the October issue, I would say that I have found the following specification for gravel roofs very satisfactory, calling to mind one case where it was put on a large railroad blacksmith shop, and for 14 years did not cost one cent for repairs. The specification is to the following effect: The roof construction shall not exceed 2 inches fall to the foot; 1 inch would be better. The sheathing boards should be of an even thickness laid close both at ends and edges and securely nailed on each edge at all bearings. Over the sheathing when thus laid place one thickness of a good roofing paper; this in turn being covered with four thicknesses of No. 1 roofing felt, the felt not to exceed 32 inches in width, and the total weight of the four thicknesses not to be less than 52 pounds per square of 100 feet. Each thickness is to be turned up and well mopped between with hot roofing cement. A galvanized eave finish is to be put on all around the edges of

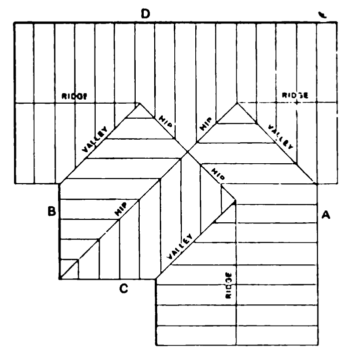


Fig. 4.—Solution Offered by "H. T. W."

the roof to form a stop. All wall connections, chimneys, skylights and other openings to have galvanized iron flashings over the surface of felt. A good even coat of roofing cement is to be flowed, the cement in no case to be hot enough to injure the woolly fiber of the felt, and not less than 8 gallons of cement per square of 100 feet to be used, including that for mopping between the layers of felt. Upon this spread while the cement is hot a good even coat of clean seashore gravel or crushed stone, the latter to be free from dust and dirt, and none to be used except what will pass through a ⅝-inch mesh screen and be caught on a ¼-inch mesh screen. This roof, put on by a reliable man, will easily last 10 years without repairs and cost about $4 per square complete, not including timber. The roofing felt used on most of the work I have had is Black Diamond. Seashore gravel is used if it can be had, but if not, use crushed stone, which should be washed before applying, or crushed hot slag around blast furnaces; whichever is used it should be heated before hoisting onto the roof, and then applied hot. In this way it gets "a good bed" in the cement. That which we use is coal tar boiled down, but not burnt. The above is for four-ply gravel roof; a five-ply is just one ply heavier and gives a slightly better roof, but costs about 50 cents per square more. I know of several thousand squares laid under this specification from Virginia to Florida, and wherever put on by first-class workmen gives perfect satisfaction under all conditions, being, as many of them are, subject to all kinds of fumes and gases as one will find in roundhouses, shops, &c.

Note.—In reply to the correspondent who asked in the last issue with regard to laying gravel roofs, we have received from a concern of long and varied experience in this particular branch of industry the following suggestions concerning the construction of a five-ply slag or gravel roof, which cannot fail to command widespread attention:

The rosin sized sheathing paper or unsaturated felt to be used shall weigh not less than 5 pounds per 100 square feet.

The felt shall weigh not less than 14 pounds per 100 square feet, single thickness.

The pitch shall be the best quality of straight run coal tar pitch, distilled direct from American coal tar, and there shall be used not less than 120 pounds (gross weight) per 100 square feet of completed roof.

The nailing shall be done with three-penny barbed wire roofing nails driven through tin discs.

The slag or gravel shall be of such a grade that no particles shall exceed ⅝ inch or be less than ¼ inch in size. It shall be dry and free from dust or dirt. In cold weather it must be heated immediately before using. Not less than 300 pounds of slag or 400 pounds of gravel shall be used per 100 square feet.

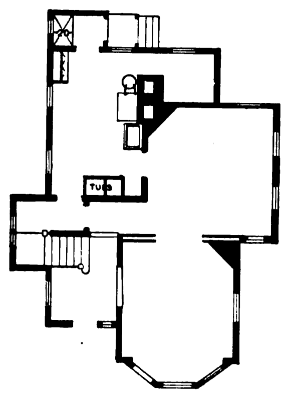
The materials shall be used as follows: First lay one thickness of rosin sized sheathing paper or unsaturated felt, lapping each sheet 1 inch over the preceding one and nailing only so often as may be necessary to hold in place until covered with the tarred felt, and the nailing may be omitted entirely if practicable. Over the rosin sized sheathing or unsaturated felt lay two full thicknesses of tarred felt, lapping each 17 inches over the preceding one, and nailing along the exposed edges of the sheets only so often as may be necessary to hold the sheets in place until the remaining felt can be applied. Over the entire surface of the felt thus laid spread a uniform coating of pitch, mopped on. Then lay three full thicknesses of felt, lapping each sheet 22 inches over the preceding one, and nailing, as laid, every 3 feet, not more than 10 inches from the upper edge. When the felt is thus laid and secured, mop back with pitch the full width of 20 inches under each lap. Then spread over the entire surface of the roof a uniform coating of pitch into which while hot imbed slag or gravel.

Raising Buildings Half a Century Ago.

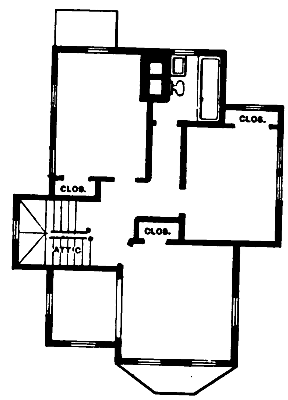
From G. K. C., *Janesville, Wis.*—In the September number of the paper I saw an account of the raising of a school building, and it speaks of it being quite an undertaking, which of course it was. When I read of raising buildings, however, my mind goes back to the raising of a whole block of buildings in Chicago in the year 1859. I think Pullman was the man who had the job, the same Pullman who made the Pullman car, &c. In the raising of the buildings in question there were used 10,000 jack screws and 1000 men were employed. It was a most wonderful undertaking and was carried to a successful issue without an accident of any kind. It was said at the time that there was not even a pane of glass broken, and business was carried on in the stores all the time the work was in progress. I was working in Chicago at the time and saw the buildings as they were being raised. Ladies were permitted to go under the buildings to watch the work as it was being done. Doubtless many an old Chicagoan will remember about it, as it was a most wonderful piece of work.

Elevations Wanted for Floor Plans.

From J. W. H., *Bayonne, N. J.*—Will some of the readers of the paper furnish for publication an elevation adapted to the floor plans presented herewith? At the same time I would take it as a favor if they would accompany it with an elevation and details of the stair platform as well as the stairs leading to the cellar. I would like an entrance from the outside to the cellar under the stairs.



First Floor.



Second Floor.

Elevations Wanted for Floor Plans.—Scale, 1-16 Inch to the Foot.

Designs of Tool Chest and Four-Room Houses Wanted.

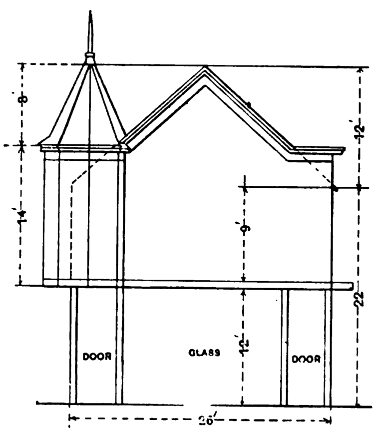
From N. U., *Johnstown, Pa.*—I should like to see more illustrations of carpenters' tool boxes and four-room houses published in *Carpentry and Building*, as I think it is an excellent paper, containing as it does so many things in which every carpenter should be interested. The houses in question should have bath and the usual conveniences, should cover an area about 18 or 20 x 28 feet, and should cost in the neighborhood of $1200 to $1600. I am of the opinion that something along these lines would prove of considerable value to a large class among the readers, and am very sure it would interest the writer.

Care and Purchase of Tools.

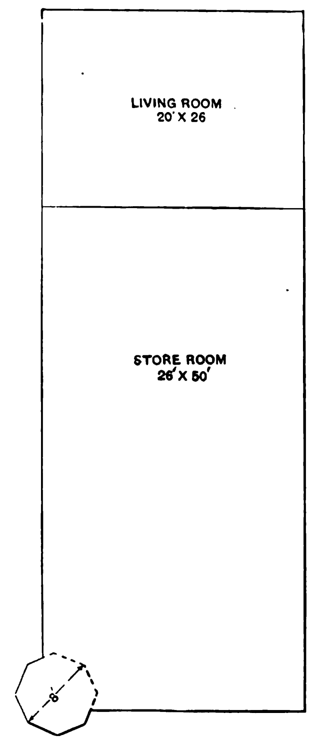
From APPRENTICE CARPENTER, *Fort Morgan, Col.*—I have very much enjoyed reading the letters from the various correspondents of the paper, and as it has been some time since I wrote anything I will offer a few comments on one or two subjects. First of all, I want to say a few words about our tools and how we care for them. Some men will buy anything, it practically making no difference what the quality may be, and they have little choice as to the maker. Now I for one am a tool crank. I claim to know a good tool when I have seen and used it. I also claim to know what concerns make good tools and this is what I am convinced all workers of wood should know. I wouldn't give tools room in my chest that were not first class in every respect, and I just want to say that the Cheap John "Keen Kutter," "Clean Clipper," and various other makes of tools generally sold by hardware dealers throughout the country are not good enough for me. They wouldn't take a decent edge if you ground and honed them until doomsday. I believe that carpenters generally buy very good saws and planes, but when it comes to chisels and other small tools they seem to be content with almost anything so long as it has the desired shape. Now I don't claim that all the tools I ever bought were first class, for I have paid for my experience in this direction a long time ago. There are a number of makes of tools which I consider very good. As regards saws I think there are four or five different makes that would grade A1. For instance the Disston, Jennings, Atkins and others. Among the best planes, according to my opinion, are the Bailey, and I also think well of the Gage plane. I have tested these planes and found them first class in every way. As for chisels and gouges, I think the D. R. Barton brand equal to any in the world for taking a fine keen edge. I have nothing to say against any other good makes, but I give the above as my opinion and write this letter merely for the benefit of the readers of the paper.

I would like to say a word about the care of tools. When I see a man come on a job with old rusty tools I can't help thinking that he takes little if any interest in his work. I think a good workman as a general thing takes pride in having a fine kit of tools.

Another thing I want to speak of is the practice of carpenters in allowing their saw handles to become loose. The other day I picked up a saw to saw a board and the handle was so loose that it rattled. Now this is all gross carelessness, for every one should know better than to abuse his tools in this way. I cannot believe that a man will ever become a finished workman who keeps his tools in such shape. Another point, when you grind edged tools be very careful to use plenty of water on the stone, for it does not take very long to draw the temper in the tools. If they are heated they will become brittle and the edge will bread off. In order to work to the best advantage I think we should have two classes of tools, those for rough work and those for fine finished work. The tools we use for finished work should be of the very best grade and should be kept in prime condition, and they should be used only on clear dry lumber.



Elevation Showing Tower Projecting Over the Corner of the First Story.



Floor Plan, Showing Division of Space.

Constructing a Second-Story Tower.

Finding Capacities of Tapering Tanks.

From B. W., *Mineola, L. I.*—I have been looking over my files of *Carpentry and Building* for the past two years in an endeavor to find a rule for figuring the capacities of tapering tanks, but I can only find methods for tanks which are as wide at the bottom as at the top. The tanks of which I desire to find the capacity in gallons are circular in cross section, but measure at the top 6 feet 8 inches and at the bottom 7 feet 7¼ inches, while the hight is 14 feet 10¼ inches. In all of my books on carpentry only one has an example of this kind, and that is "Bell's Carpentry Made Easy." He says, "to obtain the mean diameter add to the top diameter three-fifths of the difference between the top and bottom diameters," and the rest of the operation is the regular way. Perhaps some of the readers of the paper would be willing to express their views on the subject.

Note.—A rule which our correspondent will probably find of interest is the following, which covers a circular tapering vessel: Add together the square of the top diameter and the square of the bottom diameter, also the product of the two diameters; multiply this by one-third of the hight and that by 0.7854, the latter being the area of a circle 1 foot in diameter. The result will be the answer in cubic feet. To ascertain the number of gallons multiply by 7.48, the number of gallons to a cubic foot.

Still another method which may be suggested is to multiply the two diameters together after reducing them to inches, and to that product add one-third of the square of their difference. Multiply that product by the hight in inches and then by 0.0034.

Constructing a Second-Story Tower.

From T. A., *Joliet, Ill.*—I have a problem which I desire to present to the attention of the readers, and it is this: How shall I build and fasten a tower to the corner of a building at the second story, the corner of the first story being cut away, or chopped off, so to speak? The house in question is yet to be erected, and it will be frame, using 2 x 6 studding for the first story and 2 x 4 for the upper story. The joists will be 2 x 14 and the rafters will be 2 x 6 inches. The diameter of the tower is 8 feet and it rises 14 feet in the studding, at which point the pitch roof begins, as shown in the elevation. The house is to be sheathed and sided outside the framework, and plastered on the inside. There is to be no partition on the first floor for a distance of 50 feet toward the rear, as it will be used as a storeroom 26 x 50 feet in size, the second story being utilized for living rooms. Now will some of the practical readers tell me the most satisfactory method of doing the work?

Constructing Plaster Models of Buildings.

From A. E. G., *Knoxville, Tenn.*—Will some one please tell me how to construct a plaster model of a building, say, to a scale of about ¼ inch to the foot; also what materials are necessary? How are moldings, columns, &c., made?

WHAT BUILDERS ARE DOING.

BUILDING OPERATIONS in Baltimore, Md., continue apace, and up to the present time a very satisfactory degree of progress has been made in rebuilding the burnt district of the city. The work is involving the use of enormous quantities of building materials, and in connection with some of the structures under way concrete is being used instead of iron and steel in the fire proofing. Pillars and beams supporting the floors of some buildings are entirely of concrete, and the use of this material seems to be rapidly growing in favor.

Preparations are being made for the architectural art exhibit, which will be held December 12 to 24 inclusive at the Peabody Institute under the auspices of the Baltimore Architectural Club and the Municipal Art Society. It is expected that there will be between 300 and 400 exhibitors, which will include the products of the most noted architects and artists in the country.

The Builders' Exchange is in a most flourishing condition and the membership is becoming more and more comprehensive, including at the present time representatives of practically all branches of the building and allied industries. The committee on the proposed permanent building material exposition of the Builders' Exchange recently made a report showing the progress which was being made along the lines indicated.

Buffalo, N. Y.

There was an appreciable falling off in building operations in and about the city during the month of September as compared with the same period last year, although the number of permits issued shows a considerable increase. This indicates that the buildings which are now being erected are of a less expensive character than was the case last year. According to the figures of Deputy Building Commissioner Henry Rumrill, Jr., there were 174 permits issued in September of the current year for building improvements estimated to cost $366,536, while in the same month last year 139 permits were issued for improvements valued at $426,173.

For the nine months ot this year the showing is more favorable, there having been 2022 permits issued for building improvements valued at $4,831,355, as against 1486 permits for buildings estimated to cost $4,793,296 for the first nine months of last year. The work at present in progress consists largely of dwelling houses, and in the absence of any serious labor troubles the outlook is encouraging.

Chicago, Ill.

Permits were issued for buildings during the month of September aggregating 829, involving a frontage of 25,023 feet, or nearly 5 miles, and costing $5,597,450. The total is two and a half times as much as that of the previous September and is the largest record for any September in the history of Chicago, except September, 1892, during the boom period just preceding the World's Fair, when the estimated value of buildings for which permits were issued reached $7,739,400. The permits for the nine months ending with September aggregated 5461 buildings, having a frontage of 159,994 feet and costing $31,759,740, or an average of $3,528,860 a month, against a similar period of the year previous of 4658 buildings, with an aggregate frontage of 127,000 feet and costing $24,871,200, or an average of $2,763,500 a month. September thus far has been the largest month of the year in the number of permits issued and the largest in amount except June, when permits issued for several large steel buildings in the downtown district swelled the total cost.

There are now in process of erection in Chicago buildings roughly estimated to cost, exclusive of real estate, as follows: First National Bank (Section B), $1,500,000; Heyworth Building, $1,500,000; Chicago & Northwestern office building, $1,250,000; Majestic Theater, $1,000,000; Marshall Field's warehouse, $1,000,000; Adams Building, $800,000; Rector Building, $700,000; Chicago Savings Bank Building, $600,000; Thomas Orchestral Building, $450,000; Ryerson Building, $325,000; Patten Building, $325,000; Grower Building, $200,000; Paper Mills Company warehouse, $150,000; Chapin & Gore, $150,000.

The following buildings to cost approximately the sums stated have also been projected: Northern Trust Company Bank Building, $2,000,000; Stock Exchange Building, $750,000; Corn Exchange Bank Building, $500,000; Marquette Building addition, $500,000; Ft. Dearborn addition, $300,000; Union League Club addition, $200,000; Boston Store extension, $2,500,000; Fair addition, $250,000; 138-144 State street, $750,000; Hillman's addition, $200,000; State and Jackson streets, $500,000.

In addition to these there are a large number of buildings in course of construction or projected that will cost in the neighborhood of $100,000 each, including possibly 100 flat buildings and apartment hotels that will cost from $100,000 to $300,000. Great activity is manifested in the erection of manufacturing buildings and plants. Architects are unusually busy and the demand for building materials is in proportion to the increased activity of building operations.

Large improvements are going on in the stockyards. The American Agricultural Packing Company will spend about $2,500,000 immediately upon the erection of a complete packing plant. Armour & Co. are building a soap works. Swift & Co. are putting up a refrigerator car works, and other packers are enlarging and improving their plants.

The great plant of the Western Electric Company at Hawthorne, which will give employment to at least 5000 men, is nearing completion. The Illinois Tunnel Company will expend a large sum of money in the erection and equipment of a power plant, storage warehouses and other buildings necessary to the operation of its underground service.

Cincinnati, Ohio.

The building situation in the city is somewhat exceptional in that the activity is largely confined to one line. This is due to the fact that the railroads having taken over a good deal of property in the "bottoms," has compelled manufacturers located there to move further uptown. This, of course, has resulted in a good deal of building in the way of structures intended for manufacturing purposes, but, outside of this, the amount of work is not particularly important. The figures of the Building Department, however, indicate that for September there was a slight increase in the improvements projected as compared with a year ago, the permits being 297, calling for an expenditure of $430,125, as against 226 permits for building improvements costing $357,380 in September of last year.

Some of the more important improvements under way include a brick and armored concrete structure for the American Oak & Leather Company, measuring 65 x 270 feet in plan and eight stories in hight, estimated to cost about $125,000; a brick and concrete structure to cost $75,000, for the Charles Moser Paint Company; a brick and concrete structure to cost $90,000, for Merkle Brothers, manufacturers of plumbers' supplies; while the Harrison Estate is erecting on the site of the old Pike Opera House, which was burnt three or four years ago, a 10-story fire proof building which will be adapted to either offices or manufacturing purposes as the case may be, and which will cost about $125,000. The Estate will also erect a similar structure at Fourth and Elm streets to cost about the same amount. Plans are being drawn for the erection of a hotel at the corner of Vine and Opera place, which will be fire proof throughout and cost in the neighborhood of $400,000. The new Carnegie Library branch will be located at the corner of Locust and Kemper lane and will cost in the neighborhood of $35,000 to $40,000. The City Hall Bank is erecting a five-story structure, the lower floor of which will be occupied by the bank and the upper floors will be utilized as flats. The building will be of brick and steel to cost in the neighborhood of $50,000. The New Soldiers' and Sailors' Memorial Building, for which the last Legislature of Ohio authorized the issuance of $250,000 in bonds, is under way and will be located at the corner of Elm and Grant streets, adjoining the Music Hall. The ground was purchased at a cost of $50,000 and the building will cost about $200,000, will be fire proof, the design in monumental style and the exterior of granite. It will contain lodge room, banquet hall and large auditorium. There is also quite a number of fine residences that are under way.

Cleveland, Ohio.

The members of the Cleveland Builders' Exchange were the hosts on September 15 to representatives of the Builders' Exchange of Buffalo, who visited Cleveland for the purpose of seeing its buildings and the various points of interest which it had to offer. The visitors were taken through the business district by the Reception Committee of the Builders' Exchange, were given a reception in the Library of the Chamber of Commerce, and later exchanged expressions of good will at a luncheon in the rooms of the local Builders' Exchange. After the 135 members and guests had seated themselves at the table W. H. Hunt of the Cleveland Exchange, who acted as toastmaster, referred to the Buffalo Exchange as one of the banner exchanges of the country and welcomed the visitors on behalf of the local organization.

President Springborn of the Board of Public Service, welcomed the builders of Buffalo on behalf of the city, making a very happy speech, in which he expressed the hope that in course of time the limits of the city of Cleveland would be extended so as to include Buffalo. President Jameson of the Buffalo Exchange responded to the addresses of welcome and intimated that the Buffalo builders visited Cleveland in order to get ideas on exchange methods, as the Cleveland Exchange was regarded as a model organization of its kind. Henry Boller of the Buffalo Exchange made a few remarks, in the course of which he spoke of the improvements in Cleveland during the past ten years as a revelation to him, referring especially to the beautiful bank buildings. The next speaker was James Young, an active member of the Cleveland Exchange and the first president of the Ohio Association of Builders, who referred to the "group plan" as enhancing Cleveland's greatness and painted a glowing picture of the new Union Depot—when built. He also referred to the great importance of local organizations of builders. Secretary James M. Carter of the Buffalo Exchange was introduced by President Hunt of the Cleveland organization as being the best exchange secretary in the country next to Secretary Roberts of the local exchange. He talked on the labor question and stated that organizations of both workers and employers should be ruled justly and fearlessly, and if that was done it would do much to maintain a friendly feeling and avoid differences between the two. He was of the opinion that the "open shop" was not a complete solution of the labor question. Other brief speeches were made by members of the two exchanges, and the hope was expressed that members of the Cleveland Exchange would reciprocate and make a visit to Buffalo.

In the afternoon the visitors enjoyed an automobile ride through the parks and then went to the Calumet bowling alleys, where teams from both exchanges engaged in friendly contest. The first team of the Cleveland Exchange, composed of Messrs. Gick, Masters, Morgan, Noble and McNamara, defeated the first team of the Buffalo builders by score of 869 to 688, the Buffalo team being composed of Messrs. Christman, Schaefer, Hagar, Farmer and Jameson. The second team of the Buffalo Exchange, composed of Messrs. Crocker, Stygall, Gill, Frank and Springer, was also defeated by the second team of the Cleveland Exchange, composed of Messrs. Libby, Carson, Cokes, Potter and Gifford, by score of 689 to 653.

During the visit the members of the two exchanges were photographed in a group and in the evening the visitors departed for home on the Buffalo boat.

Harrisburg, Pa.

The Builders' Exchange, which was organized some time ago for the advancement and betterment of the building industries, has recently occupied a handsome suite of rooms at 23 South Third street, the rooms being large and airy and giving the exchange a central location on the main business artery of the city. The rooms are always open and the building public generally is invited at all times to make use of them as a means of ascertaining what is going on in the building industry, as well as to inspect such articles as are there on exhibition. These rooms will be the meeting place and headquarters of the State Builders' Exchange, which meets in Harrisburg the first week in December.

Kansas City, Mo.

Building operations in the city continue upon an increasing scale, and the total for the year is likely to make a most favorable showing when compared with the previous 12 months. According to the figures of Superintendent of Building S. E. Edwards there were 444 permits issued during the month of September for building improvements, having a frontage of 6588 feet and estimated to cost $859,045; while in the same month of 1903 there were 357 permits issued for buildings having a frontage of 4269 feet and involving an estimated outlay of $567,870. Of the permits issued in September of the current year 47 were for brick buildings having a frontage of 1625 feet and estimated to cost $362,900, and 181 were for frame buildings having a frontage of 4963 feet and costing $373,150.

Los Angeles, Cal.

The Los Angeles building record for the month of September shows a slight improvement over last year, there having been 654 permits issued, with an aggregate value of $1,261,482, as compared with 633 permits with an aggregate value of $1,147,965 in September, 1903. The month was notable for the large amount of brick construction undertaken, included in which were one seven-story brick building, to cost $75,000; two four-story brick buildings, to cost $60,500; seven three-story brick buildings, to cost $248,800; four two-story brick buildings, to cost $33,100, and four one-story brick buildings, to cost $5300. The bulk of the frame construction undertaken during the month was for one and two-story residences, these two classes alone reaching an aggregate value of over $610,000, or nearly one-half of the entire construction work undertaken during the month. Besides the one and two story residences, permits were taken out for 19 one story and a half residences, with a total value of $38,364.

A review of the building work undertaken in Los Angeles covering the last nine months shows that up to date during 1904 a total of 5183 permits have been taken out for work to cost $9,079,653. Of this total, about one-quarter is represented by one-story frame buildings. Among the larger work represented are two seven-story brick buildings, three five-story brick buildings, five four-story brick buildings, 32 three-story brick buildings and 42 two-story buildings. Sixteen churches of a total valuation of $73,680 and 38 apartment houses, with a total valuation of $301,755, were undertaken during the period.

Milwaukee, Wis.

The situation is comparatively quiet although there seems to be sufficient work to keep building mechanics fully employed, yet not enough perhaps to cause any unusual demand for labor. A number of large storage warehouses now in process of erection are something of a departure in the building line, but the work for the most part is made up of dwelling houses. There is a fair demand for buildings suitable for light manufacturing purposes and equipped with a power plant to furnish heat, light and power.

During September there were issued from the office of Inspector of Buildings 332 permits for improvements, involving an outlay of $677,295, as against 287 permits for buildings costing $426,581 in September of last year. The banner months of the present year, however, were April and August, when the value of the buildings for which permits were issued amounted to $1,385,833 and $1,003,328 respectively. The total value of the building improvements projected during the first nine months of the present year was $6,187,098, whereas in the corresponding months of last year the estimated cost of the buildings for which permits were issued was $5,670,494.

Minneapolis, Minn.

The month of September witnessed a decided impetus to building operations in the city, the increase over the same month of last year being in excess of 100 per cent. According to the figures of James G. Houghton, Inspector of Buildings, there were issued in September 453 permits for building improvements estimated to cost $897,180, as against 354 permits for improvements estimated to cost $427,785 during September of last year. These figures are for building permits only and do not include those issued for plumbing and electrical work in the buildings nor the cost of such work.

Taking the figures for the first nine months of the current year, it is found that there were 3588 permits issued by the department calling for an outlay of $5,445,605, as against 3369 permits for buildings estimated to cost $4,998,107 during the first nine months of last year.

New York City.

There is very little change to note in the local building situation, and while more or less work is in progress the condition of affairs has not by any means assumed a normal aspect. The number of permits issued from week to week in the boroughs of Manhattan and the Bronx compares more or less favorably with corresponding periods of last year, although the estimated cost of the recently projected improvements is somewhat behind those for the same weeks in 1903. The greatest activity has been above the Harlem River in the borough of the Bronx, where, since the first of January, building improvements have been undertaken involving an estimated outlay of a trifle over $17,000,000, while in the corresponding period of last year there was $5,268,000. Taking the figures for the boroughs of Manhattan and the Bronx from January 1st up to the time of writing the value of the projected building improvements was a little more than $75,000,000, as against $66,500,000 in the same period last year. In the matter of alterations and repairs the figures for the two periods stand $8,600,000 and $9,600,000 respectively.

One of the incidents of the month in the labor world has been the differences between the Journeymen Stone Cutters' Association and the Employing Stone Setters' Association, growing out of the fact that the union wishes to regard the machine stoneworkers as skilled mechanics under its jurisdiction. Of incidental interest in this connection is the formation of what is known as "The Greater New York Cut Stone Contractors' Association," which has as one of its objects the encouragement of arbitration and the avoidance of strikes and lockouts. According to a "bulletin" issued to the trade it has been deemed wise in order to carry out more effectually the purpose of the organization that all members give a suitable bond to live up to the regulations of the association. It is expected that these bonds will not only be a source of strength to the association and create a feeling of security and confidence among its members, but also give the public complete assurance of the ability of its members to perform any contract which may be awarded them, and to insure immunity against delays caused by strikes.

Pittsburgh, Pa.

Just at present there is a most gratifying degree of activity in building circles, and if the present volume of work is maintained to the close of the season the total for the year will compare very favorably with recent years. The value of the improvements for which permits were issued in the month of September is in excess of any recent similar period, and in the absence of any serious labor troubles the outlook is most promising. According to the figures of Superintendent S. A. Dies of the Bureau of Building Inspection, there were 311 permits issued in September of the present year for building improvements, estimated to cost $5,077,579. From the first of January to and including September 30th there were issued 3030 permits for buildings estimated to cost $13,317,939, while for the corresponding period of last year there were 2720 permits issued, covering improvements estimated to cost $14,981,550. A very large proportion of the work which is now in progress consists of buildings intended for dwelling purposes.

Bids have recently been asked for the erection of a number of large buildings, including a $300,000 hotel, to be erected at Tenth street and Liberty avenue, nearly opposite the Union Station of the Pennsylvania Railroad; a rathskeller in the building at the corner of Wood street and Fifth avenue, costing about $200,000, and which will be owned and operated by the Farmers' Deposit National Bank, and a five-story tenement building, to be erected by the Tenement Improvement Company, and a $75,000 compartment building, to be erected by a New York syndicate.

P. K. Stephenson, who recently resigned as assistant secretary of the Builders' Exchange League to accept the position of secretary of the Building Trades Employers' Association, New York City, was given a farewell dinner by friends at the Monongahela Club on Wednesday evening, September 28th. Since his association with the local exchange Mr. Stephenson has become very popular, and at the dinner his pleasant humor kept his friends in the best of spirits. While his departure from Pittsburgh is greatly regretted, the members of the local exchange look to him to bring the Pittsburgh and New York exchanges into closer and more friendly relations.

A delegation from the Pittsburgh Builders' League visited Cleveland on September 27 and were given a royal reception by the members of the Builders' Exchange of that city. During the visitors' short stay they were given an automobile ride through the business and residential sections and then were taken to the rooms of the exchange, where the "group plan" was explained and illustrated for them.

Portland, Ore.

The chief interest in Portland building is now centered about the construction of the buildings for the Lewis & Clark Exposition. Plans are now being received for three new exhibit buildings to cost in the neighborhood of $80,000. A number of bidders are already in the field, including some from St. Louis and other Eastern points. Aside from work on the Exposition grounds and on the adjacent property, general building conditions show a falling off over the same season in 1903. The summer months have been comparatively dull in Portland, and while building has not languished heretofore it is now beginning to show the effects of the reaction. The lumber industry, upon which a great deal of the prosperity is dependent, has been backward for some time and there has been a tendency to put off improvements until next year. Notwithstanding some adverse conditions builders report that they have had a fairly profitable season, and while they do not anticipate a rush of work during the winter they believe that the new year will open with brighter prospects than did 1904.

Richmond, Va.

Although the season is far advanced the city presents an unusual scene of activity and it is estimated that building operations now under way or about to be commenced closely approximate a valuation of $1,500,000. Three of the improvements account for fully two-thirds of the sum, these being the nine-story steel, brick and stone structure for the Mutual Assurance Society at Ninth and Main streets, for which J. T. Wilson is the contractor; the Catholic Cathedral on Laurel street, and the improvements which are being made to the State Capitol, for which W. A. Chesterman has the contract. Some of the other more important improvements include an $80,000 six-story stone and brick building for the Virginia State Insurance Company, the new Beth-Ahaba Tabernacle of brick and stone, to cost $60,000, for which J. T. Wilson has the contract; the $55,000 building for the Second Baptist Church, the Kidd flats, to cost approximately $50,000, and to be erected in accordance with plans drawn by Carl Ruehrmund, and repairs and improvemens to the United States Postoffice and Custom House, to cost probably $15,000. A new theater is to be erected on Broad street between Eighth and Ninth streets, a large storehouse is to be put up on the north side of the same thoroughfare, and additions are to be made to Campbell's Hotel at Tenth and Broad streets.

