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, 1903.

Educated Mechanics.

It is pretty generally conceded by those who have carefully canvassed the industrial situation of the country that a demand exists for educated mechanics which is far in excess of the supply. This demand is brought about by the exigencies of the time. In any large establishment of the present day those in charge cannot wait to educate the skilled workman to read plans or to learn how to calculate requirements and, in an emergency, to utilize approved methods known to the technically schooled man. The young man has never lacked advice as to the need of improving his time with the view to advancement in his calling, but the advice has not been sufficiently specific to benefit him. Indeed, it often has rather befogged than helped him. On the other hand, he is apt to rub up against those who are always ready to take all that he can give, and it is not strange that he acquires craft as well as knowledge from his experience in such a school. This is not for his greatest good. Something higher in the way of encouragement and substantial aid is needed. There is no dearth of material. The sons of aggressive and successful men are available, and these same men are on the outlook for some method of making young men valuable that is worthy of the times. Substantial and successful business men, whose ambitions have kept them to their object of reaching the top, are too thoroughly alive to the actualities to suggest that the apprentice should read nights in order to reach the positions that are open and for which fit ocupants are not forthcoming. There is too much mental, physical and ambition-stunting drudgery in the apprenticeship system to look to it for a solution of the problem. Many men are able to give their boys a better opportunity than apprenticeship provides, yet cannot afford to give them a college course and the necessary practical training afterward. In fact, to the minds of these successful practical men, such a course would be a waste of time.

New Method of Technical Education.

The impressionable period in the young man's life and mind does not last too long. Therefore practice and theory must be acquired simultaneously in this new method of education for important places if it is to meet the approval of the young men and of the old men, who are eager to get them. Already some tradesmen have expressed their desire to contribute toward the founding of an institution of learning that will meet the requirements above outlined. Columbia and other colleges have been approached with a view to the establishment of such a course of education, and offers have been made to equip the necessary laboratories and lecture rooms. The trade school does not go far enough, nor does the manual training course in the common schools, although they may aid in the selection of likely material for the development of the educated mechanics needed in erecting buildings, constructing bridges, tunnels, &c., and attending to the all important details that make them creditable productions. Some wealthy philanthropist could not do better than to confer with those practical men who have become experts in their line as the result of their untiring energy, get their ideas as to what is needed and then found an institution where a young man can be made a mechanic and an engineer at the same time. This is one of the demands of the times that has not yet been satisfied. The graduate from such a university would not be greeted with a smile of sympathy, but with a vigorous handshake and an invitation to take his place in the ranks at once. The absence of such an institution, however, is no cause for discouragement. It should be an incentive to the young man to make the best of the means of education now available, not the least valuable of which is reading and study. Then there are the advantages offered by the correspondence schools. This method of technical instruction has been proved safe by experience. Although slow, it affords opportunities for observation and reflection, which lead to absolute knowledge of what is correct in practice and theory. It is to be hoped, however, that the efforts of those who are pointing out the necessities of the time and those who are clamoring for men of advanced training, as well as the eager search of the ambitious youths of to-day, will be rewarded in the near future by the founding of a university of workshops, where the young man with brains can have his mind stored with the necessary equipment, while his physical needs are cared for in the shops in which he acquires the art of making a living. Time enough will still be left for the exercise of those sports the love of which helps to make the well rounded, complete man in any walk of life.

Tenement House Construction in New York.

The enactment something more than a year ago of the New York tenement house law in the interests of public health and safety and for the better housing of the poorer class of the community was followed by a decided setback in tenement construction in the city. In the opinion of many the restrictions imposed by the law made this class of building an unprofitable investment, and it was thought that operations in this field had been permanently checked. In fact, a strong movement was on foot among the operative building interests for the revision of the law, on the ground that some of its provisions were unreasonable and prohibitive. It is a gratifying to note, however, that an increasing degree of activity in the building of model tenements in New York City has been developed in the past few months. About 100 buildings of this class, six stories in hight, are now under construction according to the provisions of the act, at a total cost running well up into the millions. Nearly all of these houses will be about 40 x 100 feet in area, on lots 50 x 100 feet. Trading in tenement house property is reported to be again brisk; and this fact, together with the large amount of money that is being invested in the building of model tenements, affords pretty good proof that, in the judgment of the operators, the modern tenement house can be made to pay as well as the old type of building. The profits will not be as exorbitant as those reaped from some of the old time "rookeries," but they should be sufficient to make modern tenement property a desirable investment. The wisdom of the framers and sponsors of the New York tenement house law seems to be in a fair way of establishment. As many other cities, not only in this country, but abroad, are watching its operation with interest, the movement for better housing of the poor is likely to receive a marked stimulus through the object lesson afforded by New York City.

Massachusetts State Association of Master Builders.

The first annual meeting of the Massachusetts State Association of Master Builders was held on the afternoon of Wednesday, November 19, in the rooms of the Builders' Exchange at 518 Main street, Worcester, Mass. There were present delegates from ten organizations of the State, representing Springfield, Milford, Westfield, Leominster, New Bedford, Waltham, Brockton, Worcester, Watertown and Holyoke. It was voted to extend the work of organizing the master builders of the State and to appoint a State organizer for this particular work. While no appointment was made at this meeting, it is understood that the officers of the association have a man in mind and will submit their proposition to him before making the appointment public. The association will hold a quarterly meeting in the United States Hotel, Boston, on February 18, the directors meeting in the forenoon and the association in the afternoon.

Incorporation of Labor Unions.

The policy of incorporation of labor unions, which was inaugurated a short time since by the Wholesale Grocery Employees' Association of Chicago, as referred to in these columns in the issue for December, has secured the adhesion of another important trade organization, the Connecticut branch of the Bricklayers' and Masons' International Union having decided to take out articles of incorporation under the laws of the State. The action of these two bodies suggests the possibility of a gradual change in the sentiment of labor organizations in this matter. The advantages of incorporation for a labor union are so obvious as to outweigh in the minds of thinking men the disadvantages. United States Labor Commissioner Carroll D. Wright has expressed himself emphatically in favor of the legal incorporation of labor unions, and many other students of the labor problem have uttered similar views of late. The laws of several States and of the Federal Government provide for the incorporation of unions, but practically no advantage has been taken of these statutes heretofore. The experiment in the cases of the two unions named will no doubt be watched with interest both by capital and labor.

Interstate Organization of Builders.

At a meeting held not long since in the rooms of the Chamber of Commerce in New Haven, Conn., where were present representatives from most of the larger towns of Connecticut, as well as of Southeastern New York, an organization was perfected known as the Interstate Builders, Contractors and Dealers' Association. We understand that nearly a thousand builders have signed the constitution, and it is expected that the organization will within a very short time cover the greater portion of New England.

The officers elected for the ensuing year were:

President, A. W. Burritt, Bridgeport, Conn.

Vice-President, J. P. Crosby, Greenwich, Conn.

Secretary, A. H. Buckingham, New Haven, Conn.

Treasurer, W. H. Switzer, New Rochelle, N. Y.

The general organizer of the new association is T. B. Beecher of Bridgeport, Conn.

THE Building Committee of the World's Fair Commission for Iowa have agreed upon a general plan for the Iowa State Building at the St. Louis Exposition. The structure will cover an area 100 x 125 feet in dimensions, will be two stories in hight and will cost $44,000.

Concrete Construction for Buildings.

In commenting upon the growing popularity of concrete in building construction a civil engineer, who is in charge of some of this class of work in Milwaukee, says:

This style of building construction is coming to the front, just as concrete work in general has come to the front in the last two or three years. Look at the concrete sidewalks we now have, as compared to five years ago, and the same advance will be seen in this building line, too. The concrete used is composed of Portland cement, sand, cinders and crushed limestone, which is molded around steel rods which have been subjected to the cold twisting process. When these steel rods are cold twisted it renders them 15 to 25 per cent. stronger than had they been twisted when hot, and the idea of twisting them, too, is to give the concrete better adhesion. This same concrete is taking the place of other materials for foundations, as witness the new car beams belonging to the street railway company, which are now under course of construction at Third and Sycamore streets. Even railroad companies to-day have their concrete crews, including mixers, and concrete is used in building bridge abutments and culverts and, in fact, all railroad masonry work is being made of concrete, where formerly stone was used. Most of the foundations of the Schlitz brewery plant are of concrete. A great many people seem to to think that a concrete rich in cement is bound to have strength. That is not so. The whole secret of the stability of concrete is in its mixing, and where machinery is used the mixture is bound to be the same late at night as it is early in the morning, for the machinery does not tire.

Originator of the "Flat" House.

In the recent death of Thomas Kilpatrick, New York City lost the man who in the building trade is credited with having been the originator of the "flat" or apartment house, as it is more commonly called at the present day. The first structure of the kind which he erected was in Thirtieth street, near Lexington avenue, and was equipped with a bath room having hot and cold water connections and a kitchen for each family. At that time this was looked upon as providing a remarkable degree of comfort and privacy for the various families, and as the advantages of the plan were recognized flat houses began to spring up in great number. The first structure was five stories in hight, but later six-story flat houses were built, and these were succeeded by what is said to be the largest Mr. Kilpatrick ever constructed, being the Hoffman Arms, a ten-story building at Fifty-ninth street and Madison avenue. This was finished in 1883, and at the time was regarded as the most advanced house of the kind in design and equipment.

Mr. Kilpatrick was born in Ireland in 1822, and came to America in 1848, when he at once engaged in the building business with his brother. The firm which they founded erected nearly 3000 buildings before Mr. Kilpatrick retired about five years ago.

A CHURCH edifice embodying a number of interesting architectural features and costing in the neighborhood of $400,000, is about to be erected in Richmond, Va., in accordance with plans prepared by Joseph H. McGuire of New York City. The structure will be of gray Virginia granite and Indiana limestone, will be cruciform in shape and cover an area 200 x 70 feet in size, expanding to 130 feet at the transepts. The roof will be of unglazed green tiles, and a dome will rise over the intersection of the nave and transept. The front of the structure will be an architrave supported by six Corinthian columns. The interior will be finished in marble wainscoting with oak panels, and the floors will be of marble mosaic and dappled Terreza. The contract for the work has recently been awarded to J. E. & A. L. Pennock of Philadelphia.

A FRAME COTTAGE IN A NEW JERSEY SUBURB.

(WITH SUPPLEMENT PLATE.)

WE take for the basis of our supplemental plate this month a well arranged cottage of balloon frame construction, erected not long since in one of the many attractive suburbs within convenient reach of New York City. A careful study of the floor plans will show a compact disposition of the various rooms, while the elevations and details indicate the construction employed. The appearance of the completed building is shown by means of the half-tone engraving, which is made directly from a photograph taken especially for our purpose. The architectural effects of the exterior are rendered more striking by the combination of colors with which the house is treated. The first story is of cream yellow, the shingles of the second story are a tobacco brown, the roof is stained a dark green, while all the trim is in white, with the foundations and chimney top a brown red.

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

Frame Cottage in a New Jersey Suburb.—J. A. Oakley & Son, Architects, Elizabeth, N. J.

The house is arranged with a reception hall, parlor, dining room and kitchen on the main floor, their disposition being such that the stairs are readily accessible from each. Connection between the kitchen and the front door is direct, while that between the kitchen and dining room is through the medium of a commodious pantry. On the second floor are four sleeping rooms and bathroom, while in the attic is one finished room with ample space for storage. A feature of the general arrangement is the location of the main stairs, which land in the center of the building, thus reducing hall space to a minimum, and placing each sleeping room and bathroom convenient to them. The main flight of stairs is lighted by a double projecting window, clearly shown on the side elevation.

According to the specifications of the architects, the foundation walls are of brick laid in lime, sharp sand and cement mortar, in the composition of which one-third cement is used. The cellar bottom has a layer of 4 inches of cinders and cement, on top of which is a coat of Portland cement and sharp sand ½ inch thick. In the cellar is a set of Graham's brown glazed laundry tubs, with hot and cold water connections, while in the front corner is located a porcelain wash out water closet.

In the framing of the house all timbers are hemlock, unless otherwise specified. The girders are 6 x 8 inches; the sills, 6 x 4 inches; halved at the angles; the plates, 2 x 4 inches, doubled and spiked together; the first and second floor joist, 2 x 10 inches, and the third floor joist, 2 x 8 inches, placed 16 inches on centers; the partition studs are 2 x 3 and 2 x 4 inches, also placed 16 inches on centers; the collar beams, 2 x 4 inches, placed 20 inches on centers; the posts at corners and angles, 4 x 6 inches; the valley rafters, 2 x 8 inches; common rafters, 2 x 6 inches, placed 20 inches on centers; ribbon strips, 1 x 6 inch hard pine; ties and braces, 4 x 6 inches; veranda sills, 4 x 10 inches; beams, 2 x 10 inches; rafters, 2 x 6 inches, and ceiling beams, 2 x 4 inches, tied to the rafters and all set 20 inches on centers. All door openings exceeding 4 feet in width are trussed and the studs are doubled at heads and sides of all door and window openings.

The outside frame is inclosed with 1 x 9 inch sheathing boards, laid horizontally, over which is a layer of 2-ply building paper, this in turn being covered at the first story with clapboards and at the second story with 18-inch white pine shingles, laid 5½ inches to the weather. The roofs are covered with 18-inch red cedar shingles also laid 5½ inches to the weather. The hips are put up "Boston" style, the shingles being laid on

1 x 2 inch hemlock shingle lath properly placed and nailed. The porch columns are of the Doane patent, made by the Doane & Jones Lumber Company of Elmira, N. Y. They are 10 x 10 inch staved columns with turned base and composition plastic caps of the Ionic style with square abacus.

The first and second story floors are double, the under ones being of rough 1 x 9 inch boards laid diagonally and with a finishing floor ½ x 2 inch North Carolina pine with a good quality of building paper between.

The trim throughout the house is ⅞ x 5 inch white pine molded. The stairs have strings and risers of white pine and the treads of Georgia pine. The newels, rails and ballusters are of ash, the panel work and columns extending to the ceiling in the main hall being of white pine and the plastic caps of Ionic style with square abacus. Gib panels are placed on the inside of the bulk heads and the panels are molded the same as the doors.

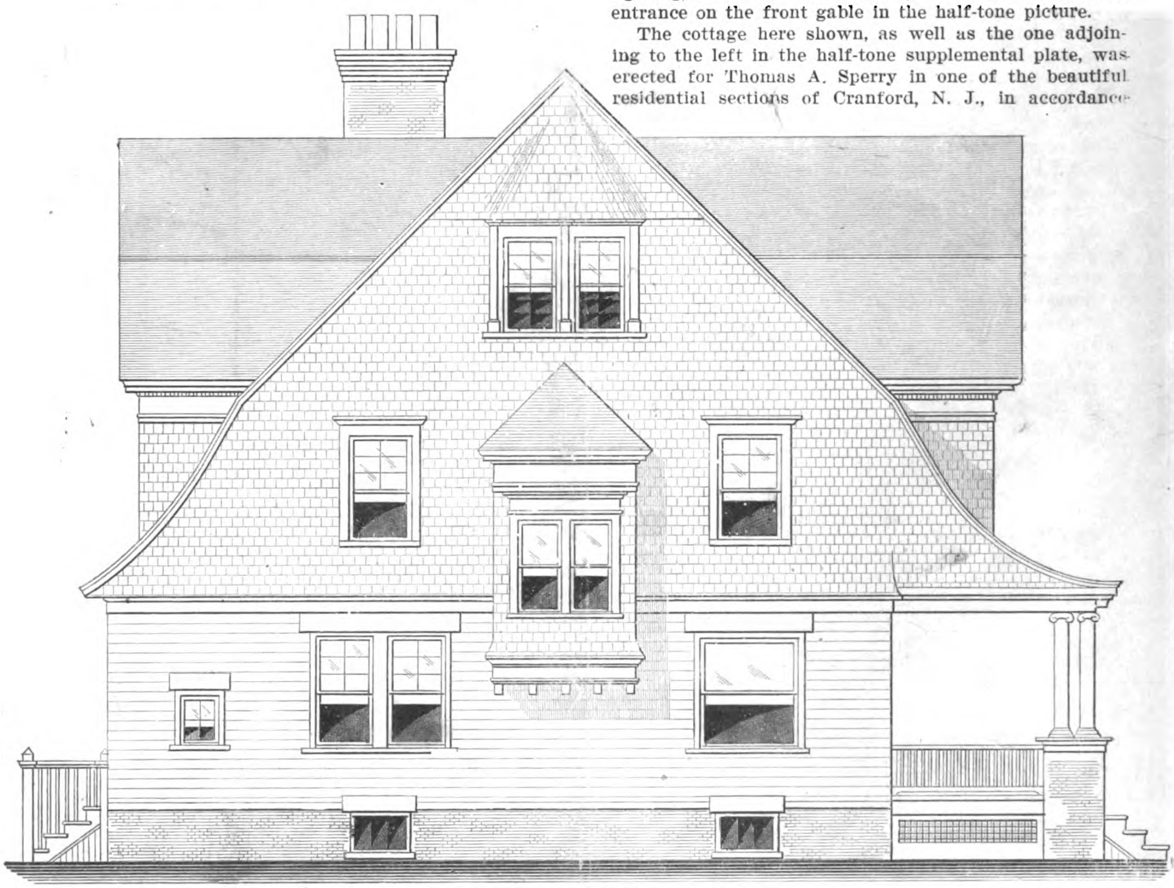
The kitchen has a Portland cement hearth and the walls to a height of 5 feet have a good white coat of Adamant Company's No. 3 finish and lime putty, lin d off in 6 x 6 inch squares finished with a neat molded cap. The room is fitted with an 18 x 36 x 6 cast iron sink; a No. 258 Provident brick set range, made by the Richardson & Boynton Company of New York City, and 35-gallon high pressure boiler. In the butler's pantry is a tinned and planished copper sink with hot and cold water connections and fitted with nickel plated trimmings.

The bathroom has the side walls covered to a hight of 4 feet with tile, finishing with a molded cap on the wainscoting and a raised decorated 4-inch frieze under the cap. The floor is also of tile laid on a foundation of concrete composed of cement, small [illegible] stones and sand, which is filled in between the joist[illegible] is fitted with a Vigilant syphon jet porcel[illegible] with oak cabinet copper lined tank; rim porcelain lined bathtub, made by the Standard Mfg. Company of Pittsburgh, Pa., and with nickel plated pipes, bibbs, &c.; a countersunk marble slab with 12-inch wall slab of marble and 5-inch marble apron, the basin having nickeled chain and plug.

The heating is by means of a No. 147 New Perfect hot air furnace made by the Richardson & Boynton Company and connected with a cold air duct located as shown on the foundation plan. All pipes running in partitions are covered with metal lath, and the sides of the studding are covered with tin. The registers on the first floors are 10 x 12 inches, and those on the second floor 8 x 10 inches, all having borders and japanned.

The house is piped for gas and wired for electric lighting, the service wires faintly showing their point of entrance on the front gable in the half-tone picture.

The cottage here shown, as well as the one adjoining to the left in the half-tone supplemental plate, was erected for Thomas A. Sperry in one of the beautiful residential sections of Cranford, N. J., in accordance with plans prepared by Architects J. A. Oakley & Son of Elizabeth, N. J.



Frame Cottage in a New Jersey Suburb.—Side (Left) Elevation.—Scale ⅛ Inch to the Foot.

Building Laws for Cities.

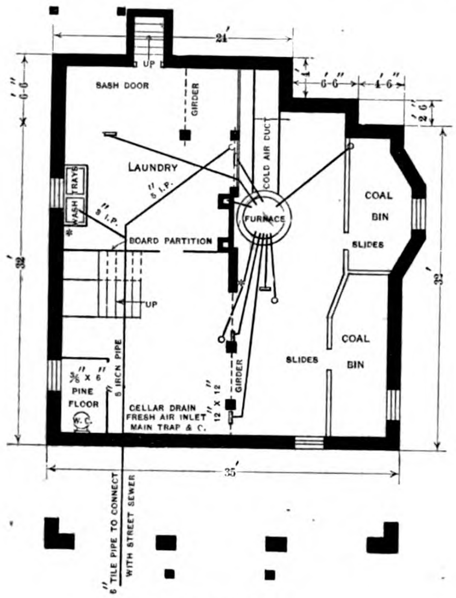
One of the papers read at the thirtieth convention of the International Association of Fire Engineers dealt with the subject of building laws for cities, the author, Christopher Clarke of Northampton, Mass., pointing out the necessity of more stringent legal enactments and raising questions which cannot fail to be of more or less interest to readers of this journal. Among other things he said:

The paper I have prepared to read to your association is upon the urgent need throughout this country of more stringent building laws, in order to meet the rapidly increasing danger from unsafe construction of new, and the alteration of old buildings—the two greatest causes of losses of life and property from fire. It must be acknowledged, also, that, although the fire departments have now the aid of greatly improved means for fighting fire, they cannot cope with the increased danger and risks that to-day have to be encountered in the higher and larger buildings that have been built within the past ten years.