San Francisco, Cal.

Just at present the building outlook in San Francisco is a little uncertain. For various causes, some transient and some probably more permanent, there has been a slight easing off in the amount of new work undertaken, though as yet no marked reaction has been felt. As a rule, all available workmen are employed, and in some lines, particularly in plumbing and roofing, there seems to be a scarcity of help.

The fall rains have begun early and have been of unusual severity, putting a temporary check on new work.

Vacant dwellings, stores and offices are becoming noticeable in some parts of the city, and for the first time in several years it can be said that the rent market is "easy." So far as known rents have not been reduced, but they are stationary. This will naturally have a tendency to check speculative building, though builders point out that the vacant buildings are those of old or inferior construction, which have been deserted for the better buildings put up this year and last.

During the last week in September the San Francisco Architectural Club held its third annual exhibit at Mechanics' Institute Hall in San Francisco. The work exhibited represented the best efforts of the architects during the past year. Chief among them were the plans submitted by San Francisco architects for the new United States Custom House.

Plans are being drawn for the construction of extensive car repair and building shops in San Francisco by the United Railroads of San Francisco, a corporation which owns nearly all the street car lines in that city. According to the plans the proposed shops will cover an area of ten acres and will be equipped not only for the repair and rebuilding of cars, but for the construction of new cars. All the construction and repair work of the company which is now done at various places will be concentrated in one spot, where it is anticipated that some new and novel features will be put in operation. They will be fitted for electrical work as well as for other construction work.

Seattle, Wash.

Seattle builders continue busy, and although there is no special rush the amount of work undertaken, as well as the new buildings projected, continue to compare favorably with the same season for last year. The labor situation is satisfactory, and although there is no superabundance of labor in the building trades there is likewise no acute scarcity in any line.

Plans are now being drawn for L. C. Smith of Syracuse for a twelve-story office building to be constructed at the corner of Second avenue and Yesler street. The building will cost $750,000, and will be of fire-proof construction throughout. The first and second and eleventh and twelfth stories will be of concrete and ornamental terra cotta. The intermediate stories will be of cream-colored brick. It is given out that the building will not be begun before the first of January.

St. Louis, Mo.

The permits which have been issued from the office of Commissioner of Public Buildings Heimburger during the past few months indicate a decided increase in the number of new brick buildings, which for the most part consist of flats, apartment houses, stores, &c. According to the figures of the department there were issued in September 203 permits for new brick buildings, costing $1,453,332, and 66 for alterations and repairs, costing $57,231; there were 263 permits issued for new frame buildings, costing $53,000, and 77 permits for alterations and repairs, costing $11,500. In September of last year there were 116 permits issued for new brick buildings, costing $728,837, and 116 for alterations and repairs, estimated to cost $104,260. For new frame structures there were 205 permits issued calling for an expenditure of $77,967, and 92 permits were issued for alterations and repairs costing $12,810. The total valuation of the improvements for September of this year was $1,575,039, as compared with $923,874 in September of last year.

For the first nine months of the current year there were issued 1109 permits for new brick structures, estimated to cost $7,784,068, and 1657 permits for repairs and alterations, costing $1,103,592. During the same period there were taken out 1859 permits for new frame buildings, estimated to cost $1,592,614, while 653 permits were issued for repairs and alterations to frame buildings, costing $136,757. The grand total for the nine months is $10,617,031, while for the first nine months of 1903 the value of the brick and frame buildings for which permits were issued was $10,986,-494.

Tacoma, Wash.

Construction work continues active in Tacoma notwithstanding predictions of a falling off during the summer and fall. The total amount of work now under way in Tacoma is slightly in excess of the same season last year. During September, 1904, the building permits issued numbered 150, authorizing an expenditure of $171,081. These permits included 68 dwellings, to cost $69,230; three apartment houses, to cost $10,518; three brick office and store buildings, to cost $56,000; two warehouses, to cost $5750; one church, to cost $3,000, and a considerable amount of smaller work, additions, repairs, &c.

Builders anticipate a slight falling off in building during the winter months, although it is hoped that the winter work will be somewhat in excess of the work undertaken during the winter of last year.

Note.

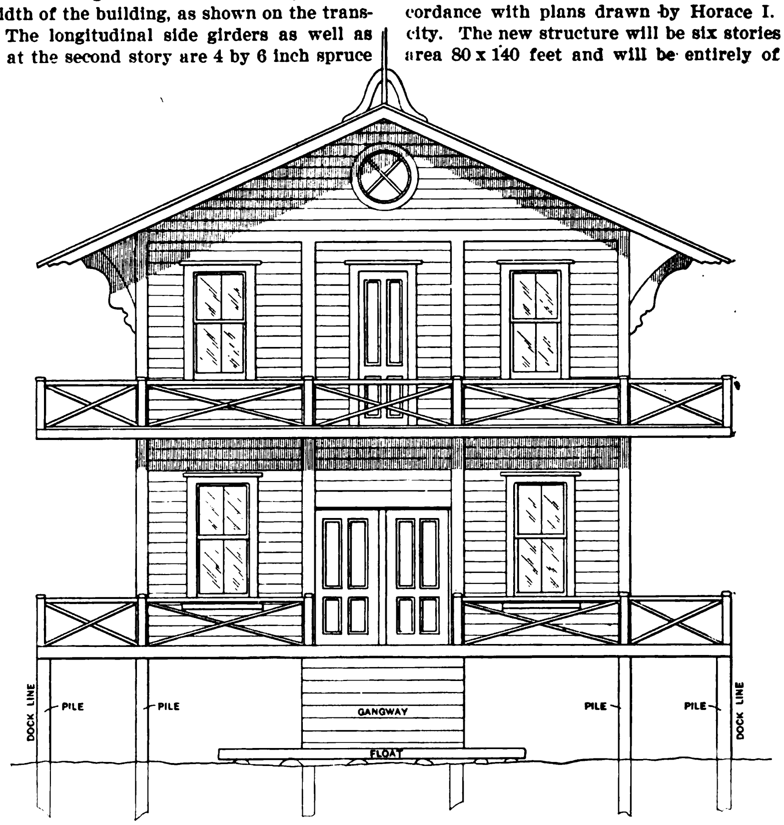
The Master Builders' Association of Springfield, Mass., has recently applied to the Secretary of State for articles of incorporation. The petitioners include Joseph W. Hayden, William Addison, T. B. Gilbert, A. G. Chapman, James F. Walls, W. A. Newton, E. W. Shattuck, Napoleon E. Russell, L. S. Wood and Leroy P. Fletcher.

Design for Yacht Club House.

We present in the accompanying illustrations the floor plan, section and elevations of a yacht club house which has recently been erected on the Hudson River at the foot of West 152d street, New York City. The house rests on spruce piles driven to a solid foundation, and then sawed off at the hight indicated on the elevations. The main corner and intervening posts are of spruce and are framed in the manner indicated. Where floor beams come in contact with the posts they are solidly bolted together in a substantial manner. The two tiers of floor beams are of spruce timber properly framed and overlapped where the lengths are not sufficiently long to span the full width of the building, as shown on the transverse section. The longitudinal side girders as well as the end girders at the second story are 4 by 6 inch spruce timbers, notched 1½ inches into the posts and bolted solidly thereto with ⅝-inch bolts and washers. The wall plates, or upper girders, shown on the transverse section are of similar material and are tenoned and mortised on the top ends of the posts, being fully braced as indicated. The sides of the house are covered with spruce and cut in tight between the posts to make the construction rigid. Over the sheathing is a layer of building paper and this in turn is covered with white pine novelty siding fitted to a close joint against the window and door frames and the heading joints well broken and staggered. The roof is covered with 1-inch tongue and grooved spruce, planed on one side and laid to a close joint in the soffit edge and thoroughly nailed. The whole is covered with three-ply tar paper, tar and gravel.

The first floor, or boathouse floor, is laid with 2-inch spruce flooring, tongued and grooved and nailed to every beam with 4-inch wire spikes. The second floor is of ⅞-inch yellow pine matched flooring. The tiers of balconies made by the projecting ends of the beams on the north and south sides of the building are floored with 2-inch yellow pine planed on the upper side, driven to a close joint and thoroughly nailed. Opposite to each post is placed a 4 x 4 inch baluster solidly nailed to the floor beam below. The top rails and diagonal flooring in between the piers are 2 x 4 inch pine cut in as shown and firmly nailed, the inner sections being notched together so as to come flush at the edges.

The building here shown was designed by Owen B. Maginnis of 310 West 128th street, Borough of Manhattan, New York.



Front Elevation.—Scale, ⅛ Inch to the Foot.

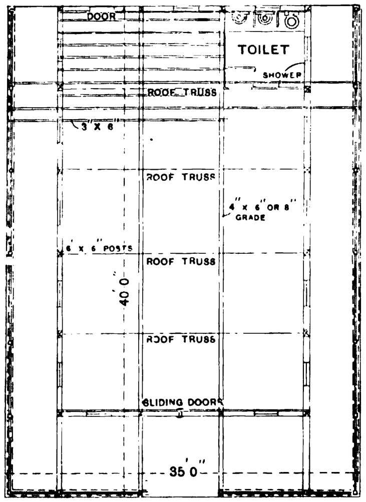
Design for Yacht Club House on Hudson River.

A Business Structure of Reinforced Concrete.

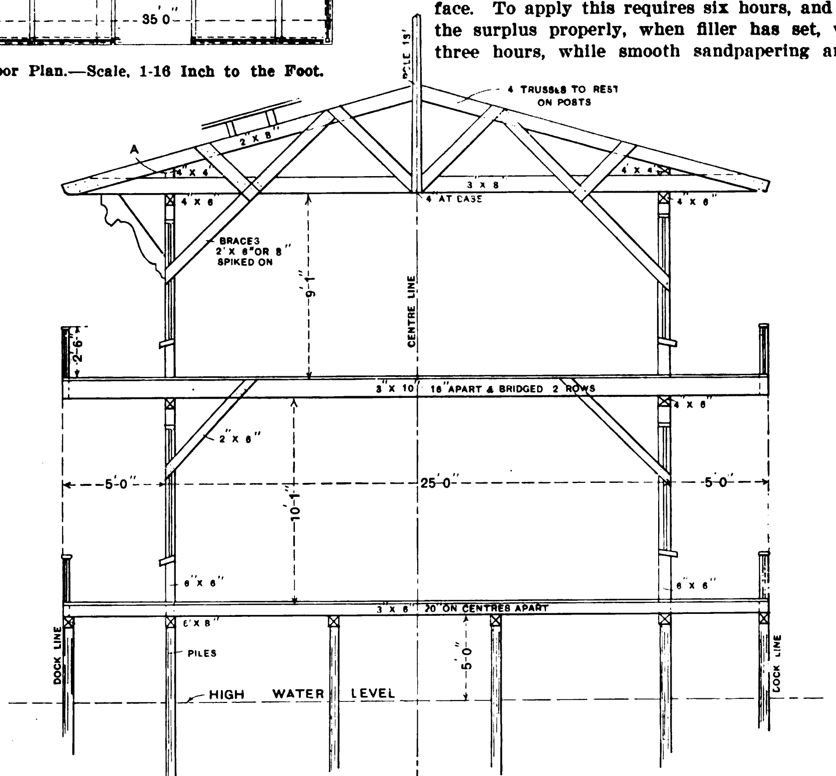
A striking example of the growing popularity of reinforced concrete in building construction is found in the new mercantile structure now under way at the corner of Prince and Concord streets, Brooklyn, N. Y., in accordance with plans drawn by Horace I. Moyer of that city. The new structure will be six stories high, cover an area 80 x 140 feet and will be entirely of concrete reinforced with steel rods. Each story will be supported by circular columns resting on footings 5 feet below the cellar bottom. These columns will have diameters ranging from 28 inches in the basement to 12 inches on the top floor, and will be connected with concrete girders and concrete beams supporting concrete floors.

The concrete columns are reinforced by 1¼-inch square steel rods, set vertically through the columns, and are crossed by a series of steel rods in a horizontal position. The rods are first placed in position and an expanded metal frame, which is the shell of the column, is fitted around the rods. Afterwards the shell is filled up solidly with concrete and after hardening is finished smooth on the surface. The girders supporting the floors are practically of the same construction, composed of solid concrete, with seven 1¼-inch rods so placed in the girder as to take up all the tension. Special attention is given to the union of these girders with the columns. Resting upon the girders and concrete beams is a row of ½-inch bars, 7 inches from the centers. These bars are placed near the bottom of a 4-inch concrete mass which forms the floors. Special attention has been given to the negative bending, or, in other words, to the reaction of the columns when the floors are loaded. The girders and

floors are formed by depositing concrete into wooden forms temporarily constructed on the columns, the steel rods being already in position. After the concrete is de-



Floor Plan.—Scale, 1-16 Inch to the Foot.



Transverse Section.—Scale, ⅛ Inch to the Foot.

Design For Yacht Club House.

posited in the molds and has been allowed to set the woodwork is removed. Thus the concrete, which entirely covers this wooden support and fills in the troughs containing the steel rods, forms one solid mass of flooring, girders and beams. The same forms are utilized in laying the girders and floors of the second story and for each succeeding floor, until the building is finished. The side walls are constructed upon the same plan, with the exception that vertical forms are built up to the hight of the story, the corrugated rods placed at intervals therein, and the whole mass of concrete deposited and rammed thoroughly. Wooden forms are also used for the window openings and are replaced by metal window frames. The building will contain concrete stairways and a concrete roof. It will be occupied by the Thompson & Norris Company, who make corrugated paper and paper specialties.

Estimating the Finishing of Interior Woodwork.

Some interesting information relative to the amount of labor and material required in finishing interior woodwork is contained in the reply to a correspondent of the *Painters' Magazine*, who asked how much it was worth per square foot or square yard to fill oak, allowing for moldings, &c., and how much it was worth to give on such surface three coats of varnish, each coat to be rubbed, the last coat to a dull finish with pumice and oil. The paper in question replied as follows:

We cannot give you any idea as to fixed charges, as prices differ in various localities, according to cost of labor, &c. We shall, however, give you an outline of the quantity of filler and varnish required, also what space of surface can be done by a man of average ability under average conditions. Eight pounds of paste filler require for thinning to the proper consistency ½ gallon of turpentine, producing enough liquid oak filler to cover, or, rather, fill, 40 square yards of well planed oak surface. To apply this requires six hours, and to wipe off the surplus properly, when filler has set, will require three hours, while smooth sandpapering and cleaning off, when filler has dried, will require seven hours more, a total of 16 hours for one man.

Then there are moldings or curved work; allowance must be made and curves considered. As to varnishing and rubbing, 1 gallon of varnish is required for each coat per 50 square yards, and eight hours' labor to apply the same. Rubbing between coats with pumice and water will require 30 minutes per square yard, while rubbing to a dead finish with oil and pumice will require the labor of a first-class man for not less than one hour for each and every square yard of surface.

THE work of excavating for the foundations of a building which will somewhat resemble in design the present Madison Square Garden is now in progress on

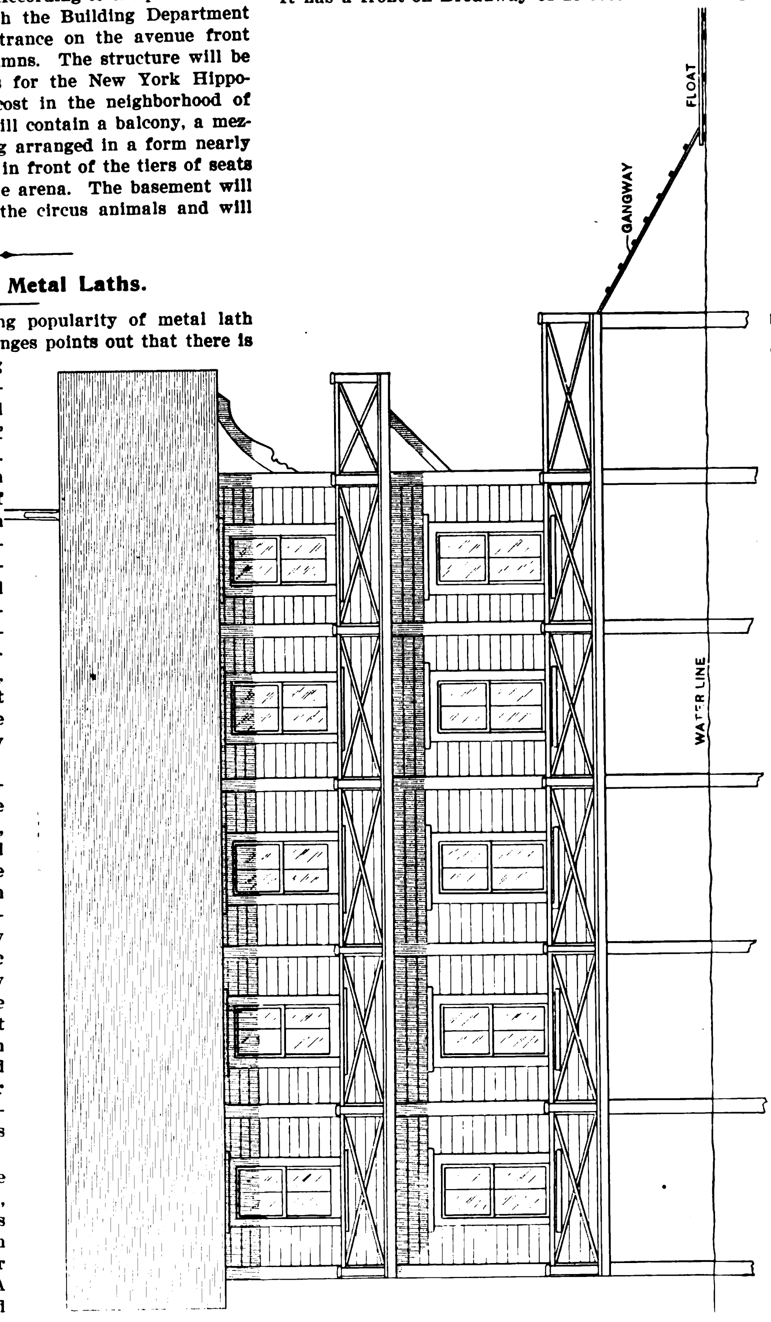
Sixth avenue from Forty-third to Forty-fourth street, New York City, the site being that of the old Sixth avenue car stables. The structure will have a frontage of 200 feet, a depth of nearly 240 feet, and it will be three stories in hight. It will have two colonnaded towers with ornamental domes and the cornices decorated with ornamental staves in rows. According to the plans which have recently been filed with the Building Department there will be a spacious entrance on the avenue front flanked with Corinthian columns. The structure will be used as a permanent circus for the New York Hippodrome Company, and will cost in the neighborhood of $400,000. The auditorium will contain a balcony, a mezzanine tier and gallery, being arranged in a form nearly oval, with a two-ringed area in front of the tiers of seats and a large stage back of the arena. The basement will be utilized as quarters for the circus animals and will contain a huge tank.

Popularity of Metal Laths.

In discussing the growing popularity of metal lath a writer in one of our exchanges points out that there is always a risk in putting ornate decorations upon ceilings or walls that may yield or crack with any change of temperature or humidity. Metal laths are used in such buildings as the Library of Congress and the Boston Free Library, where the decorations are elaborate. Owing to the rigidity imparted by the metal laths the decorations suffer no deterioration. The householder desirous of having ceilings, walls and partitions that will be rigid and inflexible can attain his object by means of the metal lath.

Walls, partitions and ceilings thus constructed are proof against fire, water, vermin and sound. Metal protected by plaster is free from corrosion. All wooden beams or supports are so insulated as to be practically fire proof. Gas pipes, electric wires and other necessary connections can be made through the walls without difficulty. The metal lath with plaster is also adapted to air shafts, dumbwaiter shafts, chimney stacks, alcoves, architraves, cisterns and vaults.

Some of the most attractive residences in the Eastern, Middle and Western States have adopted the metal lath overlaid with cement for their external construction. A stone finish may be imparted to the cement; and the various colors of the cement and the adaptability of the metal lath render possible any architectural effect that may be desired. The same method of construction is adapted to other buildings. The Pennsylvania Railroad station at New Brunswick, N. J., is covered with cement over metal laths, giving a uniform and pleasing effect. Churches, greenhouses, stables and factories can adopt the same materials advantageously for external construction, and they are adapted to the construction of stoops, archways, porticos, vestibules, cornices, fountain basins, gate posts, fences, walks and similar outside features.



Design For Yacht Club House.—Side (Left) Elevation.—Scale, 1/8 Inch to the Foot.

Smallest Building of Modern Construction in New York City.

What is said to be the smallest building of modern construction in New York City is now being erected in Broadway, between Sixty-third and Sixty-fourth streets. It has a front on Broadway of 20 feet and is triangular in shape, the base of the triangle being only 15 feet. The material is steel, stone and brick, and it is to be only one and a half stories with a cellar. The small triangular lot is the result of the irregular course of the old Boulevard at that point.

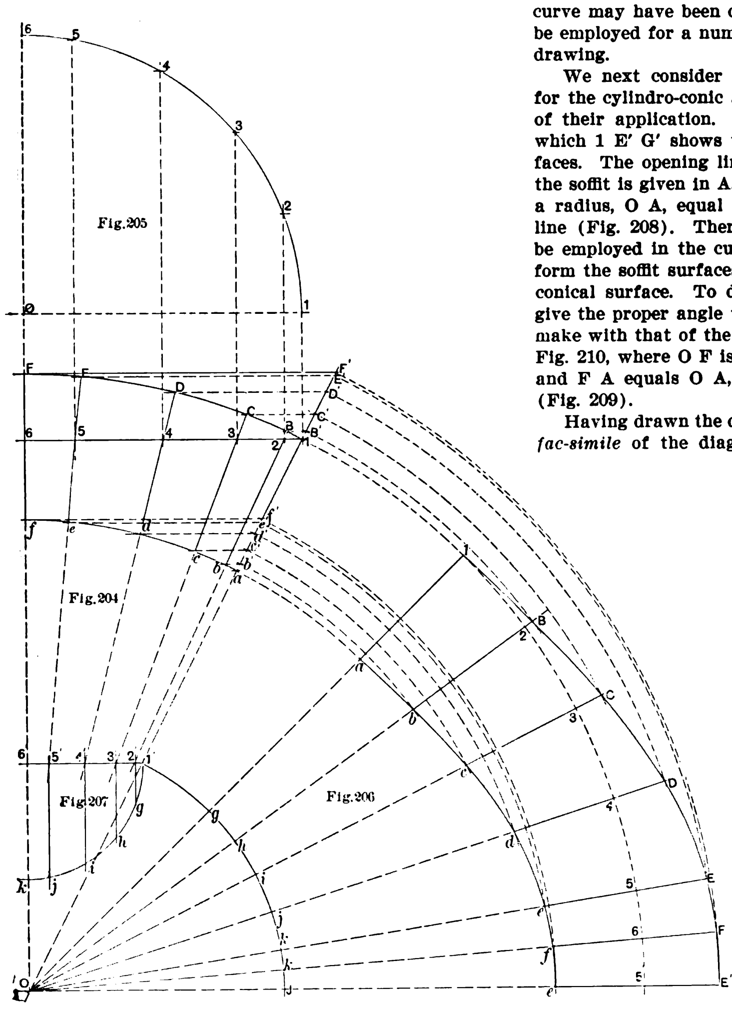
BRICK houses painted black are scarce in New York City, but there is one in Sixth avenue. The lines between the individual bricks are painted white and the building presents a neat, though somber, appearance. Appropriately enough, an undertaker has his place of business there.

LAYING OUT CIRCULAR ARCHES IN CIRCULAR WALLS.*—XXI.

By Charles H. Fox.

In the present chapter we shall discuss the development of the soffit of the cylindro-conic arch. In Fig. 204 is given the plan in which 1 F represents the outside and *a f* the inside face curve, these being drawn with O as center. The opening line is given by 1 6, this, as before stated, being the trace of the vertical plane which contains the directing curve of the cone forming the soffit surface. The directing curve of the soffit is shown by 1, 2, 3, &c., of Fig. 205, at which points it is divided to correspond to the number of stones the arch may contain.

Project the points of the directing curve into the opening line and draw the radicals; then parallel with the opening line, through the points given in B, C, D, &c.; produce lines as B B′, C C′, D D′, &c., to meet the line O 1, produced as shown in the diagram. Then with O as center, and with O 1, O B′, O C′, &c., as radii, draw arcs indefinitely. Upon that drawn with radius O 1, set off 1, 2, 3, &c. (Fig. 206), equal to the length of the corresponding arcs of Fig. 205. Join these points with the center O and produce them; through the intersections given in 1 B, C, &c., trace a curve, which will be the development of the curve of intersection of the conic surface which forms the soffit with the convex cylindric surface which forms the outer face. In a similar manner trace a curve through the points given in *a*, *b* *c*, &c., which will complete the development.



Figs. 204 to 207, Inclusive.—Diagrams for Developing the Soffit of a Cylindro-Conic Arch.

Laying Out Circular Arches in Circular Walls.

We may remark that the section at any plane parallel with that projected in 1 6 of the plan will also be a semicircle. Take, as example, that projected in 1′ 6′, intercepting the axis line in 6′ and the side of the cone in 1′. With 6′ as the center and 6′ 1′ as the radius draw the arc 1′ *g*, *h*, &c., which gives the section found at the vertical plane, of which the line 1′ 6′ is the trace. If at the points 2′, 3′, 4′, &c., lines be drawn parallel with the axis line O F, these will divide the curve in the points 1′, *g*, *h* &c., into a similar number of equal parts into which the directing curve may have been divided. This simple problem may be employed for a number of useful purposes in practical drawing.

We next consider the construction of the templates for the cylindro-conic arch, together with an explanation of their application. In Fig. 208 is given the plan, in which 1 E′ G′ shows the convex and 1′ *a g* the concave faces. The opening line is A G. The directing curve of the soffit is given in A, B, C, &c., of Fig. 209, drawn with a radius, O A, equal to the length G A of the opening line (Fig. 208). There are several methods which may be employed in the cutting of the stones. We may first form the soffit surfaces as planes, and afterward cut the conical surface. To do this a template is necessary to give the proper angle which the surface of the soffit may make with that of the joint. Its construction is given in Fig. 210, where O F is made equal with O G of Fig. 208, and F A equals O A, the radius of the directing curve (Fig. 209).

Having drawn the quarter circle, join F′ with O, and a *fac-simile* of the diagram O A G of Fig. 208 may be obtained; that is, we thus obtain in O F, O F′ and F′ F the projections, respectively, of the axis, one side, and the base of the cone of which the soffit of the arch is a portion. The arc drawn with radius F F′ will be equal and similar to the base of the cone employed. Understanding this, set off F′ B equal with one of the equal divisions made at the directing curve of Fig. 209; through F′ B produce a line as shown in F′ B C of the diagrams; then, parallel with O F, through any point, as C, draw a line, as C D, making this in length equal to that of F′ C. Now square with O F′, draw D I; then joining F′ G, the angle of the bevel required may be projected. The angle H E I is that made by the joint surface with that of the soffit, when the latter may be first worked as planes. If the directing curve is divided into equal parts, then one bevel will be sufficient to work the plane surfaces at the joints and soffits of each separate stone, as the angle made is similar at each joint and soffit surface.

To form the stones proceed as follows: Work first the joint surface; then with No. 4 template work the soffit surface, forming a plane (assuming we are cutting No. 3 stone of Fig. 200); set off at the outer edge—that is, at the edge of the outer face—a length equal to that of H I, the chord joining the points in question of the diagram; then mark upon the joint surface first formed the mold developed for the surface in question. Set off at the point given at the inside face a distance as *h i* of the chord, joining the points in question of the joint lines *h* 3 and *i* 4 of Fig. 200. Drawing a line through the points obtained gives the cutting line of the other joint surface. This may then be worked to the direction given with No. 4 template. In working the stones to this method the soffit patterns referred to on the previous page are not required, and with proper care the stones may be worked as accurately with the bevel as with the soffit mold.

The joint surfaces being formed, the cylindrical face may then be worked to the method by which the similar surfaces are formed in the radiant arch, fully explained in preceding chapters—that is, making use of the bevel No. 3 as shown in Fig. 213 and applying it to a line as 9 12, drawn square with the joint surface 9 4 5 *d*. This method is explained in the diagrams shown in Figs. 137 to 150, to which we refer the readers.

Another method of forming the stones may be employed, as follows: Form as before one of the joint surfaces. Upon this mark the joint mold of the surface in question. Then, as shown in Fig. 213, work the outer face. Upon this mark the mold developed for the surface in question. This gives the cutting line of the soffit surface at the outer face. To cut a draft at the inside face we may construct a bevel, as that of No. 1 *a* of Fig. 209, as follows, assuming No. 4 stone to be that on the banker: In Fig. 208, through the point *e* at the inside face curve, parallel with the opening line, draw *e* I; now project I of the plan into I of the base line of Fig. 209, and with O I as a radius draw an arc, I *d e*, which gives the bevel, as shown in No. 1 *a*, with which the draft may be cut as required at the inside face line of the stone. Now work the soffit surface, and mark upon the finished surface the mold developed for the surface in question. The cutting line of the other joint surface is then given in the lines respectively of the soffit pattern and of the face mold. These obtained, the stone may readily be completed.

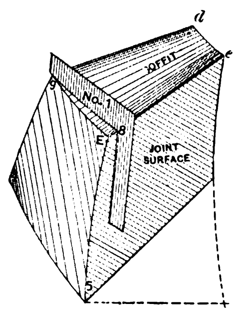


Fig. 212.—Showing Application of a Template.

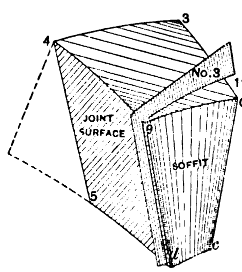
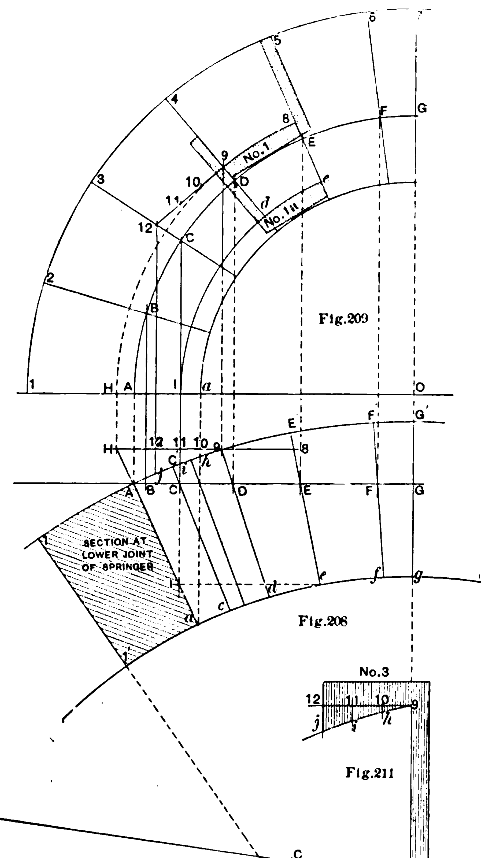
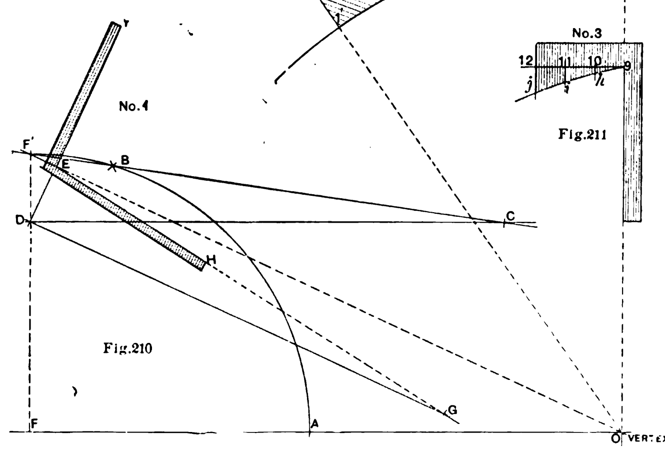


Fig. 213.—Another Method of Forming the Stones.





Figs. 208 to 211, Inclusive.—Diagrams Illustrating Method of Cutting the Stones.

Laying Out Circular Arches in Circular Walls.

There are many other methods which may suggest themselves to the stonecutter by means of which the stones may be formed. As shown in Fig. 212, the soffit surface may be formed by making use of a template, No. 1, constructed as explained above, and shown in the diagram, Fig. 209. However, the better method for the beginner to employ will be to first form a joint surface, then the face surface; then, as directed above, form the soffit, and upon it mark the soffit pattern to its direction and that given with the joint line of the face mold. The other joint surface may be readily formed and the stone brought to its required shape.

Brick and Concrete.

There is a practice which is quite prevalent at the present day but which ought to receive the condemnation of every constructor. In building foundations for columns the substructure is generally carried up either in concrete or granite to approximately the level of the bed plate, and the remaining few inches are not set in place until the construction is ready to receive the columns. The piers or walls are then carried up in brick to the exact hight necessary to receive the bed plate of the column. This construction, says the *Brickbuilder*, is all right provided the bed plate is proportioned to the safe strength of the brick, but usually the bed plates are assumed to rest directly on the granite or the concrete of the pier or wall, and in estimating the area of the plate no account is taken of the fact that brick may be used to fill in. Of course, the resistance of such a pier or wall is measured entirely by its weakest point; and whereas we may load concrete with 30 tons per foot and granite with 60, it is not good practice to trust over 15 tons on brickwork. We have repeatedly seen cases where the loads placed upon such brick nogging ran up as high as 40 tons per square inch. Of course, this was very largely a theoretical rather than an actual load, but the continued stability of such construction reflected more credit upon the ultimate capacity of brick than upon the engineering knowledge of the superintendent who allowed such evasion to pass.

The Boston Master Builders' Association and Labor Issues.

The Master Builders' Association of the city of Boston unanimously adopted at a meeting on October 4 the following general principles in its relation to labor:

1. That no persons or combination of persons, other than those who are responsible for the conduct of business, should be permitted to control or dictate upon what terms or under what conditions or following what methods business shall be conducted.

2. That absolute freedom of choice in the employment of workmen is essential to the welfare of the employer, the employee and the community; therefore artificial restraints upon such freedom should not be permitted to exist.

3. That combinations of persons organized or operated so as to create interference with the rights of others, either directly or indirectly, should *not* be "recognized" as fit and proper bodies to have business relations with.

In all labor issues the association and its members will be guided by the following order:

1. Whenever any interruption of work occurs, caused by concert of action of employees, the member or members affected will be expected to notify the board of directors without delay, giving full particulars in writing.

2. The directors will then call into conference all members of the association in the same line of business as those whose work has been disturbed or threatened, and others whose interests may be affected, for the purpose of making careful study of the facts. Following the conclusions of the said conference the directors shall determine what line of action is to be followed; every member of the association shall then be notified of the same, and be fully instructed as to the policy of the association in the premises.

3. During the continuance of the disturbance no action affecting the issues involved shall be taken either by individual members or by any of the members collectively, except under instruction from the board of directors, acting always in conference with the members of the trade and others affected by the disturbance.

4. If there be an organization of employers in the line of business affected, the board will be expected to secure its co-operation if possible. The board of directors, at its discretion, may consult with non-members of the Master Builders' Association in the line or lines of business affected, and shall in any event seek to secure their concerted action in whatever policy is adopted.

5. Whenever a demand is made upon any member of the association by an organization of workmen, or by a business agent or representative of such an organization, the member will be expected to receive the same without comment, transfer it immediately to the board of directors and take no action in relation thereto until the board shall have instructed him as to what will be expected in the premises.

Workmen employed by members of this association may be registered under the conditions and subject to and participating in the rules and privileges here following:

I.

Members of this association will be expected, from time to time, to file with the secretary the names of such workmen as they may consider worthy of recognition by the association, by virtue of skill, interest manifested in work, good habits and reliability.

II.

Workmen whose names have been thus filed with the association are to be notified of this fact, and upon application to the board of directors they may be registered under such regulations as the board of directors may establish.

III.

Members presenting the names of workmen will be expected to conform to the method governing such filing as from time to time may be adopted by the board of directors, and will be expected to notify the board should they become convinced that any workman recommended by them has become unworthy of continuance on the registration roll.

IV.

Registered workmen are to participate in and be governed by such codes of practice as now exist or may hereafter be adopted by the association.

V.

Registered workmen are to be entitled to hearings on matters relating to the common interests of workmen and employers, and conferences will be held at stated intervals between the workmen so registered and the members of the association, for the purpose of arriving at decisions in regard to matters of mutual concern which properly can be determined through such meetings.

The Connecticut Labor Bureau.

The State of Connecticut has tried the experiment of conducting a free employment bureau in the larger cities at the public expense, and the results, now sufficiently demonstrated to permit of intelligent deductions, would seem to indicate that the system is a success. The employment bureaus were established in 1901 by act of the General Assembly, under which it was provided that the Commissioner of the Bureau of Labor Statistics should establish in New Haven, Hartford, Bridgeport, Norwich and Waterbury free employment bureaus for the purpose of receiving applications from persons seeking employment and from persons seeking to employ labor. No fee many be charged either class of applicants. Some idea of the work of the bureaus may be obtained from the report of the year 1903, during which there were, in the five bureaus, 13,208 applications for employment, of which more than 7000 were from females; 10,728 applications for help, of which 7400 were for females, and situations were secured for 8180 persons, of whom over 5100 were females. Very much the same percentages prevailed during the 29 months of the life of the bureaus prior to the period covered by the report. The growth of the work has been material, in both kinds of applications and in the number of positions provided.

These bureaus have a very broad scope in the classes of help affected. No kind of employment is barred. Doubtless a very considerable percentage of applications came from servants, and an equally large number of situations procured were for this class of help. Yet of the persons for whom work was found, at the average rate of 150 a week, a large number went to manufacturing establishments, which, in Connecticut, means to a large extent metal working establishments. Thus a good work was done for both employer and employee in much the same manner that labor bureaus conducted in a number of American cities by metal trades associations and other similar organizations have done a greater work in the manufacturing field—greater because they specialize and most of them on strictly metal lines.

In the city of Bridgeport both classes of bureaus are in operation. That of the Manufacturers' Association has been freely used by workmen during the six months it has been in operation. Yet the Commissioner of the Bureau of Labor Statistics asserts that his Bridgeport bureau has not been materially affected by the operation of the association's bureau. Undoubtedly men seeking employment use both bureaus, and as one specializes in manufacturing industries, though not in this instance exclusively in metal, the two would come in conflict, if at all, only in a portion of the great general field covered by the State institution. Whether an employment bureau conducted at the expense of the State is worth the while, in view of the great and constantly increasing demands upon the public treasury for important and necessary improvements, is a problem for legislatures of other States to solve if the proposition is put to them. In Connecticut the statute puts an expense limit of $2000 on each bureau, a total of $10,000. Naturally, as the State as a whole pays the bill, only a small proportion of the taxpayers can receive the direct advantages of the institution. Nevertheless, it must be remembered that any means that assists the laborer to secure his hire or the employer to secure needed help at the earliest possible moment must be for the public good.

THE municipality of Spezia, Italy, has voted a sum of $1930 to be awarded as a premium to the competitor who presents the best drainage scheme for Spezia and its suburbs. The competition remains open until December 31, 1905.

New Publications.

The Architects' and Builders' Pocket Book. By Frank E. Kidder, C.E., Ph.D., consulting architect and structural engineer. Fourteenth edition. 1656 pages. Illustrated with 1000 engravings, mostly from original designs. Bound in flexible morocco covers. Published by John Wiley & Sons. Price $5, postpaid.

The first edition of this well-known hand book for architects, builders, draftsmen and structural engineers was brought out nearly 20 years ago, since which time it has had several revisions, in order to keep it fully abreast of the times, for it is well known that great progress has been made in the methods of building construction during the past decade. The aim of the author has been to produce a reference book containing some information on every subject except design, likely to come before an architect, structural engineer, draftsman or master builder, including data for estimating the approximate cost. In short, the idea has been to supply a hand book which should be to the architect and builder as useful and reliable as Kent's pocket book is to the mechanical engineer and Trautwine's to the civil engineer. In the present revision the author has endeavored to cover the subject of architectural engineering as thoroughly as is practicable in a hand book, and to present all information in as small and convenient form for immediate application as is consistent with accuracy.

A review of the book shows that the author's aim has been very consistently realized, and the value of the work to the profession for which it has been prepared can hardly be overestimated. The tremendous advance in building practice since the first edition accounts for the greatly increased scope necessary in the present work. Originally structural engineering referred almost exclusively to bridge work, while to-day it is a most important part of building construction. For this reason this hand book has been extended to serve the needs of the structural engineer and draftsman as well as the architect and builder. The book contains many references to other sources of information where it was impossible from lack of space to go extensively into any subject. Another noteworthy feature is a general index to many lines of work, materials and manufactured products entering into the planning, construction and equipment of buildings. An interesting section gives the names of architects of noted public and semipublic buildings in the United States, and a list of noted architects from the seventh century B.C. down to the present, and a more complete list of noted American architects, with a brief item concerning each and his principal works. Colleges and schools of architecture receive consideration in another division. "Trade References" will be found convenient to architects in locating manufacturers of classes of goods they are apt to require. The book closes with a glossary of technical terms, ancient and modern, used by the profession, and architectural terms as defined in various building laws.

The A. B. C. Schedules, or Itemized Estimates for Architects, Builders and Contractors. By A. W. Massey, Architect. Issued by the Gem Publishing Company. Bound in paper covers. Price for Carpenters' Schedules, 35 cents each; Masons' Schedules, 30 cents each; Plumbers' Schedules, 25 cents each; Painters' Schedules, 15 cents each. The four series complete, $1 per set, or $10 per dozen sets.

These schedules have been compiled by one who has had long practical experience in building and is therefore well acquainted with the requirements of the architect, builder and contractor in the way of estimating blanks. In submitting these itemized schedules of building materials, labor and cartage, which embrace the cost of every item entering into the construction of all city or country dwellings, the author calls attention to the wide differences between estimates of local builders often in moderate priced constructions where the market prices of material and labor are the same. These differences, it is pointed out, are not always due to inexperience nor to lack of practical ability or business knowledge, for they have occurred among capable and experienced builders. Among the causes contributing to these differences is the absence of a quick and reliable system of itemizing and recording all of the materials, labor, cartage and cost, which ought not only to save a great deal of unnecessary writing, trouble and valuable time, but should also contain a complete and comprehensive statement of comparison between the profit and loss on each item which could be seen at a glance. Another cause of these discrepancies in estimating is the result of the careless but common practice of uniting or grouping several items of materials, labor, &c., under one head. This leads to general confusion and uncertainty by increasing the chances of errors in omitting or repeating items, &c. The author states that he has employed the system of itemized schedules under review in his professional work for many years and has found them to result in a great saving of time and labor.

The estimates are divided into a series of four, there being one for the mason, another for the carpenter, a third for the plumber and a fourth for the painter. The pages are ruled in a way to give ample room for all items entering into the work under consideration, and builders who have made use of the schedules refer in flattering terms to their practical value.

Business Short Cuts; in Accounting, Advertising, Bookkeeping, Correspondence, Card Indexing and Management. Published by the Bookkeeper Publishing Company, Detroit, Mich. Pages, 158; boards, 5 x 7½ inches. Price, $1.

This neat little volume has been compiled by the "Board of Experts" of the *Bookkeeper and Business Man's Magazine*, for the benefit of the "Office Men of America." It consists of hints and helps designed to make office work easier and more systematic, and covers pretty nearly every detail of work done in a business office of any character. Numerous cuts illustrate the work, and an index at the end gives the contents. To the bookkeeper, accountant and office manager this little volume will be a compendium of useful "kinks," and its practical value should secure for it a wide sale.

Steel Concrete in Building Construction.

An interesting use of concrete reinforced by iron and steel rods is exemplified in a building fronting on two parallel streets in Halifax, Nova Scotia, the walls and piers being wholly of the materials named. In this building the walls were constructed in the usual way by running up wooden sheeting on each side and filling in the concrete. They are 20 inches thick to the top of the first floor, 16 inches thick to the top of the second floor, while the three top stories have walls 12 inches thick. The moldings of the fronts were formed by building up the reverse moldings in wood, thus forming the concrete molds in one piece with the walls. In describing the building George B. Low, of Halifax, states in a recent issue of *Municipal Engineering* that in order to prevent cracks due to expansion and contraction of the concrete the main piers in both fronts were built up to the top separately, with boxes built in, forming recesses to receive the ends of the lintels, which were constructed later. In this way joints were given where the movements due to expansion and contraction would be taken up. These lintels were reinforced by iron beams and twisted steel rods, as are all the piers and walls. In constructing the latter iron rods were laid horizontally every four feet in hight; the piers had vertical twisted iron rods running the full height.

During construction the sand and gravel were stored in the basement at one end of the building, the cement at the other. The mixing was done near the center of the building, also in the basement. The concrete was filled into iron wheelbarrows, which were hoisted to the required level by a horse, wheeled to the required position and dumped directly into the wall.

The concrete in the walls is composed of seven parts of sand and gravel to one of cement; that in the piers of five parts of sand and gravel to one of cement, and the moldings were made of equal parts of sand and cement, filled in with a trowel by hand just before the adjoining wall was filled in. By coating the wooden molds with a preparation of French chalk and paraffin oil the cement came to a smooth surface, which needed very slight touching up with neat cement when the molds were removed. Within the building is a large two-story vault with double 8-inch cinder concrete walls and 4-inch air space. The shelves in vault are also cement and expanded metal lath, 1½ inches thick. There is also expanded metal used in the fronts about the windows.

The building measures 120 feet from street to street, is 40 feet wide and 7 feet high from sidewalk on lower street to highest point of walls.

The architect of the building was R. A. Johnson and the contractor George B. Low, both of Halifax, N. S.

The New York Trade School.

The courses of instruction in the evening classes of the New York Trade School commenced on Monday, October 10, with a large attendance. The trades taught in which our readers are most interested are carpentry, bricklaying, house painting, plastering, steamfitting, sheet metal work, plumbing and electrical work. The evening classes naturally are available only to those who live in the immediate vicinity of New York City, and it is a credit to tradesmen in this section that these classes are well filled every year.

The management of the school makes no claim of turning out finished tradesmen, and this is firmly impressed upon the students, while they are cautioned to make the very best use of every minute and to embrace to its fullest extent the opportunity for mastering the rudiments of the trade which they select and to acquire such handicraft as persistent use of the facilities of the school will insure.

The day classes open in December and January and those who intend to take a course of instruction should make application at the earliest moment, as some of the classes are limited. A catalogue can be secured by addressing the New York Trades School, 1260 First avenue, New York City.

Trade School of the Massachusetts Charitable Mechanic Association.

The catalogue covering the fifth term of the Evening Trade School of the Massachusetts Charitable Mechanic Association of 111 Huntington avenue, Boston, Mass., presents some very interesting information regarding the classes in carpentry, bricklaying and plumbing, which will be held from October 10th of the present year to March 31, 1905. The advantages resulting from this form of trade training are set forth in convincing style, and cannot fail to be read with keen interest and attention by the ambitious youth who desires to become a skilled mechanic. The various courses of study are outlined in detail and the requirements for admission are clearly enumerated.

The course in carpentry requires three terms of about 76 evenings each. The work is so planned as to give practice in joinery, cabinet making and house carpentry, including framing and inside and outside finish. Sufficient bench work is required to insure the skilful use of each of the ordinary carpenters' tools. Blue prints are furnished for each piece of work and the use of these plans is encouraged in every way, although at first the student works under the careful direction of the instructor, who explains how to mark out the work and how to hold the tools. The carpentry trade probably more than any other requires careful theoretical training, and to supply this need lessons are given by the instructor in carpenters' geometry and the use of the carpenters' square in the laying out of hip rafters and other difficult parts of frames.

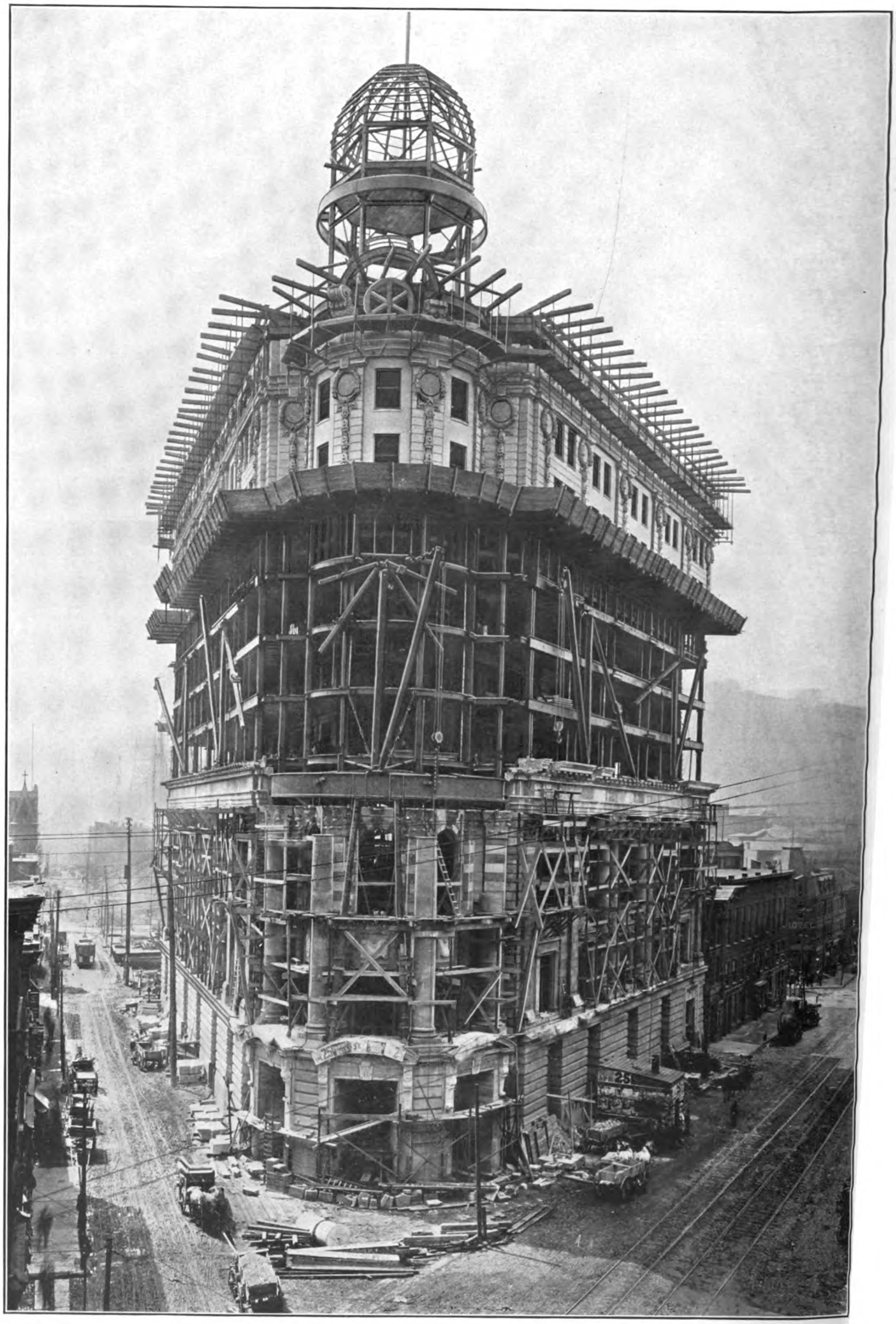
Practical work in the bricklaying class takes the form of building 8, 12, 16 and 20 inch straight brick walls, return corners, piers, arches, fire places and flues, setting window frames, sills and lintels, blocking, toothing and corbelling. In all the work done by the class great care is taken that each brick is properly laid and that the joints are neatly pointed. Lectures are given on the products and process of manufacture of brick, lime and cement, on foundation walls, pointing, &c.

The Winona Technical Institute.

From a report printed in an Indianapolis (Ind.) newspaper we learn that 200 applications for admission to the Winona Technical Institute in that city were refused on account of lack of accommodations. As this is the first year of the school, provision was made for the accommodation of only about 100 students. The opening of the school took place on Wednesday, September 21. The classes are housed in a number of buildings on the Arsenal grounds, which were recently purchased and remodeled for the purpose of the institute. A new heating plant has been installed and the institution is equipped with all the modern appliances.

Courses in the following trades are offered to students: Carpentry, bricklaying and masonry, plastering, blacksmithing, house, sign and fresco painting; plumbing, steam and hot water fitting and electrical work. Each of these trades is taught by competent and experienced practical instructors. Each student, in addition to the particular trade which he selects, is required to take instruction in mechanical and freehand drawing. It is said to be the intention to provide dormitories for the students at some future time, but at present board and lodging are secured for them in the neighborhood of the school. Dr. Sol C. Dickey, president of the school, states that plans have been decided upon for greatly enlarging the scope of the institution.

CONTENTS.



NEW STATION AND OFFICE BUILDING IN PITTSBURGH FOR THE WABASH RAILROAD.

THEODORE C. LINK, ARCHITECT.

FRAME COTTAGE ERECTED FOR MR. A. A. WOOD, ON HYDE PARK AVENUE, TAMPA, FLA.

C. E. JAY, Architect.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
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DAVID WILLIAMS COMPANY, - - PUBLISHER AND PROPRIETOR
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DECEMBER, 1904.

An Anti-Strike Agreement.

The agreement reached a few weeks ago between the master and journeymen sheet metal workers in the city of Philadelphia is of unusual interest just at the present time, as it is one of the first instances in which incorporated and responsible bodies of employers and wage earners have formed an agreement with the object of doing away with labor troubles in their trade. The Philadelphia sheet metal workers' strike, which has been in operation for some months, has caused the tying up of many millions of dollars' worth of building operations in that and other cities, in which sympathetic strikes occurred, and the termination of the trouble naturally is regarded with satisfaction in many quarters. The new agreement does not expire by limitation, but is to continue from year to year. If, however, any feature is found unsatisfactory the agreement can be amended by mutual consent, or where an understanding cannot be readily reached the differences shall be adjusted by arbitration. It also provides for the settlement of all labor disputes by arbitration within four working days. The sheet metal workers have secured substantial benefits, including an increase in wages, Saturday half holidays in the summer, and the recognition of the union, with the practical exclusion of nonunion men from the shops of the employers. On the other hand, the employers secure immunity from any interruption of work through strikes, which are absolutely barred. While this agreement appears, on the face of it, to offer a fairly satisfactory prospect of peace in this particular trade, it has some weak points. In the first place, the parties to the agreement are both, in a measure, close corporations, and do not include the whole of the trade, either among the employers or the workmen. In the second place, it practically bars from employment all nonunion sheet metal workers, so far as the shops of the associated employers are concerned. These are elements of weakness which, in the end, are likely to cause trouble, for the reason that in this, as in all trades, there will be many nonunion workmen who will be willing to serve nonassociated employers at lower rates of wages than those commanded by the union workmen. It would seem that the agreement has, as it were, merely formed a kind of labor "trust," which, under present conditions in the building trades, is hardly likely to maintain its monopoly indefinitely. For these reasons the new agreement can scarcely be regarded as furnishing either a final solution of the strike problem or a guarantee against labor troubles in the future. Its operation, however, will be watched with considerable interest.

The Business Outlook.

While the carpenter and builder may not perhaps be personally interested in the general run of commercial affairs he is more or less directly concerned in the condition of the business of the country, for upon it depends in large measure the amount of new work he is likely to be called upon to execute. With bounteous crops and reviving confidence the country is in a position to witness an increasing volume of building the coming spring and give full employment to mechanics in every branch of the business. It may not, therefore, be regarded out of place to touch briefly upon the business outlook as we find it at the close of the present volume. At the outset it may be stated that reports of the commercial agencies are almost uniformly of an optimistic character, and this applies to all sections of the country, except possibly a portion of the northern territory. The leading branches of manufacture are displaying renewed activity, skilled labor is more generally employed and the percentage of idle machinery is gradually being reduced. This fact is especially noticeable in connection with the iron and steel trade, which is generally regarded as a reliable business barometer. Prices of pig iron have stiffened materially in the past few weeks, while the volume of buying has steadily expanded. Finished products in iron and steel are also moving in heavy quantities, and in many cases the demand for prompt shipment is taxing the capacity of the mills to meet it. The same is true of a number of other industries of the country, which are beginning to show gains, not only over recent months but over the corresponding period of former years. The building industry presents evidence of remarkable activity for the season, reports from the leading centers indicating a marked increase in the volume of work since the temporary interruptions through strikes and other causes earlier in the year. The favorable outlook for the corn and wheat crops is another encouraging feature of the situation which tends to impart confidence and increase buying. But the underlying strength of the business situation is perhaps more strikingly illustrated by a decided growth in railway earnings and in the volume of bank clearings. An especially significant feature is the increased ease in collections reported from all parts of the country. The New York stock market, too, shows a remarkable revival of strength and activity, which is supported by a large volume of investment business, indicating that capital is losing its timidity and is again ready to embark in reasonably promising investments, and there are few if any depressing factors in view to mar the outlook.

Sewage Disposal.

Wherever any considerable settlement of people is made, a consideration of the question of sewage disposal is not long delayed. In the past the cesspool has been resorted to, but often with disadvantage to the population in the immediate vicinity. Mother earth is usually regarded as affording an easy and convenient recourse for the disposition of waste, but all parts of the earth are not adapted to the safe disposal of sewage in this manner. Innumerable cases have been cited where the sewage in a cesspool has flowed along the top of some impenetrable stratum below the surface of the earth until wells in the community have become contaminated. This experience has led many municipalities to enact regulations prohibiting the use of cesspools. In other communities, where a system of sewerage has been provided, the regulations compel those who have used cesspools to abandon them and connect their plumbing and drainage systems with the sewers. Recently considerable attention has been given to the septic treatment of sewage, and there is evidence that the closer study of this system and its perfection will find for isolated buildings and for quickly settled districts a solution of the sewage disposal question far more acceptable than the cesspool system has proved. Originally the septic treatment of sewage was only considered in connection with large quantities; but recently, as the result of a closer study of this method of treatment, apparatus has been constructed adapted for the uses of a single residence. Any plumber who is called upon to provide some method of disposing of the house drainage or waste has only to consult a sanitary engineer who has studied this important question to secure from him plans, with suitable dimensions, for the septic treatment of the sewage from a building of any size, the installation of such apparatus being comparatively simple and, when properly constructed, of unlimited durability.

Disposal of the Franklin Fund.

After many years of strenuous discussion as to the use of the fund bequeathed by Benjamin Franklin to the city of Boston for the benefit of young tradesmen, no final disposition of the fund, which, with the interest accumulated during the past 110 years, now amounts to a considerable sum of money, has yet been made. A strong effort is being exerted to apply this fund to the establishment either of one large central trade school, or of several smaller trade schools located in different parts of the city. Some years ago it was thought the Franklin fund would certainly be placed to this use, but enough opposition to the trade school idea developed in certain quarters to put aside the then intention of the trustees and throw the disposition of the fund again into uncertainty. It would certainly seem, from the terms of the bequest, that a trade school would be the most practical method of following out the instructions of the distinguished testator, as expressed in his will. The trustees of the fund, appointed by the Supreme Court of Massachusetts, will meet in December, when a strong plea for the trade school plan will be presented to them by a number of leading tradesmen and others interested in the trade training of American youth, and it is hoped that the arguments in favor of this disposition of the accumulated fund will prevail. The sum now at the disposal of the trustees is sufficiently large to establish and endow in perpetuity a substantial trade school of the character now so successfully operated in New York City.

An Old House Demolished.

What is said to have been the oldest house in Paterson, N. J., was demolished on September 3, to make room for Trinity Methodist Episcopal Church at Carroll and Fair streets. The building is in two parts, stone and wood, the stone section having been built by Simonon Van Winkle in the early part of the seventeenth century. Records of the Van Winkle family show that the frame piece was added to the original building a few years before the Revolution. The house was used by the family as a residence until a few years before the close of the eighteenth century, when it became the Black Horse Tavern, a noted hostelry for persons traveling in stage coaches from Totowa to New York. No stage coach ride to New York was complete unless a stop was made at the tavern for refreshments.

The house always remained in the possession of the Van Winkle family. It was last occupied by former County Clerk Albert D. Winfield. Its substantial character, with its hewn oak timbers, split lath and Colonial ornamentation of the stairways and doorposts, tells mutely of its age and the all around ability of the early Dutch settlers who made this section of the new country their home.

The Ancient Pergula.

The pergula appears to have been a kind of booth or small house which afforded scarcely any protection except by its roof, so that those who passed by could easily look into it. It served both as a workshop and a stall where things were exhibited for sale. We find, for instance, says an English exchange, that painters exhibited their works in a pergula that they might be seen by those who passed by, and Apelles is said to have concealed himself in his pergula behind his pictures that he might overhear the remarks of those who looked at them. Such places were occupied by persons who, either by working or sitting in them, wished to attract the attention of the public. Hence we find them inhabited by poor philosophers and grammarians who gave instruction and wished to attract notice in order to obtain pupils. It should be observed that scholars do not agree as to the real meaning of pergula: Scaliger describes it as a part of a house built out into the street, as in some old houses of modern times: Ernesti thinks that a pergula is a little room in the upper part of a house which was occasionally used by poor philosophers as an observatory. But neither of these two definitions is applicable to all the passages in which the word occurs.

The Villages of "Carville, Cal."

The displacing of the old horse cars in San Francisco and Los Angeles, Cal., has given rise to summer villages in each city, each of which bears the appropriate name of "Carville." In San Francisco the ocean beach is adorned with a colony of car houses, which makes a picturesque addition to the city's water front. The old cars have been fitted up in various ways to form summer cottages. In some cases two or three are connected to form one cottage, and in a few instances one car has been placed above another to form a two-story dwelling. San Francisco's "Carville" is connected by a suspension foot bridge over the sand of the beach with the city's street car system. During the present season the refitted cars are renting for from $25 each upward.

In Los Angeles "Carville" is located on the railroad line about half way between Seventh street and terminal station. The settlement was originated by Commodore J. J. Jenkins of the South Coast Yacht Club, who has succeeded in making the settlement quite attractive. The rejuvenated cars have been painted white, with green trimmings, and each has been fitted up with an idea of economizing space, and at the same time securing comfort. As a rule, the cars are provided with hinged beds, which enables a sleeping room to be converted into a sitting room at the beginning of each day. Each house is provided with a kitchen at right angles to the main room. It is equipped with stove, pantry and other conveniences.