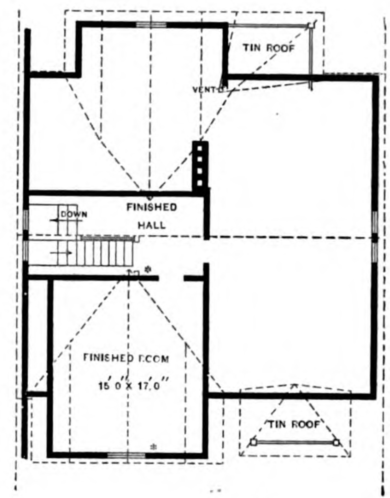
The loss of life since the New Haven meeting has also been very great, especially in crowded tenement houses, among firemen and guests of hotels. It is very strange under these conditions that no move of any importance has been made toward any decided reform in the construction of buildings, through the only effective means of securing them—namely, by the enactment of new and reasonable laws that would compel the construction of safer buildings in every State in the Union and the Dominion of Canada, which, if enforced, would certainly result in saving an enormous loss of life and property that can be secured in no other way than by general building laws that will enforce better protection. The general building laws of the States, or city, and town fire ordinances have not by any means kept up with the increased danger from the unsafe buildings that the present laws allow to be built. The compartment plan of building is without question the best means of preventing this enormous waste of life and property, in illustration of which I quote the following from the report of the United States consul in Berlin, Germany. It is as follows:

"The city of Berlin has 1,800,000 inhabitants and 33,000 buildings of four to five stories high built on the Government compartment plan of fire proof material, with this remarkable result—that no such a thing as a conflagration in those buildings is possible, the fire being confined to the story where it originated. This system is so perfect a protection that nine steam fire engines and a few hand engines are all that are needed for the protection from fire in this city of nearly 2,000,000 inhabitants."

This general system of compartment construction is to be found in the city of Paris, France, and other continental cities, and American inventors have now ready for application every form of fire proof material, with simple, practical and economical methods for application of the same, in compartment plans, for new and alteration of old constructions that will make them practically safe for both life and property. They cannot be generally introduced, however, because there are no building laws in any State in this Union that enforce their use. Just so long as our buildings are constructed



Foundation.



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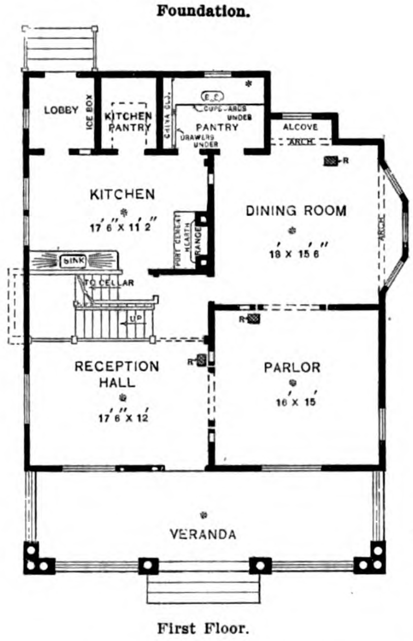
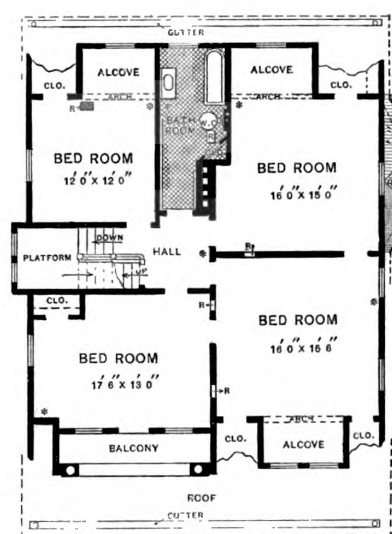
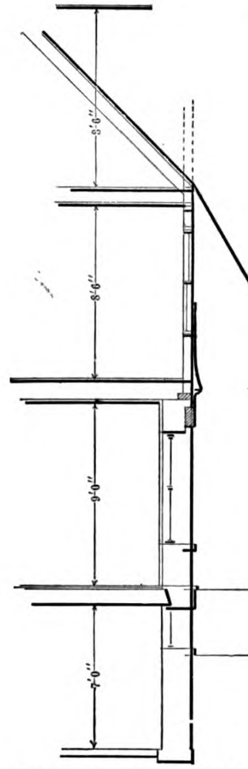
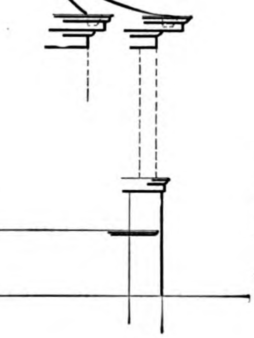


First Floor.

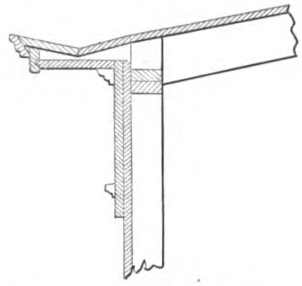


Second Floor.

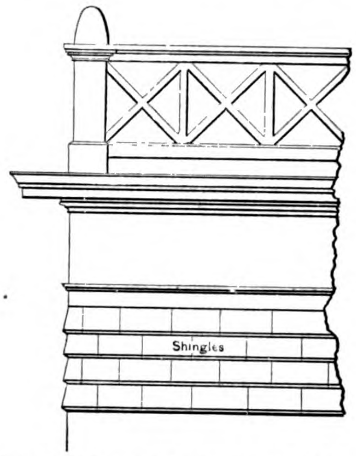
Frame Cottage in a New Jersey Suburb.—Floor Plans.—Scale, 1-16 Inch to the Foot.

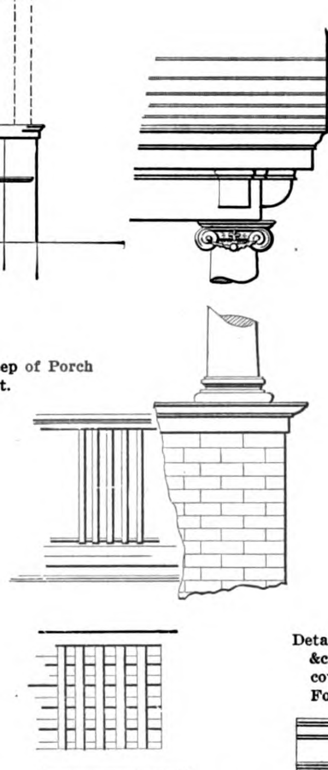
Sections Showing Hights of Stories and Sweep of Porch Roofs.—Scale, ⅛ Inch to the Foot.



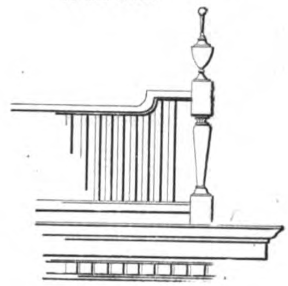
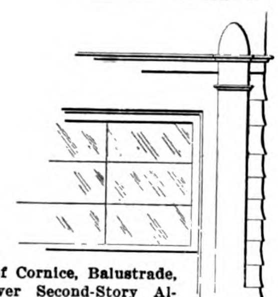
Detail of Cornice.—Scale, ½ Inch to the Foot.



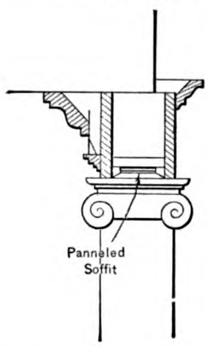
Balustrade Over Bathroom.—Scale, ⅜ Inch to the Foot.



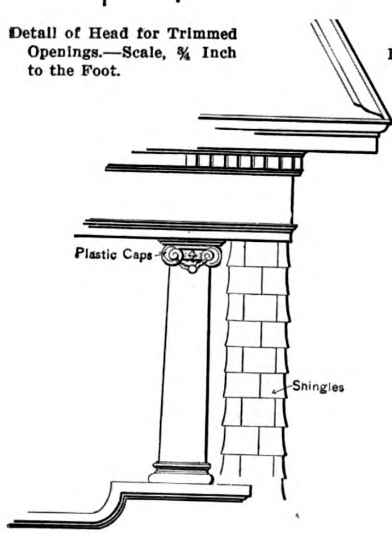
Details of Piazza Cornice, Column, Railing, Lattice Work, &c.—Scale, ⅜ Inch to the Foot.

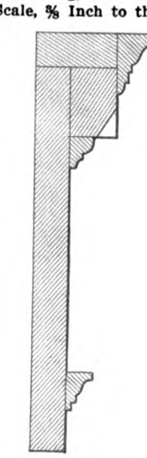
Details of Cornice, Balustrade, &c., Over Second-Story Alcove.—Scale, ⅜ Inch to the Foot.



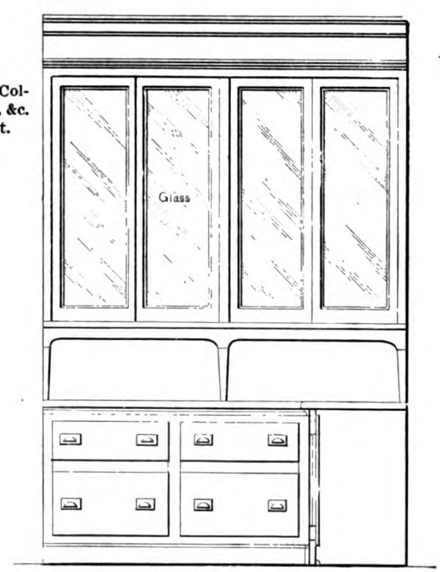
Detail of Head for Trimmed Openings.—Scale, ¾ Inch to the Foot.



Detail of Balcony Cornice, Column, &c.—Scale, ⅜ Inch to the Foot.



Section through Head Casing. —Scale, 3 Inches to the Foot.



Elevation of China Closet.—Scale, ⅜ Inch to the Foot.

Miscellaneous Constructive Details of Frame Cottage in a New Jersey Suburb.

on the present methods, which allow all hallways and elevators to be open from the cellar to the highest point in the building, with no fire stops used to prevent the flames and smoke from instantly filling the building, the present enormous destruction of life and property will go on with increasing volume, and the lives of the inmates of the buildings and the firemen who must enter them will continue until the firemen and insurance companies take hold in earnest to demand the better laws I advocate.

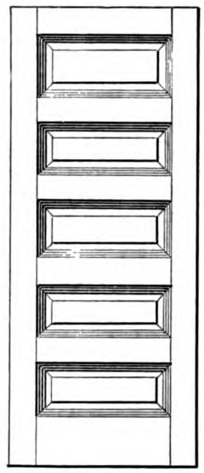
As to elevators I would say that no elevator should ever be built, except it is placed in a fire proof inclosure, with fire proof glass or other fire proof doors, properly vestibuled to prevent flames or smoke from entering the elevator well from indraft, and the elevator well should rise above the roof. Every fire chief or engineer in this association knows from his own experience that the defective building laws of this country are responsible for almost the entire loss of life, and a large proportion of the property destroyed by fire, and, if they do not move in this matter, I do not think there will be any new or better general building laws enacted. The general public does not seem to realize that it is taxed for and pays the main portion of all this enormous and needless loss of property through increased rates of insurance. And in getting these better building laws the members of this association will be ably seconded by the insurance companies, building inspectors, fire marshals and protective departments, and, if they act together, they will, I am confident, secure the desired result. Allow me to suggest that these laws should be simple and cover what seems to be absolutely necessary changes of construction, and should not ask too much in the start.

The burning of the Windsor Hotel in New York, with its fearful destruction of life, would not have happened if it had been built, or even altered, to these compartment plans of construction, which make each story, or subdivision of a story, so as to be instantly separated from all others by fire stops, fire doors and fire proof partitions. When division walls are not practicable, movable fire stops should be had on each story, which can be put in use instantly, and, being movable, no one can be shut in or prevented from escape above or below. Tower or compartment stairways connecting with each story should be built, that will give certain means of exit to the ground, and should always be included in this system. They will also afford means for the firemen to reach every story instantly, and give them a safe retreat without the use of ladders. For new buildings all the stairways, partitions and floors can be made fire proof, and put into compartments, when built; but the enormous number of old, dangerous buildings now constructed must also be protected by the effective means I have named, which will make them far safer than at present. All these changes can be made for a very reasonable sum.

These compartment protections will make an old building safer for life and property than the best new so-called fire proof buildings, so largely built within the last few years, which, with hardly an exception, are dangerous. The new protective laws should be framed so as to require in the alteration of old, dangerous buildings, and construction of new buildings, that they should be made, as far as possible, in the compartment form. It will be no hardship for the owner of a building to adopt these plans, whether the buildings are to be constructed or reconstructed, as it would result in a large saving of money in repairs and insurance rates. An instance of building protection was shown during the Windsor Hotel fire in Holyoke, Mass., soon after the Windsor in New York was destroyed, where the fire was stopped from causing a general conflagration by about 25 Underwriters' doors and shutters, of wood covered with metal, on the adjoining block to the hotel, and the loss of $325,000 by the destruction of the hotel would have been increased to $800,000 if these shutters and doors had not absolutely stopped the progress of the flames.

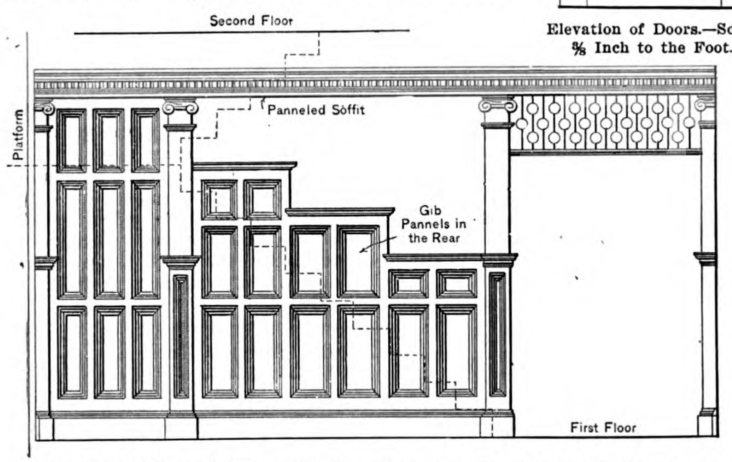
It seems to me that the association ought not to defer action on this subject of better building laws any longer, but take steps at this convention by appointing a strong committee, to prepare a law that will, when offered, induce the legislatures of your respective States that are to be in session this winter to take action. I am certain that no subject that can possibly be brought before you at this meeting is more important to the cities and States you represent than that of the protection of life and property through the better building laws I advocate.

Allow me, in closing, to say that, in my opinion, the protective building laws to be enacted should, as far as possible, be general and include every town, large and small, in its building requirements, as the small towns cannot, as a rule, have the protection of the competent fire departments to be found in the cities and large towns, and these people should certainly have all the aid and protection that can possibly be afforded them.

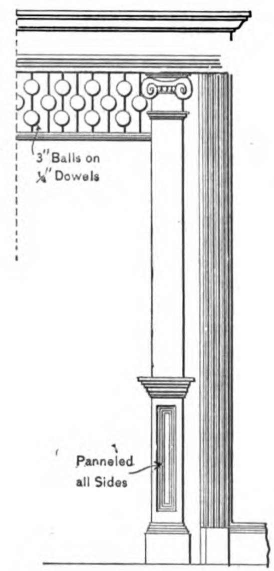


Elevation of Doors.—Scale, ⅜ Inch to the Foot.

Section through Side Casing.—Scale, 3 Inches to the Foot.



Panel Work, Columns, Grille, &c., as Viewed from Reception Hall Looking Toward Main Stairs. —Scale, ¼ Inch to the Foot.



Details of Trimmed Openings.—Scale, ⅜ Inch to the Foot.

Miscellaneous Constructive Details of Frame Cottage in a New Jersey Suburb.

CONVENTION OF AMERICAN INSTITUTE OF ARCHITECTS.

According to programme the opening session of the thirty-sixth annual convention of the American Institute of Architects was held in the assembly hall of the New Willard Hotel, in Washington, D. C., on the morning of December 11, there being present about 100 delegates representing the 25 chapters included in the association. The delegates were welcomed by Col. John Biddle, Engineer Commissioner of the District of Columbia, after which President Charles F. McKim delivered his annual address, which commanded the closest attention on the part of his hearers.

Among other things, President McKim congratulated the institute on the large attendance at the meeting, and said that the tribute to the institute made by such attendance is abundant evidence that they regarded architecture as an art as well as a profession, and that they were ready for the time to take thought for the common good, even at the expense of personal convenience. It is a cause of rejoicing, he said, that the institute which has urged upon national, city and municipal government the duty of preserving historic monuments has itself secured possession of one of the historic houses of America. In this he referred to the Octagon House, which was used as the temporary White House after the sacking of Washington during the war of 1812.

The report of Secretary Glenn Brown showed that 7 fellows and 180 associates had been added to the membership during the year. The financial report indicated a healthy financial condition of the organization, with an increased balance as compared with that of last year. The report of the Board of Directors was read and a committee on credentials was appointed, as well as one on nominations and others for various purposes. At 1 o'clock luncheon was served in the banquet hall.

In the afternoon papers on the improvement of Washington along the lines outlined by the Park Commission, illustrated by lantern slides, were read by D. H. Burnham, Frederic Law Olmstead, Jr., and Charles Moore. Following this the report of the Committee on Credentials was presented.

In the evening the members met at the Library of Congress for the purpose of viewing the drawings and models submitted by the Park Commission.

The second day's sessions were devoted to the reading of papers and discussions thereon, one of the more important being that of John S. Sewell of the engineer corps, on "The Relations of the Architect to the Engineer." The development of municipal improvement was the principal topic for consideration in the afternoon.

At Saturday's session the old officers were re-elected, as follows:

President, Charles F. McKim of New York City.

First Vice-President, Frank Miles Day of Philadelphia, Pa.

Second Vice-President, Alfred Stone of Providence, R. I.

Secretary and Treasurer, Ben Brown, Washington, D. C.

A resolution was adopted pledging the support of the institute to the American Academy which has been established in Rome, and another was adopted thanking President Roosevelt for permitting the delegates to view the improvements to the White House when they called to pay their respects in the forenoon.

The convention adjourned to meet next year in Cleveland, Ohio.

Brick and Clay Working Conventions.

As intimated in our last issue, the National Brick Manufacturers' Association will hold its seventeenth annual convention at Boston, Mass., February 4 to 7, and it has now been decided that the headquarters during the convention will be at the Brunswick Hotel. The local committee has secured the exclusive use of Copeley Hall for the entire week for convention and exhibition purposes. The week following the convention will be devoted to side trips to the various brick, tile and pottery plants in and about Boston and the neighboring cities.

The Iowa Brick, Tile and Drainage Association will hold its twenty-third annual convention at Ames, Iowa, January 21 and 22, 1903.

The Illinois Clay Workers' Association will hold its twenty-fifth annual convention at Bloomington, Ill., January 6 and 7.

The Wisconsin Clay Workers' Association will hold its third annual convention at Green Bay, Wis., January 27 to 29.

Scagliol—a New Building Material.

A public test of fire proof building material known as "scagliol" was recently made in St. Louis in the presence of architects, builders and insurance men, as well as of representatives of the fire and building departments and of the Building Appeal Board. The test took place in a building constructed of "scagliol," which is a plaster like material imported from Roostock, Germany, by Hans Molchin, the inventor. The building was fitted with an iron door casing and a swinging fire blind; also with a chimney and a window treated with a coating of the material named. A roaring fire was maintained for an hour and a half, after which a stream of water from a regulation fire hose was played upon the flames. Several coins placed in notches inside the structure were melted by the intense heat and the heavy iron door was warped so that it could not be closed. It is stated that thermometers hung on the outside of the structure varied but a few degrees of temperature throughout the test, which was regarded as satisfactory in all particulars, demonstrating the material to be an excellent fire retardant and nonconductor of heat. We understand that Mr. Molchin intends in the near future to erect a plant in St. Louis for the manufacture of "scagliol," and that he has already been awarded contracts involving the use of this material.

An Old Shingle Roof.

A striking example of the length of time for which a shingle roof may endure is found in the structure known as the "shingle house" at Warwick, N. Y. This was built in 1764 by Daniel Burt, and has recently had a new roof put on, it being the first one to be put on the house in 138 years. The frame was made of massive hand hewn oak timbers, and it was covered with hand split oak shingles, instead of clapboards. The roof was covered with the same kind of shingles. It is on record that the shingles used in building the house were all split by Daniel Burt from one white oak tree that he felled near the site. Some of the shingles are 3 feet long and 2 feet wide. They were nailed with wrought iron nails forged by hand.

The stone chimney is built up through the center of the house from cellar to roof. It is 12 feet square. A fire place, the full width of the chimney, opens on each side into the rooms through which it passes. The high mantel in the parlor is as originally put in. Above it is a panel on which is painted what tradition says was a scene on the Hudson River in those pioneer days.

There is still an older shingle house at Edenville, 3 miles from Warwick, standing, with the exception of the windows, just as it was built in 1732 by Jacobus Post. There are, says a writer in the *American Contractor*, a number of stone buildings of the Colonial period in Warwick village and the town of Warwick—the Sayre house, a famous inn before and during the Revolution, built in 1766; the Hathorne house, dating from 1773; the Benedict house, built in 1799, and occupied by a lineal descendant of the original owner, part of the B. B. Sayre farm house, erected in 1740, and the DeKay mansion, which dates from the time of the French and Indian wars.

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

BY CHARLES H. FOX.

ONE of the prime requisites in working out any intricate problem in stone cutting is a thorough knowledge of geometry, and in order that the student may be well equipped for what is to follow in these papers, we have introduced as much of elementary and descriptive geometry as we consider necessary to enable him to work out the problems presented in connection with this special subject. For the benefit of beginners who are now perhaps taking their first lessons in drawing, we shall from the very commencement assume utter ignorance on their part of any knowledge whatever of geometry, but before seriously touching upon the subject we shall present a few general remarks and directions which may not be out of place at this time. We would suggest to the beginner that from the very first he aim at neatness and accuracy, and that he be satisfied or content with nothing else. Do not stop when "nearly right," but try again and he will find that with care and perseverence success will crown his efforts.

dent will be able to clearly understand the meaning and intention of each line, and will, we feel quite sure, soon realize that laying out circular arches in circular walls, or "circle on circle," as it is termed, is not the complicated or intricate problem it is generally regarded. As we proceed with the more practical drawings they will be more readily understood if the student or reader has made himself thoroughly conversant with the diagrams to which reference is made. He will find it a great aid to the understanding of the developments explained in Figs. 6, 7, 8, and 9, if he procures two cylinders—one larger than the other and allow the larger to represent the wall and the smaller one the opening he assumes to make. The drawings should be of the same size as the cylinders, so that by wrapping or folding Fig. 9 around, as explained, he will have at once a practical illustration of the problem. Later if the student will cut models of the several arches, just as though he were cutting the stones on the banker, he will find it will repay him for

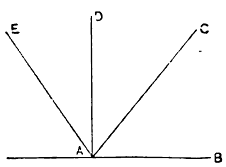


Fig. A.—Showing Acute and Obtuse Angle.