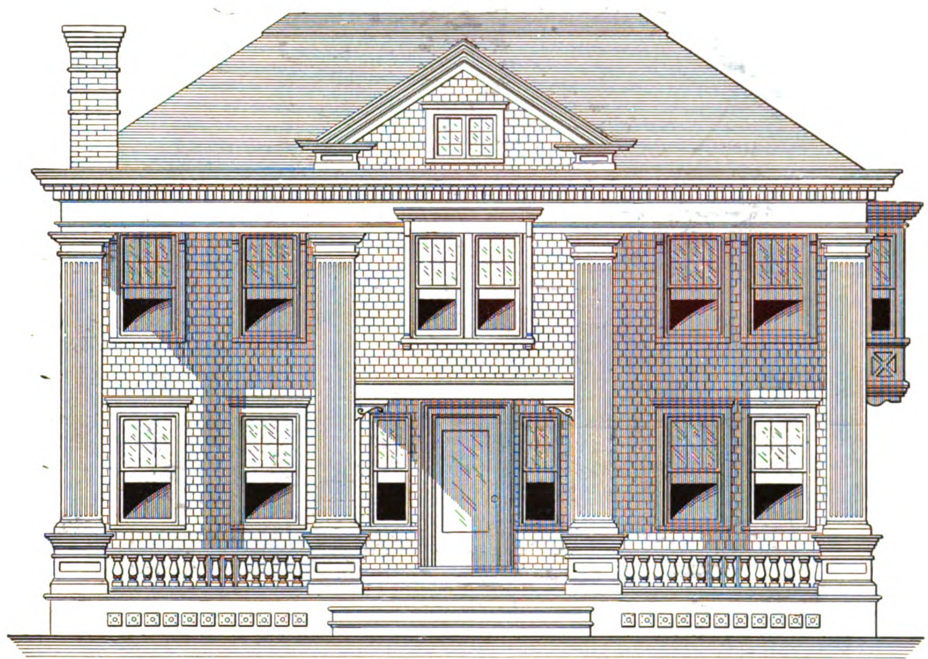
A Variation in Brownstone Fronts.

For a long time a characteristic feature of the architecture of the residential sections of New York City was the brownstone fronts, there being block upon block of residences all of which presented the same monotonous brown effect, varied only here and there by a trifling change in the steps leading up to the main entrance. It was in the darkest days of this brownstone period that a certain architect determined to give some individuality to the houses he erected, but as escape from brownstone was then impossible he made up his mind to give to that material an ornamental effect and break the monotony of block fronts. As a result there is a row of houses on the east side of the city that are more remarkable than any others to be seen in a day's search. Over every window of the houses are two carved heads and the door is ornamented in the same way. On the façade of every house are sixteen of these carved heads in every variety of facial expression. They are well done, and it is a tribute to the imagination of the sculptor that no two are alike.

COLONIAL RESIDENCE AT ELIZABETH, N. J.

WE present for the consideration of our readers this month a Colonial residence embodying features which are likely to interest a large class among builders and those contemplating homes of their own. The external treatment is bold and striking, while the arrangement of the rooms is such as to bring the principal ones on both the first and second floors to the front of the house. Noticeable features of the exterior are the square fluted columns extending upward to the main cornice, the forward extension of the central bedroom on the second floor and the projecting bay shown on the right elevation. The half-tone suppplemental plates, which are direct reproductions from photographs taken especially for *Carpentry and Building*, give the reader an excellent idea of the appearance of the completed structure, and also of the interior finish in the reception hall, dining room and library.

The house is of balloon frame with brick underpinning; the girders are 6 x 8 inches; the sills 4 x 6 inches halved at the corners and angles; the posts 4 x 6 inches; the first and second floor joists 2 x 10 inches, set 16 inches on centers; the rafters 2 x 6 inches, set 20 inches on centers; the outside wall studding 2 x 4 inches, set 16 inches on centers, and the partition studding 2 x 3 and 2 x 4 inches, also set 16 inches on centers. The ribbon strips are 1 x 6 inches; the veranda sills 4 x 10 inches; the veranda joists 2 x 8 inches, set 20 inches on centers, and the veranda ceiling joists 2 x 4 inches, also set 20 inches on centers.



Front Elevation.—Scale, ⅛ Inch to the Foot.

Colonial Residence at Elizabeth, N. J.—J. A. Oakley & Son, Architects.

The outside walls, roofs and extensions are covered with ⅞ x 9 inch tongued and grooved hemlock boards, over which is placed a layer of two-ply building paper with 2-inch lap, this in turn being covered on the side walls with 18-inch red cedar shingles laid 5½ inches to the weather. The floor of the front hall is double, the under one being of ⅞ x 9 inch hemlock, laid diagonally, and the top one of 1½ x 2½ inch North Carolina pine, tongued and grooved. The floors of the remaining portion of the first story, as well as of the second story, are ⅞ x 3½ inch North Carolina pine, tongued and grooved and blind nailed to the beams. The flooring of the veranda is ⅞ x 4 inch tongued and grooved white pine, the ceiling being ½-inch beaded North Carolina pine. The door and window frames are of white pine, as are also the sash, which is glazed with double thick glass. The double hung sash have cast iron weights and cotton braided sash cord, also Fitch bronzed sash locks. The doors throughout the house are of cypress, blind tenoned. The doors leading from the butler's pantry to front hall and dining room are made with five cross panels, as are also the doors on the second story. The doors between main hall and dining room are glazed with American plate glass. The main hall on the first floor, as well as the library is trimmed with chestnut; the bathroom and bedroom, No. 2, with whitewood, and the balance of the house with cypress. The main hall has a tile floor, and the library a plate rail, while the walls are covered in leather. The walls of the dining room to a hight of 5 feet from the floor have panels about 10 inches wide, and a top rail 6 inches with a cap to serve as a plate rail.

The main stairs are of chestnut, except the treads, which are of Georgia pine. The bottom newel is 7 inches square, paneled, and has a molded cap and post with neck molding, the other newels being 5 inches square.

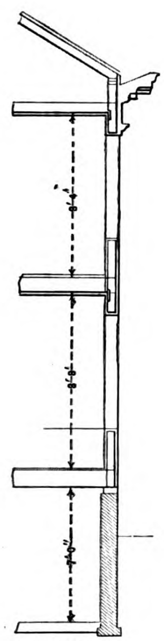
The walls are lathed and plastered, the kitchen having a good white coat finish, while the bathroom to a hight of 5 feet from the floor is lined off in blocks 4 x 6 inches showing bonded joints. The side walls and ceiling in the kitchen, pantry and bathroom have two coats of paint in colors selected by the owner, while the tile work has an extra coat of enamel. The ceiling in the various rooms is tinted. All the interior wood work has a coat of liquid wood filler, and two coats of Standard Varnish Works No. 1 coach varnish. The library, main hall, dining room and second-story hall are stained a dark golden oak. The wood work in bedroom No. 1 is stained in imitation mahogany, and in the bathroom and bedroom No. 2 the wood work has two coats of white paint and a coat of enamel.

In the kitchen is a 20 x 30 inch cast iron sink, a 30-gallon galvanized iron boiler and a No. 258 Provident portable range made by Richardson & Boynton Company of 232 to 236 Water street, New York City. The kitchen is also equipped with a two-part Alberene stone wash tray combination, with hot and cold water connections. In the bathroom is a porcelain lined lavatory, a 3-inch roll rim porcelain lined bathtub and water closet. The house is heated by a No. 155 New Perfect gas tight hot air furnace made by Richardson & Boynton Company. The registers on the first floor are 10 x 12 inches, and the others are 8 x 10 inches. The furnace is connected with the cold air duct with galvanized iron, and pipes running through partitions are covered with metal lath, the wood work being lined with tin.

The cellar bottom is covered with concrete composed of 3 parts of sharp cinders, 2 parts of sand and 1 part of Portland cement, on top of which is a ¾-inch coat composed of 1 part Portland cement and 3 parts sharp sand.

The house is wired for electric lighting, and is fitted with electric bells, annunciators, burglar alarms, telephone system, &c.

The house here illustrated was completed a short time ago for Charles W. Oakley, the junior member of the firm of J. A. Oakley & Son, the well-known architects, and is located on Westfield avenue, Elizabeth, N. J.



Section.

Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

Colonial Residence at Elizabeth, N. J.

Advantages of a Builders' Exchange.

A short time ago John M. Hering, secretary of the Builders' Exchange of Baltimore, addressed the contractors of that city upon the advantages and functions of an organization of the character indicated, and in the course of his remarks touched upon a number of points which cannot fail to prove interesting to all connected with the building business. While space does not permit of the presentation of the address in full we take pleasure in laying before our readers the following copious extracts:

The Builders' Exchange has always stood for skill and responsibility, square dealing based upon the personal integrity of its members, harmonious relations among employers and between them and their workmen, and an earnest and faithful endeavor to improve the conditions of those who are engaged in the building business, thus dignifying the profession and giving it a topmost place among our civic industries, where, in the conduct of their own business, those of the several crafts may in fact be master mechanics rather than mastered mechanics.

In such an organization, the social side—club features, games, &c.—are recreations very valuable in preserving good fellowship, furnishing relaxation for overstrained brain and muscle, and making business pleasanter for all. This side of the question is not to be disregarded by any means; the vital point, however, the vertebrae of the whole structure, is the mutual feeling of dependence upon one another, independence of action being an exploded theory, as it has been repeatedly demonstrated before the eyes of all that you must go down before every kind of opposition unless you are united.

The Builders' Exchange from the time of its formation has been composed of contractors in all branches of building trades and materials, yet its chief consideration has been without exception for the builder, the man who takes the general contract. Subcontractors and dealers are all considered with a due regard for their importance in their respective places, but the interests of the general contractor are especially fostered by all, as upon his success and commercial preferment much of the usefulness of the organization depends. But there is one underlying principle of reciprocity which the builder is not to overlook in his dealings with his fellow members. When the subcontractor and material dealer have loyally stood by the builder in the maintenance of his rights and the executing of his contracts they have a right to look for, expect and are entitled to receive from him a preference over nonmember competitors. This just principle can never be violated without great danger of serious rupture of the very foundation of the organization.

Economics of the Plan.

The Builders' Exchange, if it does not belie its name, should be the recognized center of the building industries and the meeting place for all Building Trades Employers' Associations. Ex-President Short, in a letter to the employers during his last term, said, touching this very point: "By thus centralizing all building trades in one corporate body much of the expense of maintaining separate organizations can be avoided, for at almost no expense chapters or branches can be formed within the

Exchange by such trades as find it necessary, &c., and, being members of the Exchange, would have the co-operation and protection of said body," &c.

The dues of the Exchange should cover all running expenses and should be the only dues charged.

Rooms should be provided free for all meetings of the various chapters, boards and committees held during the day, and for the expense of an occasional night meeting and a clerk to keep the records a small assessment upon the members of the chapter holding such meeting would suffice, and would be their only additional expense.

The Builders' Exchange realizes that numerous independent organizations are expensive to maintain; therefore, in its scheme for a new building and a largely augmented membership, its aim is to minimize all expenses, at the same time furnish every convenience and facility that any member or chapter may require.

Code of Practice.

To achieve the highest ends and preserve harmony and perfection of organic union a code of practice or business ethics binding upon all must be adopted and faithfully observed by all the members, else the organization will be speedily dismantled of its chief glory and its prestige lost.

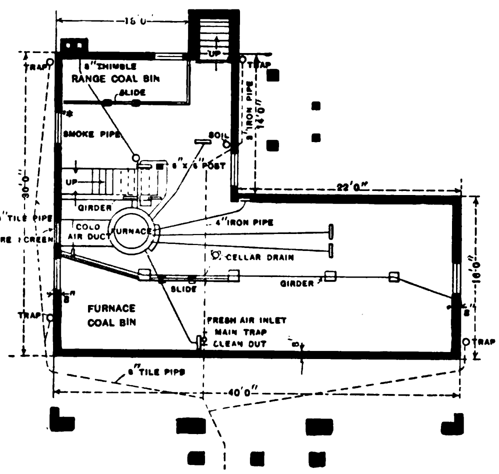
In this code provision should be made for the opening of bids at such place and under such rules as will preclude partiality and unfairness of every kind in the awarding of contracts. I think if a system of this kind were adopted and thoroughly explained to the architects, property owners and agents they would readily concur in it. In response to personal letters sent to master builders by the Builders' Exchange upon this subject a large number gave their unqualified and emphatic approval. This principle should be applied to the awarding of subcontracts also, as failure to do so can only bring dissatisfaction, loss of confidence in the general contractor and a disruption of the otherwise pleasant dealing between him and his subcontractors.

The code should provide for the settlement by proper committee within the association of all grievances of a business nature should any arise between members. Many a person, whether from a real or imaginary wrong, has impulsively left his organization, making a breach that years have failed to heal. Had the matter been referred to a judicious committee and all differences adjusted friendly relations and increased strength would have been the result.

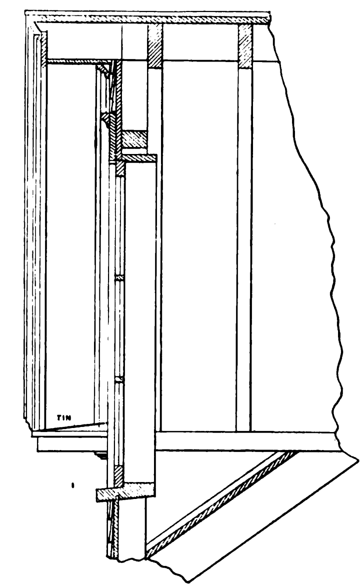
An Emergency Committee for directing emergency work during a suspension of operations or from other causes is a most important adjunct to an association of employers. They should be wisely chosen and their decisions should be final.

The right of the contractor to employ or not to employ, and of the mechanic to work or not to work, is an incontrovertible principle and any attempt at coercion is un-American and should be suppressed in its inception.

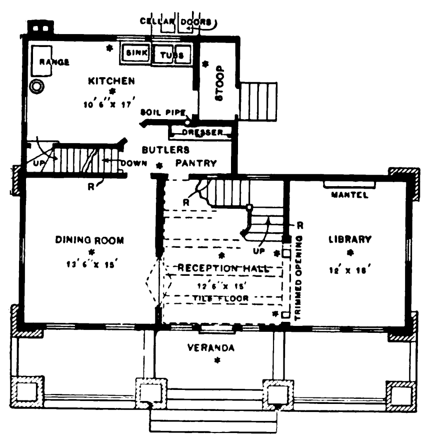
If in this plan and code of practice there is any



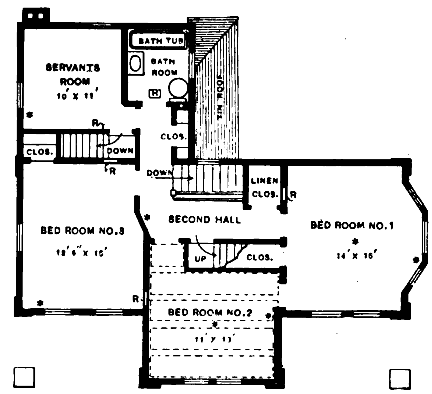
Foundation.



Section through Front Dormer.—Scale, ½ Inch to the **Foot.**



Main Floor.



Second Floor.

Scale, 1-16 Inch to the Foot.

Colonial Residence at Elizabeth, N. J.

thought which you regard with favor and you think should be put into operation, will you do the part of one contractor and help put these thoughts into operation? You can do nothing on the outside, but the builders all together, with the subcontractors and dealers who will gladly rally to their support, can readily frame the laws necessary to make the organization just to their liking and such as will be appreciated by owners and architects.

The Builders' Exchange has long since realized the force of Longfellow's words,

"Still achieving, still pursuing,
Learn to labor and to wait,"

for we have labored and waited, and we have achieved many successes during the 16 years of our existence, and we continue to pursue, still laboring and waiting.

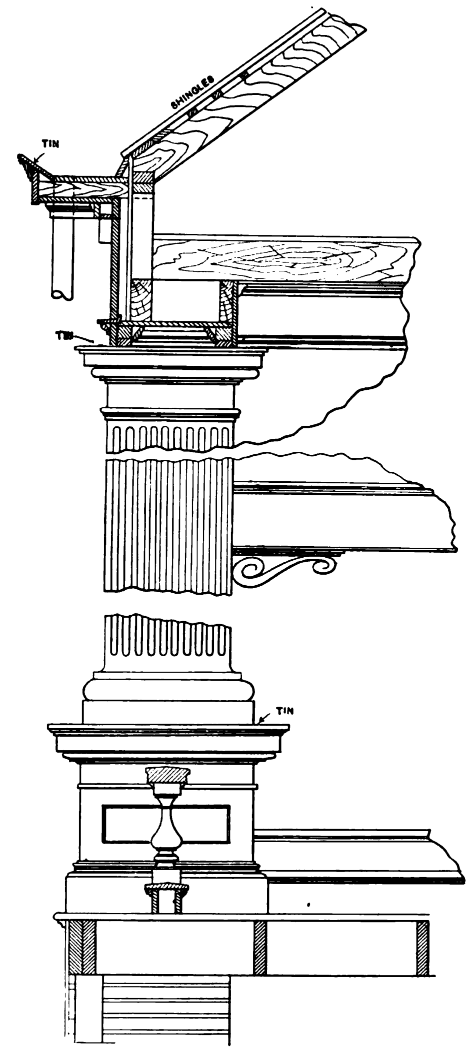
Under the leadership of a line of presidents who have a record for integrity of which any of us would be proud it has accomplished inestimable good to the building profession and to the community at large, but it has not reached its chief objective—namely, the active co-operation of all the master builders—so we still labor and we still wait, full of confidence that the conditions in the most progressive sections of our country, which have driven even the most conservative and independent contractors into organizations for their own safety, will so forewarn the Baltimore builders that they will forearm themselves by that unity of effort and purpose which is proving to be the safeguard of their brethren in other cities.

Without disparaging any of the other trades we say frankly to the master builders we want and must have you in this organization to help attain unto the full fruition of our hopes for the building industry of Baltimore; and we say to you, just as frankly and assuredly, that you need the united support and the backing of just such an organization as this will be when the general and subcontractors realize that their interests are identical and unite for the safety of those interests.

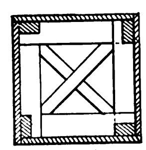
The Master Builders' and other employers' associations which form so large a part of the Baltimore contractors have shown by the very fact of their organization that they believe in united action by their respective trades, and already have realized some benefit therefrom. But these organizations acting separately, many of them with comparatively small membership, cannot cope with the almost innumerable unfair, entangling, paralyzing and unheard of demands which are mercilessly forced upon the building trades and the helpless public. Helpless public? Why helpless? Because the contractors in the building trades to whom the public has a right to look for the peaceful conduct of the building business are not united, but, endeavoring to work on single and separate lines, are easy prey for the labor agitators and walking delegates, who keep them in a state of demoralization and commercial chaos.

Numerical strength and centralization of power must be had to prevent encroachment upon our rights.

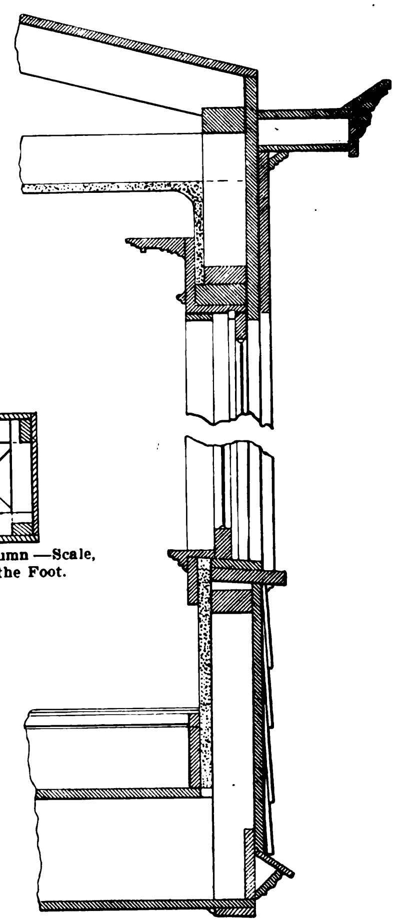
Our builders should occupy an active and not a pas-



Details of Main Cornice, Column, Balustrade, &c.—Scale, ⅜ Inch to the Foot.



Section of Column —Scale, ⅜ Inch to the Foot.



Section through the Side Bay Window.—Scale, ¾ Inch to the Foot.

Miscellaneous Constructive Details of Colonial Residence at Elizabeth, N. J.

sive position in the making of the new Baltimore. Let every progressive and loyal contractor boom Baltimore at every opportunity and be a recognized factor in its commercial life. Don't be satisfied with small things and with letting other people and towns set the pace for all your movements. Push ahead, take a leading position, and stand in the might and dignity of an industry upon which the city depends more than any other to place itself abreast of the times in modern progress. Every member should be a live one; only such get the full benefit of an organization or are of much benefit to an organization. Be on the aggressive to thwart the intentions of all who may seek to interrupt the lawful and peaceful pursuit of your business or in any way impede the rehabilitation of our city.

Make the Builders' Exchange the headquarters for the gathering and disseminating of all valuable data in the building business, the matrix of all advanced ideas and improved schemes for the betterment of our professions, and the mother house for the safe sheltering of all associations of employers in building trades.

Houses Built About a Circle.

One of the most interesting building enterprises recently projected in Salt Lake City involves the erection of 24 attractive houses on a block at the crown of First Street Hill. The idea is to build the rooms in the form of a circle, fronting on a beautiful park in the center. Opening into this park will be private entrances, so that the public will be excluded and all the pleasures of the place reserved for the occupants of the rooms on the block. The building improvement is estimated to involve an expenditure of not less than $150,000, and it is expected that the enterprise will prove one of the attractions of the city. The ground upon which the improvement is to be made is historical, it having been set apart in the early days by Brigham Young as the site for a theological seminary for the Mormon Church.

Seasoning Woods for Pattern Making.

The wood worker in general and the pattern maker in particular are constantly hampered by the tendency of wood to change its shape while they are using it, as well as in the finished structure after it is completed. This change usually consists in a reduction in the size of the piece, either as a whole or in some dimensions, and they find that this is due almost entirely to the amount of moisture it contains. As the wood loses moisture it tends to grow smaller, not in every direction, however, but in certain directions only. It grows smaller across the fibers or grain, but does not change its size appreciably in the direction of the length of the fibers. A marked silver grain, as in oak or sycamore, has an important bearing on the way in which wood shrinks, so that if such wood is not treated properly it tends to split up into sections.

If a thin piece of stock that has been freshly dressed be placed over night with the face in contact with some surface, as a bench top, it will be found the next morning with the exposed face shrunken, and the whole piece warped toward that face. On account of these facts, says M. J. Golden, in a recent issue of the *Pattern Maker*, the workman makes an effort in getting stock for any particular job to obtain that which has been so treated as to reduce this tendency to the minimum.

When wood is first taken from the forest a large proportion of its weight, often nearly half, is due to the moisture it contains. This moisture is necessary to the growth of the tree, as it serves for dissolving some of its food matter in the form of salts from the soil about the roots, carrying it through the trunk and tissue to the leaves, and, after it has been digested in the leaves, carrying it to the part of the tree where it is required for

View in Library, Looking from Reception Hall.

Colonial Residence at Elizabeth, N. J.

building up new tissue. There is a constant tendency to the dissipation of moisture into the air from the portion of the tree that is above the ground, principally from the leaves. This is due to the tendency of water to change into gas (steam or vapor) under normal atmospheric conditions. While the tree is growing the loss of moisture from the exposed parts is compensated for by the absorption of moisture from the soil.

When the tree has been converted into lumber the evaporation of its contained moisture continues from exposed surfaces, and is what is known as seasoning. When the seasoning is assisted by piling the lumber where it is exposed to the drying action of the air under ordinary outdoor conditions the operation is called natural seasoning, but when the drying is assisted by special conditions of heat and dryness in a chamber it is called artificial seasoning, or kiln drying, the chamber in which the lumber is dried being known as a dry kiln. In either case the drying occurs from the exposed surfaces of the wood, and the moisture in the inner parts tends to pass through the cell walls to the outer and drier parts and so to bring the whole to a condition of equilibrium. When there is no further tendency of the wood to lose moisture under normal atmospheric conditions the wood is said to be seasoned.

Time Required for Seasoning.

When the air around the wood is very dry and warm the time required for seasoning is decreased, but as the moisture passes slowly through the cell walls it is possible to exhaust nearly all of that contained in the outer portion before that in the interior has had time to pass outward. The result is that the degree of moisture in the different parts of a piece of timber would vary greatly.

When the moisture is withdrawn from the wood cells their walls become thinner and rougher, and the cells become smaller in cross section. When this occurs throughout the mass of a piece of wood the entire piece grows smaller in section or shrinks. It is a well-known fact that the wood does not become much, if any, shorter along the direction of its length, the shrinkage taking place almost wholly across it, and this seems to be due to the character of the fibers.

An idea of the force with which shrinkage takes place may be had in the following manner: Taking a piece of ordinary green lumber from a board 1 inch thick, cut the piece so that it is 1 foot long and 1 foot wide. Clamp or fasten the sides in such a way that it cannot shrink across the grain, and then expose it in a warm, dry place. It will be found that in a comparatively short time the shrinking force is sufficient to break the piece. If a similar piece from the same board be put in a testing machine and the force required to break it be measured it would be found to require a considerable amount of energy. A piece of white pine 1 inch thick and 12 inches long will take nearly 3 tons to break it, and hence the shrinking force must be greater than this in a piece of this size.

In the past the notion has been very generally held that wood which was exposed to the slow drying action of the air by piling it up in the form of logs and permitting it to season during a year or more was better as stock and gave better results than wood which had been kiln dried.

A method which has been employed in some cases to get extra good lumber was to ring the tree in the winter when the sap had ceased to flow by cutting a groove around the trunk through the bark and growing tissue and into the wood of the heart. As the zone of growth was thus separated the tree would cease growing, on account of the fact that the sap could not flow. The tree was left to stand in this way for a year, and then cut down and sawed into log lengths, the bark removed from the logs, their ends painted to prevent excessive evaporation and the attacks of insects, and the logs were then piled loosely so that the air might reach as much of the surface as possible. At the end of another year, or for hard woods a longer period, they were cut into 2-inch plank, or scantling, and were again piled loosely and allowed to season further.

Of course, by this method an amount of money equal to the cost of lumber and also to the cost of the labor involved was locked up for two or more years or until the lumber could be used. This and the fact that the timber was cut only in the winter have been important factors in introducing the present methods of cutting and drying timber. At present trees are felled at any season of the year.

The properties of the woods commonly used in building have been investigated by the United States Division of Forestry of the Bureau of Agriculture, and as a result of these investigations it has been ascertained that wood which has been kiln dried has the same strength as air dried wood, other things being equal.

To properly season pine stock by the natural method takes two or more years when it is cut into 2-inch plank, while the same material may be kiln dried in as many days, producing as good or better stock.

By the natural method, as the outer part of the wood loses its moisture that in the interior part slowly passes outward, and this continues until the wood is seasoned, the process being interrupted by spells of weather when the air is so saturated with moisture that the wood absorbs instead of losing moisture, and by other periods when the outer parts become too dry and the moisture from the inner parts cannot pass through the cell walls freely enough to compensate for this loss going on. When this set of conditions exist there is a tendency for the outer part to shrink so rapidly as to crack. As the timber for natural seasoning is usually piled in the form of logs, the large bulk of the timber increases its tendency to split.

It will be remembered that the medullary rays, or silver grain, are made up of tissue similar to that in the pith, and in shape and arrangement of cells are somewhat like a honeycomb, instead of the long, tube-like character of the rest of the wood. As this tissue grows older and gradually ceases to assist in the food circulation it becomes harder and is flattened into shell-like plates, and is not greatly affected as to size, by changes in moisture. These rays extend from the heart outward. When the rest of the tissue forming the annular ring shrinks these rays extending across the annular rings retain their size and cause splits or cracks, extending from the outside inward. Where the pieces being seasoned are comparatively small in the direction of the medullary rays of course the liability to crack or check is greatly decreased.

Artificial Seasoning.

In artificial seasoning the lumber is usually cut up to the size in which it will be used and is piled openly in the kiln. It is then gradually heated to a temperature that is above the temperature of the air, but not great enough to cause the gums and oils in the wood to harden upon cooling, and so cause the wood to be brittle. The increase in temperature is obtained by blowing heated air through the kiln, by piling the lumber over steam pipes, or by blowing steam into the chamber. The lumber is kept in the kiln long enough to heat the moisture inside of the wood and to change the greater part of the moisture into gas (steam or vapor) and cause its expulsion from the wood. As this can be done nearly as well with lumber cut in the summer as with lumber cut in the winter, and also on account of the fact that it can be done immediately after the lumber has been cut, these modern methods of lumbering have almost entirely displaced the old slower plan of air seasoning. It will readily be seen that if the moisture can be converted into vapor in the pores of the lumber itself, and the vapor caused to pass out through the pores, the action will be more rapid than where the water itself has to be forced through the pores.

Besides the greater permanence of form and the advantage of reduced weight in seasoned lumber it is interesting to note that seasoned lumber is nearly twice as strong as green lumber. The reason for this is not fully understood. The common explanation given is that the fibers are small tubes, which in green lumber are filled with water and rigidly fastened side by side, so that when bent the walls are liable to rupture, but the objection to this theory is that even in green lumber all of the cells are not filled with water, the water occupying only a part near the walls, while the central space is usually more or less open.

BEVELS USED IN CARPENTRY.

A Short Treatise on the Principles of Geometrical Drawing.

BY GEORGE W. KITTREDGE.

RECENT communications with regard to certain published methods of obtaining the bevels of rafters, together with numerous inquiries as to how particular bevels are to be obtained, have led us to believe that a short but comprehensive treatise on that subject will be acceptable to the readers of *Carpentry and Building*. We have, therefore, prepared the following with a view to explaining those operations in as clear a manner as possible and of reducing them to a system, which, while it does not follow the one most usually employed by carpenters, yet cannot fail to recommend itself on account of its simplicity. Its methods, once understood, will be found applicable to all of the bevels of carpentry, whether they be applied to rafters or to other portions of constructive work.

A clear understanding of the underlying principles of any mechanical or technical work, together with a systematic method of employing the same, will enable the careful student to solve the most difficult problems. What the carpenter really requires, therefore, is not a compendium of separate rules, but a system which will cover any problem that may arise. That department of drawing which will meet his requirements is properly termed descriptive geometry, though it is also referred to as linear drawing, mechanical drawing or projection. Descriptive geometry is a sort of playground on which some of the simpler operations of abstract geometry are manipulated for the purpose of obtaining certain much desired and often surprising results. It is being taught to beginners in the trade schools, now becoming so general throughout the country, as well as by those schools which teach by correspondence. It is regarded as an essential part of the education of the young mechanic in almost every field of labor.

It is quite likely that the methods of roof construction most popular with the majority of carpenters and builders of to-day are those which will enable them to perform the work upon the timber itself without involving the use of paper and drawing instruments. Such methods, without doubt, have their advantages and are great strides in advance of the "cut and try" method employed in years gone by by those who made no pretensions whatever to scientific knowledge. But every trade has its technical features, and its most successful practitioners are those who best understand its science. This is an age of progress, and every workman who is worthy of a place in the ranks of his trade is anxious to advance himself to the limit of his capabilities. With all due deference, therefore, to those who have done their drafting on a shingle and scribed their lines directly on the wood from calculations made on the steel square, the fact remains that the scientific principles involved in carpentry can best be learned on the drafting board, and a course of training in such work cannot help placing its possessor in advance of those who have not had that advantage.

This may by some be deemed a formidable undertaking, but since that which is worth having is seldom to be obtained without cost in some form, the practical carpenter will be well recompensed for the labor and attention necessary to an understanding of this very essential department of science. We shall proceed, therefore, to first outline briefly and simply the general methods of geometrical drawing, and then to follow up the same by its specific application to the development of the various bevels and oblique cuts required in carpentry.

In the original operations of descriptive geometry it was considered that the representation of any solid or object as seen from two points of view—that is, as shown upon two planes (usually vertical planes, taken at right angles to each other)—was sufficient to show the character and all the elements of that solid. In all mechanical and architectural work, however, a representation upon a third or horizontal plane has been con- and the methods employed in obtaining such views may sidered necessary in addition to those above mentioned, be extended as required to representations made upon any number of planes placed obliquely or otherwise.