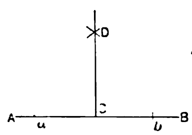


Fig. 1.

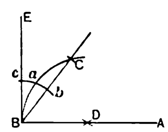


Fig. 2.

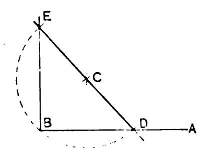


Fig. 3.

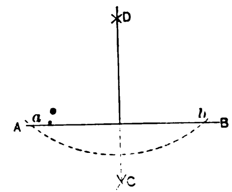


Fig. 4.

Diagrams Showing Various Methods of Erecting a Perpendicular.

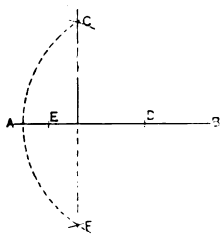


Fig. 5.—Still Another Method of Erecting a Perpendicular.

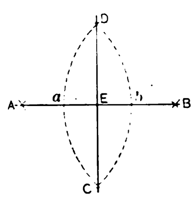


Fig. 6.—Bisecting a Line.

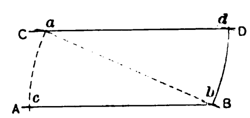


Fig. 7—Drawing a Line Parallel with a Given Line.

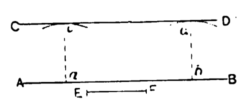


Fig. 8.—Drawing a Line Parallel with a Given Line and at a Given Distance.

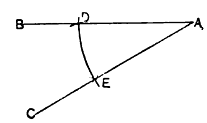
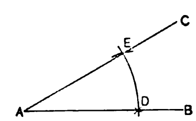


Fig. 9.



Figs. 9 and 10.—Making an Angle Equal to a Given Angle.

Laying Out Circular Arches in Circular Walls.

In using the compasses, for example, hold them lightly between finger and thumb, only allowing the instrument to rest with equal weight on both points, the thumb and finger being used merely to guide it. We would suggest that compasses having round legs be employed instead of those having triangular ones, as the latter are apt to make a large hole in the paper when using them. For drawing curves through points "French curves" will be found useful. In doing this kind of work the student should turn the French curve around until some part of it corresponds with three or more points on the curve; then draw as much of the curve as possible and find the remainder in another part of the French curve or try another one. We would at all times, however, advise the student to practice free hand drawing, as there are such a variety of curves that no mechanical means can supersede the eye and hand in forming them, while with practice it is possible to draw many of them more quickly by hand than it would take to find their places on the French curve.

We recommend the student to thoroughly master the diagrams presented among the early papers bearing upon the subject and the principles involved in connection with them, for no art can be successfully acquired unless its elementary principles are first thoroughly understood. By carefully examining the diagrams the stu-

the trouble, as by so doing he will get both a theoretical and practical illustration, while being at the same time able to set out or cut a larger one in practice.

In making the working drawings of a model, we suggest that thick drawing paper be used, as then the molds may be cut directly from the paper, thus saving the time which would otherwise be required to transfer the molds upon another piece of thick paper. By closely following the directions given, the student will have little difficulty in mastering the problem of "circle on circle."

Practical geometry is the method of applying the rules of the science to practice, some examples of which we shall give in connection with the problems which follow.

A right line is a straight one of the shortest that may be drawn between any two given points. Every line which is not a right line is a curve.

Parallel lines are in every part equally distant from each other.

An angle is the space included between two lines meeting at a point, thus in the accompanying diagrams the point A in Figs. 9 and 10 is called the vertex or angular point. This is a rectilinear angle, which is formed by two straight lines meeting in the point A. If one line meets another so as to make the angle on each side equal, each angle is called a right angle. In Fig. A the line A D, which meets the lower or base line, is called a perpendicular. The lines A E and A C do not make the angles on each side equal to each other, and they are therefore said to be drawn obliquely to the base line A B. An acute angle, such as B A C of Fig. A, is less than a right angle, while the obtuse angle as B A E is greater than a right angle.

Converging lines are right lines so inclined to each other as to meet if produced to a certain point. Thus C E and A B of Fig. 11 converge toward each other, and if produced will meet in an angle at F. The angle D C E is equal to that of B F C.

In order to erect a perpendicular from any point as C of the right line, A B, in Fig. 1, proceed as described. On either side of C set off equal distances, as C *a* and C *b*; then with *a* and *b* as centers, and at any convenient radius, draw arcs meeting or intersecting in the point D. Now from the points D and C draw the line D C, which will be the required perpendicular.

To draw a perpendicular when the given point is on or near the end of the line, as B of Fig. 2, proceed as follows: Take any point as D as a center, and with D B as a radius describe and arc B C. Then with B as center and with any radius as B *a*, draw an arc, *b a c*. Now, make *a* C equal to *a* B, and draw the line B C. Make *a c* equal to *a b*, and through *c* draw B *c* E, which gives the perpendicular desired. In Fig. 3 is illustrated another method. Take any point as C as a center, and

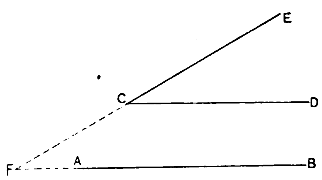


Fig. 11.—Diagram Illustrating Converging Lines.

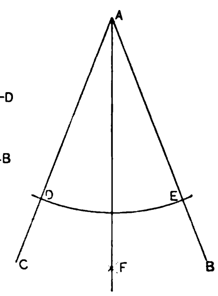


Fig. 12.—Bisecting a Given Angle.

Laying Out Circular Arches in Circular Walls.

with C B as a radius draw an arc D B E, meeting A B in D. Through D C draw D E, then drawing B E gives the perpendicular required.

When the point as D in Fig. 4 is above the line the operation is as follows: Take D as the center, and with any radius draw an arc, meeting the line A B in the points *a* and *b*. Now, with *a* and *b* as centers, and with any radius draw arcs meeting in C. Drawing C D will give the required perpendicular. Still another method is illustrated in Fig. 5 of the diagrams. In this case let the given point be C, from which it is desired to drop a perpendicular to the line A B. With any point on the line as D for a center and C D as radius, describe an arc, C F. Then with another point, as E, for a center and E C as radius, draw an arc in F. Complete the operation by drawing a right line through C F, which gives the required perpendicular.

In order to bisect a line—that is, to divide a given line as A B of Fig. 6 into two equal parts, proceed as follows: With A and B as centers, and with any equal radii greater than half the length of A B, draw arcs meeting in C and D. Through these points draw a right line, which will divide A B at the point E into two equal parts.

To draw a right line to a given point, as *a* of Fig. 7 parallel with a given line, as A B, proceed as follows: With any point as *b* as center and *b a* as radius, draw an arc, *a c*; then with the same radius, and with *a* as center, draw an arc, *b d*. Make *b d* equal to *a c*, and through *a d* draw the right line C D, which gives the parallel required. In order to draw a parallel to a given line, as A B of Fig. 8, and at a given distance, as E F, the operation is as follows: With any two points, as *a* and *b* for centers and E F as radius, draw arcs in *c d*. Draw line C D to touch the arcs at the highest points and C D will be the parallel required.

In Figs. 9 and 10 is shown how to make an angle, as B A C, equal to a given angle. With A as center and any radius draw an arc, E D. Repeat with the same radius in Fig. 9. Make D E of Fig. 10 equal to D E of Fig. 9, and through E draw A E, then D A E will be equal in both figures.

Fig. 12 shows how to bisect a given angle. Let C A B be the given angle; then with A as center and with any radius, draw an arc as D E. With D and E as centers, and with any radius draw arcs in F. By drawing the line A F we have bisected the angle C A B.

Construction of St. Louis Fair Buildings.

In the construction of large buildings intended for purposes of exhibition there are involved many interesting problems, the method of solving which cannot fail to attract more than passing notice. In discussing this matter Philip J. Markman, chief building engineer of the St. Louis Exposition, gives the following particulars relative to the methods employed:

The masses and details of the designs are represented and rendered in plaster and staff applied to wood sheathing, furring, studding, &c., the latter backed and braced, according to needs, by heavier timber and steel framing. All the pedestals, bases, columns, pilasters, antæ, archivolts, architraves, friezes, cornices, panels, vaulted, groined and domed ceilings, pendentives, medallions, consoles, brackets, niches, parapets, archials, balustrades, spandrels, arches, coffers, caissons, gargoyles, diaphragms, obelisks, globes, pavilions, pylons, turrets, trophies, fountains and what not, which the architects have used in their compositions, require a bewildering mass of light frame work approaching the general contours of the architectural forms.

When the architectural forms are finished in plaster and staff they merely "represent" masses, while they are only a light shell mounted on wood forms. These shells arise to such respectable hights that special care is required to brace them against buckling, crushing or overturning by wind. The roofs of these buildings must generally be carried on long span trusses, so as to restrict the number of posts and give as much freedom as possible in the arrangement of exhibits. There are no solid walls on which these trusses may be set; they must be supported by pillars from the ground up. The exterior walls are generally secured to these posts, and these posts, with knee braces and trusses over them in one direction and portal bracings in the other direction, give to the structure its stability.

All foundations are built of timber, either cribbage or ground sills resting upon the natural solid ground, where the natural ground is not more than 4 or 5 feet below the established street grades of the exposition grounds; or upon piles, driven not less than 15 feet into the natural ground, where natural ground is too far below grade to make cribbage practicable or economical, or where the nature of the soil is not above suspicion, as in the basin of the former park lake, and the filled in beds of the River des Peres and its numerous tributaries.

The entire frame work of the buildings is of wood, of small size sticks in close proximity, shaped to the contours of the architectural exterior, and of massive heavy timbers for truss posts, trusses, knee, spandrel and sway braces, &c.

Iron rods, bolts, pins and plates are used for web tension members and their connections and for the splices of long tension chords where they cannot be had in one length. Castings are used for washers, strut shoes and special angle blocks.

Posts, trusses and, in general, all heavy framing timbers are of long leafed Southern pine. All outside plaster is put on a dovetail grooved sheathing, nailed to the wall studs, ceiling, joists, &c. This sheathing is used to add stiffness to the wall frame, and to furnish ready nailing ground for all plaster or staff ornaments.

The roofing material is gravel and composition on all flat and deck roofs and felt on all other roof surfaces.

CABINET WORK FOR THE CARPENTER.

BY PAUL D. OTTER.

IN the articles on this general subject which appeared in these columns during the past year the main purpose was to turn the attention of the carpenter to a class of work with which he may not be altogether unskilled, yet may not have had the subject heretofore presented to his mind in a prepared condition to enable him to exercise his skill in a higher branch of joinery. The journal of to-day sent broadcast, with its articles and departments relating to self help, makes it possible, if not indeed certain, for every intelligent person to acquire knowledge, or at least to add to his knowledge along certain lines. The mother or the daughter in isolated districts has acquired information and skill in millinery or dressmaking, studying explicit directions and illustrations which are often self explanatory in their clearness, while in the column for domestic science greater deftness is gained, together with the important knowledge of chemical changes incident to good cooking. From these sources a pronounced broadening of the individual is evidenced, and to-day the "mossback" is the one who pores over the only printed matter that comes to him—the local "weekly."

Value of the Correspondence Department.

The privileges allowed in the space devoted to "correspondence" in *Carpentry and Building*, or any other trade journal should not be undervalued either by the young or the old subscriber. Its advantages are indeed great, and many are pulled out of dense ignorance or turned from a well worn rut by a careful and thoughtful study of its columns.

We will suppose the carpenter has many "off days" now and then, due to weather or other conditions, and unless he is a "captain of industry" the question of how to employ his time to profit is uppermost in his mind. The exercise and higher development of one's skill at these times if not directly productive certainly will be later, in his being rated a first-class man. To this end he should have a better home work shop, or room, than any other tradesman. First of all the place should be swept up and always kept that way after work, then a good substantial work bench placed to the best advantage for the light, and all that appertains to his work should be put in convenient places or shelves. Brackets should be made for certain tools, then a hanging shelf for lumber, so that it can be kept clean and flat. All these handy arrangements and ideas for carrying on the work whenever spare time is given for it, will occur to the man who goes at the matter with the purpose of having an inviting place in which to work. After all is accomplished in the way of convenience and order, keep it so. Everything being in readiness you will, when the opportunity offers, get to work like one who has an appetizing meal before him.

Advantages to Country Carpenters.

In turning the carpenters' attention from large to small construction, such as portable objects about the house, what benefit may come from these papers will be more to the carpenter in isolated districts than to the journeyman in the city, who is kept more actively occupied. His work then will not be so much brought into contact in a competitive way with the cabinet maker, who seldom locates in a small village or town. This fact should be a greater reason and incentive to the cultivation of his skill in the higher branches of joinery; for even in country towns there are the "upper class" people, or those of means, who generally are easily prevailed upon to secure some interior fitting, or article of furniture, particularly should it be made for a special purpose, which raises it above the factory commodity.

With the essential requirements provided for the individual needs are then generally gratified and the housewife with great pride in her plants or china will be equally interested in acquiring a plant stand or plate rack. These now are quite commonly sold in towns or cities, but often are poorly made or finished. Here, then, is the mission of the carpenter to work up a local side business.

Primitive Structural Idea.

The form which would suggest itself to a workman, should he be called upon to produce an article, is the unadorned and useful qualities in a piece of furniture; this would be a natural expression of his ideas of construction, free from imitation. Much of the furniture which is sold to-day is strong and durable, but of such a severe type that it is highly probable the demand for it will be short lived. Our homes, surroundings and tastes are ever changing; the desire is greater for ornament, and change of outline, even to vitiated tastes; the primitive structural furniture looks very much out of place unless a room was fitted up entirely in that style, or in the later interpretation of it, the "Arts and Crafts" school.

The structural idea should ever be in mind in creating a piece of furniture, yet in our day of hard business drive the few hours or moments of home rest should be in rooms furnished by furniture not of the restless over elaborated French style, nor by the rigid square edge primitive style; rather design our furniture from this primitive type, as a dressmaker molds her cloth over nature's form, knowing then we are started right.

Take, then, these old structural forms and in our mind's eye pick up the draw knife and round off well the edges and corners, so that if we ever did fall against it we would not bruise the flesh or have our teeth knocked out. Possibly in some places, leaving still ample strength, cut out quite an arched line, which would be a little more in keeping with our rounded out lives.

Suggestion and Incentive.

Have the main line in furniture clearly define its purpose. Probably the main thought embodied is in a plain sweeping line which meets an untimely fate in some meaningless jumble of scallops and coves. Rather have the design motif creep up to and join in with this main line in the shape of surface carving, or applied carving, properly shaded off and brought into definite relation with the prevailing outline.

From observing good, sensibly designed furniture the craftsman is aided and inspired to evolve from a primitive structural form something which immediately has individual character, and it may solely spring from a pure curved outline of his own shaping, one not previously conceived, but wrought by strength and tool to the material. The main construction is determined by the purpose for which it is intended by his effective outline worked out of the material to lighten the effect of the whole, and thus he becomes designer of his work.

We have no doubt that many intelligent carpenters refuse special jobs, or do not appreciate the fact that a great increase of revenue could be acquired, simply because they always did the work but never attempted to conceive it. We know of one builder who as a carpenter made a name as a builder by planning at night neat drawings of porch and bay additions. These he showed to people whom he knew had denied themselves those attractive features when involved in their home building. A man with funds barely sufficient to surround and shelter himself with a home will leave out the porch in his calculations, but both himself, and particularly his wife, are bound to have it added later on. This same businesslike spirit can be cultivated relative to furniture. This desire to make our interiors more attractive is just as uppermost with many as it is to follow styles in dressing. Accompanying this series illustrations are offered with the thought in view that the pieces can be carried out as shown, or modifications made on the same constructional forms. The first subject will be that of a fuel chest, and this will form the basis of our next communication.

(To be continued.)

FRAMING ROOFS OF EQUAL AND UNEQUAL PITCH.

BY MORRIS WILLIAMS.

AFTER explaining the few geometrical problems in our last article, we will now proceed to explain the method in use among carpenters to frame roof timbers with the use of the steel square, and as our purpose is for these articles to cover the whole field of roof framing from the most simple to the most intricate constructions, we will commence with the "lean to" roof, which is usually called "shed roof," and which is simply one side of a "gable roof;" the rafter leaning on the plate at one end, and against the back wall at the other end.

Assuming a shed roof to have a run of 12 feet and a rise of 6 feet, the lengths and cuts of the rafters are obtainable by taking 12 inches on the blade and 6 inches on the tongue, and step along the scantling intended for the rafter 12 times. The blade will give the bottom cut and the tongue will give the top cut. This roof is said to rise 6 inches to the foot run—that is, for every foot of run it has 6 inches of rise. Instead of stepping with the square 12 times, the length of the rafter may be obtained by multiplying the bridge measure of 12 inches and 6 inches by the run of the rafter. In this case the bridge measure is 13 7-16 inches. Multiply

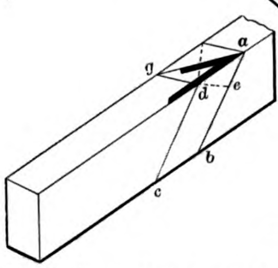


Fig. 2.—Simple Method of Finding Top Bevels of Rafters.

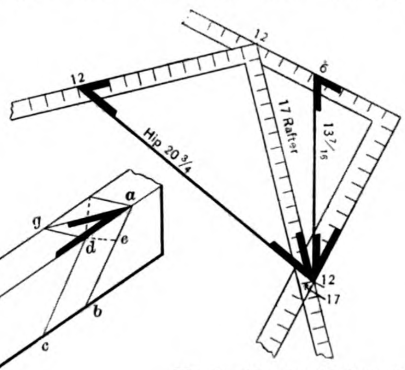


Fig. 1.—Showing Method of Using Steel Square in Obtaining Lengths and Bevels of Rafters in Roof Framing.

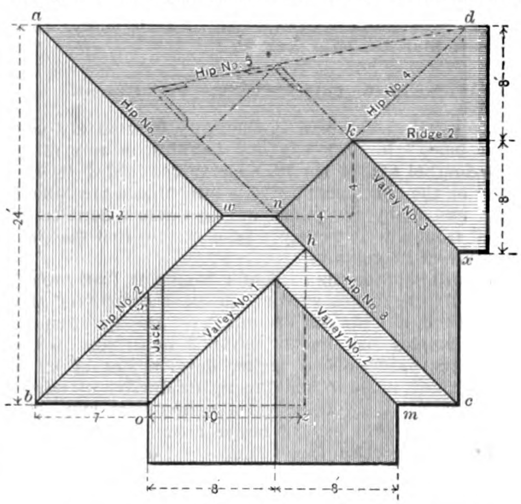


Fig. 3.—Plan of Hip and Valley Roof of Equal Pitch.

Framing Roofs of Equal Pitch.

13 7-16 by 12 (the run of the rafter), and the quotient will be the length of the rafter.

The bridge measure always can be obtained from the steel square and a 2-foot rule, as shown in Fig. 1. Place the foot rule across from 6 to 12 on the square; the rule will measure 13 7-16. The bridge measure, as found, in this manner represents the length of the rafter reduced to a scale of 1 inch to 1 foot; every inch, therefore, on the rule represents a foot, and the fraction of 7-16 a fraction of a foot. In the example under consideration we have 13 7-16 inches, and by considering them as feet we find the real length to be 13 feet 5¼ inches, which is the correct length of the rafter.

The correct length of valleys, hips and jacks may also be found in this manner: In one-half pitch roofs, *h y*, a roof where the run and rise are equal, the length of the rafter will be equal to the run of the hip or valley. Assuming the run and rise to be 12 feet, the length of the rafter will be 17 feet; so also will the run of the hip or valley be 17 feet. Now to find the length of the hip or valley, place the 2-foot rule across the steel square from 17 to 12, as shown in Fig. 1; the rule will measure 20¾ inches, which according to the scale of 1 inch to 1 foot will be 20 feet 9 inches, the exact length of the hip or valley. The square as used in this manner also gives the top and bottom bevels, as shown at 12 and 17 in the diagrams. The simplest method to find the top bevel for the jack rafters is shown in Fig. 2.

The top plumb bevel of the hip is marked on the side of the scantling, as shown at *a e b;* and a parallel line is drawn at a distance equal to the thickness of the scantling, as shown at *e d*. From *d* a line *d g* is drawn square across, as shown, and a line drawn from *g* to *a* will determine the bevel, *a d g*, that will fit against the side of the hip or valley, as the case may be.

This bevel will also fit the hip or valley against the ridge pole, if applied to same after they are backed to conform to the planes of the intersecting roofs. If the hip or valley is left square, as is usually the case, another bevel must be found to fit against the ridge. It should be kept in mind that the bevel shown in Fig. 2 is applicable only where the seat of the hip or valley is at an angle of 45 degrees, or when it is a diagonal of a square. This is the case in roofs of equal pitch only; therefore the bevel in Fig. 2 is applicable only to this class of roofs and should consequently be carefully avoided in roofs of unequal pitch.

Roofs of Equal Pitch.

In Figs. 3 and 4 is illustrated a plan of a hip and valley roof of equal pitch. The design is intended to contain almost every difficulty pertaining to roofs of this class.

Referring to Fig. 3 it will be noticed that it contains three long hips starting from *a*, *b* and *c* respectively; also one short hip designated as hip No. 5, which is shown to be a portion of the long hip designated hip No. 4 in the figure. It contains also three valleys of different lengths and placed in different positions.

Referring to Fig. 4, which is a reproduction of Fig. 3, with the addition of the hips and valleys in their respective positions above their plans, we will proceed to demonstrate the simplest method in use to frame every piece of timber that the roof calls for. The method is usually designated as the "17-inch method." The pitch of the roof in the figures is known as ½-pitch, *h y;* it rises 12 inches to the foot run.

To find the lengths and cuts for the common rafters, the run is taken on the blade and the rise on the tongue. The tongue gives the top cut and the blade gives the bottom cut.

In Fig. 4 the plate *a b* on the left side is 24 feet long; the run of the rafter therefore will be 12 feet. Take 12 on the blade and 12 on the tongue for the cuts and for the length multiply the bridge measure of 12 and 12, which is 17 by the run. For example, 17 multiplied by 12 equals 204 inches, or 17 feet. Thus 17 feet is found to be the length of the common rafter.

To find the cuts and length of the common rafter of the front gable, take 12 on the blade and 12 on the tongue for the cuts and multiply the bridge measure (which is 17 inches) by the run, which in this case is 8 feet. Seventeen multiplied by 8 equals 136 inches, or 11 feet 4 inches; which is the length of the common rafter. The rafter of the right side gable, owing to it having the same run as the front gable, will have the same cuts and be of the same length. In the figure all of these common rafters are shown to coincide with the seats of their correlative hip and valleys. This happens only in one-half pitch hip and valley roofs of equal pitch. Note that the method of multiplying the bridge measure is adopted to save the time it will take in stepping along the rafters with the steel square, as well as to secure more accurate measurement. To find the cuts and length of hip No. 1, take 17 on the blade and 12 on the tongue for the cuts, and for the length multiply the bridge measure of 17 and 12 by the run of the common rafter.

The bridge measure of 17 and 12 equals 20 13-16 inches multiplied by 12, the run of the common rafter will equal 20 feet 9¾ inches, which will be the length of the hip. This roof, as shown in Fig. 3, has three hips of this length—viz., hips Nos. 1, 2 and 3.

Hip No. 4 is shown cut between the main ridge at *n*, and the ridge No. 2 at *k*.

To find the cuts and length of this portion of the hip, take 17 on the blade and 12 on the tongue for the cuts; 12 on the tongue; multiply the bridge measure of 17 and 12 by 8, the run of the rafter, the quotient will be the length of the valley. Seventeen and 12 will give the cuts.

To find the cuts and length of valley No. 1, take 17 on the blade and 12 on the tongue; multiply the bridge measure by 10; the quotient will be the length.

It will be noticed that this valley reaches from *o* on the plate *o b* to *h*, which is a point in the long hip No. 3. By drawing a line from *h* to *z*, and measure from *z* to *o*, we find the run to be 10 feet; hence the "why" the bridge measure is multiplied by 10 for length of this valley. The figures 12 and 17 will give the top and bottom cuts. The cut across the back, where it intersects with hip No. 3, *a h*, is shown at *z*, in Fig. 5.

The top and bottom cuts of the jacks will be found by taking 12 on the tongue and 12 on the blade, the same as for the rafters.

For the cut across the back to fit against the hips or

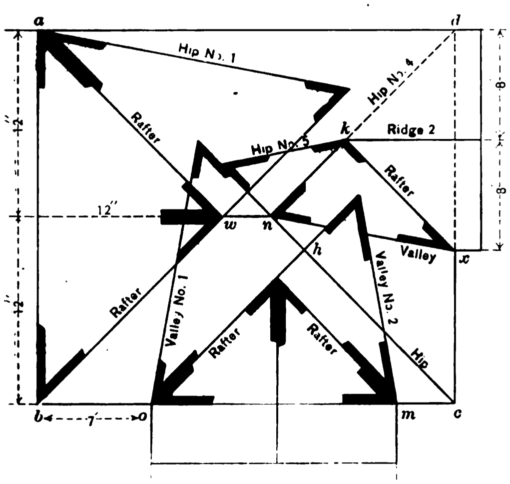


Fig. 4.—Hips and Valleys of Roof of Equal Pitch in Their Respective Positions Above Their Plans.

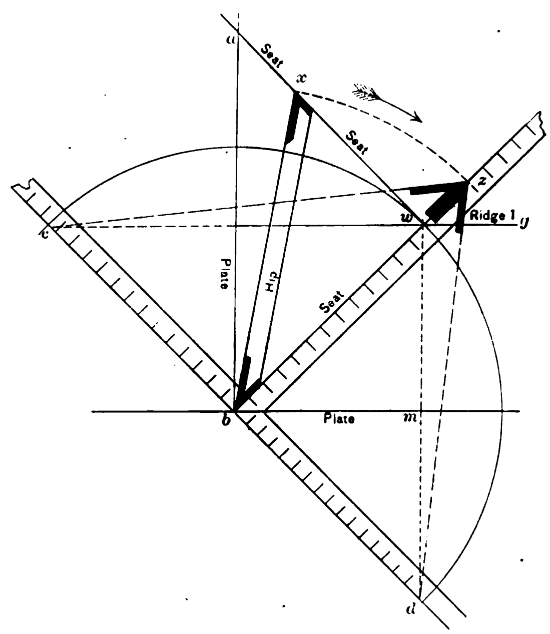


Fig. 5.—Finding Bevel for Hip or Valley to Fit Against the Ridge.

Framing Roofs of Equal Pitch.

the tongue gives both top and bottom cut; and for the length multiply the bridge measure of 17 and 12 by 4, which is the distance between the main ridge and ridge No. 2. This measurement is found by deducting 8 feet, which is the run of the right side gable from 12 feet; which is the run of the rafter from the back plate *a d* to the main ridge *w n*. Note that if the hip marked hip No. 4 was to reach from the main ridge to the plate at *d*, the figures on the square would be the same as for the short hip marked hip No. 5, but that to find the length of it the whole run of the common rafter from the back plate *a d* to the main ridge *w n* would have to be multiplied by the bridge measure of 12 and 17.

Note also that the rule for obtaining the length of the hips and common rafters is to multiply the bridge measure of the figures on the steel square that will give the cuts by the run of the rafters. One might think that for the hip it ought to be multiplied by the run of the hip; but such is not the case—always the run of the common rafter for hips and valleys.

The same rule is applied to find the cuts and lengths of valleys. To find the length and cuts of valley No. 3 in Fig. 3 take 17 on the blade and 12 on the tongue; multiply the bridge measure of 17 and 12 by 8, the run of the rafter; the quotient will be the length of the valley, 12 and 17 will give the cuts. To find the length of valley No. 2 of the front gable, take 17 on the blade and valleys, the method shown in Fig. 2 is the most simple of any for roofs of equal pitch.

If preferable to use the steel square, take the length of the rafter on the blade and the run of the rafter on the tongue; the blade will give the cut. Here I wish to emphasize that these two methods are to be used only in roofs of equal pitch.

The lengths of the jacks may be found as follows: Take the length of the common rafter to be the length of the longest jack; the length of the next to it will be found by multiplying the distance between center of jacks and the length of the common rafter. For example, the length of the common rafter from the left side plate, *a b*, Fig. 3, to *w* is 17 feet, as previously found by measuring the bridge measure of 12 and 12.

Multiply 17 by 2 equals 34 inches, which will be the differences in length of each jack. If 18 inches is determined between the centers of jacks, multiply 1½ feet by 17 equals 25½ inches, which will be the difference in the lengths of the jacks. There is another very simple method to determine the difference in lengths of jacks, which is as follows:

Divide the common rafter into as many equal parts as there are of spaces between the jacks; each division represents the length of a jack—that is, one of the divisions represents the length of the short jack; two represent the length of the second short jack, &c.

The lengths and bevels of the jacks, between valley No. 1 and hip No. 2, shown in Fig. 5, may be found as follows: Take 12 on the blade and 12 on the tongue for the top and bottom cuts, and for the length; multiply the bridge measure of 12 and 12 by the run of the jack, or in one-half pitch roofs by the length of the front plate *b o*—the quotient will be the length of the jack shown from *o* to *x* in Fig. 3. All the jacks between the valley No. 1 and hip No. 2 will be the same length.

The bevel across the back to fit against the valley and hip may be found as was demonstrated in Fig. 2, or by taking the length of the common rafter on the blade and the run on the tongue, the blade giving the cut. This completes the construction except the finding of the bevel to fit the hips and valleys against the ridges.

Probably this bevel is the least understood of any among carpenters. They seem to consider it to be the same as the bevel to cut the upper side of the jacks, but this is incorrect; except when the hip or valley is backed to conform with the planes of the intersecting roofs, but such treatment seldom occurs in practice. As a general rule, hips and valleys are not backed, but left square at right angles to the side of the hip or valley. When thus treated, the bevel that is used for the jacks will not obtain to fit the hip or valley against the ridge.

In Fig. 5 is represented a method to find this bevel that is universal in its application. The plan is that of the left side and front corner *b* of Fig. 4, where *a b* represents the plate; *a w* and *b w* the seat of the two hips respectively; *w* the ridge, and *b m* a portion of the front plate. Square to the seat of hip *b w*, and through *b* draw the line *c b d;* continue the ridge through *w* to *c'*, draw a line square to *w c* from *w* to *d;* extend the seat of hip beyond *w* indefinitely, and revolve the hip, as shown, by the dotted curve and arrow, from *x* to *z*. Connect *z c* and *z d*, thus determining the bevels shown at *z*. The one on the right side will fit the hip *b w* against the ridge, and the one on the left side will fit the hip *a w* against the ridge.

These hips are designated in Fig. 3 as hip No. 1 and hip No. 2. They will also miter the two hips, if required. A little study of this diagram will show that the figures to be used on the square are those that represent the seat and length of the hips respectively; *b z* on the blade is equal to the length of the hip; *b d* on the tongue is equal to the length of the seat of hip shown at *b w*. It will be noticed that *b w* and *b d* are exactly of the same length, as shown by both *w* and *d*, being points on the circumference of a semicircle described from *b* as center.

From the explanation given it is evident that the rule to find this bevel by the use of the steel square is as follows: The length of the hip on the blade and the length of the seat of hip on the tongue, the blade giving the cut or bevel. Now, let it be remembered that this rule is applicable to roofs of equal pitch only. The length of the hip on the blade will obtain for equal and unequal alike, but the length of seat of hip will not obtain in roofs of unequal pitch, owing to its angle with the plates not being 45 degrees.

The rule to find the bevel for unequal pitch is as follows: Take the length of the hip on the blade and the length of the line *c b* or *b d* in Fig. 5 on the tongue; the blade giving the bevel.

When we come to the treatment of roofs of unequal pitch, we will have occasion to consider this bevel more fully.

(*To be continued.*)

Origin of Term "Penny" as Applied to Nails.

The terms "four penny," "ten penny," &c., as applied to nails, refers to their weight by the thousand. Six-penny nails are those of which a thousand weigh 6 pounds; eight-penny nails weigh 8 pounds to the 1000 and ten-penny nails weigh 10 pounds to the 1000. It is an old English term, and meant at first "ten pound" nails (the "thousand" being understood), but the old English clipped it to "tenpun," and from that it degenerated until "penny" was substituted for "pounds." When a thousand nails weigh less than 1 pound they are called tacks, brads, &c., and are reckoned by ounces.

Relative Cost of Building East and West.

Several recent occurrences involving labor difficulties in the building trades in the vicinity of New York City have served to freshly call attention to the vexations which often harass employers in this field of operations, and it would not be surprising if in the not very distant future metropolitan builders and contractors follow the example of their brethren along the State line and institute some needed reforms. The claim is made that building construction in this city costs far more than in any other large city in the country by reason of the limited work performed per man. A flagrant example of this is found in the case of structural work on steel buildings. With the same number of hours per day and the same rate of wages, the erection of steel frame work in New York is said to cost from two and a half to three times as much as in other cities which are also supposed to be cities of high building costs. It is stated that a hand riveter who could easily average 250 to 300 rivets a day contents himself in this city with 80. In other cities, on straight work, a good man finishes up 80 an hour. The pneumatic riveter, which has proved such an annihilator of time in other cities, finds something different in the air of New York and strikes a slow gait. The same tool in the hands of a man in almost any other city will drive 1500 to 2000 rivets in a day against 250 or 300 in New York. It is no wonder that structural erection costs $15 to $18 a ton in this city as compared with $6.50 to $8 in other centers of building activity. There are other elements of cost here which should never have to be taken into consideration in such a business proposition as the erection of a building, as, for instance, fines against the contractor for trumped up charges, which simply mean that he is being called upon to pay the expenses of running the union or perhaps to meet an advance in the salary of a union official to which the latter may think he is entitled.

It was precisely such a state of affairs in Chicago that brought on the great lockout of 1900 which continued for almost the entire year. Up to that time no city in the country was so "easy" from a trades union standpoint as Chicago. It was the shirkers' paradise. The labor day was nominally eight hours, but apparently every man was under instructions not to do more than an able bodied man could easily turn out in six. Employers were constantly being mulcted in fines for the benefit of the unions or the officers of unions. But the day came when the employers resolved to act and they wrought a great change in the conduct of the unions. It was a costly fight, but it had to be made, and Chicago is a better city as a result of it. Some day the building trades unions in New York City may be called upon to pass through the same experience if the leaders do not change their tactics.

An English Building Achievement.

Englishmen are growing restive under the constant disparagement of English methods of work by their own newspapers as well as by visitors from other countries. Hence when a piece of good work is done they hasten to let the world know about it. For instance, the Manchester *News* for November 8 contains a communication from John Kendall, chairman of George Peake & Co., Limited, giving the details attending the reconstruction of their burned warehouse, seven stories in hight, which was accomplished in eight weeks, including the clearing out of the ruins and the taking down of some of the walls. The frame work consisted of cast iron columns and steel beams, which, including the iron principals of the roof, were placed in the time mentioned. The building covers 1000 square yards of land, equivalent to about 200 x 400 feet. Skipworth & Jones of Manchester erected the steel and iron work.

IT is announced by the management of the World's Fair, St. Louis, that 50,000 of the 250,000 gold dollars to be struck in commemoration of the centennial celebration of the purchase of the Louisiana Territory, will be sold at $3 each.

CORRESPONDENCE.

Advantages of Contributing to the Correspondence Department.

From HEE H. SEE, *Montreal, Canada.*—Of all the pages contained in the various issues of *Carpentry and Building* I think those of the Correspondence department are the most popular, and I base this opinion upon my own experience and upon the various comments which I have heard bearing on the subject. I would like to say right here to the younger chips that they do not know the chances to improve themselves they are missing by not using the Correspondence pages for the purpose for which they are intended—that is, for an interchange of ideas regarding trade topics and peculiar jobs of work which arise in their every day practice. I have found that no matter how rough may be the sketches or how patchy the description, our worthy Editor has always been able to straighten them out and make them readable. This helps you to do better the next time, and the man who can express himself on paper to be understood can always make himself understood when speaking of his work to his foreman or to any one who should happen to be working under him. When a man can do this he is the best part of a good bit on the road to success.

Note.—We trust our practical readers will seriously ponder the comments presented above by our Canadian friend and resolve each and every one to utilize the long winter evenings now at hand to write at least one letter to the Editor for publication in the Correspondence department. It may deal with any one of the many topics under discussion in the recent past, describe some peculiar job of work that the writer may have executed or of which he has knowledge, reply to some of the numerous inquiries to be found in the columns of the department, or offer such suggestions and criticism as may seem best calculated to promote the interests of all concerned.

Square Root as Applied to a Flight of Stairs.

From J. F. H., *New Marion, Ind.*—I desire to ask some of the readers of this valuable journal to demonstrate and explain the method of figuring square root and in connection with a rough sketch of a flight of common stairs show its application.

Raising a Frame Building.

From L. H. H., *Greenwood, Ill.*—As there are many problems occurring in connection with a large manufacturing plant which ought to be of interest to members of the trade, I have decided to offer a short description of the method we used in raising a wooden building. The structure occupied an area of 126 x 130 feet, of which 70 feet of the building covered four tracks, as indicated in the plan, Fig. 1. The building was used for constructing, repairing and painting coaches. The 60 feet of the building not covering the tracks was used as a planing mill. It was found that the car shop was too dark, and it was decided to raise this part 6 feet and put glass windows all around, as indicated in the perspective view, Fig. 2. This work was done in the winter with five men, and while the building was crowded with cars and workmen all the time; in fact, the work of car building was not interfered with in any way, even to the varnishing.

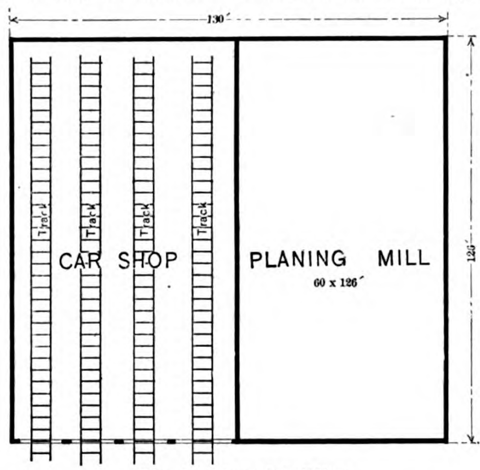


Fig. 1.—Plan of Building.

Fig. 3.—General View of What is Known as a "Hutchicks."

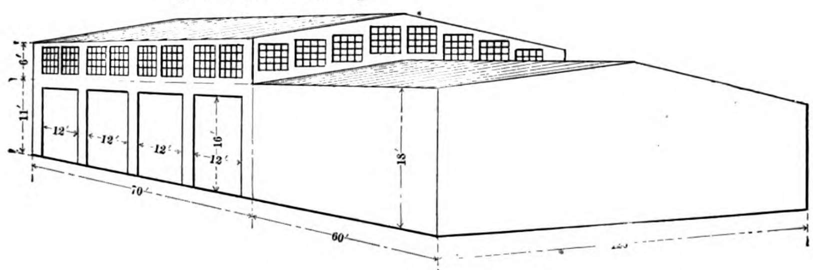


Fig. 2.—Perspective Showing Portion of Building that Was Raised, as Well as the Planing Mill Section.

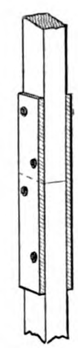


Fig. 4.—Section of Spliced Blocking.

Raising a Frame Building.

The raising was accomplished by the use of what is called on some railroads a "hutchicks," and consists of two pieces of oak timber 4 x 6, about 3 feet long, two ¾-inch bolts 19 inches long, with cast iron washers, and two ⅝ x 5 inch track spikes, all as indicated in Fig. 3 of the engravings. My recollection is that we had not more than 12 14-inch screw jacks, which allowed us to raise six posts at a time. We raised from 6 to 10 inches at a time and used ordinary short blocking until we were up 3 feet, when we spliced on a 3-foot block 8 x 8 inches, as shown in Fig. 4. We used any ordinary scraps of 2 x 8 for spliced plates and 40d spikes instead of bolts. We then proceeded as before until we reached the desired hight, 6 feet, and substituted 8 x 8's 6 feet long, for the 8 x 8's 3 feet long, splicing as shown.

Repairing a Brick Cottage.

From J. F. H., *New Marion, Ind.*—I have a brick cottage 18 x 36 feet in area and with studding 10 feet in hight, in connection with which I desire to make some repairs. One end wall, 18 feet long, must be taken down, and I desire to know if I can replace that with wood work and make a substantial job of it. Will some of the readers tell me how I shall fasten this construction to the brick side walls?

What Constitutes a Day's Work for a Carpenter.

From C. A. L., *Homestead, Pa.*—I have been reading your valuable paper for several years and note with much interest the many topics discussed in the Correspondence department. I wish to say a few words in regard to this day's work question—hanging doors, blinds, fitting sash, shingling, &c.—for I have seen some of it done. I know one man who could hang 20 doors 1⅜ inches thick, put on rim locks and do a good job. He would carry all the tools he used while on the job, or I should say when moving from door to door, in his left hand, and in the other he carried a bench or piece of wood in which to hold the door. He had a regular system and never left a door until it was hung. He had a knack of carrying his tools in his hip pocket and was never obliged to reach to the floor for a screw driver, bit or try square. If one watched him closely it could be seen that he never moved outside of a radius of 10 feet from the door he was hanging. Everything seemed to be in place and he moved at a moderate speed, every movement being deliberate and accurate. The tools were few and of the very best. The same man is now foreman for a builder in the vicinity of New York and is noted for his shorthand methods of executing a job.

I wish to say in regard to shingling I have had a record of laying from 4000 to 5000, using a gauge on the hatchet, the shingles being laid on shingle lath on the roof, or where the sheathing boards were spread enough to get a foothold. I never used chalk line, scaffold or anything but a gauge on the hatchet. The greatest task is piling the shingles on the roof in such a way as best to facilitate the work. First calculate what a bunch will cover, then arrange the bunches on the roof, so that after having carried them from the ground and placed them on the roof it will not be necessary to roll them around every now and then in order to keep them out of the way of the shingler. Take up enough nails in a barrel to last until dinner time and do not go down after a chalk line and then forget what you went after. Take a few minutes for thought of what is needed, and then after all the necessary tools are on the roof remain there until the work is finished —that is the whole thing.

I have been across the country and have seen more or less of what is going on. For traveling I have a small box that can be carried on the shoulder, just long enough to hold the longest saw or tool. It is about 10 or 11 inches deep and the same width. My idea is to learn to work with as few tools as possible and by so doing a great deal of time will be saved. Experience will show that the tools must be of the very best quality and must always be kept with a keen edge. With an outfit of this kind it will not be necessary for the mechanic to wait for a team to haul his "freight car," and if the boss has any good jobbing to do you will generally get it, as he will find that you can move your kit the easiest.