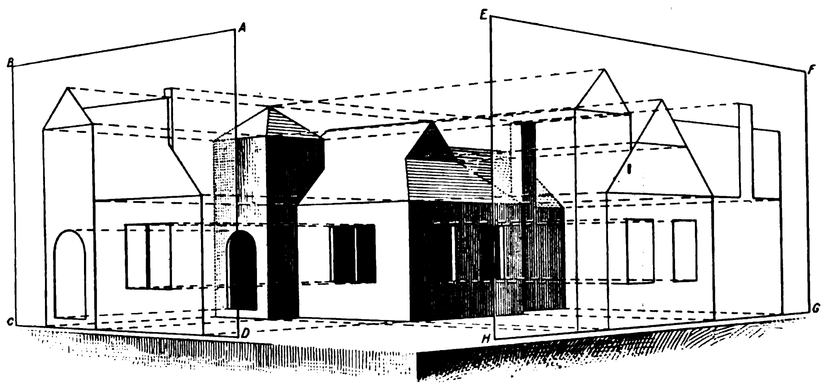


Fig. 1.—The Theory of Projection Pictorially Illustrated.

Bevels in Carpentry.

It may be explained that by the term solid is meant any object of which a view may be required, be it an elaborately designed building or a stick of timber. A plane is defined as that which has length and breadth without thickness. It is supposed to exist in the abstract wherever wanted, but may be represented physically by any surface without curve, as that of a table top, a wall, a drawing board, or more particularly by a sheet of paper, since that is the medium upon which most drafts and illustrations are made.

By the representation of an object upon a vertical plane is meant such a view as would be obtained by a system of parallel lines projected horizontally from all points of that object to a vertical plane placed near by. While the plane upon which such projections are made may be placed in any position with reference to the object, that view obtained by placing the plane parallel to one of the sides of the object best serves the purpose for which it is made and constitutes what is termed an *elevation* of that side. It gives accurately all horizontal distances as well as the hights of the side it represents. The view obtained similarly upon another plane, also vertical, but placed at right angles to the first one, becomes an end elevation and gives accurately the hights and all horizontal measurements across the object or at right angles to those of the side or first elevation.

The third view, or projection upon a horizontal plane, usually called the *plan*, gives all the horizontal measurements or distances of both the other views, but, of course, no hights. The operation of constructing these several views is properly termed orthographic, or right line projection, and insures, as is apparent, that each view of an object shall correspond in every respect with the other as regards the position of all its points and elements.

The theory of projection and the relation which the elevations and plans bear to the subject and to each other are pictorially illustrated in Fig. 1, while the geometrical process is shown in Fig. 2. In these illustrations the "solid" or object selected to demonstrate the operations of descriptive geometry is a house in its most elementary form, which, while it has form without detail, has sufficient variety in its design to serve the purposes of illustration.

In Fig. 1, A B C D represents a vertical plane, as, for instance, a plate of glass placed parallel with the front every element or feature of the object, as stated at the beginning. It is customary in geometrical drawing to represent all those portions of the subject which are beyond or beneath the foremost surfaces in the view by means of dotted lines. When, however, confusion might arise from the use of a great many dotted lines it is common practice to make separate projections or elevations of the several sides of a subject.

In order to show more clearly portions of the interior of an object it is often necessary to make projections upon certain vertical planes, cutting the subject transversely or longitudinally, whose positions are shown by lines drawn across the plan. Views so obtained are termed *sections*. In detail work sections are often made on oblique planes for the purpose of showing the shape or profile of some portion at a particular point.

In the usual operations of projection it must be borne in mind that the drawings are made before the subject

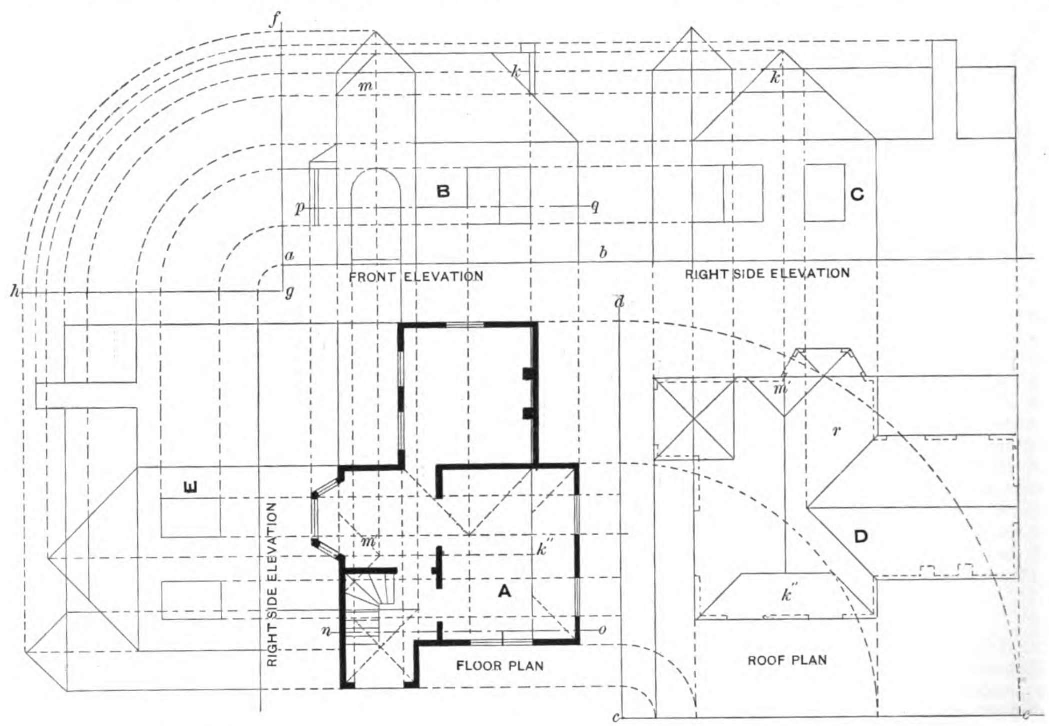


Fig. 2.—Obtaining the Several Views of an Object According to the Methods of Descriptive Geometry.

Bevels in Carpentry.

of the house, while E F G H is another plane similarly placed with reference to the side. These may be termed the view planes. Lines, shown dotted in the engraving, are projected horizontally and at right angles, respectively, to the two planes, from such points of the object as are necessary to determine all the lines of the two views. A line projected from the terminations of each line of the object determines the position of that line in the elevation, all of which is so clearly shown in the engraving as to need no further explanation. The two vertical planes being seen obliquely in the illustration from the nature of the sketch, the elevations, as obtained thereon, appear distorted to the eye, but if each could be viewed squarely they would appear as at B and C of Fig. 2.

Each of these elevations, or projections, shown in Fig. 1, it will be observed, represents the side of the object adjacent to it or to the plane. When it is considered that lines may also be projected to the view plane from points in the side or end of the object which is farthest from the plane of its view, and likewise from the points of such elements or features as may be entirely within the object, the two elevations thus completed will, strictly speaking, give every possible measurement and locate or thing represented has been built, and that projections are, therefore, not made from the object itself, as indicated in Fig. 1, but from one view of the object to another as the process of designing progresses. It is presumed that all architectural work is constructed in accordance with certain requirements or specifications. The preliminary outlines of the principal view are therefore made from certain known or specified facts. The plan is usually the first drawing made, and, although a certain arrangement of rooms is required, its outlines are in a measure conditional upon some change which may be deemed advisable as the elevations begin to assume form.

In beginning the work, therefore, the plan must be so placed upon the paper that the side of which the principal (usually the front) elevation is required shall be turned toward the draftsman—that is, toward the bottom of the paper, as at A, Fig. 2. The plan should contain the general lines of the roof, the ridges, valleys, &c., as well as the outlines of the walls, with the location of the doors and windows. From each of the angles in the plan a line is now carried perpendicularly, or, in other words, projected vertically into the elevation, as shown by the dotted lines. In making the projections from the plan it must be borne in mind that lines are drawn only from those points of the plan which would be visible in the house itself when viewed from the side of which the elevation is being made—that is, in this case, in the direction indicated by the arrow below A. Those lines of the object which would be invisible from that point of view may be projected from the plan if necessary, but must be shown dotted in the elevation. The elevation should always be drawn just above the plan. A horizontal line drawn as low as is consistent with space across the perpendiculars, as shown by *a b*, will serve as a base line of the elevation, from which all hights may now be set off, in accordance with requirements, and horizontal lines then drawn to show the eaves, ridges, tops and bottoms of windows, &c.

Having now completed the front elevation so far as practicable, the side elevations may be constructed by projections from both the plan and the front elevation. If the elevation of the right side be required its proper place in the set of drawings is at the right of the front elevation, as shown at C, Fig. 2. It will greatly facilitate matters if the plan has been previously drawn upon a separate sheet of paper, so that it may be turned upon the drawing board to the position necessary for the required elevation, as explained above. Having, therefore, brought the plan to a position at the right of A, with its right side downward, as shown at D, lines from its several angles are projected vertically into the space at the right of the front elevation, after which the required hights of the several parts are obtained by projecting lines horizontally from the front elevation, as shown. In case the plan has first been drawn on the same sheet as the front elevation a tracing can be made and turned to such positions as are required in drawing the different elevations; otherwise the projections may be first taken horizontally from the plan in its original position at A to any vertical line, as *c d*, erected near that side of the plan of which the elevation is required. By now assuming any point on the line *c d*, as *c*, at a convenient distance below the plan as a center, the several points may be carried by means of the compasses around a quarter circle to the horizontal line *c e*, from which line they may be projected into the side elevation just as they were from the plan, and with the same result as before, all as shown by dotted lines in Fig. 2.

The elevation of the left side may be obtained in a similar manner by turning the plan to the left and proceeding as before described, while the rear elevation may be similarly drawn by completely inverting the plan and placing it so that the elevation will come next to either of the side elevations according to convenience.

One other method of obtaining a side elevation is recognized, which is shown at the left of A and B. Though not usually employed in the case of the principal or general elevations, it is very useful in the case of details, especially when oblique projections are required, and is conducted as follows: If the elevation of the right side be required, the right side of the plan is for the time being considered as the bottom of the drawing, and the projections from it are carried into the space at the left of the plan. The projections from the front elevation are now carried also to the left to any vertical line, as *a f*, placed conveniently near; and from any convenient point below *a o n a f* extended, as *g*, used as a center, the points obtained on *a f* are carried around a quarter circle to the horizontal line *g h*, from which line they are then dropped vertically to intersect with the lines previously projected from the plan, all as shown at E. This method, as will be seen, does not give the elevation in an erect position, but, as stated above, is found very convenient in obtaining certain details.

Referring again to the matter of design, if after the general lines of the elevations have been drawn it be desirable to add certain other features not before considered, as, for instance, the small gable shown at K and K', respectively, of the front and side elevations, or the truncation of the gable at the opposite end of the same ridge, and shown at *m*, these features may be here designed and their positions in the plan obtained by projections made from the elevations back to the plan, as shown at *k''* and *m'*.

(To be continued.)

Brick Bonding.

One of the oldest subjects connected with brick laying is the style of bonding, and though so much has been written about it, and though every mason claims to know exactly what the various styles of bonding imply, it requires the closest supervision to obtain thoroughly bonded brick walls in ordinary practice. In late years the so called Flemish bond has come largely into favor. We say so called, says the *Brickbuilder*, for the reason that a wall is seldom laid up throughout in the regular old Flemish bond. Usually the headers are clipped so that an outer screen of 4 inches of brick face is carried up for at least seven courses and then full headers put in to tie to the backing. As the interior of the wall is composed simply of parallel rows of stretchers, it will be seen that the only tie, aside from the seventh course of headers, is that afforded by the adhesion of the mortar. In many cases this is insufficient to give a very solid wall, but if anything but the best of cement mortar is used and joints are not thoroughly filled throughout, the wall loses a great deal of its strength. The better way is to carry the bond up with every header full. This means carrying up the outer 8 inches of the wall solid through seven courses and then successively heading over through the wall to get a tie clear to the inside with headers, constituting thus practically a double wall 8 inches thick on the outer section and the balance on the inner. In the old style Flemish bond, however, each course is complete clear through the wall, and as it is impossible to carry up face work or backing in advance one of the other, it is for that reason very little used. Furthermore, with full Flemish bond the bricks of the backing and the face work must of necessity be of the same size, and this is rarely possible in modern work; but for solidity of construction there is no method of building a brick wall so satisfactory as a full Flemish bond carried clear through the wall in every course.

A Washington School Heating System.

The District Commissioners of Washington, D. C., have recently inspected and accepted the new William Ludlow school building erected in that city. A description of the building is presented in the Washington *Star*, as follows:

For the heating system air is introduced through a large duct from a rear window and forced into the furnace at a rate of 15,000 cubic feet per minute. By a series of dampers the heating of this volume of air is controlled, and it is possible for the engineer in charge to change the atmosphere in any classroom within a few minutes. Each room is provided with a speaking tube, so that the teacher can communicate the necessities to the janitor or the engineer. A novel feature is the arrangement for ventilating and circulating the air. Instead of the usual ventilators showing above the roof, the architect has designed a crown ventilator, consisting of a heavy molding at the deck roof line, in which are a number of openings. The vent ducts are gathered into this roof chamber and discharged through these openings. This equipment is so arranged that from the basement the exterior ventilators can be closed after the school sessions and the air within the building circulated to reduce the burden upon the heating plant during cold nights.

A BUILDING intended for store and dwelling purposes has just been completed at Brookside, near Wilkes-Barre, Pa., in which concrete was employed for the foundations, walls, floors, porch and even for the roof. It is something of a novelty in that section of the country and has been inspected by local builders and contractors, as well as many from Allentown, Easton and other places. The building covers an area 60 x 30 feet and is four stories high. The first floor is divided into four stores, while the upper stories are used for dwelling apartments. The building was put up by A. M. Dimmick, a well-known resident of Wilkes-Barre, and we understand that a similar building is now in process of erection at Danville.

ADVANCED METHODS OF WARM AIR HEATING.

AT the seventh semiannual meeting of the American Society of Heating and Ventilating Engineers, held in July in Detroit, Mich., one of the papers presented was that of A. O. Jones of Battle Creek dealing with advanced methods of warm air heating. There is in the paper so much of interest to many readers of this journal that we take the space to present it, together with the illustrations accompanying it:

In consideration of the fact that a great many furnace dealers oppose a plan of warm air heating where two rooms are to be heated from one supply pipe, and knowing from experience that the same is practical, has prompted the writer to describe a system, and attach herewith floor plans of a residence which has been heated for the past three winters with a warm air furnace, where seven basement or supply pipes are used for heating 13 rooms. These supply pipes have a larger area than would be necessary were they intended for heating but one room, and instead of conveying the

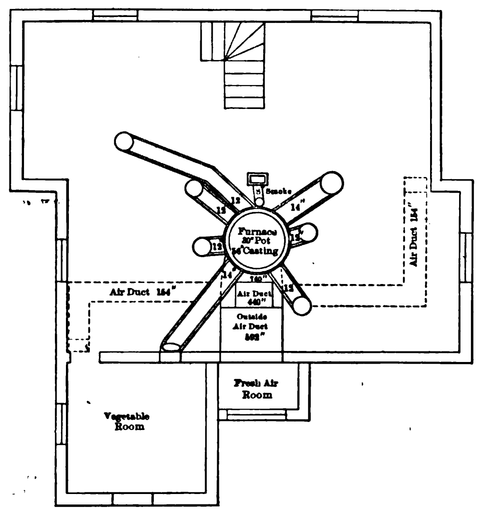


Fig. 1.—Basement.

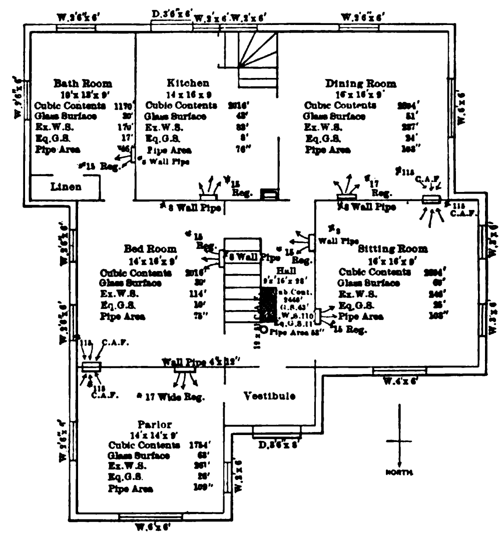


Fig. 2.—First Floor.

Advanced Methods of Warm Air Heating.

necessary amount of warm air for heating each room through a separate pipe, the amount necessary for two rooms is conveyed through one large pipe which has an area equal to the areas of the two pipes necessary to do the work separately.

While a prejudice has existed, and may exist at the present time, in the minds of a great many furnace dealers or warm air heating experts against a plan of heating two rooms from one supply pipe, it is, no doubt, owing to the fact that they have never given this system a trial, or because they have attempted to heat two rooms on the same floor by branching from the main supply pipe and attempting to carry the air in another direction, which would necessitate an angle, or possibly an elbow, to change the course of the air from the course it was traveling in the main supply pipe, where it is next to impossible to successfully heat two rooms with one pipe. The system herein described, however, is on an entirely different plan. Wherever it has been tried it has proved a success, and is admitted to be along advanced lines. It may be in order to mention that during the past three years several thousand warm air furnace dealers have tried this system and have found it thoroughly practical.

By referring to the plans presented herewith it will be seen that in the residence referred to, which is owned by T. Evans of Battle Creek, Mich., there are six rooms and a hall on the first floor and six rooms on the second floor, which have a total area of 23,548 cubic feet. It will also be noticed that there are 504 square feet of glass surface and 2267 square feet of exposed wall surface, equivalent to 236 square feet of glass surface; in all, the equivalent of 740 square feet of glass surface.

In estimating the amount of warm air necessary for heating a given room, a plan, which has been followed successfully during 20 odd years of experience in the furnace business, is to reduce the exposed wall surface to glass surface, and divide the exposed wall surface by the thickness of the wall—in no case less than 10—and this added to the actual glass surface, which, when multiplied by 75 and added to the cubic contents and multiplied by 0.013, gives the area in square inches necessary for heating a given room to 70 degrees F. when the outside temperature is at zero. One per cent. should be added for each degree below zero. This rule applies for warm air pipes for heating rooms on the first floor, where the velocity of the air in the basement pipes is 100 feet per minute, when the pipe has an elevation of 1 inch in 12; but inasmuch as the velocity increases when the elevation of the pipe is increased, and as the velocity of the air in the wall pipes leading to the second floor is 300 feet per minute, they can be much smaller: and, in this case, the wall pipe which conveys the warm air to the second floor rooms has an area of 40 per cent. of the necessary area for heating rooms of the same size and exposure on the first floor.

By referring to the plans of this residence it will be seen that the registers are placed in the wall; and, in order to secure sufficient opening through the bottom of the register boxes where they connect with the basement pipe, specially constructed side wall registers have been used, which are so constructed that they have an opening sufficiently large to take care of all of the air that the basement pipe can supply.

In the rooms on the first floor, Fig. 2, where more than 78 square inches are necessary, and where the room above is also heated from the same supply pipe, a No. 17 register has been placed, the bottom opening of which has an area of 113 square inches. This is connected to the furnace with a 14-inch pipe, which has 154 square inches area. The question, no doubt, will arise: How can 154 square inches pass through the bottom of this register, which has but 113 square inches opening? By way of explanation I will say that in the basement pipe of 154 square inches, where the velocity is 100 feet per minute, 117 cubic feet of air will be discharged per minute; but the velocity of the air increases when the elevation is increased, and as the elevation in this case is increased at the first turn of the elbow, it is estimated that this air is traveling at the velocity of 150 feet per minute when it is passing through the bottom of these register boxes. It will be seen that 79 cubic feet of air will pass through this opening at a velocity of 100 feet per minute, and 118 cubic feet at a velocity of 150 feet per minute, or more than a 14-inch pipe will supply. In rooms on the first floor, where less than 78 square inches are necessary, a No. 15 register is used; and as all of the rooms in this residence have been heated from 70 to 75 degrees F. during the coldest weather since this plant has been installed, some three years ago, it will be seen that the above estimates are correct.

It might be well to explain that while all but two of the rooms on the first floor require 78 square inches of the pipe area, and that 12-inch pipes with 113 square inches area are used to convey the air from the furnace to the bottom of these registers, the wall pipe, which continues from the top of the registers to the rooms on the second floor, has an area of 35 square inches, and, inasmuch as each register is supplied with an adjustable diaphram, which can be used as a deflector, the warm air is divided while it is traveling upward, which is the only place that it can successfully be divided, and 55 cubic feet of air per minute is discharged into the rooms on the first floor and about an equal amount is discharged into the rooms on the second floor.

It is owing to the fact that the air for these two different rooms is divided while it is traveling upward, or through a perpendicular conductor, that it is possible to successfully divide the air for the different rooms to be heated, while, if this division were undertaken while the air was traveling through a horizontal pipe, it will readily be seen that it cannot successfully be divided on account of the warmer air hugging the top of the supply pipe. If this division were undertaken while the pipe was running horizontally the branch nearest the top of the supply pipe would naturally rob the supply pipe, and the branch would not get its share of the warm air; in which case but one room would be heated successfully at one time, as has been proved in many cases. This no doubt has caused the prejudice referred to above.

In order that the description of this system may be more thoroughly understood, a plan of the basement, Fig. 1, is given, showing the location of the furnace, air ducts, warm air pipes, &c., also the first and second floors, Figs. 2 and 3, which show the location of the warm air registers, pipes, and return air registers. After finding the amount of air necessary for each room and adding all together, we find how much air is necessary. The next thing is to have a furnace large enough to allow this amount of air to pass through it between the castings, or the furnace proper, and the casings, and to have an air duct with sufficient unobstructed area to supply this amount of air. If this air is taken from the outside of the building it will be well to remember that when heating it from a temperature of zero to 175 degrees above zero it will expand about 20 per cent., but if a greater allowance is made the air supply in all probability will be inadequate; and more trouble has arisen in warm air heating from a lack of air than from a lack of heat, for it matters little how hot a furnace is unless there is sufficient air delivered to it to utilize the heat as it passes over the furnace on its way to the rooms to be heated. Then, with a proper air supply, a furnace large enough to allow this air to pass through the warm air pipes, and the furnace so constructed as to heat this air while it is passing over the heating surface of the furnace, there can be no failure in warm air heating if the rooms to be heated are properly ventilated, so that a circulation of air is secured, unless the warm air is cooled while passing through the basement pipes, and this can be prevented in a great measure by using a few large basement or supply pipes instead of using many small pipes or one for each room to be heated.

Any furnace manufacturer will guarantee his furnace to heat more space where one large register is used with one large supply pipe. Then is it not reasonable to suppose that a furnace will heat more space with the same amount of fuel with one-half the number of supply pipes, or the same space with less fuel.

As proof of this statement you are referred to this residence, where but 10 tons of anthracite coal were used to heat 23,548 cubic feet of space divided into thirteen rooms, where 2267 square feet of wall is exposed to a climate where the thermometer registers as low as 22 degrees below zero, besides there being 504 square feet of actual glass surface, the cooling effect of which has to be overcome.

Besides successfully heating this residence with a minimum amount of fuel, all of the rooms have been ventilated and the air throughout the house is kept free from impurities, which cannot be said of some residences heated with other systems.

Another feature of this system or plan of heating is that no coal dust or odor from the basement is delivered into the rooms, as no air from the basement can enter the warm air pipe; and air for protection, instead of being taken from the cellar or coal bin, is drawn out of the

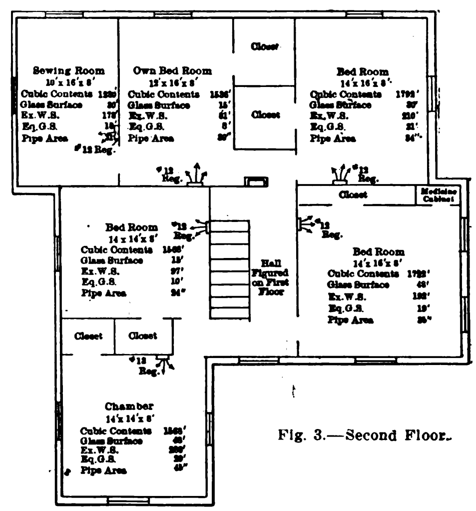


Fig. 3.—Second Floor.

Advanced Methods of Warm Air Heating.

rooms being heated, through the opening at the bottom of the registers, which is made for the purpose of ventilating the rooms being heated and protecting the wall pipes from overheating.

Summary.

Space heated	23,548 cubic feet.
Exposed wall	2,267 square feet.
Actual glass surface	504 square feet.
Actual glass and equivalent glass surface	740 square feet.
Number of rooms heated	13
Number of basement pipes used	7
Area of warm air pipes	740 square inches.
Area of outside air supply	592 square inches.
Area of inside air supply	740 square inches.
Area of air space in furnace	768 square inches.
Diameter of grate in furnace	30 inches.
Area of grate	670 square inches, or 4.65 square feet.
Heating surface of furnace	124 square feet.
Coal consumed during season	10 tons.
Proportion of grate to heating surface	1 to 27 square feet.
Proportion of heating surface to space heated	1 square foot to 193 cubic feet.
Proportion of heating surface to equivalent glass surface,	1 to 60 square feet.
Proportion of grate area to exposed wall surface,	1 to 46 square feet.
Proportion of pipe area to space heated	1 square inch to 31.08 cubic feet.
Proportion of pipe area to equivalent glass surface,	1 square inch to 1 square foot.
Proportion of coal consumed to space heated	1 ton to 2,354 cubic feet.
Proportion of coal consumed to equivalent glass surface,	1 ton to 740 square feet.

Specialization in Architecture.

Attention has been called to the specialization that has taken place in architecture. The time was when an architect did the whole work of a building, perhaps with the assistance of a draftsman, but of late the complicated character of the modern building has called for men who have given special study to each branch. As the New York *Sun* puts it, "One member of a firm would be specially skilled as a designer, the artist of combination; another acquainted with materials and methods of construction, so that he is able to superintend the work of the contractors; a third good at specifications or perhaps specially rich in friends and able to deal with clients."

Architectural firms in which men of various gifts participate are still numerous, but specialization has developed independent architects who are consulted by many firms upon special problems. There are men who do little or nothing but write specifications, and others who are employed by many of their fellow architects in preparing the colored drawings intended to make unimaginative clients see how a building will look when completed. Architectural engineering is more than ever a profession in itself.

Meanwhile the architectural draftsman has also had his development. English architects are surprised to find how large a share of important work in the offices of New York architects is left in the hands of so-called draftsmen. These are often carefully educated young architects, who hope sooner or later to set up independently or get into some established firm as junior partners. In some cases a draftsman develops into a sort of managing clerk, just as some law clerks become the executive officers of important law firms.

Other draftsmen are prized for their taste and skill in decorative design. Such men are sometimes employed to do a large part of a competitive design submitted for important buildings, public or private. However little the employing architect may have advised in this work he and not the designer gets the credit, and the prize if it is successful.

This is quite in contrast with the methods pursued in England. The English architects are men who work largely alone, having no partners and employing few draftsmen. They do not seek to create a great business, but are content to build comparatively few houses. They do, however, place their individual mark not only upon the general design of the houses they build, but upon every detail. This method of work makes it impossible that they should intrust to hired draftsmen a great variety of details such as in this country is done by draftsmen.

This architect works almost purely as an artist, with jealous care that nothing shall go out from his office that he is not ready to father in all its important details.

Such architects do not earn great incomes, for the comparatively small volume of the business makes that impossible; but their fees for individual houses are relatively large, and only the well to do can employ them. Their work is known all over the British Isles and even in this country. The few American architects who work in this fashion attract less attention than like men in England.

Alteration of Second-Class Buildings.

A decision was recently made by the Boston Board of Appeals which affects very materially a number of prominent buildings erected in that city prior to the passage of the laws forbidding anything but first-class fire proof constructions for buildings over 70 feet in hight. Application has been made to alter one such structure actually over 90 feet in hight, the proposed alterations including a number of ordinary wooden stud partitions in the first story. This application, says the *Brickbuilder*, was rejected by the Building Commission under an interpretation of the building law which provides that "any alteration in a structure shall conform to the provisions of this act for a new structure," claiming that as the law requires all new buildings over 70 feet high to be fire proof, therefore alterations of this 90-foot building must be fire proof. The Board of Appeals, to whom the question was referred, decided against the commission and ordered the permit to be issued, taking the ground, it is understood, that the law as it stands does not intend to deprive a property owner of any of his rights nor to compel him even in part to transform an existing second-class building into a first-class one, even though such a second-class building could not now be erected under existing laws. To rightly express, therefore, the import of this decision the law should read: "Any alteration . . . shall conform to the provisions of this act for a new structure of the same class as the structure to be altered, irrespective of whether or no said structure otherwise complies with all the terms of the existing law." It will be seen at once that this decision very materially affects the fire risks of the business district in which are many second-class structures over 70 feet in hight.

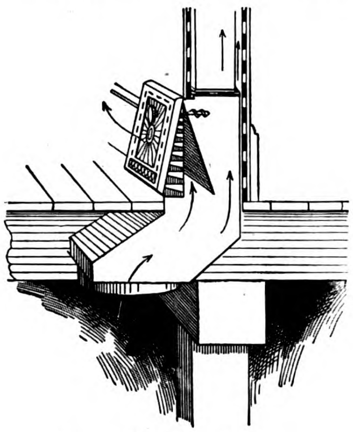


Fig. 4.—First-Floor Register.

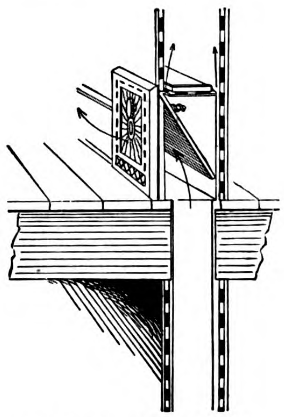


Fig. 5.—Second-Floor Register.

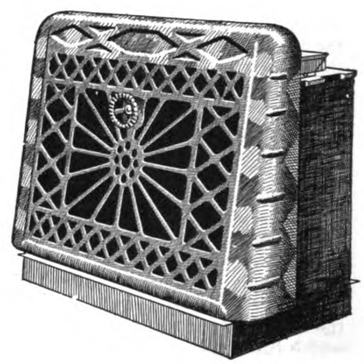


Fig. 6.—Special Register.

Advanced Methods of Warm Air Heating.

THE use of roofing cement is probably known to most readers as a quick and sure method of temporarily stopping a leak in a roof when the necessary time cannot be spared to fix it otherwise, but it has remained for some progressive architects to employ it as a bedding in which to lay roofing slate. When employed for this purpose it gives an elastic yielding surface to the slate, and not only calks the joints, so to speak, but in a large measure prevents their breaking by reason of the bed in which they are laid. It is also applied with similar effect between the joints in corrugated iron roofing.

NOTES ON LAYING BRICK.*

By Frederick W. Taylor and Sanford E. Thompson.

WHILE investigating the cost of labor required in laying brick the attention of the writers has been called to the scarcity of literature relating to the practical details of bricklaying and the methods employed by bricklayers on different classes of work. Workmen in different localities also employ different methods, and a study of some of the operations may be of assistance in devising arrangements of work which are most economical. It is not proposed in this article to enter into the subject of architectural design, but only to touch upon the methods used by building contractors and bricklayers in the actual processes of laying the bricks.

Even in the seemingly simple operation of laying a brick to line there is quite a divergence in the method of work. In some localities it is customary, at least on all surface work, to lay each brick separately. When this is done the quickest method is for the mason to pick up the brick with the left hand at the same time that he is taking up the mortar on his trowel with the right hand, then turn to the wall, spread the mortar, put a little of it on the end of the brick which he has in his hand, and place it. Considerable time may be lost by the mason first spreading the mortar for a single brick, and then

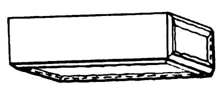
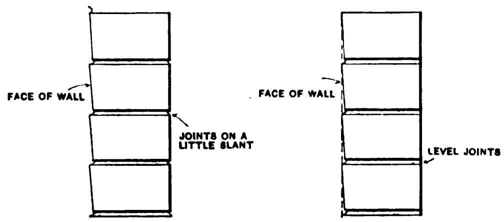


Fig. 1.—A "Buttered" Brick Ready to Lay.



Machine Brick. Hand Made Brick.
Fig. 2.—"Rolled" Face Brick.

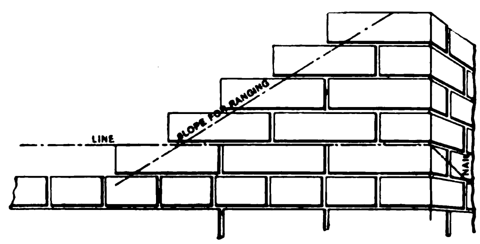


Fig. 3.—A "Lead," Showing Line for "Ranging" with Level or Straight Edge.

Notes on Bricklaying.

with a separate movement turning around and picking up his brick. He may also waste time, and yet appear very busy, by unnecessary tapping and scraping of the brick after it is laid. After laying, the joint should be scraped with point of trowel to remove the mortar which squeezes out of the joint, and this mortar placed on the end joint for the next brick.

In other localities where common brick are used on the surface of the wall, or even sometimes for pressed brick, the bricklayer "strings" the mortar. Large trowels, up to 14 inches in length, are used. The man picks up a trowelful of mortar and strings it along the wall for a length of six or eight or even more brick, then lays down his trowel and places the bricks with both hands. Several tests made tend to show that a man familiar with both of the methods described can lay, using a trowel of ordinary size, about 10 to 15 per cent. more brick by "stringing" than by spreading the mortar for each brick separately, but it is not generally considered to produce good work. One great advantage in "stringing" mortar is that the masons can be doing this while the men on the leads are raising the line, thus avoiding delays.

"Buttered" joints are made by scraping a little mortar from the trowel around the edge of the bottom and end of each face brick before it is laid. The mortar has to be quite fat when used in this way, or it will not stick. A thinner and more uniform joint can be thus made more quickly than by the regular method of laying. In New York City and many other places pressed brick are nearly always laid in this way. In Fig. 1 is shown a "buttered" brick ready to be laid.

Many specifications require a "shove" joint. For this a thick bed of mortar is spread, and the brick is placed upon it and shoved with a twisting and sliding motion up against the brick or bricks already laid, so as to force the mortar up into the vertical joints. This method is necessary for the interior of walls where solid work is required. Sewer masons follow it quite generally.

All brick are more or less "rolled," as shown in Fig. 2—that is, the bricks are laid on a slight slant, or else with the widest surface uppermost, so that the lower edge sets back from the upper edge of the course below. By this means the lower edges of the brick will not show when looked at from below, and the wall has a smoother appearance. Looking up from a window in a brick building the surface appears much smoother than when looking down from the same window. On a curve laid with ordinary straight brick the lower corners of the bricks can be thus hid from view instead of projecting out over the brick below. All hand made brick have one surface wider than the other by perhaps 1-16 inch. A mason in laying a brick throws it over in his hands and holds it by the wide edge, which he can distinguish by the feel.

A wall of moderate thickness built entirely of common brick is generally laid from a staging on one side. If faced with special brick stagings are generally built on both sides of the wall, but if this is not done the face brick are laid "overhand" from the inside stage. It takes about 10 per cent. longer to lay brick to line overhand than direct, with a still larger difference in time at the leads and corners where the work has to be plumbed and leveled. When the wall reaches a certain hight above the stage it is necessary, unless the wall is thin or the stages are built very close together, for the mason to get up on top of the wall (thereby loosening the brick already laid), and lay a few courses of the face to reach the hight of the next stage. The extra labor of laying overhand, however, is more than balanced by the saving in staging and the time gained in not having to change so often from one location to another. Overhand work cannot be so well done as direct work, and therefore ought not to be used in neat face construction.

In carrying up a wall the most careful work has to be done on the corners and the other "leads," a lead being the term applied to brick, Fig. 3, which are carried up ahead of the rest of the wall for holding the ends of the line. A line should not be stretched more than 20 or 30 feet, unless supported in the center, or it will sag and the courses will not be level. To support a longer line than this a "twig," or "ting," which consists of a short piece of string tied around the line in such a way that it can be slid back and forth, is placed in the center of the line. One brick is laid on the new course near to it, and the line is then held in place by resting the twig on this single brick with a loose brick on top of it.

Before stretching any line, however, the leads for each end have to be carried up several courses ahead of the rest. In starting a new wall the corner or lead men are set to work first and build up a triangle from five to nine courses high. The brick in the lead have to be laid plumb and level by means of the spirit level. The corner brick in a corner lead is laid first, and in setting the brick next to it care has to be taken that it is set well forward, as there is a tendency to get this brick back from the face. The brick should be leveled after each course of the lead is laid. The plumbing, by good workmen, can be deferred until several courses are laid, although many bricklayers prefer to plumb as they go along. The authors happened to notice one day two men laying on similar corners. One of them plumbed and leveled his courses as they were laid, while the other one carried up six or seven courses then leveled and plumbed them at one operation. The total time building the lead was exactly the same for the two men. They laid their separate bricks in the same time, but the leveling and plumbing after completion required as much time as the sum of the times of the other man on the plumbing and leveling of each brick. The joints of the man who leveled and plumbed as he went along were much the truer.

In addition to the plumbing and leveling the leads pilasters or piers themselves, unless very wide, or near enough together to use a separate line, have to be carried up by means of the level and plumb.

It takes longer to lay the brick at a jamb, even when this is laid to line, than the rest of the brick. In common brick it takes the average man about one-quarter longer to lay the jamb brick, and on face brick nearly double the time. In addition the jamb brick have to be plumbed, as already stated.

There is considerable time which is necessarily lost by the bricklayers in changing from one part of the work to another. On small jobs the same masons often lay both face and backing. To do this they lay the face brick from one header course up to the next, then go around on the back of the wall and lay the common brick. This can, of course, be, and generally is, obviated by having two sets of masons, one for the face and the other for backing up. Even when this is done several changes are necessary throughout the day. It is customary in laying a wall between two stories to make three, or sometimes four, changes. The masons commence at the floor line and lay up to the line of the window sills, when they change to another part of the wall, so that the sills may be set (if done by different men) and the window frames placed. They then go back and lay about half way up the window frames, when they have to change again to allow the stage to be built. Returning to the new stage, they lay to the top of the windows. If the masons set their own window caps, or turn their arches, no change is necessary until they build "staging high" again. If separate men set the caps an additional change is generally necessary here.

Another source of lost time which is difficult to prevent is not so noticeable as that described. Where several masons on a wall with openings are laying brick to the

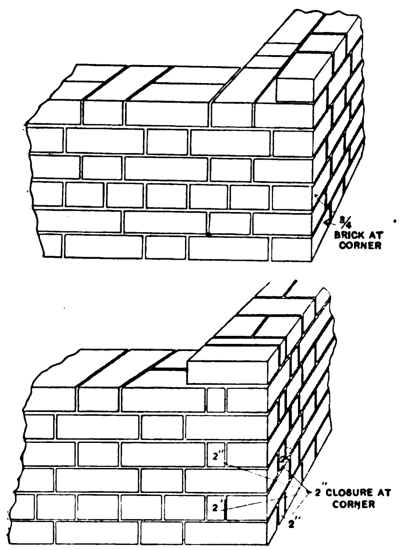


Fig. 4.—Two Styles of Corner Bonding for Flemish Bond Brick Work.

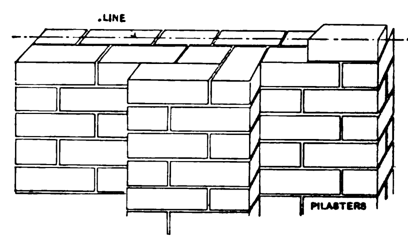


Fig. 5.—Lining Face Brick at Pilasters.

Notes on Bricklaying.

have to be ranged—that is, the level is placed diagonally from the uppermost corner brick downward, so as to straighten all of the other bricks.

In nice work the hight of each course has to be measured at the lead, the best method being to mark off a stick for the thickness of the courses. The thickness of the joints sometimes has to be varied slightly near the top of a line of windows so as to come exactly right for the window caps or arches.

In common bond the brick next to the corner in the header course has to be cut to make the bond come right. In the best quality of Flemish bond, and in laying 12-inch Roman brick, a 2-inch piece, called a "closure," is required next to the corner brick in every other course. Sometimes a three-quarter brick is used instead of this, but it does not make so neat a job. In Fig. 4 is represented two styles of corner bonding for Flemish brick work.

It is not usually necessary to carry up leads at window jambs, since the line can be stretched across the window openings. The jamb brick have to be plumbed on the return.* When laying pilasters, or projecting piers, Fig. 5, they can be carried up one course below the line work, so that the line can be stretched the entire length of the wall, as though they were not there. The same line, each man's section necessarily varies in length from his neighbor's, and the men who get through first often wait until the last man lays his closing brick; even in a blank wall the work is not usually proportioned equally or relatively to the speed of the men, and there are apt to be similar waits. This lost time cannot be wholly obviated, but can be reduced very low by a good foreman.

(*To be continued.*)

* The return, or the reveal, is the vertical surface of the wall each side of an opening and at right angles to the main wall.

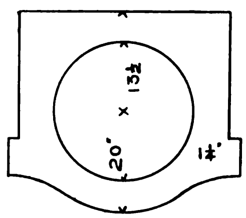
Convention of Brick Manufacturers.

Announcement has been made by the Executive Committee, through Secretary Theodore A. Randall, that the nineteenth annual convention of the National Brick Manufacturers' Association will be held in the city of Birmingham, Ala., January 30 to February 11, 1905. In the call for the meeting reference is made to the accessibility of the city as influencing the committee in its selection, and to the fact that in the vicinity of Birmingham are all kinds of clay working plants, which will afford delegates an opportunity of fully investigating the methods of the various factories, which include up to date soft clay, stiff clay, dry press and sand-lime processes, also a large sewer pipe plant and extensive chemical and metallurgical establishments, the doors of which will be thrown open to the visiting members.

CONVENIENT BEDROOM FURNITURE.

By Paul D. Otter.

It is a matter of progression rather than of unrest which creates the desire to have about us much that is convenient and conducive to our comfort. The time was when the gourd dipped into the running stream or spring permitted the morning face wash right on the spot, or, later, with more shifting and apportioning of the precious fluid, the ablution was performed within doors. Time and even the wind mill have produced such a change that the small boy has no excuse to skip the wetting of his face because the pitcher is empty. The harnessing of the wind with a system of simple plumbing will give a city man's comfort to the ranchman on the plains. We, however, have not universally advanced to the time when cold, much less hot, water will be found in every room of a dwelling. Some have gone so far as to invite the pump into the kitchen, which seems by the way a more hospitable, as well as modern, show of civility than to leave it to freeze outside.



Plan of Top.

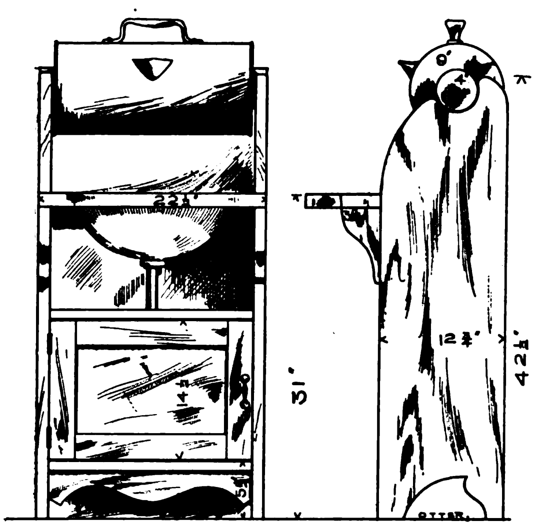


Fig. 1.—Front Elevation and Side View of Portable Wash Stand.

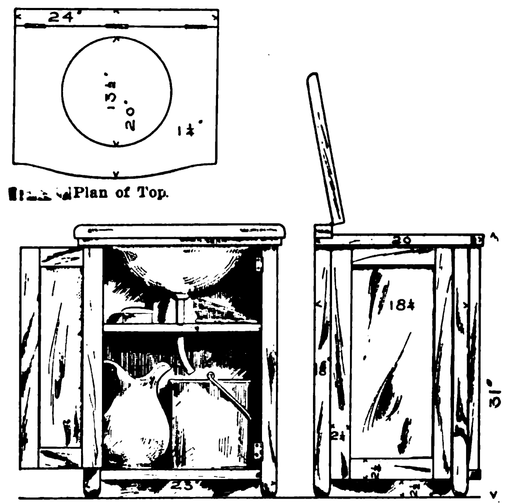


Fig. 2.—Front and End Views of Another Style of Wash Stand.

Convenient Bedroom Furniture.

For the rooms unprovided with the luxury of running water the portable wash stand, illustrated in Fig. 1, is sugested as a substitute for the permanent wash bowl and faucets. The main purpose is to avoid the always objectionable feature of lifting and emptying the contents of the bowl into the slop jar. This is accomplished, as shown in the engraving, by procuring a regular lavatory bowl and having a short length of drain pipe to enter the top of the cupboard, where the waste water is allowed to fall into a pail hidden from view by the cupboard door. In this inclosure may also be placed other articles objectionable to the order of the bedroom. It would be well to have a few apertures bored into the back paneling for the purpose of ventilation.

The top of the stand may be made of almost any 1¼-inch material and covered smoothly with copper or zinc, the metal extending over the front edge and partly under the edge of the opening. The size of the hole should, of course, be determined after the bowl is obtained, as size, shape and make are apt to vary. The vessel, of sheet copper, for holding the water is readily constructed by a tinsmith and will add much to the stand when the finish is in weathered oak. The shape is a 9-inch cylinder provided with 4-inch trunnions soldered on each end as axles to hang on the ends of the stand as shown in Fig. 1. A grip handle makes it convenient to carry from the source of supply and the water may be directly heated in this vessel. Either an outlet, as shown, or a drinking fountain faucet may be provided. The material throughout, with the exception of the bowl top, would make up well from ⅞ dressed boards; if it is to be the still prevailing weathered finish use plain oak; this is a wax finish desirable for such a piece of furniture subject to some extent to water marks.

Another form of stand closing up entirely after using is represented in Fig. 2 of the drawings. The construction consists of four 1⅝-inch square posts with paneled frames at the sides and back and two swell paneled front doors conforming to the shape of the bowl top as shown. The inside of the lid and surface, as well as the edges of the bowl top, are to be covered with zinc or copper. Ample room will be found on the upper shelf for brushes, mugs and other articles of the toilet.

An accessory to the wash stand is the towel stand, which is of infinite variety of form. The style shown in Fig. 3 is given as a companion piece to the wash stands presented in the preceding illustrations, and with the firm narrow base it occupies but little room. At right angles with the ¾-inch dowels two ¾ x 9 inch dowels may be set into the front of the post on which to hang the wash cloths. The post centers on a block ⅞ x 8 inches square.

The value of the clothes stand heretofore has been little appreciated, the apparatus consisting usually of a few hooks here and there, or a chair seat and back was utilized to hold the clothes discarded for the day. Either method gave little chance for proper airing or an easy disposal of them to the hallway or unused room for the night.

The arms entering the standard transversely as shown in Fig. 4 permit of eight double hooks being used; a 12-inch dowel may be centered just above the braces for hosiery. The total hight of the stand is 62 inches. The intersecting base is halved with the standard entering joint with a ¾-inch tenon, well fitted and glued. The braces may be doweled to the standard and secured to the base by screws from underneath, counterbored.

Estimating the Cost of Buildings.

The proper way to estimate the cost of buildings, having regard to the various items of cost in structures of different kinds, was the subject of a paper read a short time ago by C. T. Main of Boston before the New England Cotton Manufacturers' Association:

It is not uncommon, he says, to hear the cost of a building put at from 60 to 80 cents per square foot of floor space, regardless of the size or number of stories. This is incorrect, since there is a wide range of cost per square foot of floor space, depending upon the width, length, hight of stories and number of stories. Cost will depend upon the nature of the site (foundations); whether the end or side is formed by another building; whether it is to be a storage building with low stories; whether the material is to be brick, stone or wood; whether the building is to be an office building or something less elaborate. The allowance to be made in each case was given in the paper read by the author, so that the diagrams which he had constructed can be used to determine the appproximate cost of various kinds of buildings. The diagrams are serviceable also, it is held, as a basis of valuation of buildings. By following upon the diagram the curve for a building of a given width to the point where it cuts a line showing the intended hight the investor finds a horizontal line pointing out the cost per square foot of floor space of the entire structure. "Existing buildings," the author observes in reference to valuation, "are usually of less value than new modern buildings, for the reason that there has been depreciation due to age and that the old building is not so well suited to a business as a modern building would be."

The conclusions reached are of interest to prospective builders. Cost per square foot of floor space decreases with the increase of width, for the reason that the cost of walls and outside foundations diminishes with increase of the width of the building. The minimum cost per square foot is reached, as a rule, with a four-story building. A three-story building costs a little more per square foot than a four-story. The one-story building is the most expensive. This is due to the fact that the cost of foundations does not increase in proportion to the number of stories; that the roof is the same for one story and for many; that the cost of columns, including supporting piers and castings, does not vary much per story as stories are added; that as a number of stories increases the cost of walls increases, owing to increased thickness, the saving in foundations and roof in the four-story building thus offsetting the increased cost of walls. The saving by the use of frame construction for wall instead of brick is not so great as many persons think.

The only saving with frame construction is in lighter foundations and in the outside surfaces. The floors, columns and roof must be of the same strength and construction in any case. The cost of a frame storehouse of four stories, having 10,000 square feet of floor space, is to the cost of a brick storehouse of the same area on each story as 574 to 778. The ratio of cost of a brick storehouse of one story with 10,000 square feet of floor space is 866; two stories with like area on each floor, 813; three stories, 790; four stories, 778.

Prices of foundations, walls, columns, &c., for buildings of from one to six stories are estimated, with definite allowances for hight of stories, floor space, roof and stairways. Mr. Main does not propose in his paper to make "every man his own architect," but he suggests certain general facts and principles which every one can comprehend.

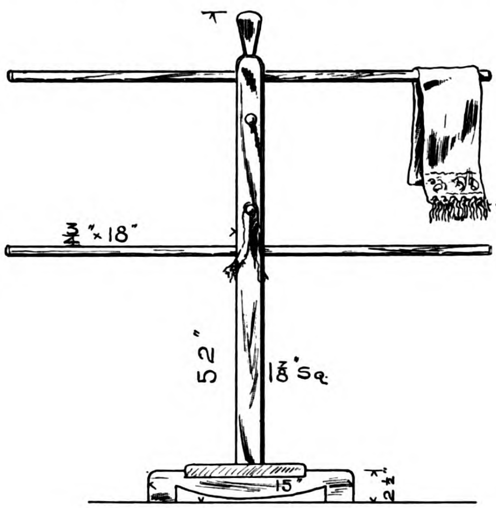


Fig. 3.—A Towel Rack or Stand.

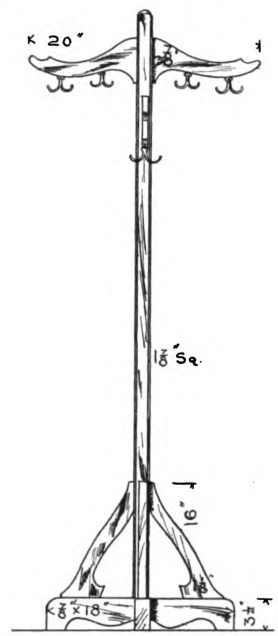


Fig. 4.—A Clothes Stand.

Convenient Bedroom Furniture.

Novel Fire Escape for School Building.

The Dudley Stone Primary School building in San Francisco, Cal., has been equipped with two new life saving chutes, by means of which it is claimed the entire school building, containing several hundred children, can be emptied in case of fire in a very few minutes. The chutes are cylindrical in shape, and extend from the ground to the upper stories. They are 6 feet in diameter, in the center of which is a stand pipe connected with a water main at the base. In connection with this stand pipe, a hose system will soon be installed. About the stand pipe is ranged a spiral nearly 3 feet wide, making five complete turns in running from the top to the bottom. The spiral is made of steel plates ⅛ inch thick, each plate overlapping the one below, so that there shall be nothing to hinder the free descent along the spiral. There are two entrances on each of the upper floors of the school building and an exit at the bottom. At the lower end the spiral approaches the horizontal in order that the speed of exit shall not be too great. The exit door opens automatically on the approach of anybody coming down the spiral. The complete descent from the top story can be made in ten seconds.

CONSTRUCTING AN ELLIPTICAL STAIRWAY.*

By MORRIS WILLIAMS.

WE will now proceed to explain the method of developing the mold and finding the bevels for block 6, which, as shown in plan and elevation of Fig. 17, connects the wreath with the level landing rail.

This block represents a problem as difficult as any that may possibly be encountered. Its plan rail, as shown, is described from two different centers; its plan tangents are of different lengths and form an obtuse angle with one another, while the elevation of the tangents shows one to be inclined and the other level. Let O K L M of Fig. 24 represent the plan of the block and K' L' M' represent the elevation of the tangents. It will be observed that these are taken from Fig. 17. We will first find the angle between the tangents, as required in the face mold. From O of the plan draw O W parallel with the level tangent L M. This line will be level owing to its being parallel to the level tangent; it will also be the plan of the minor axis, owing to its being a level line drawn from the center of the plan railing.

We will now transfer this line to the section, or, in other words, to the oblique plane of the wreath, and when in this position it will indicate the minor axis of the ellipses that constitute the curves of the face mold. Take L as center, and with the radius L W revolve W to W', as indicated by the dotted arc W A W'; again take L' as center, and with the radius L' W' revolve W' to W'', as indicated by the dotted arc W' B W''; draw a perpendicular line to the level tangents from W on the plan to cut the arc W' B W'' in W''. Now from W'' draw the line W'' O'' parallel with the level tangent L' M'. The line W'' O'' will be the minor axis.

To find the angle required in the face mold between the tangents draw a line from W' to L' and the angle required will be at L', being formed by the lines M' L' and L' W''.

To find the length of the face mold transfer the point K from the plan by the same process as that used to transfer the point W. Take L as the center, and with radius L K describe the arc K K', as shown by the dotted arc from K to K'. Again with L as the center and L' K' as radius describe the dotted arc shown by K' H' K''. The point K'' determines the length of the mold, as indicated from K'' to M'.

The major axis will be the line M' O'', which will be found to form a right angle with the minor axis O'' W''. The width of the mold at the end M' is found by placing on each side of M' the distance X Y, taken from the bevel Y; and its width at the end K'' is found by placing the distance Z N, taken from the bevel Z, on each side of K''. Other points in the curve may be found by means of ordinates or level lines; the curves are traced through each point, as shown at 2 5 8 x for the outside curve, and at 2 4 x for the inside curve.

To determine the bevel Y we first take the full length of the major axis from M' to O'', the center of the mold, and place it from O in the plan extended to Y; thus it is shown that this length forms the hypotenuse of the triangle O Y M, which constitutes the bevel. To find the bevel Z take the length of the line O'' F from the section and place it from O in the plan extended to Z, as shown. Another method to find the bevels is as follows: Take the length from O' to M' for the altitude of the triangle, and take the radius of the plan O M for its base; by connecting Y with O the bevel is found. Again take the length of D D for the altitude and place it from K to Z; the base of this triangle will be the radius O K of the plan; by connecting Z with O the bevel is found.

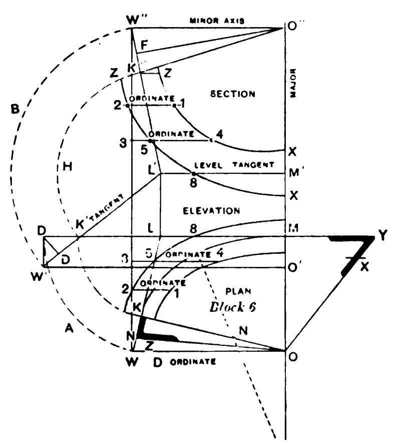


Fig. 24.—Plan, Elevation and Section of Block 6.

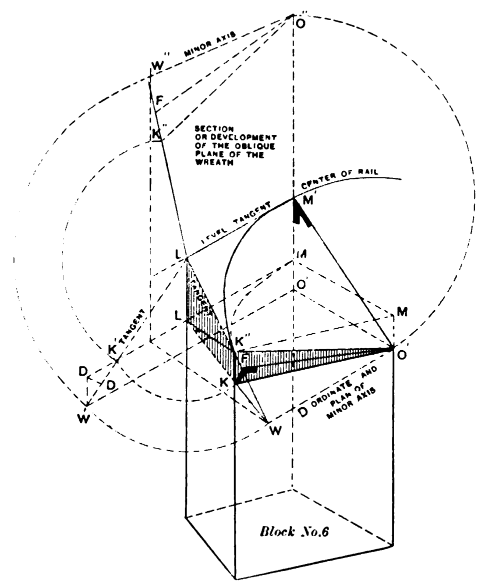


Fig. 25.—A Perspective of the Previous Figure.

Constructing an Elliptical Stairway.

It will be observed that the above methods of determining the bevels are applicable also in determining the bevels or cuts for a common rafter in roof framing, thus attesting the contention more than once asserted in these articles. In the first of these methods the length of the rafter, as we may say, was taken and placed from O to Y, thus determining the rise of the roof and the angle cut, the run being already known, as from O to M, the radius of the plan. In the second method, the run and rise were made use of to determine the length of the rafter; the two methods resulting in the finding of the same angle cut. The advantage in roof framing over hand railing, as heretofore stated, to determine the bevels, is that in the former the run and rise are known, while in the latter we encounter problems demanding a geometrical method of solution to determine them, which makes the science of hand railing appear intricate and complex.

The problem in Fig. 24 may be considered as such, and yet, as will be shown, the solution is very simple. All that is required is to find a level line in the plan and a corresponding level line in the development. This will

* Concluded from page 308, November issue.

be clearly understood by comparing Fig. 24 with Fig. 25, which is a perspective of the former, showing every line and point in their co-relation to one another as the factors in the development of an oblique plane cut through an obtuse angle block. The oblique plane is shown in Fig. 25 at O' K" L' M'; the level line of the plan is shown at O' W, designated as the directing ordinate; in this instance it stands for the plan of the minor axis, as previously stated, owing to its being a level line drawn from the plan center O'. The corresponding level line in the development is shown in Fig. 25, as well as in Fig. 24, to be the line O" W", and, as shown, it stands for the minor axis. Now, if the development is folded into its true position by revolving on the level tangent L' M' until the minor axis coincide with its plan line O' W, as shown in Fig. 25, it is evident that every other line and point in the development will coincide with its respective plan lines and points. The line O' K' in the development will be above its plan line O K; so will be also the two developed tangents, as shown at K' L' and L' M'. In this figure the oblique plane is so clearly defined as to enable us as in common roof framing to take from it the run and rise to determine the angle bevel. We find that it has the run of O' O', and the rise of O' M' in its direction from the line O' W up to the level tangents L' M'. Therefore, by connecting M', the highest point, with O', the lowest point, the bevel is determined as at M'. This bevel is designated in Fig. 24 as the bevel Y, and it was determined in that figure by precisely the same dimensions of run and rise—namely, O M for the run and O' M' for the rise.

The bevel marked Z in Fig. 24 is shown in Fig. 25 to determine the bevel for the inclination of the plane in its direction from its side O' M' to its opposite side K' L'. The run for this bevel, as shown, is from O' to K; so it is also in Fig. 24, and the rise as shown from K to F, which is equal to D D in both figures.

It will be observed that the line D D is made square to the raking tangent K' L'; it is shown in its true position in Fig. 25 at F K. The line F O" in this figure is drawn square to the side of the block or tangent; so also is the base line K O'. It is shown that the lines constituting the bevels are drawn square across the tangents and also square to the face of the tangent. They are to be applied to the wreath so as to form a square butt joint. In Fig. 25 they appear exactly as they are applied to the wreath, and if we consider the position a rafter assumes in a roof, we find that it corresponds with the position of the bevels as indicated in Fig. 25.

Assuming the hypotenuse of bevel Y, as shown at M' O, to represent a rafter, it is here indicated to be placed square to its ridge pole L' M', and that its upper cut or bevel is for the purpose of fitting it against the side of the ridge pole. The cut on the end of the rafter when it is thus in position is shown to be vertical, and so will the sides of the wreath be vertical after being squared and placed in its inclined position. The analogy that is thus shown to exist between rafter cuts and hand rail bevels, in that it eliminates the supposed mystery usually atttributed to the latter, ought to encourage all students to go ahead until they reach the point where it will be as easy for them to find the bevels in hand railings as it is to find the cuts in a "lean to" rafter.

In concluding these articles we wish to state that the endeavor throughout has been to demonstrate the treatment of combining wreaths in the construction of continuous rails by means of tangential diversions. As was shown, the continuous rail spanning the distance from the newel to the landing rail may be constructed either in three, four or six wreath pieces, and, if the workmanship is accomplished with the exactitude due the science of hand railing, all the pieces may be glued and bolted together in the shop without the least fear of having to alter a single joint when being put up in the building.

THE next convention of the Bricklayers' and Stone Masons' International Union will meet in San Francisco, January 8, 1905.

Architects for the Carnegie Technical Schools.

The committee on Carnegie Technical Schools at a meeting held the latter part of October awarded the prize in the competition for the immense new educational institution to be erected in Pittsburgh to the architectural firm of Palmer & Hornbostel of New York City. The second place in the competition was awarded to George B. Post, also of New York City. In referring to the prize design, Prof. Warren B. Laird, head of the department of architecture of the University of Pennsylvania, who was the advisory architect of the committee throughout its work, said:

In this design the buildings are grouped about three great courts which open into one another, and are of dimensions running into some hundreds of feet, not less than 200 x 600.

About the principal court will be grouped the administration buildings and the superintendents' offices of two of the four schools. At the end opposite the main entrance will be placed the School of Applied Design, so situated as to give a very fine effect to its especially artistic character.

Close by the Administration Building are the headquarters of the remaining school, that for women, its building inclosing one of the secondary courts. This insures a certain separate life and privacy for women students. The group lies at that end of the plot nearest the residence section.

The remaining court extends westerly from the central space, and is surrounded on its three closed sides by the buildings of the School of Applied Science and the School for Apprentices and Journeymen. These lie toward the valley and railroad fronting on Woodlawn avenue. The power house is located on the lower level between the railroad and the shop schools.

The buildings are treated with a simple yet effective use of brick and terra cotta. They are so designed and massed as to be beautiful, while expressing, each in its own way, the purpose for which it is intended. The architect has been very successful in securing to the highest degree practical efficiency in his plant without sacrifice of that character which is usually called the artistic.

A Large Warehouse.

The new building now in course of erection on the block bounded by Washington, Morgan, Warren and Bay streets, Jersey City, N. J., covers a ground area of 200 x 400 feet, and the total floor area will be 520,000 square feet. This, it is said, will be greater than any wholesale building in New York City, and second only in the United States to the Chicago premises of the firm, Butler Brothers, for which the new structure is being erected. The building is eight stories and basement in hight, the material used in the walls being a light red brick with banded courses of dark purple brick worked out at each window line. There will be iron frame automatic wire glass windows; automatic closing doors and automatic sprinklers throughout. The building will be divided into three parts by two fire proof vestibule sections, which contain all elevators, toilet rooms, ventilating shafts, &c. There will be ten elevators of large capacity.

The floors are water proof and built like the deck of a ship—that is, with a slight pitch from the center to the walls, along which are copper scuppers leading outside, so that in case a floor is flooded the water will readily run off without damaging the floors below. The top floor, where the offices will be located, has what is known as "saw tooth" skylights, giving an abundance of light with no direct sun and no shadow. The roof will be finished as a summer garden, which will be open to all employees during luncheon hours. Each employee will have an independent woven steel mesh sanitary locker, and there will be hot and cold water on every floor, with automatic electric pump circulating filtered water throughout the building. There will be a large and comfortable smoking room for the men and lounging room for the women employees, and large well-equipped dining rooms for all who desire to use them.