In regard to shingling, I wish to say that I was in Boulder, Col., some time ago and ran against a fellow we called "Billy the Shingler." Another man and myself were on the roof when he came around and asked for a job. The boss asked what he could do. He said he could shingle and lath a little. The boss said he did not want any hatchet and saw men working for him. But Billy said, "I'll tell you what I will do. Pay me what you pay one of those fellows and half again and I will put on as much as two of 'em." Strange to say, he did it, and Billy got all the shingling in sight. The boss had fun with us after that, I can tell you. Billy could put on between 6000 and 8000 shingles on a plain roof. My respects to Billy if he sees this article; my hatchet has been rusty ever since.

I was accustomed to holding my own with anybody I met. So I say to the young mechanics, Don't get the idea you know it all. Read all you can about building, study plans, learn drawing, study geometry; go to an architectural school if possible; study mathematics, listen to builders and good mechanics, and you will find out after a while that the study of architecture is fascinating. I wish to say in conclusion that some of my tools are now on the walls as ornaments. I am now working for an architect, designing heavy buildings of steel construction and doing general office work.

From M. L., *Newark, N. J.*—Once more I wish to ask for a little space in your valuable journal, and hold up my hands and say, well! well! there are still more of those wonders at large. At first we heard of the man of 3500 shingles per day. Now comes F. T. Odell with his 4000 shingle man and his little hatchet with a hole and pin. I would say to this that there is a great demand for such men in this part of the country, but the trouble is they don't seem to get this side of the Allegheny Mountains. I trust, however, we may some day receive a call from them.

Again "T. J. La B." comes along with his man and dispenser of shingles, and another one who lives on 1⅜ x 2-8 x 6-2 doors. The readers of this paper may think me a crank, or some one who writes just for the fun of criticism. Such, however, is not the case. I have had 16 years' experience, and of these I was a foreman for nine years. As yet I have never come in contact with the great workers, such as those mentioned, but I find some consolation in knowing that there are such in the land of the living. The remarks of J. P. Kingston are to my way of thinking as nearly right as any yet published. A man may lay 3000 shingles in one day, but not every day. Again, it is not often we get a straight roof, but take the average roof, and from 1800 to 2000 shingles is a good day's work of eight hours.

I think there is more than a joke in the suggestion of C. A. Wagner, as regards a diploma or certificate of competency. For every first-class workman there are 25 who know nothing about the business except to cut to the mark and 10 per cent. of these cannot satisfactorily do that. My idea of a first-class mechanic is one who can lay out any kind of building from the ground up, cut every timber on the ground to its proper length and size, trim the house and do it right, put up the stairs and hand railing, and if called upon to do so, lay out and make the sash, blinds and doors. He should also have a fair knowledge of wood working machinery and be able to draw up a set of good working plans, for in my opinion a man to understand a plan should know how to make one. Of course the readers will jump on me for this opinion, but I say come one, come all—the more the better. No one's work is complete or perfect without criticism. I trust that all readers will take a hand in nailing this to the mast or haul it down, according to the way it strikes them.

From D. B. S., *Alexandria, Minn.*—I have been reading with much interest the discussion of day's work for a carpenter, and although I am a comparatively new subscriber, yet I would like to add some comments derived from my own experience. With regard to shingling I might just tell what I have done on a few occasions. This summer three men and myself laid 32,000 shingles on two old buildings, one being 24 x 44 feet and 28 feet high at the eaves, while the other was a one-story building. We built the scaffold to the eaves, took off the old shingles, put on the new ones, took down the scaffold and pulled all nails, cleared up on the lumber used and put it in a pile at the cost of $1.15 per thousand for the shingles used, the wages being 25 cents per hour. On this job one man and myself laid and nailed four bunches in 40 minutes, just to see what we could do. Two years ago I took a job of 20,000 shingles on an old building. We had to remove the old shingles and put on the new ones at $1 a thousand. We made $2.50 per day of ten hours. The shingling was done on long roofs and straight work. On house roofs that are cut up I find I can do work at the rate of about 2500 shingles per man per day of ten hours on an average. Here we laid all shingles to a straightedge, one man laying and another nailing.

As for door hanging most of the readers seem to think that 12 to 15 pine doors in a day is a big job, and it is a big day's job, for a man has got to be pretty good to do it. I know it can be done, for I have seen a few men accomplish it. I have fitted, hung and locked 12 in a day, and I know I can fit, hang and trim with mortise locks. 15 common white pine doors in ten hours, but will not put on stops or thresholds. I have fitted and hung a 2-6 x 6-6 x 1⅜ inch door in 22 minutes, and I have put in mortise lock in 13 minutes, but this is far above the average. I figure on about 50 cents each for trimming doors, with the average man. Now as to hard wood doors, four years ago I hung 60 doors in one building, each being 3 x 7 feet by 1¾-inch solid Georgia pine, with three 4½ x 4½ butts, in six days of ten hours each, but did not put in locks. To-day I finished hanging six doors in a house, which were 3 x 7 feet by 1¾ inches, with three 4 x 4 inch butts; one door 3 x 7 feet by 2¼ inches and one door 3½ x 7 feet by 2¼ inches with three 5 x 5-inch butts, which were red oak doors and finished complete. It took me an average of two hours and 15 minutes per door to fit, hang and put in mortise locks complete. The stops were in the frames and the doors swung without thresholds.

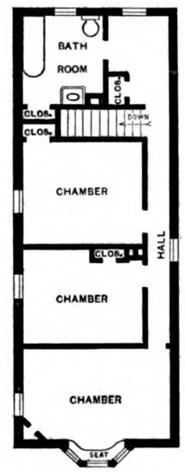
I wish to make a suggestion. We can gain something by learning what others are able to do, but cannot we gain more by learning how they do it? I employ methods of doing work which I see very few use, and will pass them along, hoping others will do the same. With regard to hanging common pine doors, I first placed them around where they are to be hung, after which I took a slide measure—two sticks put together with a slide—so I can get the width of jambs conveniently and place them on the top and bottom and mark the width; then take a piece of board 4 or 6 inches wide and cut it so it will go across the frame and fit tight. I place it about 2 feet from the floor and cut a notch to hold up the door. Turn the door on edge with the end in the notch and joint to marks. By this means there is no bother of moving doors or anything of that kind. I then take a piece of hard wood about ¾ x 2 inches and rabbet it the width I want the hinges to go on the door and just the depth I want to cut the gain, then cut to the exact length of the butt and the result is a gauge for all marks on the door and jamb. Put the door in the frame, and with a knife mark on both door and jamb where the butts are to come. Take down the door, place the block at these marks, and with a knife mark all around, which saves on gauges and is done almost with one motion. For painted and better work I use a Stanley butt gauge. If I have a number of doors of one thickness on which I am to put locks, I take three pieces of board about a foot long and nail them together, the same as a miter box, the bottom as wide as the door is thick and the sides about 6 inches. Then lay it out for the lock. Bore holes in the bottom just as I want them in the edge of the door for the lock, and I always bore close together; then through the sides bore holes for the knob and key; slip the box on the edge of the door up the proper hight, stopping with a brad and bore all holes before taking off. Now this may be old to some readers, but perhaps if it finds its way into the paper it may help some one.

Front Elevation.

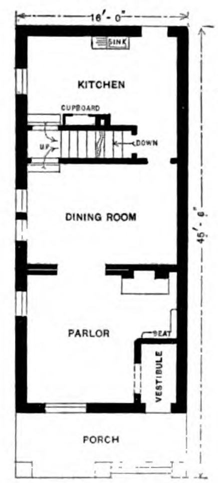
Side (Left) Elevation.

Plans For a Small Brick House.—Scale, 1-16 *Inch to the Foot.*

From SLOW ONE, *Long Island, N. Y.*—I have been much interested in the various letters published during the past months on what constitutes an average day's work for a carpenter. The articles have been entertaining and instructive. and now while I desire to present a few comments I am not going to say what constitutes a day's work, but figure a little on what others do. I notice that some of the hustlers lay from 3500 shingles, which my brother from Stockton, Cal., considers a small day's work, up to 7500 in nine hours, and even 10,000 in ten hours. Now I suppose these shingles were properly nailed, two nails to each shingle. If they were not, what is the use of the discussion. It takes 15,000 nails to properly nail 7500 shingles, and in nine hours there are 32,400 seconds, which allows a man not quite two and one-sixth seconds to pick up, place in position and drive two nails in each shingle. The other express (?) who laid 10,000 shingles in ten hours has one and four-fifths seconds to do the same work; likewise, the wonder in Blue Earth, Minn., has about two seconds. Just think of doing that all day long. I think we might place them in a class by themselves and label them "The Eighth Wonder of the World." We of the East are not in it. The man who lays 2000 shingles in nine hours has only eight and one-tenth seconds in which to do his work, and we won't say anything about his carrying the shingles onto the roof.



Second Floor.



First Floor.

Cementing a Cistern.

From J. F. H., *New Marion, Ind.*—Will those who have had experience tell me which is the better way to cement a cistern? Will it last longer to first wall the cistern with stone or brick or leave out the wall and cement to the dirt?

Plans for a Small Brick House.

From E. I. R., *Columbus, O.*—In reply to "J. M. R." of Morristown, Pa., who asks in a recent issue for plans of two-story brick houses, I send drawings which may be of suggestive value to him and possibly to others. The drawings show front and side elevations and first and second floor plans of such a house as I understand from the correspondent's description that he requires. As there was nothing said about the heating, I have placed a grate in the parlor which, with the seat at the right, will make a cozy little corner. I have also placed bathroom over the kitchen and have made a few other changes, which can readily be seen from a comparison of the correspondent's plans with those I present. The first-story wall is 12 inches thick and the second story 9 inches thick. The hight of the ceiling in the first story is 9 feet 6 inches and in the second story 8 feet 6 inches in the clear.

Method of Binding "Carpentry and Building."

From FRANK K. THOMSON, *Raleigh, N. C.*—The binding which I have recently put on my loose numbers of *Carpentry and Building* has proven so satisfactory that I have thought some of the readers might be interested in knowing about it, especially at this time of year, when the winter evenings can be put to good use. In the first place straighten and take out the wire fasteners that hold the pages together and remove the covers and advertising sheets. Arrange the months in order and see that the supplemental plates are in their proper places. Select from those removed as many good covers as one may have volumes to bind and with a sharp knife or straight edge cut them apart, leaving the front and back separated. Obtain from your dealer a yard or more of cheesecloth and a bottle of good mucilage. Cut the cloth in pieces slightly larger than the backs, spread a good coat of the mucilage on the inside of the cover and lay the cloth smoothly over it. Slip the cover between two sheets of heavy paper or between the leaves of an old magazine a little larger than the covers and screw down in an ordinary letter press for half an hour. If taken out while still damp the extra sheets will come free from the cloth without sticking. The covers should now be laid aside in a warm place until dry. When thoroughly dry take a sharp knife and a straight edge and trim the cloth close to the edges of the covers. We now have an ordinary *Carpentry and Building* cover front and back separate, reinforced on the inside with cloth which will prevent its tearing.

Now we are ready for binding. Get from your book store a box of brass paper fasteners with round heads and a box of washers for same. Take a strip of paste board and make a gauge to cut for your fasteners. The end fasteners should be about 1¼ inches from each end and the other two spaced equally between. Lay a magazine on a soft board, lay the gauge on the magazine and with a small knife blade cut a hole for the fasteners through each gauge mark. The holes should be about ½ inch from the back of the magazine to the center of the hole. Cut holes in each month separately, then the backs, being careful to lay the gauge from the same end of the magazine each time. If the holes are properly gauged and cut the fasteners will slip in without any trouble by first putting them through the front cover, then each month at a time and finally the back. Put the washers on next and with a thin steel paper knife or something similar press down hard between the ends of the fasteners on top of the washer and separate them. A slight tap with a hammer on the washers will rivet the fasteners and complete the work. It is well to tap down the magazines as they are put on, particularly close to the fasteners. This will cause them to lie closer and make a more compact volume.

I have bound several volumes of *Carpentry and Building* in this manner, one year to a volume, and find that it makes the best cheap binding I have ever seen used.

Construction of Molds for Artificial Stone.

From W. A. F., *Camden, Me.*—Will "J. E. S." of Delaware City, Del., or some other reader of *Carpentry and Building* please explain the method of constructing the forms for artificial stone composed of Portland cement and gravel and intended for use as stone steps? The method of making walks has been very fully explained and if carefully followed one could do a very good job. It seems to me, however, that the steps are the most difficult part of the work. How can the second coat of cement and fine gravel be put on the top and front of the step at the same time before the material sets. I think this is a question that interests every one who owns a house.

Note.—With no desire to anticipate the comments which our readers may present in answer to the above, it may not be without interest to give the suggestions as to laying Portland cement steps offered by F. H. Crafts of Rochester, N. Y., whose valuable article on "Laying Portland Cement Walks" appeared in the issue of the paper for December. He says:

The lower step is always laid first. A concave frame 7 or 8 inches high is useful in making steps with a convex "rise" of front. The face of the frame is planed smooth and sometimes painted with shellac. The second step laps over the one below.

When ready for the step concrete is packed in behind the frame, but not against it. Rich mortar 1 inch in thickness is plastered along the face of the frame, a little at a time, to keep away the concrete, which is tamped all the time it is going in, great care being taken to make a good job. The tread of the step is finished, and as soon as the step is hard enough to stand alone the frame is removed and the face of the step finished with a steel trowel. The tread should be 14 or 15 inches wide when another step is to be laid above, and it is not necessary to finish a step back of the tread as this part will be covered by the next step.

Sharpening a Hand Scraper.

From PAUL D. OTTER, *Chicago, Ill.*—I have noted the inquiry of "C. C. H.," Brookville, Pa., on page 311 of the December issue, relative to sharpening a hand scraper. If the correspondent will refer to the article in the October number entitled "Cabinet Work for the Carpenter," page 242, second column, he will find his question covered at length in the description of stock dressers' scraper. The blade in this instrument is sharpened with the purpose of holding a more permanent edge than that commonly given a cabinet scraper blade, and when used without the handle described the edge is squared without grinding on one side. Then both edges are turned down and treated with a steel burnisher, as described, giving a reserve edge when one side becomes too dull. This method of sharpening with an oil slip and burnisher will give a more durable edge than filing and oilstoning.

Design Wanted for Store Building.

From F. C., *Grand Falls, N. B.*—I would like to ask some of my brother chips to tell me the best way to construct a two-story building, covering an area, say, 30 x 60 feet. The lower floor is intended to be used as a store for groceries and dry goods and the second floor as a furniture store. Part of the cellar will be used for the storage of goods, and a portion of the first floor will be set aside for the same purpose. The building is to be heated by hot air with the furnace located in the cellar. I want a plate glass front and an office between the store and the rear portion where goods will be stored. It is desirable t have no posts on the first floor at the front of the building, as I want the space clear as much as possible. If the readers who contemplate answering this inquiry consider the dimensions of the building which I have given out of proportion for a store of this kind, they can change the size to suit their own ideas. I have been a reader of the paper for some time, but this is the first question that I have ever sent to the Correspondence Department. I hope the readers will give it early attention and express their views, accompanied by drawings, as the matter may interest others beside myself.

Frost on Windows.

From H. B. M., *Barrie, Ont.*—A copy of the issue of *Carpentry and Building* for March last has just come under my notice, and in looking over the various communications in the Correspondence department I find on page 68 some comments regarding the prevention of frost on windows. Let me simply say that the treatment of closed in windows as there recorded can be fully indorsed. In this north country, where we have 20 to 30 degrees of frost the plan there outlined is followed with success.

WHAT BUILDERS ARE DOING.

SUBSTANTIAL evidence of prosperity in Chicago is afforded by the November real estate record just issued, the transfers showing not only a large increase in value over the sales during the corresponding months for many years, but placing November among the foremost months of the current year of increased activity. And the same is true of actual building operations even to a much greater degree. But not only in the consummation of important deals has November been prominent; it has been rather more conspicuous as the birth month of other and greater real estate projects which the future will develop.

In some respects really more interest is aroused by the record of the actual building operations of the year than by the mere transfer of property. Already during the 11 months just closed the value of the new structures is over $45,000,000, and by the close of the year fully $50,000,000 will have been involved, the greater portion of which already has been distributed. Thus the building record of 1902 is without precedent, the value of the structures completed and under way during the past 11 months exceeding by from $10,000,000 to $13,000,000 the value of the buildings erected during any previous corresponding periods. The number of individual contracts in 1902, however, was exceeded during the years from 1893 to 1896, inclusive, many permits having been issued for cottages during those years. It is worthy of note that apartment houses are increasing in favor, predictions to the contrary notwithstanding, and even more significant is the number of permits issued for factories and warehouses recently, the former largely predominating. Much activity is being displayed in the machinery district of Chicago, in the neighborhood of Canal street, more especially in the demand for warehouse facilities resulting from the rapid growth of Chicago as a center of the distribution of machine tools and special machinery.

Chattanooga, Tenn.

A shore time ago the leading building contractors and others prominently identified with the building trades of Chattanooga, Tenn., organized a Builders' Exchange, with the following officers:

President, John J. Mahoney.
Vice-president, John Heibeck.
Treasurer, Walter W. French.
Secretary, W. G. Wells.

We understand that at present the exchange has a membership of 73, representing nearly every trade which contributes in any way to the construction of a building. At a recent meeting copies of the new constitution and by-laws were distributed.

Cincinnati, Ohio.

Not long since the leading building contractors of the city and county held a meeting in the rooms of the Builders' and Traders' Exchange in the Grand Opera House Building and formed what is known as the "Contractors' Association of Hamilton County." According to the information given out the meeting was called for the purpose of completing an organization having in view the regulation of abuses in the building trades, particularly those relating to unwarrantable and unjustifiable interference on the part of labor unions in the business of the contractors.

The officers elected were Archibald Colter, president; Louis Belmont, vice-president; Ezra Lawton, secretary; E. Griewe, treasurer, and John Simon, sergeant-at-arms.

It is claimed that 90 per cent. of the local building contractors are represented, including cornice makers, stone masons, carpenters and bricklayers, while the plasterers, steam fitters, stair builders, iron and stone contractors have the matter under consideration.

Los Angeles, Cal.

The statistics for the fiscal year ending November 30, 1902, as compiled by the City Superintendent of Buildings of Los Angeles, show that 4655 permits were issued for improvements, aggregating $8,981,974. These included, among others, one 12-story brick structure, costing $275,000; one six-story brick building, costing $120,000; two five-story brick buildings, costing $165,000; four four-story brick buildings, costing $168,000; 126 other brick structures, costing $885,529, and frame buildings, costing in round numbers $6,379,000.

Natick, Mass.

The leading builders and contractors, as well as others identified with the building trades, have recently formed a Builders' Exchange for the purpose of securing those objects which accrue from an organization of this character.

The officers elected for the ensuing year are E. T. Wilson, president and secretary; D. J. Ferguson, vice-president, and W. D. Parlin, treasurer.

New York City.

Building operations in the city and suburbs continue upon a scale of reasonable activity, considering the season of the year, the high cost of building materials and the general attitude of labor. The figure at which building materials are held has caused more or less complaint on the part of prospective builders, and no inconsiderable amount of home building in the suburbs has been delayed, if not altogether postponed, on this account.

Some figures which have been compiled, covering various branches of building construction and embracing the period from 1898 to 1902, show a total average increase of nearly 30 per cent. This covers leading materials entering into the construction of a building and the increased cost of labor in these particular trades. Of course the greatest advance has been in iron and steel, although lumber should be charged with no small part of the increased cost of construction.

An idea of the extent of building operations in the boroughs of Manhattan and the Bronx from January 1 up to the middle of December may be gained from the statement that there were issued 1627 permits for building improvements, estimated to cost $86,053,775, as against 2473 permits, calling for an expenditure of $115,228,700 for the corresponding period of last year. In Brooklyn there were 2955 permits issued from January 1 up to the time of going to press, calling for an estimated expenditure of $16,802,130, as compared with 3180 permits for improvements, costing $17,573,350 for the corresponding period of 1901.

Philadelphia, Pa.

At a recent meeting of the Board of Directors of the Master Builders' Exchange steps were taken looking to an organization of the master builders in the city embracing all branches of building operations, by which disputes between workmen and employers which they cannot adjust will be referred to an Advisory Board, which is intended to be the final court of appeal. This board is composed of John Atkinson, John S. Stevens, George Watson, William H. Albertson and John D. Carlile.

The following circular letter signed by the members of this board and stating the object of the movement was ordered sent to the different organizations of employers:

"The undersigned board earnestly call your attention to the enclosed resolutions which were unanimously adopted by the Master Builders' Exchange at its last quarterly meeting, held on Tuesday, November 25, 1902, and at a special meeting of the Board of Directors held on Monday, December 1, 1902. The president appointed the undersigned, with the approval of the Board of Directors, as an 'Advisory Board' of the Master Builders' Exchange.

"The object of this board is not to make war on trade organizations as has been stated by some of our daily papers, or in fact to make war on any one, but rather to make peace by preventing strikes and lockouts that have so retarded the construction of buildings during the past year.

"We also ask you to strengthen your organization by soliciting all in your branch of the business to join, to inaugurate conference committees with your workmen and to endeavor to create a feeling of good will with them, with the object of preventing trouble; in event of your efforts proving of no avail, then to report the case to the Advisory Board for its action.

"You are particularly cautioned to see that all contracts are made in accordance with the recommendation of the resolutions relative to strikes and lockouts, in order that if the Advisory Board are compelled to exercise the power conferred it will find you in position to comply with its decision without loss from penalties for delay.