CORRESPONDENCE.

Convenient Floor Scraper and Burnisher.

From Frank G. Odell, *Lincoln, Neb.*—The sketches which I inclose will sufficiently describe a floor scraper designed by the writer for his own use, also a burnisher for sharpening floor and cabinet scrapers, which may interest many readers of the paper. The floor scraper is chiefly valuable because of the ease with which it is managed and the rapidity and efficiency with which it will do its work when properly sharpened. The fact that it is pulled toward the operator makes it easy of manipulation, and its construction enables one to get a clean shaving close up to a base board or in a corner where the ordinary commercial floor scraper is utterly useless. When fitted with a cutter of good steel and in proper condition this scraper, Fig. 1, in the hands of a good workman who is not afraid to "get a move on him," will clean flooring as it runs from the mill faster and better than two equally good men will with any other tools the writer has ever seen used. This assertion is made as the result of actual tests within the past year, and as a result many of our mechanics are now using this simple device. The handle of the scraper may be made of any good hard wood, and the cutter is secured by a simple

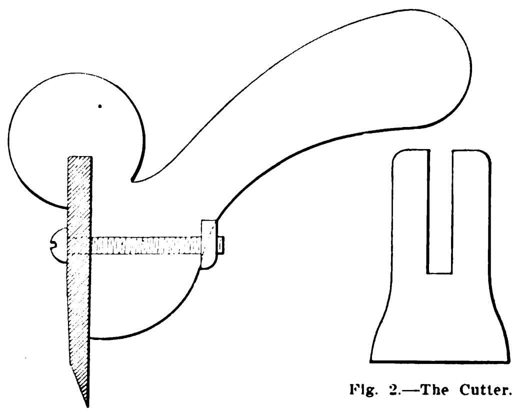


Fig. 2.—The Cutter.

Fig. 1.—Floor Scraper, One-third Full Size.

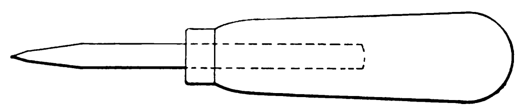


Fig. 3.—General View of Burnisher, One-half Full Size.

Convenient Floor Scraper and Burnisher.

round head stove bolt. A piece of heavy saw blade or cabinet scraper may be used, though a heavier piece of steel will work steadier and give better results. A discarded plane bit makes an excellent cutter if not too hard. Any good blacksmith or handy mechanic can forge a pair of cutters similar to the one shown in the illustration Fig. 2 at small expense. It is better to have two or more cutters ready so as to save frequent sharpening. Other hollow and round cutters may be made of any desired pattern for cleaning hard wood, molding, finish, &c.

The burnisher shown in Fig. 3 is made from a common nail punch, ground to a blunt point and mounted in a turned handle. The hard steel in the ordinary round cut point nail punch makes the best possible burnisher, and the point is not only useful for pointing up the edge of a scraper, but answers equally well for a screw awl, scratch awl, and other like uses. So far as known, these two types of tools are original with the writer, but are not made commercially, and any reader of *Carpentry and Building* is at liberty to make them for himself.

Comments on Saw Filing.

From S. F. B., *Wellington Ohio.*—I would say to "M. A. R." of Seville, Ohio, that I began filing saws 35 years ago, and I hold the point of the file toward the point of the saw. I carry the file handle below the teeth and well back toward the saw handle. This gives a wide sharp bevel to the cutting edge of the tooth, and leaves it nearly square on the back. A tooth filed in this way cuts going down, but comes back easy. I never drag a file back, but lift it clear of the teeth. Now for the rip saw: I file a rip saw square across, and give just set enough so it will not bind. The more hook I can get to a rip saw the better; then the point of the tooth strikes first and square across the grain just the same as a chisel in digging a mortise. I have been very busy this summer, but have plenty of time to write now, for I am lying around with one foot on the table trying to ease the pain from two broken and two bruised toes.

Moral.—Get insured, boys, and when the boss cuts you out the insurance man begins—not full pay, perhaps, but it eases the mind.

What Is a Two-Story House?

From C. L. B., *Yorktown, Texas.*—If the editor will kindly allow me the space I would like to ask a question and have the readers discuss it freely in the columns of the Correspondence department. What is a two-story house, also a one and three-quarter story and a one and one-half story? Is a building with 16-foot walls and two floors under one roof classed as a two-story house? Is a building with 10-foot walls and an attic designated as a one and one-half story house? What hight of wall constitutes a "story?" Is there any standard?

Strength of School Room Floors.

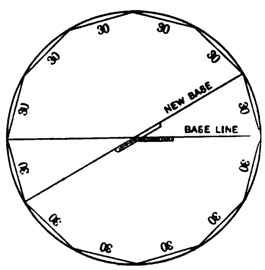
From C. J. C., *Troy, Pa.*—I am not given to writing for the papers, but I feel like doing a little talking about the school rooms shown by "C. A. D." in the August paper. I have been building for 25 years, and while I have used some belly rods I have done it under protest, because a joist or girder is always in two states—the top is in a state of compression, and the bottom is in a state of tension. Any rod put under the said timber to strengthen it, or, in other words, to reduce the tension, and having for its draw heads or base of action the ends of said joist, must increase the compression at the top of the timber, and unless a camber or crown is placed in the center of the timber the rod instead of supporting the load only tends to deflect the center of the timber, and is worse than useless as a support to it. When the joist or beam to be supported comes in a position so that the belly rod can be carried back to a pin or some other anchorage independent of the timber then we can strengthen the beam to the amount of the breaking strain of the rod or the parting strength of the anchor. When so employed, however, a rod virtually ceases to be a belly rod and becomes the same factor as the main cable in a suspension bridge.

I would suggest that the joist construction of the room 26 x 30 feet can be made perfectly safe by using two of what I call knife handle girders, 26 feet long, and then using three strings of 10-foot joist. The increase in cost will be but slightly more than the one shown by "C. A. D." The girders should be constructed as follows: Take two pieces of 3 x 12 inch stuff 26 feet long and between them place a piece of steel ½ inch by 12 inches by 26 feet, and then bolt the whole thing together. A 2 x 4 inch scantling should be spiked on each side flush with the bottom on which the joist may rest. This completes the girder. I would then use 2 x 10 inch joist, and cross fur with 2 x 2 inch stuff for plastering, or if the room below will admit of it the iron plate may be omitted, and a 4-inch hollow steel column filled with concrete can be set on a pier in the cellar. This, I think, will fill the requirements so far as strength is concerned. Either of the constructions described is in my opinion better than any under rod construction.

I might say further in regard to belly rods that their efficiency is greatly increased (I think more than doubled) by attaching them to the lower edge of a stick of timber at the ends instead of at the top. I use a wrought plate made to hook into the end of the girder, and then bolt up through the stick, the rod and plate forming a hinge joint, bolted. I use a turnbuckle in the rod. This, of course, brings the rod in some kind of a cross tie below the girder.

Dividing a Circle by the Steel Square.

From JOHN L. SHAWVER, *Bellefontaine, Ohio.*—In the January number "Old Subscriber" of Rochester asks for a rule by which a circle may be divided into any number of equal parts, using the steel square. Divide 360 by the number of equal parts desired, which will give the angle in degrees. Take this angle on the bevel square, as noted in connection with my comments on making a five-pointed star with the steel square, and from any diameter



Dividing a Circle by the Steel Square.

as the base line secure a new base, using this from which to secure a second, and so continue to secure new ones until the circumference is completed. For example, suppose we have a circle 12 inches in diameter, on which we desire to describe a 12-sided polygon. First divide 360 by 12, which gives us 30 degrees as the distance between points. Setting the bevel square at 30 degrees, by aid of the protractor, we proceed as indicated in the accompanying diagram. If the circumference be very large one may first make a small drawing, the diameter of which is a factor of the diameter of the given circumference, and remembering that dimensions of similar figures are in proportion, the sides may be secured by the rule of three.

Geometry and carpentry are closely related, and every young carpenter or apprentice should take a few lessons in geometry if he has not previously done so, for it will be of incalculable value to him in many ways.

Design Wanted for Round Dairy Barn.

From O. G. C., *Oklahoma.*—Will some of the numerous readers of the paper send for publication plans for a round dairy barn to accommodate 100 cows? There must be ample passageways, a driveway, granary, root cellar, milk room, testing room, office and a man's room. The ground floor is to be concrete, with gutter, stanchions, mangers, &c. The second floor is to be used as a hay loft. I would like to have those furnishing plans for publication send bills of material. I am quite sure that something of this nature will prove equally interesting to a large number of readers of the paper located in the Central and far Western sections of the country.

What Is a Philadelphia Gutter?

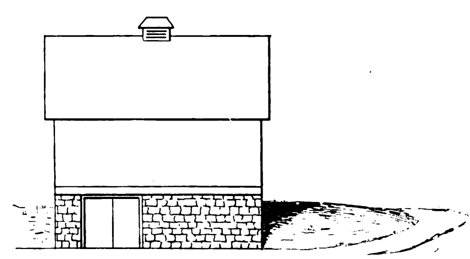
From J. T. H., *Washington, D. C.*—In answer to "J. J. D.'s" inquiry as to what is a Philadelphia gutter, I would like to say that I have frequently heard gutters specified and seen specifications written, "Put the gutter in Philadelphia style." This means that where the straight creases of the standing seam roof, having a good pitch, connect with the cornice or gutter, instead of being connected with a flat seam and soldered, they are connected to it by means of a standing seam, which is flattened down midway between the two standing seams in the end creases, so as to allow the water to flow freely into the gutter at the center of each course. Of course, this standing seam must be at a hight which will not allow the water to flow over at the edge of the gutter or cornice before it can take it into this standing seam. What is the reason that the architect did not tell "J. J. D." of what a Philadelphia gutter consisted, since he specified it?

Floor for a Second-Story Piazza.

From C. A. WAGNER, *Port Jervis, N. Y.*—In answer to the inquiry of "A. M. F.," New York City, which appeared in the September issue of the paper, I would state that I built some two years ago a piazza of the kind to which he refers, and a brief description of which may not be without interest to the readers of the paper: The piazza was 11 feet 4 inches wide by 26 feet in length, and had a fall of 1 inch to every 4-foot run. In the first place, I secured the very best of white pine flooring 1⅛ inches thick with 2-inch face, and placed it out in the sun an entire day for the purpose of airing it. I took good care of it that night, and the next day I repeated the operation, and began to use the flooring about 9.30 in the morning. When I laid it I treated it to a coat of good paint made of Jewett's white lead, and just thick enough so that it would spread with a flat 2-inch brush. I gave the grooved edge of the flooring a good coat of lead, and at the same time treated the tongued edge in the same way, while filling all the surfaces, nail holes included, proceeding in this manner until the entire floor was laid. I would state that all flooring laid should be painted the same day or before any dew or moisture has an opportunity of falling upon it. I gave the whole floor three coats of paint when completed. The correspondent will find this a good A1 job, but he must follow out instructions, even though he may find it a rather slow and tedious operation. In order, however, to have the job give satisfaction, he must not be content to give "a lick and a promise," and say: "Well, that will answer," as I have seen and heard in connection with some jobs. I would advise no ceiling overhead, but the surface of the floor beams. The latter can be chamfered if he so desires.

Plans Wanted for Two-Story Barn.

From W. E. M., *Fairmont, W. Va.*—I would like to see published the plan of a barn 25 feet square and two stories in hight, with about 5 feet of one side underground and the main entrancce as shown in the sketch. I want provision for two box stalls and the other half



Plan Wanted for Two-Story Barn.

for wagons and buggies. The barn will be located between two streets.

Shingling Around a Chimney.

From G. H. B., *Eliot, Maine.*—In the article from "J. E. R." in regard to "Shingling Around a Chimney" I can say that I do not like his way of doing the work at the lower side marked B on his drawing. I should put the tin outside the shingles. If he puts a course on top there is nothing to prevent water following the nails through and leaking. In this section we never use tin—always lead or copper—and we always leave the hole for the chimney, the mason putting in the lead before we shingle, which, we think, is the best way, as it can then be made perfectly tight.

Further Comments on Day's Work for a Carpenter.

From MORRIS LUNGER, *Newark, N. J.*—If the editor will be so kind as to allow me half as much space as was allowed L. Jerome Aimar in the October issue, I shall be very thankful, for I think the comments on what constitutes a day's work for a carpenter deserve a reply. The correspondent admits that times and conditions have changed, also methods, but does he expect the man, the carpenter, to stand still while the world goes on and passes him by; has no carpenter the right to enjoy better conditions than he did years ago? When I say better conditions I mean that I will take $4 per day and eight hours' work for mine, against his old-time $10 per week and sunrise to sunset. Again he says, "let us go back a generation." Note what they did a generation ago and ask yourself if you would wish to do the same. For myself I answer, No. Has any reader of this paper ever known of men going on strike because the sun went down, whether it was the last nail or the first? I would like very much to know how high was the staging from the ground from which the men used to throw the hatchets and jump. I think a very important item has been omitted. It was very nice to jump in and help Jack out when he spoiled the door, but I have done tricks of that kind, and within two years ago.

As for "Charlie"—well, Charlie must be a star to tie up a job because he quits, and the foreman must be a good one to let any one or half a dozen men tie him up as our friend has stated may be the case. That foreman would not last long around these parts. I might continue along this line and pick our good friend's letter to pieces, but no, let it rest here, as the old saying is "enough is enough, but too much is a hogs' nest."

What has made the men of the present time independent and indifferent? Do not the readers think the boss is somewhat to blame? I do, because I have been there; I have driven the business from both ends. How often does the boss meet the architect and be told by the latter that he is a little too high on certain plans. "Is that so," says the boss; "I should like to have that job." "Well," says the architect, "how much can you come down? John Jones bid so much, and if you can come a little under his figures the job is yours." The contractor turns the matter over in his mind and thinks to himself, "Well, if I do take it at that price I will drive that bunch of carpenters for all they are worth. Yes, I will do it for the price." Jim, the foreman, poor fellow, starts the job on Monday—the boss wants the first payment on Tuesday, and keeps telling Jim that he is losing money on the job, that he only took it in order to keep the men busy, and every time he comes on the job he jumps on Jim to rush and drive that bunch through (why don't he do it himself). Poor Jim, I know how much he likes it, because I have been there, and I am there at present, but thank goodness the conditions are far better than in connection with any of my former jobs. Our good friend "L." asks the question, "Is he right?" Well, he may be, but—.

I take it for granted that "L." is a contractor and trust that he will not be offended when I say I have no doubt he is just a little mixed. I also trust he will not be offended at the way in which I have criticized, as in his letter he called for remarks on the part of the readers. In the latter part of his letter he gives the union a rap (from a boss, of course), and tells of the jack legs and men not worth their wages. Now, before the union came the contractor paid any old price. If one man received $3 per day and some one came along for $2.50, he got the $3 man's job, and when it was required to work overtime the men got nothing for it. The statement is made, "Next came the demand for shorter hours *ad libitum*," or at pleasure—but no! only at such times as trade conditions would permit of the demand, and success did crown the efforts *deo gratias*.

Now a few words more to the young men and I am done. Strive to be good mechanics; do your work well and do it but once; take an interest in your work; keep your eyes open; don't be afraid to ask questions, and do not bother figuring out how big the tool chest should be to require three or four men to carry it, or see how many doors you can fit or spoil in a day; above all things, do not carry a black bottle with you at work (with apology to "L." and his black bottle); and do not carry arms in times of peace.

I trust the correspondent will pardon me if I have given offense, for I hope the few lines I have written will be taken in the same kindly spirit as I have taken his. *Volenti non fit injuria.*

From G. H. B., *Eliot, Maine.*—I think the article in the October issue of *Carpentry and Building* from L. Jerome Aimar calls for some comment, and as I am a reader of the paper I take the liberty to present a few remarks. He writes of what consists of a day's work for a man, and says "Is it any wonder " when we tell a fellow like this that we have carried on the roof of a barn from 25 to 30 bunches of shingles, 250 to the bunch, perched ourselves down beside them and nailed them on the roof one at a time. I say is it any wonder he thinks we are giving him ghost stories? He does not say he nailed them on in ten hours, but by the way he writes he evidently wants the readers to think so. I hardly believe, however, he will convince us that such is the case, at least any one of us who knows anything about the work. I know one at least who will be found skeptical, as I have laid too many shingles and have laid them with too many men, and smart ones at that. I have been on a job at 7 in the morning and worked until 6 at night, and will say for the benefit of the young carpenters who may have read the article referred to that the chances are against their ever getting so that they can lay ten bunches in a day. If they do, and I am talking of new solid work—no hips or valleys—they can go from their job satisfied that they have done a good day's work, even if they have not attended strictly to business from 7 in the morning until 6 at night. They will also find that by far the larger number of the men with whom they work won't lay more than eight and some even less, if they do their work as well as it should be done. It has been my experience that when a man is found who has ever done such a big day's work, he always did it in his younger days. I have never found one who ever knew any who did it, although I have been with many who have known of such a man and worked with him, but all such things appeared to have passed from every mind but his own. I will say in regard to a day's work in this section (Maine, New Hampshire and parts of Massachusetts where I have worked) that 2000, or eight bunches, were considered a good day's work of nine hours, although some, however, could lay more, but I have found they were the exception, not the rule.

I would like to ask the readers if they have had trouble with shingle nails rusting off before the shingles were much worn. I have found a number of roofs with the nails rusted and the shingles blowing off after being laid three or four years, something we do not find with work done 25 years ago. I have taken off shingles that had been laid 25 years where the nails were good for 25 years more. Can any of the readers tell the cause of so much rust?

Finding Capacities of Tapering Tanks.

From G. A. W., *Vandegrift, Pa.*—Replying to "B. W." of Long Island, N. Y., I will give a rule for finding the capacities of tapering tanks which I trust will be of interest to him. Reduce all dimensions to inches and find the volume in cubic inches; divide this by 231, the number of cubic inches in 1 gallon. The rule for finding the volume is as follows: Add together the areas of the upper and lower ends—that is, the top and bottom of the tank—and the square root of the product of the two areas; multiply this sum by one-third the altitude.

Making Division Wall Sound Proof.

From H. S., *Indianapolis, Ind.*—I have just had built a double house, using a double row of studding for the division between the two portions of the building. The tenants moved into one side of the house on the 14th and into the other side on the 20th, but already I have had complaints that the division wall is not "dead"; that is, one tenant claims that conversation can be easily heard on the other side of the wall. The contractor assured me that the double row of studding arrangement would prevent sound passing through, but such appears not to be the case. I am now planning another double house, and would like some of the practical readers to tell me the best method of deadening a wall without building it of brick.

Comments on Various Topics by An Interested Reader.

From C. B. L., *Yorktown, Texas.*—It is some time since I sent anything for publication in *Carpentry and Building*, and now that I have the opportunity I will tell the editor how well pleased I am with the paper. I like to see it maintain the high standard of excellence which it has done for so many years and which ranks it among the best published. I certainly enjoy reading the letters from the various correspondents of the paper asking for or giving information on different subjects, together with the criticisms wnich are steadily forthcoming. If the editor will kindly allow a western Texan a little space I will offer a few comments. The article submitted by L. Jerome Aimar in the October issue, on "What Constitutes a Day's Work for the Average Carpenter?" is, in my estimation, O. K., and I would like to hear more from conservative old time chips, each speaking from his own standpoint and as he has been taught by long experience; then we can come to a verdict more easily.

"Are Mill Men Getting Careless?" Well, the "Wandering Wood Butcher's" idea is all right, as he outlines it in the September number, but it seems to me that some of the correspondents began kicking before they were spurred. The agitation of this subject should be kept up and thoroughly discussed until we can find some way to influence careless saw mills so that they will turn out better work for us.

"Blue Hand Saw" and "Apprentice Carpenter," in the August and November issues respectively, are certainly all right and ought to have come out and made their speeches sooner. I don't want to repeat what they already said, but think it is perfectly proper for good mechanics to post one another in regard to good tools. There are very few small town hardware dealers who keep good tools in stock but the "keen cutter blue brand," and not all good workmen can live in large cities where good tools are to be had. It is not too much to say that many carpenters do not know where to get a good tool or how to call for it. If I may be permitted I would add to the list of good tools sucn names as Fale's patent plane, Buck Brothers' chisels, Russell Jennings' auger bits, Germantown hammers, &c. Let us hear from some of the other readers, for there is now plenty of time to write letters to the editor, as the evenings are lengthening and we can employ the time to good advantage.

Porch Floor Construction.

From S. F. B., *Wellington, Ohio.*—My attention has recently been drawn to certain porch floors, and I desire to lay the matter before the readers with a view to obtaining an expression of opinion regarding the construction described. The floors are about 18 inches from the ground, and the walls are laid perfectly tight. Some of the timbers are hemlock, and my experience teaches that hemlock is short lived in damp, dark places. If I was doing the work I would have plenty of light and air. What say the readers?

Solutions of Problem in Roof Framing.

From W. H. H., *Saranac Lake, N. Y.*—In answer to the inquiry of "A. S. W.," Shawnee, W. Va., which appeared in the October issue of *Carpentry and Building* I send a sketch, Fig. 1, showing a roof plan, which may be of interest to him. The hips may be changed to the dotted lines at the octagon corners, as shown in the sketch, if desired. If the idea indicated by the drawing is carried out I believe it will make a very pretty roof.

From W. L. R., *Mt. Carmel, Ill.*—I have been a reader of *Carpentry and Building* for many years and have always been well pleased with it. I take an interest in all that appears in the columns and avail myself of this opportunity to reply to the inquiry of "A. S. W." which appeared in a recent number of the paper. If I were to frame this roof I would first put up four hip rafters and cut the common rafters to them. The hips indicated by the dotted lines in the plan Fig. 2 should be 2 x 8 at least. I might mention in this connection that I always use a template in laying off jack rafters. The plan which I send is to a scale of 1-16 inch to the foot and the rafters have a 12-inch run to a 12-inch rise.

While I am on the subject I wish to say a few words about "rafters." One can see from a glance at the plan that the highest point is 13 feet. Multiply 13 by 17 and dividing by 12 will give the run of the hip rafters—in this case 18 feet 5 inches—which is also the length of the longest common rafter if it goes to the crown. Multiply 18 feet 5 inches by 17 and divide by 12, which gives 26 feet 1 inch as the length of the hip rafters. In order to obtain the length of the common rafters multiply the run 8 feet by 17 and divide by 12, which gives 11 feet 4 inches. Next, to obtain the length of the jacks, deduct twice 17 inches (the rafters being 2 feet on centers), which is 2 feet 10 inches from the common rafter. From each succeeding jack deduct or add for the next shorter one 5 feet 8 inches in order to obtain the length of the combination jacks. This will give the length of all the rafters without a drawing or a square. Always deduct for hip and valley rafters and ridge boards.

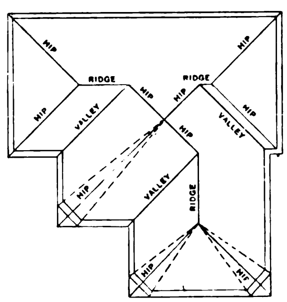


Fig. 1.—Diagram Submitted by "W. H. H."

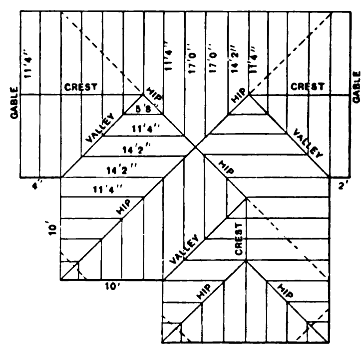


Fig. 2.—Method Suggested by "W. L. R."

Solutions of Problem in Roof Framing.

Should Roofing Tin Be Painted on the Underside?

From S. F. B., *Wellington, Ohio.*—I would like to ask the readers of the paper for an expression of opinion regarding the following matter: I lately noticed three large porches, the roofs of which were covered with tin painted on the underside and laid on tarred paper. I claim that the acid and gas from the paper will eat out the tin and render it of short life.

WHAT BUILDERS ARE DOING.

REPORTS from leading centers of the country indicate a considerable degree of activity in the building line, the volume of business making a very favorable comparison with the corresponding period of last year. In fact, the reports since our last issue show very few sections where the amount of building in progress is less than it was at this season in 1903. Of course where strikes have been in progress it is natural to expect a falling off in operations, but taking the country over the showing is most gratifying and strikingly indicates the impetus which has been given to this branch of industry.

At the present time there is perhaps less disturbance in the labor world than for some time past, although here and there men are out on strike, but not to an extent sufficient to seriously hamper building operations. The feeling with regard to the future is hopeful and it is expected that with the opening of spring there will be a marked revival, more especially in those sections where labor disturbances have tended to hold back more or less work.

Chicago, Ill.

The expansion in building operations noted for some time past continues on a constantly increasing scale, and the year is likely to be notable in the amount of new structures, alterations and repairs which have been completed. Figures covering operations for the month of October make a better showing than for any corresponding month in the past 12 years, but it is quite natural to expect that in the two years prior to the opening of the World's Columbian Exposition there would have been more than the usual activity in the building line, and it is here that the record exceeds that of the month under review. For October of the current year permits were issued in the city of Chicago for the construction of 707 building, having a frontage of 21,395 feet and estimated to cost $4,703,550, while in October of last year permits were issued for 568 buildings, having frontage of 21,030 feet and involving an estimated outlay of $3,840,170. If the rate of increase continues until the close of the year the figures will make a most favorable comparison with any recent 12 months. It is, of course, possible that more or less of this work in the way of new buildings is a reflection of the long period of inactivity growing out of the protracted strikes which occurred a few years ago. It might be interesting to state in this connection that the greatest amount of new work projected during October was in that section known as the "South Side," where 263 building were commenced, having a frontage of 9340 feet and estimated to cost $2,436,200.

The Chicago Architects' Business Association has recently elected the following officers for the ensuing year: President, William W. Clay; first vice-president, Fred. Ahlschlager; second vice-president, J. T. Fortin; treasurer, S. A. Treat; secretary, Charles R. Adams.

The Illinois Chapter of the American Institute of Architects gave its annual Thanksgiving dinner in the Artists' Club room in the Art Institute on the evening of November 14, prominent among the guests being officers of the Art Institute, the Municipal Art League, the Chicago Society of Artists and the Chicago Architects' Business Association.

Cleveland, Ohio.

The city has been the scene of unusual activity in the building line during the past season, and at present the volume of operations is of liberal proportions. In fact, the amount of work projected during the month of October was largely in excess of that for the same month last year, the increase being in the neighborhood of 100 per cent. According to the figures of the office of Building Inspector Dooley there were 430 permits issued for the erection of building improvements estimated to cost $811,820, while in October last year there were 329 permits issued for the erection of new buildings, repairs, alterations, &c., estimated to cost $422,225.

From January 1 to November 1 of the current year there were 3352 permits issued for building improvements, estimated to cost $5,841,955, as against 2896 permits for building enterprises, involving an estimated outlay of $5,788,651, for the corresponding period of 1903.

Real estate men and builders are looking for great activity next spring, which, it is expected, will exceed anything in the past few years. With the rapidly increasing growth in the city's population dwelling houses and apartment houses are going up in all sections. Hundreds of people are building their homes, and this building is general, not only in Cleveland, but in all the outlying places, such as Glenville, Collinwood and Lakewood.

Secretary Roberts of the Builders' Exchange is sending out a folder giving some of the leading points taken from the annual report of the Board of Directors, and which are of more than ordinary interest. Among the statements is one with regard to the growth of the exchange in the last four years, the figures showing that in November, 1898, the membership was 149, and in November of the present year it was 350. The annual address of President William H. Hunt, on "The Possibilities of Cleveland in the Development of Municipal Art," delivered before the exchange on Monday evening, November 14, has been issued in pamphlet form and is being distributed among those likely to be interested.

Houston, Texas.

The contractors, material supply dealers and others closely associated with the building trades have recently held several meetings with a view to forming a Builders' Exchange, and on October 18 they formally organized with the following officers for the ensuing year: President, W. W. Willson; vice-president, C. C. Wenzel; treasurer, E. Y. Hartwell, and secretary, F. F. Arnim.

Kansas City, Mo.

The volume of building operations continues to show a marked improvement over corresponding periods of last year, and the record for the month of October is no exception in this respect. According to the figures issued from the office of Superintendent of Buildings S. E. Edwards there were 445 permits issued for building improvements having a frontage of 6436 feet and estimated to cost $1,036,430, which is an increase over October of last year of 64 in the number of permits issued, 2333 in the number of feet frontage and $248,290 in the value of the improvements projected.

The number of frame buildings for which permits were issued during October of the current year was 183, estimated to cost $383,050, while for brick buildings 51 permits were issued, calling for an expenditure of $565,300. The total for October is considerably in excess of the corresponding month in any recent year.

Lincoln, Neb.

Business conditions continue prosperous in the building trades and the total volume of operations for the year in the city and suburbs will aggregate not less than $1,000,000, fully 60 per cent. of which is residence building. All the leading builders are contracted ahead for the entire winter, which assures plenty of work during the cold weather and a probable renewal of the existing trade agreements for next year.

The most harmonious relations continue to obtain between the master builders and the trades, and there is no reason to look for any friction in the future. The present *régime* is largely "open shop," and it is possible that the question of "open *vs.* closed shop" will enter largely into the renewal of trade agreements this winter. Some of the leading builders have become converts to the closed shop idea, because of the unfair competition of a sporadic character caused by the influx of outside contractors who come into the city for the season, camping in tents, bringing in their workmen and working long hours at a low wage, and interfering directly with home contractors and journeymen alike. It is contended by the unions that the closed shop would enable the contractors' organization to successfully handle this difficulty, and the seriousness of the evil may induce the trial of the remedy prescribed by the unions.

The city of Lincoln has recently let contracts, aggregating $61,000, for the installation of a municipal electric lighting plant, which is expected to be in operation by September 1 next, and the prospect of substantial appropriations from the incoming Legislature for State buildings makes our local contractors feel hopeful for the coming year. While building conditions continue good, there is no demand for mechanics, the local supply being sufficient for all purposes, and transients are advised to stay away from Lincoln.

Los Angeles, Cal.

The total volume of building undertaken during the month of October was in excess of $1,100,000. This is considered a very good showing, especially for a season when there is usually a slight reaction in building activity. The demand for new residences is brisk and a large number are now in course of operation. The most notable buildings undertaken during the past month were one eight-story brick structure, to be erected at an estimated cost of $250,000, and a four-story brick building to cost $60,000. Arrangements have now been made for an early beginning on the new Los Angeles federal building, which will involve an outlay of approximately $1,000,000.

New York City.

There is very little in the local business situation to call for comment. Matters are moving along in about the same quiet manner as heretofore, with an occasional ripple on the surface caused by slight disaffection here and there of some branch of labor. The amount of work projected from week to week continues to show a shrinkage in the Borough of Manhattan as compared with last year, but this is more than offset by the greatly increased activity above the Harlem River in the Borough of the Bronx. Since the first of the year the value of the building improvements in the Borough of Manhattan is placed at $64,900,000, as against $67,220,000 in the same period last year, while in the Borough of the Bronx the value of building operations is estimated at $19,-127,000, as against, in round numbers, $6,000,000, in the same time in 1903. The value of the alterations and repairs in the two boroughs was practically the same in both years.

In the Borough of Brooklyn the record is very decidedly in advance of the same time last year. Up to the middle of November permits were issued for 4892 buildings, estimated to cost $33,231,175, while in the same period of 1903 there were permits issued for 3419 buildings, to cost $20,943,192. So long as present conditions obtain in the labor world there is not much hope of any decided increase in building activity, but it is expected that the coming spring will witness a revival all along the line and that some effort will be made to compensate for the protracted lull, which has resulted in a dearth, so to speak, of flat houses and apartments.