"It is the object of the exchange and the Advisory Board to exhaust all conciliatory measures before resorting to the stoppage of work, and urge you to do the same. It is hoped that with a strong organization comprised of employers' associations in all branches and in conjunction with the Builders' Exchange, also with the indorsement of individuals, who will not join employers' associations, that the effect will be to render less frequent and may possibly do away altogether with the foolish exactions and with sympathetic strikes without resorting to extreme measures.

"It must be acknowledged by all concerned that it has become absolutely necessary that something should be done to prevent a repetition of the experiences of the past year, and as the Master Builders' Exchange have been repeatedly appealed to, they have deemed it necessary to appoint this board as the first step toward joining hands with all organized bodies throughout the city of Philadelphia, for the purpose of co-operating with the 'Advisory Board' in this good work.

"We therefore earnestly appeal to your organization to act on the enclosed resolutions at your earliest convenience, and we sincerely trust that you will stand by us, shoulder to shoulder, in this good work, pressing steadily to the front until strikes and lockouts shall become a thing of the past, and thereby creating a feeling of good will and fellowship between the employer and the employee.

"We therefore respectfully ask your association to adopt the enclosed preamble and resolutions, and return same to the Advisory Board."

The resolutions defining the position of the exchange, and referred to in the circular letter, are as follows:

"*Whereas*, At a regular meeting of the Master Builders' Exchange, held on November 25, 1902, the following preamble and resolutions were unanimously adopted—to wit:

PREAMBLE AND RESOLUTIONS.

"*Whereas*, The trade organizations of workmen connected with the building trades, by their repeated strikes and stoppages of work on buildings in the process of erection, have caused much annoyance and a great loss of money to the contractors and the building public; and

"*Whereas*, The workmen have by organizing and enforcing what they call 'the sympathetic strike,' by calling from work all workmen engaged on a building, and stopping all work in all branches for a fancied or real grievance in only one of the branches; and

"*Whereas*, The times are fully ripe for the employers to form organizations in self defense; therefore, be it

"*Resolved*, That we urgently recommend to all employers in the building trades to organize for mutual protection against unfair and arbitrary demands of the workmen.

"*Resolved*, That we recommend the formation of an 'Advisory Board' of five (5) members of the Master Builders' Exchange, to be appointed by the president, subject to the approval of the Board of Directors, to whom shall be referred all disputes that the employers are not able to settle satisfactorily with the workmen.

"*Resolved*, That the Advisory Board shall have power in the event of a strike in which all fair efforts have failed to effect a settlement, as a last resort to stop all work on all buildings in process of erection by the members of the association.

"*Resolved*, That it be recommended that the Uniform Contract be used, including the clause relative to strikes and lockouts with all their contingencies.

"*Whereas*, At a subsequent meeting of the Board of Directors of said exchange the president appointed, and the Board of Directors unanimously approved, the following named gentlemen as an 'Advisory Board'—viz.: John Atkinson, John S. Stevens, George Watson, Wm. H. Albertson and John D. Carlile. Therefore, be it

"*Resolved*, That this association agrees and binds itself and its members that in case of a dispute or disagreement between the employers and workmen of this or any other organization of employers and their workmen engaged in the building trades that they may fail to settle by arbitration, by conference committees or by other means, then that said matters shall be submitted to the said Advisory Board for their consideration.

"*Resolved*, Should said Advisory Board fail in satisfactorily settling said dispute or disagreement they shall have power in their discretion as a last resort to stop all work upon any or all buildings in process of erection or completion.

"*Resolved*, That this organization for itself and its members agrees to abide by the decision of said Advisory Board and cause all work in our respective line to cease until said Advisory Board shall order said work resumed."

The report of the Bureau of Building Inspection for November shows that there were 599 permits issued, covering 847 operations, estimated to cost $2,116,250, as compared with 676 permits, covering 841 operations and involving an outlay of $1,813,390 for the same month of last year. Taking the first 11 months of the year the cost of the building improvements undertaken reached a total of $27,827,370, as against $26,711,190 for the same period in 1901.

Seattle, Wash.

The building record for the month of November does not rank very high as compared with previous months. The large number of permits, with the comparative small valuation, prove the assertion that the custom of starting buildings in the fall has been abandoned. This month has been given over especially to repairs and alterations, and these two items are quite prominent. Many of the architects' offices are now full of work, and the majority of the new buildings will be started as early in the spring as the weather will permit. The best and costliest improvements include a number of hotels, apartment houses and semi-business buildings, beside a library building, the Y. M. C. A. Building, the new home of the Seattle Athletic Club and that of the Rainier Club.

Utica, N. Y.

The members of the Builders' Exchange held their first meeting since the summer vacation period late in November in Arcanum Temple. A large representation was present, and while routine matters were discussed the most important business transacted was the election of delegates to the annual convention of the New York State Association of Builders, to be held in Albany in January. The delegates selected were William Fisher, B. McDermott, Joseph Wicks and C. Y. Fuller. At the conclusion of the business session a luncheon was served by Caterer Stockhauser of the Arcanum Club, and the evening was spent in social enjoyment and renewing of friendships.

LAW IN THE BUILDING TRADES.

SCOPE OF PARTNERSHIP IN FIRM OF ARCHITECTS.

A member of a firm of architects, who was practically managing the business of the firm, one member being abroad and another engaged in matters not connected with the firm's affairs, who contracts for plans of a residence and mausoleum, is acting within the scope of the business of the firm, and such contract is binding on them.—74 N. Y. Supp., Rep. 711.

FAILURE TO REMOVE NAILS FROM PARTIALLY BURNED TIMBERS NOT NEGLIGENCE.

The rule that an employer must furnish his workman a safe place in which to work or perform his services is not applicable when the employee is hired to take down a building. And the failure of a contractor, before attempting the removal of material in tearing down a building, to clean it up by removing the nails from partially burned timbers or permit it to be done by those in his employ, is not negligence as a matter of law.—Merchant *vs.* Mickelson, 101 (Ill.) App. Ct., Rep. 401.

The work of tearing down a building is necessarily attended with danger, and the rule that it is incumbent upon the master to furnish the servant a reasonably safe place in which to do his work does not apply.—Western Wrecking & Lumber Company *vs.* O'Donnell, 101 (Ill.) App. Ct., Rep. 492.

LIABILITY OF SECOND CONTRACTOR.

Where a contract to construct a building according to certain plans and specifications was abandoned by the contractor when the work was partially completed, and another contractor was engaged to finish the work according to the original plans and specifications, the latter contractor is bound to correct, without extra cost, such defects in the work and materials formerly employed as were apparent to a competent and careful observer; but the lost of correcting defects not so discoverable is not within his contract, and the owner must pay for same, and is entitled to recover them from the first contractor.—67 Pac., Rep. 499.

RECEIVER OF BANKRUPT CONTRACTOR TAKES MATERIAL ON THE GROUND.

Where the owner of a building advanced more money to the contractor than was required by the contract, believing that the material on the ground was sufficient security for such advance, but took no possession of such material until after the contractor was adjudged bankrupt, such owner acquired no lien on such material by reason of such advance, as against the trustee or receiver.—112 Fed., Rep. 638.

MEASURE OF DAMAGES WHEN PREVENTED FROM COMPLETING CONTRACT.

Where a contractor, after part performance, and without fault on his part, is prevented by the other party from completing the contract, and sues for breach of same, his measure of damages will include compensation for labor done and material furnished, and such further sum as may, on legal principles, be assessed for the breach.—51 Atl., Rep. 89.

CONSTRUCTION OF PLUMBING CONTRACT.

A plumber's contract for a dwelling house "to properly connect tank, boiler, range, wash trays, butler's sink and bathtub with galvanized pipe with hot and cold water, to be put in good working order," does not require a circulation pipe for the hot water.—50 Atl., Rep. 1028.

MAKING VENEERED DOORS.

MORE or less interest attaches to the construction of veneered doors, for while the carpenter and builder as a general rule purchases what he may require from the factory, yet there are occasions when it is necessary or desirable for him to make the doors in his own shop. To all such the following article, contributed to a recent issue of the *Woodworker* by H. T. Gates, may not be without suggestive value. Regarding the necessary equipment the writer says:

Aside from the usual door making machinery, this consists of larger facilities for preparing and applying glue, veneer press, resaw for veneers and panels (unless they are purchased from a dealer in veneers), a warm room where the glue may be applied and material gotten ready for the press. Unless the factory is already supplied with a large kettle for preparing glue, it will be found of advantage to make a large copper kettle that will fit the holes in the heater, but large enough to hold three or four ordinary sized kettles of liquid glue. This can be done by making it higher and wider about the flange, as shown in Fig. 1. In this way sufficient glue may be made ready for a good sized batch of doors without fear of running out.

Of course, these remarks do not apply to the factory having modern glue spreaders, hand or power feed, which are very essential in strictly veneer establishments. The remarks apply only to the shop where veneered doors are one of the many by-products, so to speak, which accompany the usual line of mill work.

For spreading the glue by hand procure a 4-inch flat wall brush and prepare it by pouring alcohol gum shellac into the roots of the bristles, and driving blind staples into the butt end, as close together as possible, thus preventing the bristles from coming out. Have a pair of "horses" about 3 feet high, strongly made, and having an angular piece on the top, to prevent waste of the glue, and squeezing it off the work at the bearing point, as shown in Fig. 2.

Make the veneer press wide enough between the uprights to permit of veneering a table top or wide panel if needed, and have two rows of screws, so that two stacks of cores may be pressed at one time. A strong press can be made with 6 x 6 inch maple cross pieces and ⅞-inch round iron rods, with jamb nuts to hold the upper piece in place, having regular veneer press screws at least 1⅜ inches diameter. The bed piece should be lagged up and trued, so that it will be straight and out of wind. To prevent the work from sticking to the bed it should be covered on the top with zinc or tin, as indicated in Fig. 3.

For resawing veneers and panels, where there is no band resaw, a gauge, Fig. 4, and pressure roller, Fig. 5, used on the band saw table, and 1½-inch saw in proper trim, with right management should turn three or four veneers out of inch stock, which may be applied direct to the coring without dressing, as described later on.

To do a good job of gluing to advantage it is necessary to have a warm room, so that a large batch of material may be worked at one time. There are various other purposes to which this room may be put, but to make a veneered door properly, without waste material or lost time, a warming room is very essential. First, the parts of wood to be glued must be thoroughly warm, also the temperature of the room where the work is to be done must be such as not to chill the glue and hinder its spreading and making good joints.

It is taken for granted that our factory has a hand jointer, pony planer, mortiser, tenoner, sticker, door clamp and drum sander. It is a question whether veneered doors can be profitably made without the few essentials here enumerated, and where they are made in quantities special machinery for spreading glue, cutting moldings, presses, clamps, panel raisers, &c., will be needed.

Dry coring is the first thing that is required to make good doors. It is usual to cut up the material and put it in the dry, or warm, room referred to above, or in a dry kiln, properly stacked, and leave it there as long as possible to drive out every particle of dampness. All waste material of suitable size and too poor to be used for any other purpose may be used for coring. It is preferable to have the strips wide enough so that when glued up they may be split through the center, as shown in Fig. 6, to make two stiles or rails, thereby saving much labor in gluing, which item cuts quite a figure in veneered door work. The stock sawyer can lay aside such material from time to time and have it stored as mentioned, so that there is a supply of dry stuff to draw on when a batch of doors is wanted.

The glue for coring need not be of high grade, and where quick preparation is desired a ground or pulverized bone glue will answer the purpose admirably. The men soon become accustomed to handling the glue and it needs no soaking, as the flake or noodle glue does. For veneering medium grade of hide stock glue is to be preferred, one that is free from acid, clear in color and not too quick setting. It will pay to follow up the glue question more closely than we usually have done to obtain good results with economy. The glue for veneering does not want to be too thick. Practice in the work makes the workman proficient in its preparation. It should flow freely from the brush without being "tacky," as the painter would say.

The veneers and panels should be cut up and resawed before they are kiln dried. The ends should be glue sized and they should be stacked straight and even in the kiln. Those who have tried resawing kiln dried hard woods are aware of what a sorry job it makes, and how the veneers buckle, spring out of shape, pinch the saw or make it run crooked. When the saw has not too much set the veneers may be glued onto the cores without planing, provided the sawing is a good, smooth job. Care must be taken in dressing veneers or panels not to chip them out, as that is ruinous in this class of work.

The man who is doing the job needs to be familiar with the work and its methods in order to do it well

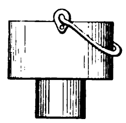


Fig. 1.—Copper Kettle for Heating Glue.

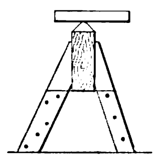


Fig. 2.—End View of Wooden Horse.

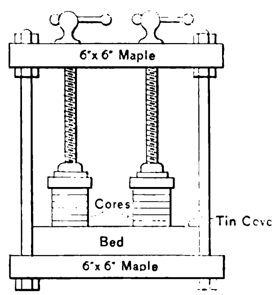


Fig. 3.—End View of Veneer Press.

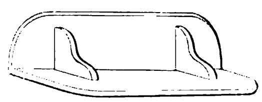


Fig. 4.—View of Gauge.

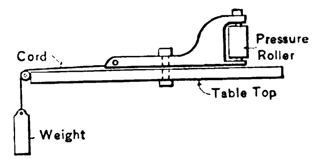


Fig. 5.—Pressure Roller.

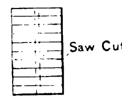


Fig. 6.—Showing How to Utilize Waste Material for Cores.

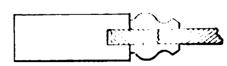


Fig. 7.—Showing Panel Construction in Doors.

Making Veneered Doors.

and economically. Filling the doors is the first work toward the desired end. A list of the size, style, thickness of doors and kinds of wood should be on each working bill, and follow the material in its progress out of chaos into stiles, rails, panels and finally the finished product. This bill should include the edge strips, the width, length and thickness of each bundle of cores, the finished size of the parts they are intended to make, and the number and both the sawing and finished size of veneers and panels.

After the sawyer has the material cut, and it is thoroughly dry, the one who does the gluing assembles the cores, puts them on the heating coil and prepares his core glue, the pieces are spread on the horses and given a coating of glue, assembled in batches, and put into the press, the surplus glue being squeezed out by this process, which includes putting the edge strips on each stile requiring one.

After they have been allowed to set sufficiently they are taken to the jointer and the straightest side trued up. If they are built up for making two pieces they are resawed and again jointed and thickened to desired size on the pony planer.

They are now ready for veneering. They are again put in the warm room, over the coils; when warm they are put on the horses as before and spread with glue on both sides; a bottom board is first laid and then the veneers and cones stacked in regular order. The veneers must previously be carefully looked over, poor ones culled out, and any pin holes, porous spots or checks covered by gluing a piece of paper over, to prevent two stiles from being stuck together by glue oozing through such spots. They are again pressed out, and when dry, trued and sized to width. They are now ready to be laid out, same as any blind tenon door.

The framing must be done in a first-class manner with true joints and tight tenons. In fact, all machine work on veneered doors must be carefully done to have true work and tight joints.

Instead of putting the panels in when the doors are put in the clamps, the frame work is glued together with open panels, the stiles and rails being grooved, and after the doors are polished and put on the finishing bench, a panel strip is put in all around the edge of each panel, to which the panel mold is glued and nailed. The molding is put in one side first, panels laid in and molded the other side, as shown in Fig. 7. This arrangement prevents the molding from pulling away from the stiles, should the panels shrink, and allows enough play for the panels to keep straight with the natural working of the wood in the changes of the atmosphere. There is advantage, too, in gluing up the frame work without the panels. This cannot be done in the case of solid molded doors.

The finish of a veneered door should be first-class, the panels, molds and frame work well sand papered, and flat surfaces scraped smooth, as every defect seems magnified when the filler and varnish are applied.

Special care should be taken not to scrape, scratch or mar the face of the doors in shipping. Many a good door has been injured by careless packing or handling in shipping, after the cabinetmaker has finished his job. They should be crated, if shipped on a railroad or by boat, or they will not be worth much on arrival at their destination.

Hand Book for Lumbermen.

The Bureau of Forestry of the United States Department of Agriculture at Washington is about issuing Bulletin No. 36, entitled "The Woodman's Hand Book," which contains rules for determining the contents of logs and standing timber, methods of estimating timber, a brief explanation of working plans and a description of instruments useful for work in the woods. The matter forms the first part of a collection of papers by Prof. Henry S. Graves, director of the Yale Forest School.

The author has collected the various log rules in use in the United States and Canada, and parts of them are shown in a comparison table giving the contents of logs 12, 16 and 20 feet in length and of all diameters from 6 to 60 inches, followed by brief description of each rule. The Scribner and Doyle rules, being those most commonly used, are published in full. The use of standard, cord, cubic and board measure is also explained, and in a chapter on the measurement of standing trees there is a number of volume tables showing the contents of standing trees of various species in standards, board feet, cubic feet and cords, together with methods of estimating timber. This little hand book is likely to prove of great practical value to foresters and lumbermen alike, while its form is such as to make it convenient for ready reference in the woods.

Methods and Speed in Skyscraper Construction,

Many persons in the financial section of New York City have been greatly interested in what may be said to be a race in the construction of skyscrapers. The buildings which figured in this race were those of Blair & Co., at the northwest corner of Broad street and Exchange place; that of Kuhn, Loeb & Co., at the southeast corner of William and Pine streets, and the 20-story addition to the Corn Exchange Bank, in William street. The Blair Building will be 18 stories high and the Kuhn, Loeb & Co. Building 20 stories high. Ground for the buildings was broken on July 1 last. The total value of the land and the buildings is said to be more than $5,500,000. At the time of going to press (December 15) the Thomson-Starrett Company seemed to hold the palm, as Kuhn, Loeb & Co.'s building, which they were erecting, was a trifle nearer completion than the other two, the frame work being practically completed and the encasing masonry being finished to the eighteenth story. The iron work of the addition to the Corn Exchange Bank was completed, but the masonry was up to only the eleventh story, while in the case of the Blair Building the frame work was up to the seventeenth story and the masonry up to the tenth story.

It may be remarked in this connection that the general public appears to take a deep interest in the construction of the modern skyscraper, as evidenced by the eager throng of onlookers which congregate about every structure of this kind while in process of erection. The work, however, that seems to attract the most attention is that in connection with the foundations. The sinking of the caissons has not yet lost its novelty and while the work is in progress there is sure to be a small army of sightseers. The use of pneumatic riveting hammers is another most interesting process for the general public.

One of the contracting companies have recently attracted a good deal of attention by the adoption of steam percussion piledrivers. These are mainly used for driving down the heavy matched planks near the curb line so as to allow the workmen to lay up the foundation walls. The first that was used was a small machine suspended from a beam overhead by block and tackle. This was held by two men while it delivered its blows. This has been superseded by a large and powerful pile driver arranged in a regular derrick frame work. The hammer slides on four steel rods attached to the steam chest, and the whole apparatus follows the descending pile with each blow that is struck. The steam chest and hammer are hoisted and lowered on the regular slides by a hoisting engine, which also furnishes the steam for the hammer. The blows delivered are, of course, much more rapid than those of the old fashioned drop piledriver. The only disadvantage the new apparatus has for use in the heart of the city is the terrific noise that it creates.

CONSTRUCTION on the Louisiana Purchase Exposition grounds is making good progress, according to a recent report of Director of Works Taylor. Of the nine buildings which are to form the main group of the fair, seven are in course of erection. The Manufactures Building has recently been contracted for, and the Transportation Building, it is anticipated, will be put under construction very shortly. There are now about 8½ miles of railway and spur tracks on the grounds. In connection with the landscape work 127 large trees, from 9 to 16 inches in diameter, were transplanted, and all but eight or ten of them have grown remarkably well.

COMPARISONS IN THE COSTS OF BUILDING.

A SUBJECT that is receiving serious consideration in real estate and building circles is the higher cost of materials and labor, and the effect that this already has had or soon will have on the business of mechanical construction and real estate transactions at large. Incidentally, complaint is mingled with the observations, because of the alleged retarding of individual home building in the suburbs and of certain kinds of constructive operations in the city. It is charged that the incomes of the provident have not been enlarged in proportion to the higher cost of shelter, and as a consequence of this and the higher cost of other necessaries the public is being squeezed somewhat painfully. It is impossible to indicate in all respects what the increase in cost of construction has been during the five years now ending, but the statistics that follow will convey an approximate idea, says a late issue of the *Record and Guide*. The period of five years has been selected not only because it is a division of time commonly made, but also because prices began to ascend about five years ago, and not from the panic level quite, but from a level that may be termed normal. The month of November has been selected as more typical than December, the present month. And, for various reasons, perhaps no better dates could be chosen for the purpose of contrasting prices such as are here dealt with and for showing the advance that has actually been made in the remarkable era than November, 1897, and November, 1902.

In Schedule A is set forth without special selection, except in the nature of condensation, the prices of labor and material in the fall of '97, as published for the most part in the regular market reports of the *Record and Guide*. In a parallel column are the prices for November, 1902. So far as space permitted, no generalizing was indulged in, for to generalize is usually to err. Rather than permit that typical items were chosen. Thus, instead of consolidating all grades and kinds of brick into one item and averaging all the prices, which would clearly be improper, the prices of several grades are given separately. In trying to present the matter in a concrete form we have at the same time endeavored not to confound it.

Schedule A.—Showing Rise in the Prices of Materials.

	November, 1897.	November, 1902	Per cent. increase.
LABOR: Ordinary, per hour	$0.28	$0.35	20.5
Masons, per hour	.50	.65	30.0
Plasterers, per day	4.00	5.00	25.0
Carpenters, per day	3.50	$4.00 to $4.50	21.4
Plumbers and steam fitters	$3.50 to $4.00	4.25	13.3
Painters, per day	2.50 " 3.50	3.00 to 4.50	25.0
Stonecutters, per day	4.50	5.00	11.0
Tinsmiths, steam and gas fitters	...	...	13.0
Materials.			
BRICK: Hudson River Special	5.50	5.75 to 6.00	3.1
Hudson River Common	5.00 to 5.12	5.25 " 5.75	8.4
Philadelphia	20.00 " 22.00	25.00 " 27.00	23.8
FIRE BRICK: American No. 1	26.00 " 30.00	20.00 " 28.00	...
American No. 2	18.00 " 25.00	17.00 " 18.00	...
CEMENT: Rosendale	.70 " .75	.85 " .95	24.1
Portland, domestic	2.00 " 2.80	2.00 " 2.25	...
Portland, German	2.00 " 2.65	2.20 " 2.75	...
COPPER: Sheet	.14	.21	50.0
Wire	.137	.18	31.5
DOORS: Pine	.92	1.89	105.0
Hardware	...	...	40.0
Heating and ventilating	...	...	56.0
LATH: Eastern spruce slab	2.25	3.30 to 3.50	51.6
LEAD	3.90	4.10	5.1
Pipe, per pound	.045	.05	9.0
LIME: Maine common	.75	.75 to .77	...
Maine finishing	.75	.95 " .97	...
State jointa	1.00	.90	...
State common	.70	.75	...
Linseed oil	.36 to .37	.47 to .48	29.7
GLASS—Window (box of 50 feet):	Single.	Single.	
Size, 6 x 8 to 10 x 15	$6.50 $6.00 $5.75	$32.00 $26.75	$25.50
" 11 x 14 " 16 x 24	7.50 6.75 6.50	33.50 28.00	26.75
" 18 x 22 " 20 x 30	10.50 9.50 9.00	36.00 30.00	28.00
" 15 x 26 " 24 x 30	11.50 10.00 9.25	37.50 34.75	29.00
	Double.	Double.	
Size, 6 x 8 to 10 x 15	9.00 8.00 7.75	42.75 37.50	35.50
" 18 x 22 " 20 x 30	14.00 12.75 12.00	56.00 49.50	46.00
" 15 x 36 " 24 x 30	15.25 13.75 12.25	57.50 50.75	46.75
Discounts	60, 10 and 5 %	88 and 5 %	
			Per cent. increase.
Average advance: Sheet			5.0
Plate, 3 to 5 square feet			7.0
LUMBER: Spruce, Eastern special*	$15.00 to $17.50	$20.00 to $28.00	32.8
Random cargoes, narrow	13.00 " 14.25	19.00 " 21.00	46.9
Random cargoes, wide	14.50 " 16.00	21.50 " 23.00	...
Hemlock—Pennsylvania joists	11.00 " 11.25	16.50 " 18.50	57.2
Pennsylvania boards	12.00 " 12.50	18.00 " 24.00	...
Pennsylvania boards, surfaced	12.50 " 12.75	18.50 " 19.00	...
Timber, 20 feet and under	10.00 " 12.50	17.00 " 18.00	...
" 22 to 24 feet	12.50 " 13.00	18.25 " 20.00	...
" 38 " 40 "	15.00 " 16.00	23.00 " 24.00	...
Oak: Quartered	.... "	.... "	40.0
White pine:			
Good uppers, 1—2 wide, M feet	45.00 " 50.00	80.00 " 83.00	73.6
Good uppers, 2¼ to 4 wide	55.00 " 60.00	85.00 " 88.00	...
Dooring boards	23.00 " 30.00	34.00 " 38.00	...
Shelving	27.00 " 30.00	36.00 " 47.00	...
Cutting up	28.00 " 35.00	41.50 " 69.00	75.7
Yellow pine: Flooring No. 1	15.00 " 18.00	22.00 " 22.50	34.8
IRON AND STEEL:			
American pig No. 1	11.50 " 12.00	24.65	109.6
Structural—Beams and channels 15 feet and under	1.20 " 1.25	2.25 to 2.50	94.6
Angles	1.15 " 1.20	2.25 " 2.50	...
Tees	1.35 " 1.40	2.25 " 2.50	...
Refined bars	1.15 " 1.20	1.75	52.1
Sheets, No. 27, Pittsburgh	2.05	2.65	...
NAILS: Wire	1.65	2.00	21.2
Cut	1.40	2.30	64.2
PLASTER PARIS: Ordinary	1.30 to 1.45	1.30 to 1.50	...
SLATE: No. 1 Bangor	6.50 " 7.50	5.00 " 6.50	...
STONE: Limestone	.90 " 1.00	.85 " 1.00	...
Ohio freestone	.85 " .90	.85 " .90	...
Tin plate, 100 pounds	3.10	3.79	22.2
White lead in oil	.055 to .06	.06 to .065	...

* Cargoes delivered in New York.

Almost every item in the list shows an increase in price. As regards labor, the plasterers have secured a promise for the future that is not here taken into account. Of materials only the wholesale prices are quoted, and consequently the increased cost to contractors and builders may be, and probably is, even greater than the computed percentage, depending upon whether the margin of profit for the retailer has increased or not.

The greatest advance has been in iron and steel.

The value of pig iron is 109 per cent. greater than in 1897, and all the manufacturers of iron have been affected by the rise in the proportion that the raw material bears to labor in the composition of those products. Structural steel is 94 per cent. higher than it was; cut nails, 64.2 per cent., and refined iron bars 52.1 per cent. For the builders' hardware list 40 per cent. has been set down as a fair representation of the change in values. To lumber is chargeable no small part of the increased cost of construction, seeing that it enters so largely into buildings and has advanced, in the case of white pine, 75 per cent.; of hemlock, 57.2 ; of spruce, 46, and of lath 51.6.

It cannot be said that common brick has added much to the investment devolving upon owners, since the finest of Hudson rivers have advanced only about 3 per cent. and the common sort only about 8. Nor can anything be said against cement, seeing that domestic Portland has not, officially, gone up at all. But in reality it has cost the average consumer considerably more, owing, for one reason, to the larger profit demanded by middlemen at urgent moments. Then, taking one kind of window glass with another, the article has advanced only from 5 to 7 per cent., and lime, another important constituent, has moved upward but 5 per cent.

It follows that some kinds of building have been more concerned with the upward tendency of prices than others, inasmuch as they have required in their composition more of those things that have risen in value, and less of the things that have not risen in value. The modern office building represents the utmost limit of increased cost of construction in 1902 over 1897. Next in order is the suburban frame dwelling. A structure composed chiefly of brick and mortar, with the proportion of lumber and hardware reduced to the lowest minimum, is the type least affected by the higher cost of materials.

However complex the undertaking, still an attempt will be made to reduce all the figures and terms heretofore given to a single expression, one that, while it may or may not be true of any particular construction. will yet for the aggregate be fairly indicative of what has occurred. For this will be taken a table that has been compiled in the office of Ernest Flagg and W. B Chambers, architects, from data furnished by reliable contractors. (See Schedule B.) Here the basis of calculation is four years instead of five, as in Schedule A.

Schedule B, Showing Increase in Cost of Building Construction in Various Trades, 1898-1902.

Trades.	Increase, per cent. Material.	Labor.	Average.
Excavating	..	35	35
Masonry work	26	40	33
Cut stone work (granite)	..	.	3C
Fire proof construction (steel and concrete)	40	23	31½
Water proofing	25	40	32½
Concrete paving	20	70	45
Steel and iron	35	39	37
Sheet metal and roofing	15	17	16
Plastering	13	20	16½
Carpentry and joinery	20	30	25
Painting	..	..	15
Glazing	..	..	20
Hardware	..	..	40
Plumbing	42	20	31
Heating and ventilating	66	15	40½
Total average increase	30.2	31.7	29.86

and elements and factors not considered in Schedule A have been taken into account, as, for instance, hours of labor and unit price estimates.

The final expression deduced is 29.86 per cent., which stands for the total increased cost of construction in the period named, so far as figures can show it. But in addition there should also be taken into consideration the greater length of time (twice in some trades) required for executing and completing contracts, owing to slow deliveries.

Here, then, is where we stand. The suburban dwelling that cost $3000 to erect in 1897 could not be duplicated to-day for much under $4000, and the proportion holds good in the city residence building of any kind costing 10 or 100 times as much. In New York as well as in many smaller towns, the consequence has been a marked diminution of speculative building.

Smith's Skylight and Rafter Tables.

Those who are engaged in making skylights will find a great saving of labor in the possession of a set of the rafter and skylight tables that have been prepared by H. Collier Smith, 253 Broadway, New York. While these tables have been prepared primarily for the use of the sheet metal worker they are also adapted for the use of architects, carpenters and builders, and are just as well suited to securing the length of jack and hip rafters for roofs as they are in determining the proper length of jack bars and hip bars for galvanized iron skylights. Three of the tables are especially adapted to pitches of roofs and skylights that are generally used, while the fourth table is suitable for use in getting the dimensions of jack and hip rafters for roofs and bars for skylights of any pitch. A familiarity with these tables is likely to create a desire on the part of the workman to possess a set, as it would be unnecessary to measure with the possibility of an error, as the tables give information that would require some time to secure in the regular way.

THE fire loss of the United States and Canada for the month of November, 1902, amounted, according to the records of the New York *Journal of Commerce*, to $10,546,000, as against $9,593,800 in the preceding month and $13,478,000 in November, 1901. The total loss by fire in the 11 months ending with November is given at $134,644,350, or nearly $14,000,000 below the figures for the corresponding period of last year.

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FRAME COTTAGES ERECTED FOR MR. THOMAS A. SPERRY, IN CRANFORD, N. J.

J. A. OAKLEY & SON, ARCHITECTS.

SUPPLEMENT CARPENTRY AND BUILDING, JANUARY, 1903.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

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

FEBRUARY, 1903.

The Tallest Office Building.

There is now in process of construction in this city the foundations which will support when completed the tallest office building, measured from basement to roof, in the entire country, if not in the world. It is being erected on Exchange place, between Wall and William streets, for directors of the National Bank of North America, in accordance with plans drawn by Clinton & Russell, and will be known as the Wall-Exchange Building. It will rise 25 stories above the sidewalk, and from basement to roof, exclusive of the pent house, will be 337 feet high, which means about 327 feet above the street level. This exceeds the Park Row Building, now the tallest office structure in the world, for while the towers of the latter rise 382 feet above the ground, the hight of the main roof is but 309 feet, and that of the St. Paul Building 308 feet. The façade of the new bank building will be granite for the lower stories with brick and terra cotta above, the architectural treatment being Italian in style and somewhat resembling that of the Broad-Exchange Building, across the street, harmonizing with it in color effect. The side and rear walls will be rendered ornamental by introducing in them to some extent light colored brick to contrast with that of darker shade. There will be about 7524 square feet of rentable space to a floor, making with the basement about 5 acres in the entire building. It will be fire proof throughout, with marble lined corridors, and the George A. Fuller Company, who have the contract for construction, expect to have the building ready for occupancy by May 1 of the present year. The quarters of the bank will be on the first floor, and the vault of the State Safe Deposit Company in the basement.

New York's New Theaters.

One of the noticeable features of local building operations during the year just brought to a close was the stimulus given to the construction of new places of amusement. Notwithstanding the fact that there are already something like 40 theaters, properly speaking, in the city of New York, with a capacity for accommodating approximately 55,000 people, several new ones were completed during 1902 and work is now in progress upon seven additional buildings which will cost in the neighborhood of $2,500,000 and add accommodations for 15,000 theatregoers. This is an increase for the year of something over 25 per cent. in the capacity of amusement places and breaks all previous records in the way of theater construction for a single year. A striking and significant fact in connection with this new work is that the theaters are for the most part going up on sites in the immediate vicinity of what is known as Long Acre Square, being that section of the city lying just above Forty-second street and at the intersection of Broadway and Seventh avenue, where theaters already abound. Among the new playhouses the most elaborate and costly will be the New Amsterdam, having a frontage of 150 feet in Forty-first street, just west of Seventh avenue and running through to Forty-second street, on which it will extend for a distance of 25 feet. The building will be about 100 feet high, with an exterior of limestone, surmounted by a heavy mansard roof in red slate. The entrance will be through an imposing archway 25 feet wide and 46 feet high. The cantilever principle is being utilized, thus doing away with columns in the auditorium, and it is stated that the middle aisle will also be abandoned. The stage, which will be viewed through a 40-foot opening, will be 48 feet deep by 98 feet wide. The carving around this opening will be very rich and in the decorations of the lower floor embossed leather and carved oak will be an important factor. The staircase will be of white marble, with a railing of green glazed terra cotta. The subjects selected for the mural paintings are the "Morte d'Arthur" and Spenser's "Faery Queene." Above the entrance archway on the Forty-second street side will be offices, and this portion of the building will be topped by a roof garden having a seating capacity for 556 people. The general architecture of the building will be French Renaissance and it will cost, according to the architects, Herts & Tallant, something over $500,000. The owners expect to make it the most perfect theatrical structure in the world.

The Theaters in Detail.

A few feet further west on Forty-second street is to be erected another theater planned by the same architects and known as The Liberty, the estimated cost being placed at $250,000. This will be a three-story brick affair, having a 20-foot frontage on the street named and extending through to Forty-first street, where it will front 80 feet. The New Lyceum, now in progress in Forty-fifth street, west of Sixth avenue, and which is expected to be completed for the spring season, was planned by the architects mentioned and will cost about $120,000, the style of architecture being elaborate French Renaissance. The mansard roof is to be pierced with six medallions and edged with a heavy ornamental border of galvanized iron. Below the cornice of the French roof are to be four sets of columns coupled at each end, while between the column spaces are to be three monumental windows, each faced with a detached statue. The cantilever principle for doing away with the columns in the auditorium is repeated in this structure. A theater which will have a seating capacity entitling it to high rank as regards size is the Drury Lane, now being put up by Oscar Hammerstein on the north side of Thirty-fourth street and extending through to Thirty-fifth street, just west of Eighth avenue. The plans, which are drawn by William E. Mowbray, call for a façade in a style of architecture that may be termed Grecian, but modernized in some particulars. It will cost nearly $500,000 and will be very elaborate in its interior appointments. A heavy tank is intended to cover the entire area of the stage, which is 126 feet wide by 68 feet deep. The seating capacity is given as about 4000. Another interesting project is the Lyric Theater, fronting 119 feet on Forty-third street and 20 feet on Forty-second street, just west of Seventh avenue. The main facade will be of stone, with polished granite bases, while the upper portion will consist of cream limestone, cream terra cotta and maroon brick, the whole being topped with a tiled copper roof finished in verde antique. The interior decorations will be in rose, cream ivory and gold, and the cost of the completed structure will run something in excess of $200,000. The plans, which have been prepared by Victor Hugo Koehler, call for a structure of pure Italian Renaissance style of architecture, with a seating capacity of 1400. Still another playhouse in this locality is the Hudson, fronting 83 feet on Forty-third street, west of Sixth avenue and extending through to a 42-foot frontage in Forty-fourth street, and estimated to cost $175,000. The style of architecture is Renaissance with tasteful and rich effects. The stairway will be a very elaborate affair in white marble and bronze. The original plans of Architects J. B. McElfatrick & Son have been revised somewhat as to the façade by Israels & Harder and the scheme of decoration is quiet and unostentatious. Considerable progress has been made on the Harlem Auditorium, designed by the same architects, occupying a plot 125 x 100 feet at the corner of Seventh avenue and 126th street. It is estimated to cost $200,000 and to have a seating capacity of 1200 people. In addition to the above is the Grand, which has been planned by Architect Koehler for a 100 x 100 foot plot on the lower East Side of the city and to have a seating capacity of 1350; the Colonial in Forty-seventh street, near Broadway; the Long Acre Square Theater, at Forty-fifth street and Broadway, upon which work has recently been resumed on a larger scale, and the Majestic on Eighth avenue, between Fifty-eighth and Fifty-ninth streets. There have also been alterations on such an extensive scale in connection with three playhouses as virtually amount to rebuilding them, so that the city would seem to be well equipped with places of amusement for some time to come. It is, however, reasonable to suppose that as the population increases each year will witness more or less building activity along the lines indicated.

Lighting and Ventilating the New York Stock Exchange.

As the new Stock Exchange on Broad street nears completion it is interesting to note some of the features of its internal arrangement and methods of lighting, ventilation, &c. The great board room, where the business of the day will be transacted, is 138 feet long, 112 feet wide and 80 feet high. The Broad street and New street sides of the room are practically two immense windows weighing 13 tons each and built to resist a maximum wind pressure of 75 tons. These windows are well within the colonnades marking the front and rear outlines of the building and are wholly separated from the columns. The steel mullions supporting the giant panes of plate glass are in nine pairs for each window and are suspended from the steel girders which support the roof. The windows will be double in the lower half and small heaters will warm the air between the two panes of glass, thus preventing frost on the windows and obviating the rapid cooling of the interior air in severe weather. Much of the ceiling space is occupied by an immense skylight which covers the center of the room.

The shades of the windows are arranged to roll horizontally instead of vertically, as is usually the case, so that whatever screening out of the light may be necessary, that which is still admitted will be well diffused. The skylight is to be similarly screened by ingeniously contrived electric tubes operated from the floor. The window shades will be operated by the pressing of electric buttons.

The ventilation of this immense room has received the most careful consideration and, in the opinion of the architect, George B. Post, will be the best ever provided for a building of this character. The fresh air will enter through rectangular ducts of galvanized iron with an aggregate capacity of 26,000,000 cubic feet per hour. This air will be forced into ducts leading directly to the board room by a circular fan 11 feet in diameter and will enter the chamber through paneled registers in the ceiling, falling gently to the floor and being drawn off when vitiated through registers in the floor and discharged through an air house on the roof into which the tubes for exhausting impure air will lead. The down flow of air will, it is thought, completely prevent all dust from rising.

A Seven-Story Cement Building.

Among the building improvements now in progress in the city of Milwaukee and which is attracting unusual attention on the part of architects and contractors is a seven-story structure in which cement is the principal material. The building is being put up for an electrical company, and the reason for adopting this plan was the delay that would have ensued in securing the necessary material had a steel frame structure been attempted.

In the new building there will be above the second story neither wood nor iron, except that the window casings and sash across one street front will be wood, and those along the other side and in the rear will be of metal.

The girders will be solid beams of concrete, cast upon the premises as they are required, and the floors will also be of concrete, which will be cast in position as the stories rise one above the other, and will be finished with a smooth surface, the same as street sidewalks. The scheme is known is the Ransom system. In order to construct such a building there has to be a great deal of false or temporary work done in order to mold the concrete in the position in which it is to remain as a part of the structure. False floors have to be constructed and false girders in the form of boxes have to be placed in position in which to mold the concrete.

The building will cover an area of 60 x 175 feet, with an "L" in the rear, 62 x 85 feet, which will be three stories high. The supporting columns for the floors in the basement and the first and second stories will be iron incased in concrete. It will be used for manufacturing purposes only.

Metal Work in Interior Decorations.

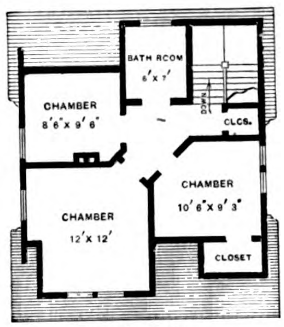
One of the most noticeable tendencies in interior decoration, says a writer in the *Architects' and Builders' Journal*, is to introduce the metals, especially copper, to take the place of wood and plaster. Closets, doors, panels, jambs between ranges of small windows, ceilings and cornices are more and more being made of copper and compositions in which copper is used, and, with the constantly increasing means of cheap production and working of metals, this practice is likely to extend still further. Frequently now metal is being used as the outer casing for wood work, and the result is both original and highly decorative. Besides this, the metals are used in grills and about fire places and in moldings to inclose marble and tile linings.

The extension of the electric light first created a demand for light hand wrought fittings in metal, and from that the use of that material extended quickly to fire screens, stands, trays, flower and lamp standards and to all the hundred and one small objects that crowd the modern drawing room. From these to the room itself was an easy transition. But the demand that everything about a modern high class dwelling shall be fire proof as far as possible is a factor which has helped to push metal work along to take the place of wood. The time is coming when the use of the latter will be reduced to a minimum in a fine house.

MEMBERS of the Master Carpenters' and Contractors' Association of Boston, Mass., and their guests to the number of about 80, attended the banquet given January 10, at the American House, to the newly elected officers of the organization. The latter were Walter Ballantyne, president; T. E. Johns, vice-president; Herbert E. Decker, treasurer, and L. C. Creber, secretary.

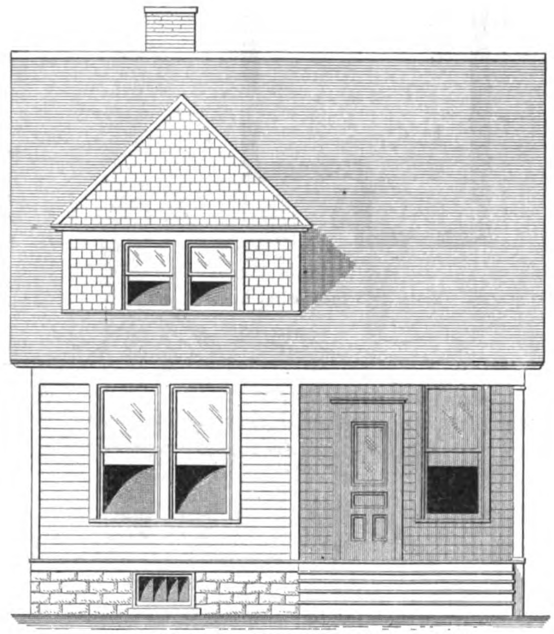
DESIGN FOR A LOW COST COTTAGE.

WE show in the accompanying illustrations a design for a low cost cottage having three rooms on the first floor and three sleeping rooms and bathroom on the second floor. According to the specifications of the architect, F. E. Doty, Herkimer, N. Y., there is a cellar 6½ feet deep under the whole house. The foundation walls are of broken quarry stone laid up in cement mortar, consisting of 1 part cement to 2 parts of clean, sharp sand. The frame of the house is of hemlock of the sizes indicated on the vertical cross section. The exterior of the frame is covered with sheathing boards, over which on the first story are laid clapboards, while the gables and dormer windows are covered with cedar shingles laid 5 inches to the weather.