Oakland, Cal.

During the month of October the total amount of the building contracts filed in Oakland and adjacent towns amounted to $367,137. Of this amount $285,458 was for frame construction, $74,741 for brick construction and $6938 for alterations. The principal contracts let during the month were the two for the State University in Berkeley, one being for $40,876 and one for $20,600. During the entire summer building in Oakland, Berkeley and Alameda has been very actice, there having been 1571 new residences, flats and cottages constructed in Oakland alone.

Philadelphia, Pa.

An appreciable increase in building operations has been noticeable during the month of October, this being due in large measure to the number of two and three story dwellings which are being put up in considerable numbers in the suburban districts of the city. As compared with a year ago the volume of business has been somewhat larger, both as regards the number of permits issued and the value of the improvements projected. According to the report of the Bureau of Building Inspection for the month of October there were 869 permits issued, covering 1390 operations, estimated to cost $2,143,785, while for the same month last year there were 712 permits issued, covering 1063 operations and involving an estimated outlay of $1,843,605. Out of the total of a trifle over $2,000,000, a little more than $1,200,000 is accounted for by 600 operations covering two and three story dwellings. Alterations and additions called for practically $300,000; manufactories, $157,000, and stable and carriage houses, $65,000. The greatest activity was in the Twenty-second, Thirty-fourth and Thirty-sixth wards.

San Francisco, Cal.

During October 414 permits for building operations were issued from the City Architect's office, the improvements aggregating $1,721,166 in value. The permits in question provide for 161 new buildings, of a total value of $1,593,066, and 47 cases of alterations, the estimated cost of which will be $90,640. Under free permits, of which 206 were issued during the month, work is to be done aggregating in cost $37,460. The month showed a slight decrease in the volume of building contracts entered into when compared with previous months of this year, but when compared with former years the month of October, 1904 stands well to the front with a total of $1,398,524, classified as follows: Frame construction, $800,614; brick, $522,590; alterations, $75,-320.

The architects are less busy than at any time this year, although the new work is generally of a better class. The Columbus Savings and Loan Society will build a bank building on the northeast corner of Montgomery and Jackson streets, to cost $50,000, in accordance with plans by Meyer & O'Brien. It is expected that the transforming of the Bishop Block, on Market street, into the Monadnock office building will begin about December 15. E. W. Crellin has had plans made by E. J. Vogel for a six-story iron and brick building on the south side of Mission street, 100 feet east of Fourth street, on a lot 25 x 100 feet. It will be a business structure, and its entire front will be of glazed brick and plate glass. On the ground floor will be a store.

Seattle, Wash.

The number of permits issued in October numbered 680, with a total valuation of $371,935. During October, 1903, the total value of the building permits was $389,614, thus showing a slight falling off during October of this year; but this is more than offset by a substation for the municipal electric plant, to cost $23,000, which was begun during October, but for which no permit was taken out. Building throughout the city shows a natural falling off at the approach of winter, though on the whole builders do not anticipate a very quiet season. The architects report that more plans are now being drawn than was the case a year ago, and that the character of the work under contemplation is of a better grade.

Notes.

It is reported that at Ambler, Pa., the demand for houses is far beyond the supply, and that in other towns along the Northern Pennsylvania Railroad much the same conditions exist. It is thought that next spring and summer will see a decided revival in building operations all along the line.

Contractors and builders of Zanesville, Ind., are much pleased with building conditions in that place, as the amount of work already executed and in progress is in excess of that of any corresponding period for some time past. Not only are the number of contracts of last year exceeded, but the quality and style of the buildings excel those of the past.

Lansdale, Pa., is at present enjoying something of a building boom, there being a large number of houses under way and in contemplation. During the past three or four years comparatively little has been done, owing to the high prices of materials, and the present activity is most welcome to members of all branches of the building trade.

Lancaster, Pa., is the scene of a considerable degree of activity in the building line this season, and mechanics in all branches are reported to have plenty to do. In the Seventh Ward alone 40 dwelling houses are being erected, these being intended largely for the homes of workingmen. Several large business buildings are in course of construction and the outlook is most encouraging.

What might almost be termed a boom in building is at present in progress in Uniontown, Pa., where buildings now in course of erection or just completed represent an outlay of something like $1,000,000. Improvements in progress are of a varied character and include business structures, private residences, school houses, hotels, a Salvation Army building, railroad station and a new building for the Standard Wood Fiber Plaster Company.

During the month of September there were issued from the office of the Inspector of Buildings in Washington, D. C., 339 permits for building improvements to cost $489,190. The permits covered 47 brick dwellings, costing $288,700, and 29 frame dwellings, costing a trifle over $32,000. In addition there were among others two apartment houses, three brick and one frame church, three warehouses, two office buildings and two stores.

According to the report of the Department of Public Safety of the city of Rochester, N. Y., there were issued during the month of September permits calling for building improvements estimated to cost $183,296, as compared with $179,223 in September of last year. The total for the nine months shows the building improvements to have involved an estimated outlay of $2,791,855, while in the nine months of last year the value was placed at $1,458,128, thus showing an increase in favor of the present year of $1,333,727.

In the opinion of builders in Waltham, Mass., there has been no year since the panic of 1893 when there has been such a boom in building operations as has been evidenced since the beginning of 1904. Much of the activity is due to the opening of several large estates within easy access of the business section. The aggregate cost of the dwellings in progress or completed is said to be in the neighborhood of $150,000. The Waltham Hospital Ward for contagious diseases, now in the course of erection, will cost about $25,000, and projected buildings, for which land has yet to be broken, will add at least $50,000 more.

According to the figures of Building Inspector Robert Wilson of Denver, Col., there were issued during the month of September 203 permits for building improvements costing $297,685, as against 173 permits for building improvements costing $369,790 in September of last year. Of the total for September of the current year 102 permits were for brick dwellings costing a trifle over $203,000, while 13 were for apartment houses, costing over $40,000; 1 was for a school house costing $20,000, and 12 were for frame dwellings costing about $6000.

THE master builders of Yorkshire, England, have recently initiated a movement to avoid strikes and lockouts, proposing that all disputes be submitted to a Board of Conciliation and Arbitration. Yorkshire bricklayers and masons largely favor the proposal, but the Yorkshire branches of the Amalgamated Society of Carpenters and Joiners have expressed their disapproval of the scheme by a majority of 1595, only 312 voting in its favor. The decision, however, is not regarded as final.

LAYING OUT CIRCULAR ARCHES IN CIRCULAR WALLS.*—XXII.

BY CHARLES H. FOX.

WE now come to the groined annular and radiant arch, the soffit of which is comprised of the surface of an annular and radiant arch, the intersections of the surfaces forming the curves of the groin. The reader who has closely followed the explanations already given relating to the radiant arch is now acquainted forms the soffit of the radiant arch constitutes a groin, the plan of which is given in O′ V B and J V I of Fig. 214. A portion of the two soffits is cut away, so to speak, as, for instance, O′ V J, which belongs to the annular arch, is cut away and in its place is substituted a portion of the radiant arch. In the radiant arch a por-

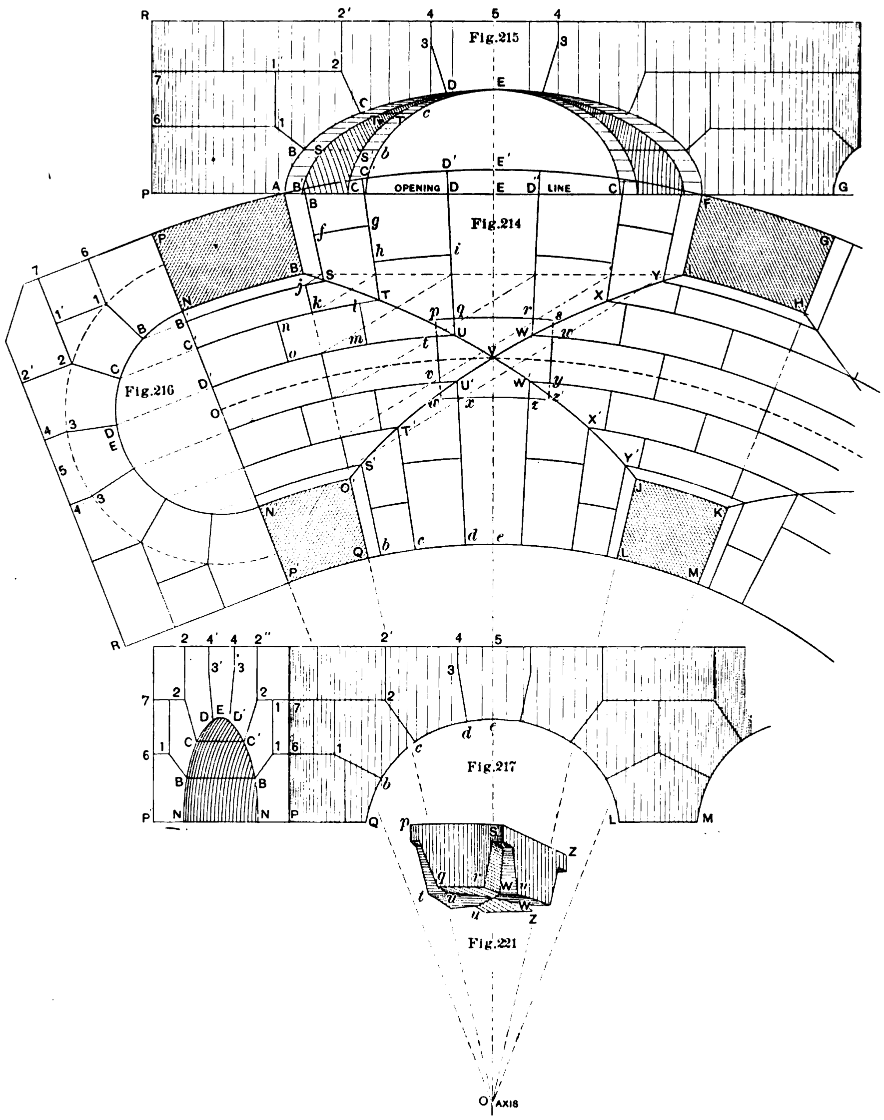


Fig. 214.—Plan of Groined Arch.
Fig. 215.—Orthographical Projection of Outer Cylindrical Face of Arch.
Fig. 216.—Showing Joint Lines of Annular Arch.
Fig. 217.—Orthographical Projection of Inner Cylindrical Face of Arch.
Fig. 221.—View of the Finished Keystone.

Laying Out Circular Arches in Circular Walls.

with the manner in which the soffit of the arch in question may be generated. We will, therefore, confine our remarks to an explanation of the manner of generating the soffit of the annular arch. In Fig. 216 let N N′ represent the diameter and O the center of a semicircle, N E N′, contained in a vertical plane passing through the vertical axis projected in O of Fig. 214. If now the semicircle be revolved around the vertical at O it will generate the soffit of the annular arch. The intersection of this surface with that of the conoidal surfacce which tion, O V B, is cut away and in its place a portion of the annular arch is substituted. The same remarks apply to the portions J V I of the annular and I V B of the radiant arches.

To find the plan of the curves of the groin let P A E F of Fig. 214 represent the outer and P′ Q *e* L the inside face curves of the wall. Let A F represent the opening at the outer face. Then A Q and L F represent, respectively, the elements which belong to the soffit of the radiant arch at the springing line, the elevation of which is given in P G of Fig. 215. The directing curve of the soffit is an ellipse, of which A F of Fig. 214 is the major and O E of Fig. 216 the semiminor axis. This understood, divide the semicircle of Fig. 216 into the same number of equal parts as there are arch stones in the annular arch—in this example seven. Draw the joint lines B 1, C 2, &c., as for the similar projections at a right arch. Now square with the diameter N N′, draw B B′, C C′, &c. Then, with O of Fig. 214 as center and O N, O B′, O C′, &c., as radius, draw the arcs N B, B′ S, C′ T, &c. Divide the opening line A F into parts proportional to the divisions N B′ C′, &c., of the diameter line of Fig. 216 and join these points with the plan center O. This gives the plans of the elements which belong to the soffit at the joints of the radiant arch and correspond to those projected in B′ S, C′ T, &c., of the annular arch. The elements projected in the points B, respectively of Figs. 215 and 216, intersect in the point S of Fig. 214. This is, therefore, one point through which the curve plan of the groin passes; T U and V are other points found in a similar manner, the point V being that of the highest point in the groin.

Joint surfaces in the radiant arch will, of course, be similar to the corresponding surfaces of the radiant arches heretofore shown. If plane surface joints are substituted instead of the winding surface ones the simplest method will be to make the surfaces normal to the center points of the right line elements, as that projected in B S, S′ *b*, C T′, T *c*, &c., of Fig. 214. The method by means of which the normals may be projected has been fully explained in preceding diagrams, therefore a repetition is unnecessary. The joint lines B 1, C 2, &c., of the annular arch, Fig. 216, in the revolution of the vertical plane around the axis O, Fig. 214, will describe zones of conical surfaces similar to the surface of the joints in a hemispherical dome, the vertices of which will be on the vertical axis through O when these joints produced intersect it. In the revolution of the vertical plane the vertical lines 1 1′, 2 2′, &c., of Fig. 216 will describe cylindrical surfaces, having the same vertical through O, Fig. 214, for their common axis, and the horizontal lines, as 1 6, 2 7, &c., will describe zones of circles, thus completing the bounding surfaces of the annular arch.

In Fig. 215 is shown an orthographical projection of the outer cylindrical face, together with the surfaces of the soffits of the annular and radiant arches and their intersection which form the groins. In Fig. 217 is shown a similar projection of the inner cylindrical face, together with the projection of the vertical plane of Fig. 216, which contains the direction of the annular arch. In Fig. 218 is shown a representation of the triple springer, the bottom joint section of which is given in F G H I of the plan. Figs. 219 and 220 are representations of groin stones, the plans of the soffit surfaces of which are given for Fig. 220 in *k j* S *f g t k* of Fig. 214 and for Fig. 219 in *l m* U *i h* T *l* of Fig. 214. In Fig. 221 is shown a representation of the finished keystone. In Fig. 222 is shown a stone of the annular arch, the plan to " Domes, Their Construction," &c., by the author of this plan.

All the horizontal lines of the surface bounding the groin stones are projected in their true dimensions at the plan. Having found the horizontal projections of all the lines bounding the groin stone considered, the true dimensions of all the surfaces by which it is bounded may be found from the projections of Fig. 216, together with the developments made as directed in preceding figures for the similar constructions, &c., of the radiant arch. From the explanations already given the reader will have no difficulty in setting out and cutting this form of arch. For a complete explanation of the methods by means of which the stones, &c., which belong to the annular arch may be formed we would refer our readers to " Domes, Their Construction," &c., by the author of this work.

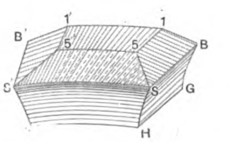
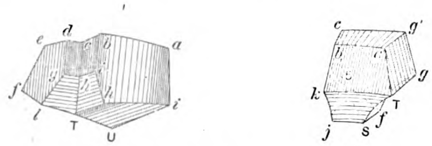


Fig. 218.—The Triple Springer.



Figs. 219 and 220.—Representing Groin Stones.

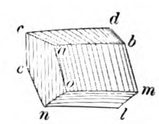


Fig. 222.—One of the Stones of the Annular Arch.

Laying Out Circular Arches in Circular Walls.

Metallic Window Frames.

The protection of the more seriously exposed window openings in the congested district of a city must be a part of any plan for the elimination or the lessening of the conflagration hazard. No building, however well constructed, can withstand or check a spreading fire unless its exposed windows are effectively protected. The Baltimore conflagration proved that beyond a doubt, says *Insurance Engineering*. As a barrier to flame, the ordinary glass window is absolutely of no value. It is readily cracked by heat or broken by flying objects, hose streams, &c. The ordinary wooden window frame and sash furnish just so much more fuel for a fire.

The danger of unprotected windows early attracted the attention of underwriters, who for years advised as a remedy shutters made like the regulation tin clad door. Thin sheet iron shutters have also been used. Shutters of the double battened, tin clad type are still recommended. Apparently the idea of getting rid of the combustible trim of windows was not thought of until the invention of wire glass. The adoption of wire glass as a substitute for fire shutters made a stronger window frame and sash necessary; moreover, to use wood or any other combustible trim would be absurd.

Thus came into prominence the subject of metallic window frames, without which wire glass would be valueless as a fire retardent. Metallic window frames combine lightness and strength, durability and rigidity. The use of metallic sash is not limited to windows in exterior walls. It is especially adapted to skylight construction, and must be used wherever wire glass is employed to retard fire. Partition walls for dividing up rooms of large area may be constructed in a manner similar to fire proof windows and will accomplish the same purpose.

Fire shutters of approved construction will effectually prevent the spread of fire if closed at the critical moment. If they are not closed or are neglected for any reason they are of no use. Fire shutters have their own range of usefulness, but there are locations where something more adapted to the purpose must be used. If a live ember or a burning brand falls on an ordinary wooden window sill the wood is almost sure to take fire. Intense heat radiated by fire in a burning building will ignite an ordinary wooden window frame. These facts are a strong recommendation for the metallic frame.

The practicable value of noncombustible window trim was promptly acknowledged by insurance men, and the National Board of Fire Underwriters went a step further by promulgating specifications for such work. In the matter of window protection each case must be carefully studied. Automatic devices, if reliable, are a better form of protection than nonautomatic ones, which must be operated by hand. Metallic window sash is made to close automatically by the fusing of a link of solder and metal. For all practical purposes such windows are always closed. Exposed windows on the upper floors of high buildings and windows on narrow alleys require special consideration.

New Publications.

The Up-to-Date Hardwood Finisher. By Fred T. Hodgson. 210 pages. 5½ by 8 inches. Illustrated by 117 engravings. Bound in board covers. Published by Frederick J. Drake & Co. Price $1, postpaid.

The use of nearly all kinds of hard woods in the finishing of houses has increased so rapidly within the last few years as to render this book of special interest and value to carpenters, cabinet makers and workers in wood generally. In his consideration of the subject the author has divided it into two parts, the first giving rules and methods for working hard woods, with more or less reference to the tools required, also how to use, sharpen and care for them, how to choose hard woods for various purposes and how to work and properly manage veneers. The proper use of glue is described and there are directions for preparing it, as well as for blind or secret nailing. Not the least interesting chapter in this part of the work is that which tells how to sharpen and use scrapers of various forms, the matter being illustrated by means of pictures showing how to properly handle the tools.

The second part of the work is given up to a description of the methods of filling, staining, varnishing, polishing, gilding, enameling and finishing all kinds of wood work. It also tells how to renovate old work and how to repolish, revarnish and finish woods generally. There is a short treatise on dyeing woods in various colors, for inlaying and marquetry work with rules for making stains, dyes, fillers and polishes of various kinds. The reader is also told about French polish, hard oil finish, rubbed and flat finish, together with the proper method of treating hard wood floors, waxing, polishing and the general finishing of hard wood in all conditions.

In presenting this work to the public the author points out that, while not as complete as it might be, it deals with the subject of wood finishing in a more extended and complete manner than any other work devoted to the subject with which he is familiar. His effort has been to obtain the best and latest information on the subject indicated by the title and to put it in such form that the regular everyday workman may understand what is intended to be conveyed. In running through its pages readers of *Carpentry and Building* will find some of the text and illustrations more or less familar, as in his preface the author states that he is indebted, among other journals, to *Carpentry and Building* for some of his material.

Stair Building Made Easy. By Fred T. Hodgson. Size, 5¼ by 7½ inches. 160 pages. Profusely illustrated. Bound in board covers. Published by the Industrial Publication Company. Price, $1, postpaid.

This is the third edition, revised and enlarged, of a work which was originally placed upon the market nearly 20 years ago. Some of the matter in the old edition has been discarded as being out of date, some portions have been rewritten and a number of new illustrations added. Since the first edition of the book was issued a number of others have appeared on stair building and hand railing, and the author states that as many of the readers may wish to pursue the subject further he has added in his preface a list of these books for their guidance.

The work under review consists of an extended description of the art of building the bodies, carriages and cases for all kinds of stairs and steps. Its object is to teach the beginner in the arts of carpentry and joinery, as well as some simple rules for the construction of the body of stairs, so that he may be able to undertake work of this kind with some degree of certainty that satisfactory results will follow his efforts. In order that the beginner may understand the meaning of a great many of the terms used in the construction of stairs and which are employed by professional stair builders the author has placed at the end of the book a complete glossary or explanation of the terms used in stair building. This is a feature which cannot fail to be appreciated not only by the beginner, but by some of the older ones in the trade as well. Illustrations are numerous and of a character to greatly assist the beginner to a proper understanding of the construction of stairs, while at the same time giving him a good idea of the appearance of the finished work. There are a number of pictures of staircases which will serve as good suggestions to the stair builder. Not the least valuable feature of the book is a chapter on estimating the cost of a staircase.

The Architects' Directory and Specification Index for 1904-1905. Size, 7¼ by 10¼ inches. 160 pages. Bound in red board covers. Published by William T. Comstock. Price, $2, postpaid.

This is the sixth edition of a directory which cannot fail to prove of interest and value to architects and builders generally. Several new features have been added since the last edition of the work, and great care has been taken to make the lists accurate in all respects. The work comprises a list of the architects in the United States and Canada classified by States and towns, indicating those who are members of the American Institute of Architects. There is also given the names of the officers and the locations of the different architectural associations in this country. Two new lists have been added to the directory, consisting of landscape architects and naval architects. There has also been added the new schedule of charges adopted by the American Institute of Architects. A feature which will be found very convenient is the giving of the names of the members under each firm. In addition to the lists indicated the work presents a specification index of prominent dealers and manufacturers of building materials and appliances, thus making the directory of great convenience as a work of reference. A noticeable feature of the present edition is the attractive covers in red, with the type matter in a white ink, thus producing a pleasing contrast and adding greatly to the attractive appearance of the book.

The Soho Public Baths at Pittsburgh.

Plans proposed for the Soho public baths have been received from a well-known London architect and submitted to the Public Baths Committee, Pittsburgh, Pa., and the work of considering the plans and raising the money with which to meet the appropriation of the city for the erection of the building will be taken up in earnest, and a vigorous campaign will be carried on this fall and winter. Before the committee held its final meeting, early in the summer, plans were submitted by several local architects, with further estimates to be presented at the first meeting this fall.

The plans which have just come from London call for a handsome structure on the site at 2414 Fifth avenue, and are modeled after similar institutions in Europe, whose best features have been incorporated into the new drawings. One of the most notable features is a circular swimming pool for men, surrounded by the baths, with a similar swimming pool and baths for the women.

In the specifications are included baths, both tub and shower, for men and women, rest and reading rooms, and in the rear portion of the building, which is below the level of Fifth avenue, a swimming pool to be fitted up, with dimensions not less than 35 x 75 feet. It is intended to make the swimming pool most complete in every respect and to have it filled with constantly running water. There will also be wash rooms and drying rooms, which will be placed at the service of the women of the Soho district at a nominal charge.

The site in Fifth avenue was purchased for $15,000, and adjoins that of St. Agnes' Roman Catholic Church. Between the two is an alley, four feet wide, which it is proposed to keep open for communication between Fifth avenue and Forbes street, thus affording easy access to the baths building from both thoroughfares. The city appropriated last spring $25,000, which the women of the Civic Club of Allegheny County and the permanent Civic Committee hope to treble, expecting to expend at least $75,000 in the erection of the building.

THE fire losses of the United States for the first nine months of 1904 were nearly double those of the corresponding periods of the previous two years, the approximate figures being $208,000,000 this year, as against $114,000,000, both in 1902 and 1903.

Hospital Heating and Ventilating Plant.

Among recent installations for heating and ventilating public buildings is that for the Worcester City Hospital at Worcester, Mass. The buildings, seven in number, are located a short distance from the center of the city at the top of a long hill, and are therefore exposed to severe weather in the winter. In the new ward building a slow speed Sturtevant fan located in the basement draws the fresh air from the top of the building, a distance of about 45 feet, through brick flues and into galvanized iron ducts to the tempering coil, where the chill is taken from the air. It is then forced through a heater containing coils of 1-inch steam pipes inclosed in a fire proof steel plate jacket. Thence it passes to the plenum chamber, which is divided horizontally into two chambers, one for the hot air and one for the tempered air, the latter passing underneath the heater from the fan. By means of mixing dampers, automatically controlled, the air is regulated to the desired temperature and is forced through the distributing ducts to the different rooms. To insure positive ventilation in the rooms, a Sturtevant electric propeller fan located in the basement exhausts the vitiated air through galvanized iron ducts connecting with registers in the floor and discharges it outside.

Mechanics of Fifty Years Ago.

Mechanics just out of their time 50 years ago were not regarded as skilled workmen to whom any job, no matter how difficult, could be given, says the *Engineering Magazine*, but they were fair, all round men, who could be sent out of the shop to erect or repair work with confidence. They could chip and file details to drawings, being particularly skillful with the file. It is needless to say that they were always in demand at the wages paid in the United States at that period, $1.25 to $1.75 per day of ten hours. Thus it will be seen that our grandfathers put in from five to six of their best years to obtain merely a working knowledge of the handicrafts they had adopted. All that was expected of them was to be able to read drawings and interpret their mandates in wood or metal. They were not asked to show diplomas or parchments with degrees attached before they could get jobs; indeed, it was rather against them than otherwise to be suspected of scholarly accomplishments. What they knew, they knew; a good mechanic in embryo was not metamorphosed into a poor scholar, with a smattering of science and a superficial knowledge of mechanics and machines, to get his living as best he could with such an inadequate kit.

The Mexican Mechanic.

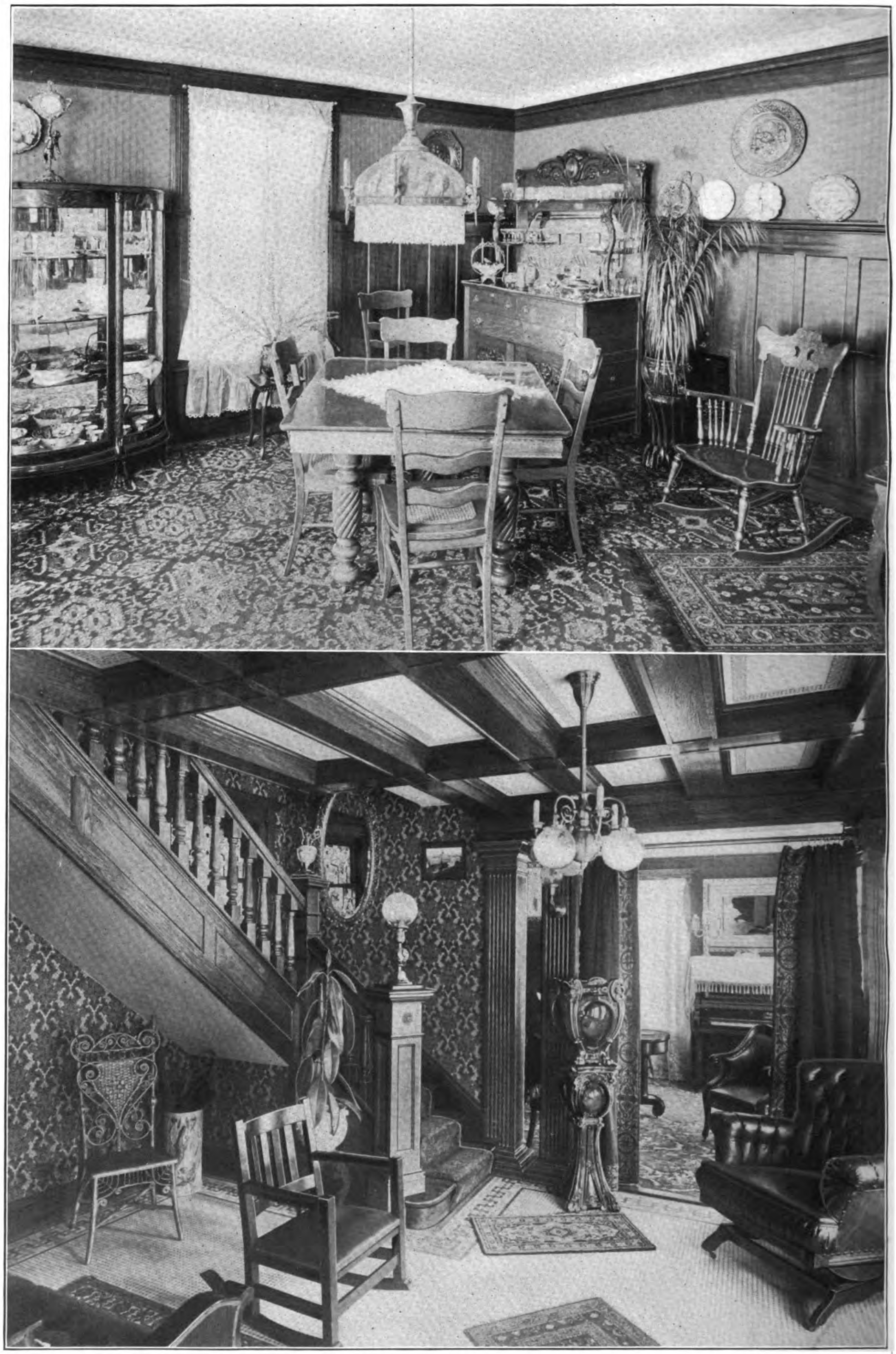
The Mexican as a mechanic is imitative and slow. He does well, however, in stone, brick and mortar, for he and his fathers have worked in them for ages. He lays 200 bricks a day; an American lays ten times as many. When a brick does not fit he marks it carefully and then with his trowel hacks away for five minutes, whereas an American, says J. B. Morrow in the Boston *Transcript*, would knock off the piece at one quick stroke. Building contractors say that it is cheaper to employ Indians to dig cellars, even when the excavation is to be a large one, than to employ mules and scrapers. An Indian will easily carry two bushels and a half of wet sand out of a hole in the ground—carry it on his back—and will work ten hours for 25 cents in gold. The best way, however, to hire an Indian is to pay him a stated sum for a stated task; then he will work; otherwise he will do as little as he can. The Aztecs knew how to cast gold and silver together. In molding a fish upon a vase they could make the scales of both metals and could alternate them. This likewise they could do with the feathers of a bird. There was iron in their mountains, but they did not know its use. Their cutting tools for stones and metals were made of copper and tin. To-day in the parks of Mexican cities Indians can be seen mowing grass at the edges of flower beds and along the borders of the stone walks with pieces of thick tin 4 inches long and 3 inches wide.

Slag Cement.

In describing the process by which slag cement is made, a writer in an exchange says: "The slag is granulated as it runs from the furnace by a jet of water, dried in revolving dryers, mixed with the proper proportion of slacked lime and ground so fine that from 90 to 95 per cent. of product passes through a No. 200 test sieve. This powder is the finished product. In making puzzolan cement better results are obtained by carefully regulating the furnace charges so as to give slag of a certain chemical composition. The granulating of the slag by water improves its hydraulic properties. Slag cement must be ground much finer than Portland in order to give good results. Slag cement is not suitable for work in dry places or for sidewalks, and is best suited for use under sea water, &c."

THE site is an important element in the designing of a house. It can never be neglected nor ignored. The successful house is successful largely because its design is especially fitted for one site and for no other. This is an important factor in house design which is often forgotten.

CONTENTS.



VIEWS IN RECEPTION HALL AND DINING ROOM IN RESIDENCE OF MR. C. W. OAKLEY, ELIZABETH, N. J.

J. A. OAKLEY & SON, ARCHITECTS.

COLONIAL RESIDENCE OF MR. CHARLES W. OAKLEY ON WESTFIELD AVENUE, ELIZABETH, N. J.

J. A. OAKLEY & SON, ARCHITECTS.

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