Second Floor.

First Floor.
Scale, 1-16 Inch to the Foot.



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

Design for a Low Cost Cottage.—F. E. Doty, Architect, Herkimer, N. Y.

The floors are of ⅞ x 2 inch white spruce and the interior trim is of white wood. The walls and ceilings of the rooms are plastered with two coat work, all walls being skimmed with a white finish. The side walls in the kitchen and the bathroom are wainscoted 3 feet 6 inches high. The plumbing fixtures in the kitchen include sink and a 30-gallon hot water boiler. While no bathroom fixtures are shown on the second floor plan, it is intended to have a syphon jet closet, a 4-foot Success bathtub and a 20 x 30 inch marble hand basin.

The exterior wood work is painted two coats. All interior trim, including sash and doors, has one coat liquid wood filler and two coats of varnish in full gloss.

What is Bird's-Eye Maple?

"What is bird's-eye maple?" That is a question which just now seems to be baffling not only people who use furniture made of this particular wood, but even wood workers themselves. In a recent number of a wood working magazine an article was published which stated that bird's-eye maple was not a peculiar maple, but simply ordinary maple cut in a certain way. In a recent issue of the New York *Sun* that statement is refuted. It is there stated, on the authority of a wood worker, that bird's-eye maple and curly maple are both cut only from the logs of the rock maple tree, *Acer saccharinum*, in which a beautiful lustrous grain is produced by the sinuous course of the fibers. This tree is not at all the common hard maple. It is a hard maple, but is full of little gnarls called eyes. Men looking for bird's-eye maple logs go through the standing timber and pick out the bird's-eye maple trees, paying for them from $30 to $50 per 1000 feet in the woods. Ordinary hard maple logs are worth only from $6 to $7 per 1000 feet. It would be impossible to cut a piece of veneer with eyes in it from a common hard maple log, and it would be equally impossible to cut a bird's-eye maple log, no matter how you cut it, so that it would not show the eyes.

The Construction of Stone Houses.

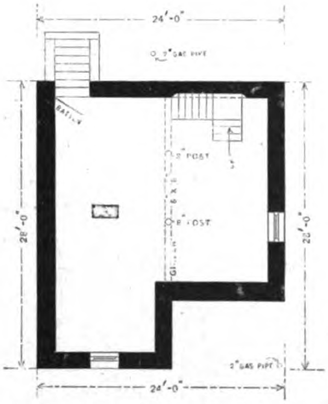
There is no more prolific source of trouble, both to builders and owners of stone houses, than that caused by water penetrating the walls and getting in over the windows after a heavy rain. The causes producing this trouble being well known, it would seem an easy matter to overcome them, and all sorts of suggestions to that end have been made, but so far without effect, says a writer in one of our exchanges. The present time, therefore, would seem an opportune one in which to offer a practical solution of this trouble, and that is the purpose of this article. The underlying cause of all this trouble is haste to finish the building; hence, the first thing to be done, and without which all else is practically useless, is to "make haste slowly." Time should be given the mortar to harden, the building to settle, and the cracks to show before the pointing is done. No stone house should be pointed the same year it is built, for two reasons. First, the cement used in pointing forms a barrier to the evaporation of the moisture in the mortar in which the stone is laid, and prevents it from drying. The pointing, while keeping the moisture from coming out, will not prevent the frost from going in and freezing the mortar. This will produce an expansion, which causes the pointing to lose its grip on the mortar and create innumerable crevices through which the water easily finds its way. Second, all stone buildings, even when built in the most careful manner, have a tendency to settle. This settlement cracks the pointing. In many cases these cracks are so fine as to be scarcely visible, especially if some distance from the ground. But no cracks are too small for water to penetrate, driven by the force given to it by the wind from an open sweep of miles, as it has in many parts of this country. It is absolutely essential, therefore, that the mortar should have time to evaporate all its moisture and become thoroughly dry, and the building time to settle, before pointing.

Houses built with stone, and having all windows arched solidly through the entire thickness of the wall with brick, seldom have water dropping from the soffit of the frames; for if any water should beat through the stone work or cracks in the same, the bricks, having power to absorb so much of the water, hold it while the rain lasts, and after it is over evaporate it to the outer air.

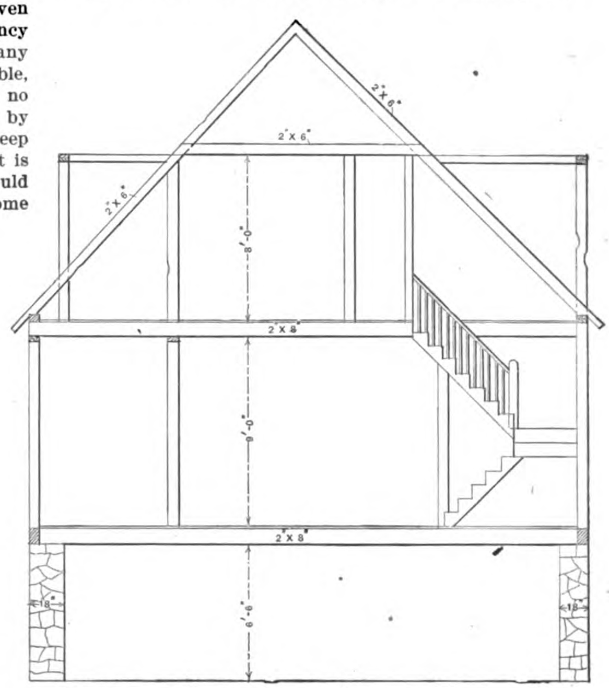
When impracticable to use brick over the windows, from architectural or other reasons, a piece of sheet lead, going through the entire thickness of the wall, and extending about 1 foot each side of the window, and turned up 2 inches on the inside, will hold the water until it evaporates.

A style of architecture much in use at this time necessitates exposed gables. These gables are usually finished so late in the season that the mortar has not time to dry before the frost sets in, and in consequence the mortar freezes. Mortar once frozen loses its adhesiveness, and therefore has no life in it. The proper and only safe plan is to use portland cement and sand (no lime) in all gables. This will set in one-tenth the time of lime mortar, and will be hard and dry before frost comes.

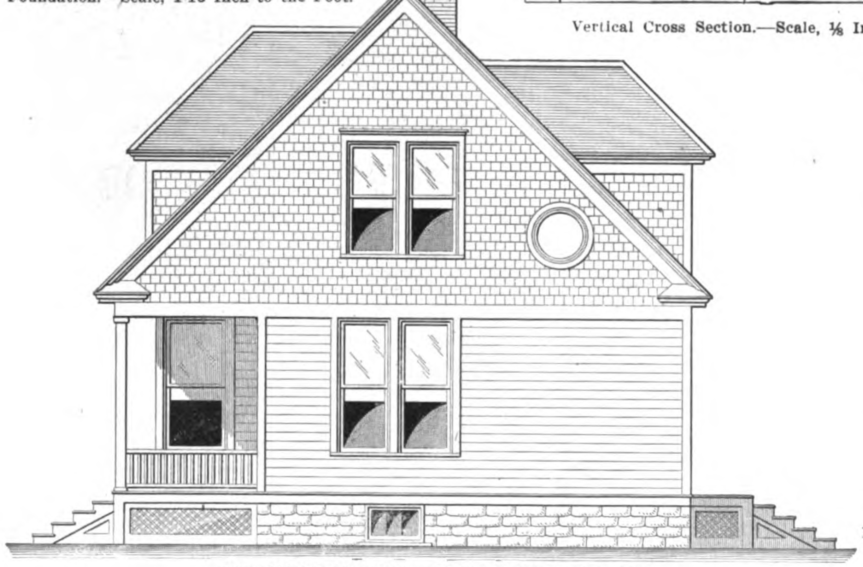
Some gables that rise above the roof, and are only protected by stone coping, should have a sheet of lead to cover the entire wall put on under the coping. This lead should project over the inside of the wall, and be turned down over the flashing of the roof. By this means all water that gets through the joints of the coping will be carried off. In conclusion, with care and a proper observance of the natural laws governing the ma-



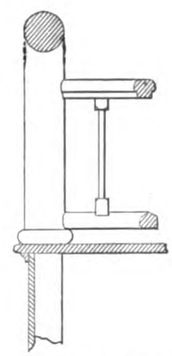
Foundation.—Scale, 1-16 Inch to the Foot.



Vertical Cross Section.—Scale, ⅛ Inch to the Foot.



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



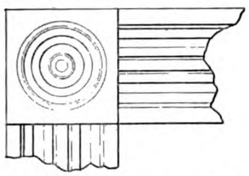
Detail of Porch Column and Balustrade.—Scale, ½ Inch to the Foot.

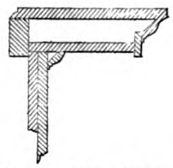
Design for a Low Cost Cottage.

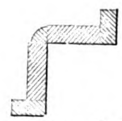
terials used in its construction, a stone building can be built in the present day just as tight as years ago, when people did not expect to excavate the cellar in the spring and move into the finished house in the autumn.

Laying Out an Elliptical Arch.

The following method of laying out an elliptical arch is described in a letter of a correspondent of one of our English exchanges: The width and hight of the proposed arch being given, a rod is cut, equal in length to the sum of the rise of the arch and one-half the span; and a notch is cut on the rod, at a distance from one end equal to the rise of the arch. A line is then to be drawn vertically through the middle of the proposed arch, and another horizontally across it at the springing line; or a strip of wood may be secured in each of these positions, so that the ends of the notched rod may rest against the strips, and move upon them. Placing the notched rod upright, in contact with the vertical strip, and holding a pencil in the notch, the rod, keeping the pencil in place, is to be moved along the sticks, so that one end is constantly in contact with the vertical stick, while the other is constantly in contact with the horizontal stick. The pencil will then describe one-fourth of a true ellipse, or one-half of a truly elliptical arch of the hight and width desired; and, by shifting the rod, the other side of the arch may be drawn in the same way. For the use of plasterers, carpenters and decorators, who often have occasion to lay out elliptical arches of a given hight and span, and who can always find three sticks and a pencil, this method is the readiest and simplest that we have ever seen described, and our readers will do well to keep it in mind.


Detail of Inside Trim.—Scale 1½ Inches to the Foot.


Raking Cornice.—Scale, ¾ Inch to the Foot.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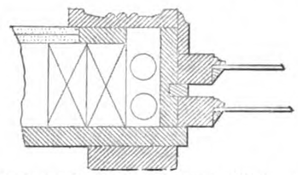
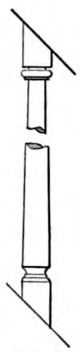
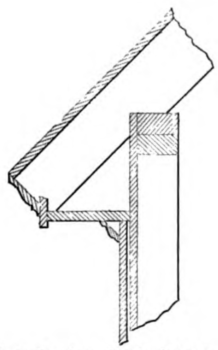

Horizontal Section through Window Frame.—Scale, 1½ Inches to the Foot.

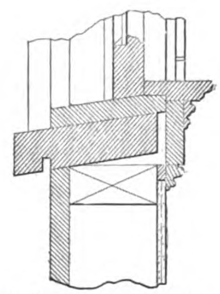

Newel at Landing. —Scale, ½ Inch to the Foot.

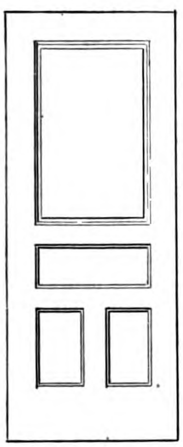

Detail of Spindle. —Scale, 1½ Inches to the Foot.

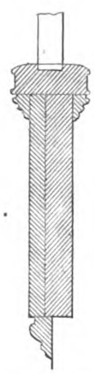

Main Cornice.—Scale, ¾ Inch to the Foot.

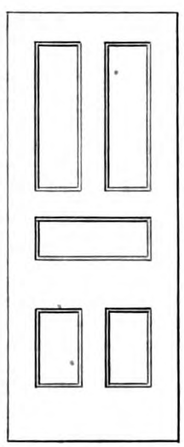

Base.—Scale, 3 Inches to the Foot.

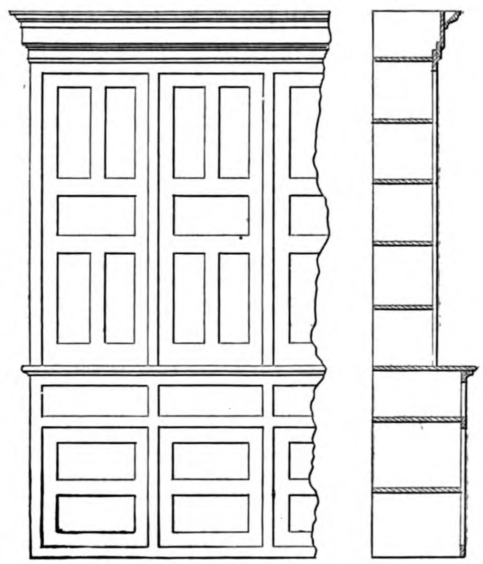

Water Table.


Vertical Section through Window Sill. Scale, 1½ Inches to the Foot.


Elevation of Front Door. —Scale, ⅝ Inch to the Foot.


Detail of Stair Stringer. —Scale, 1 Inch to the Foot.


Style of Door on First Floor.—Scale, ⅝ Inch to the Foot.


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

Miscellaneous Constructive Details of Low Cost Cottage.

ONE-FIFTH more siding and flooring is needed than the number of square feet of surface to be covered, on account of the lap in siding and matching of flooring.

METAL LATH AND CEMENT CONSTRUCTION FOR RESIDENCES.

(WITH SUPPLEMENTAL PLATE.)

BY means of one of the half-tone plates which accompanies this issue of the paper we show a rather striking example of the use of cement on expanded metal lath for the external construction of a modern dwelling. The house has the lower portion constructed of local gray freestone of a slightly bluish tone, with wide and narrow courses alternating and backed with brick. The upper portion is covered with Portland cement on expanded metal lath and left the natural color of the cement. The exterior wood work is painted a warm gray, except the sashes, which are black, the whole giving a very quiet yet pleasing effect.

The details involve many interesting features, and we cannot perhaps do better than give the particulars as furnished by the architect, S. S. Godley of 803 Neave Building, Cincinnati, Ohio. He states that the desire for a covering for the outside walls for dwellings of moderate cost, which should be both strong and durable and not necessarily require frequent paintings or other surface washes or stains in order to retain a presentable appearance, led him to use cement as a substitute for the various kinds of shingles and weather boarding so generally employed. The use of cement in this way was suggested by the half-timbered work which many imitate but few really accomplish. The increased cost of half-timbered work and the great difference in the method of building, as compared with that usually employed, accounts, in the opinion of the architect, for its frequent imitation. "In order to use cement in a way which should not be an imitation of something else, but exactly what it is claimed to be—namely, a strong, durable wall covering—some general rules were adopted, and while there may be differences of opinion as to the artistic results, there has been but one opinion as to its practicability and durability when properly applied."

The house here shown is the residence of John F. Pogue of Cincinnati and is in its general construction a frame one, built in the usual way and sheathed with tongued and grooved flooring boards on the outside. Openings were placed where desired and no vertical strips used, except the usual outside casings for openings, these being made to suit the designer. At the back edge of the casing a strong bevel or square rabbet was made at least ¾ inch each way, so that cement could be pressed well up into it. Horizontal courses were introduced, usually at the floor line, window sill, cap lines or wherever the architect deemed best, and were more especially for the purpose of avoiding too large and irregular surfaces of cement. The point is made that while it is impossible to prevent cracking in irregular shaped spaces, they seldom appear in rectangular ones. These horizontal courses had the bevel or rabbet on the bottom edge, next the sheathing, and the top was weathered, or, much better, was covered with copper or other metal flashing, turned up against the sheathing about 2 inches. On these rectangular surfaces of sheathing were nailed ordinary lath, ¼ inch thick and not more than 8 inches apart. To these furring strips, as they may be called, the expanded metal lath was securely nailed.

The first coat of mortar on the lath was of the ordinary character, composed of lime, sand and hair, and gauged with Portland cement. This cement was for the purpose of stiffening the mortar and to prevent it cutting off when applied to the metal lath. The second and last coat was composed of Portland cement and coarse, clean sharp sand, which, after being well troweled, was finished with a carpet float to prevent the perfectly smooth surface usually left by the trowel. Almost any finish of texture or color can be obtained on the surface of the second coat, though these are occasionally secured by a third and much thinner coat of cement, colored to suit and applied with a brush or broom, or as a splash coat if a very rough surface is desired.

The furring strips were kept about 2 inches away from the outer edges of the panels and the metal lath was nailed as closely to the edge of the panel as possible, so that the meshes would not pay out. Strong wire staples were used for securing the lath in place. The mortar and cement were well pressed up into the rabbets above referred to, in order to secure a weather tight joint. It is well known that many plasterers prefer sheet metal lath, as it requires less mortar, but the extremes of temperature may cause the sheet of metal to expand or contract sufficiently to break the key back of it. Wire or expanded metal lath permits the mortar to be pressed up to the sheathing and causes the lath to become embedded in the middle of a solid sheet of martar, making the breaking of the key impossible, and forming an unbroken surface between openings, impervious alike to wind, rain and dust. The two coats of mortar should make a total thickness of about ⅞ inch.

THE LABOR QUESTION AT THE PRESENT DAY.

BY T. BUCKLER GHEQUIER.

WE are all born to toil as the sparks fly upward. Every created being endowed with appetites and volition is more or less of a laborer. Every insect and animal, from the smallest microscopical living speck to the highest combination of brain and muscle, has its own peculiar fields of activity; indeed, so widespread is the law of living by doing that many, if not all, so-called inanimate objects have to undergo certain internal spasms if they would exist at all. Every child labors at lessons or at play, and some men who appear the most idle do an amount of work, physical or mental, that would look very respectable if codified in hours. Labor, then, is a general heritage and capital—as represented by money—is only the result of labor transformed into another medium; it can be compared to steam, for although it frequently dissipates and is lost sight of, it invariably returns, by devious ways perhaps, to the condition from which it sprang.

It is true that much of the work done by human beings is fruitless, in that it is not turned into capital, which can be stored up like steam in a boiler, or like corn in a granary, against a time of need; nor does it in any way aid the progress of the world. It is not with this class of labor, however, that we have at present to deal. The labor under discussion is, or should be, full of potential energy; an energy, first of all, directed toward the elevation of mankind to a higher plane, toward ministering to its needs, toward fulfilling its multifarious desires, and, secondarily, toward the securing of money wherewith to live soberly and respectably and to the accretion of capital to forward still further the ends originally aimed at. These facts, the foundation stones of proper dealing between man and man, are largely overlooked in our twentieth century civilization. Men consolidate and the bodies so constituted perform a multitude of acts that seem for their benefit, while the rest of the world suffers. This statement has had so recent an exemplification that it is needless to dwell upon it. Selfishness is at the bottom of all such proceeding. Opponents will not yield a jot of their opinions; stoppages, industrial wars, hunger, cold and poverty are the results, whereas mutual concessions would have prevented all and would probably also have caused mutual gain. Until the great principles on which human brotherhood should be founded are better understood and acted on, the parent—labor—will be a foe to its offspring--capital—and the offspring will contemn and take advantage of the parent. We belong to the curious epoch of the world's history, in which the one born is, in man's eyes, greater than the one bearing and one in which the retransformation of the former into the latter, unlike human life, a never ending cycle, is accompanied by the pangs as of a new birth, and all because of the popular and unchristian greed for money to hoard foolishly or to spend on things of self.

An Era of Organization.

The present is an era of organization in every department of capital and industry—the greatest strength lying in those to which the purse belongs—and, as matters stand, there is going on an almost unceasing conflict of giants. The David of one man labor has, it appears, small chance against the Goliath of banded millions, for the pebbles that will slay have not yet been found. To say that organization, *per se*, is opposed to the general good of the human race would be to show one's self ignorant of what it has accomplished and may still accomplish, but no organization can be moving toward a right result when it is founded on the main idea of selfish gain. Every man in every organization must bear clearly in mind the need of every brother outside, and while the organization should benefit its members it should also, to a greater degree, benefit the world generally. This is the Christian attitude, and we pride ourselves that this is a Christian country, with a constitutional Government founded on the surest and most reasonable precepts. Charity may commence at home, but should end in the broad field of the world and to do good to one's self should not mean the imposition of greater burdens on others. Mankind at large never has borne for any long time and never will bear the selfishness, impositions and errors of any select body of men, be they kings, nobles, capitalists or workmen, especially if their acts induce physical suffering. A few steps too far, a few screws too tightly applied and revolutions and uprisings mark the times of such impositions and errors with blood. The humble worm will turn at last and man grow into a venomous serpent with destruction in its breath.

Capital and Labor.

The problems that confront us at present in the issues between capital and labor are new to the history of humanity, and although they have been grappled with by sociologists, by deep reasoners in other spheres of thought and by hard headed men of affairs, they are apparently no nearer solution than in the beginning. We think that most of the vexed questions have been settled, when behold! an irruption in some new and unexpected place. Beneath an exterior to the gaze calm and peaceful is still smouldering a molten mass of selfishness, and there can be no guarantee of safety until the fires are quenched by the pure waters of Christian charity and real consideration for others. The bond of human brotherhood must prove a stronger one than any of man's forging. Especially is this true of the building construction department of human industry. So many and various are the kinds of labor entering into this department and so closely interlocked the joints between all that a failure in or accident happening to one portion weakens the whole. There may be, and there should be, trades unions and contractors' unions, but if the sole object of these unions is to increase the cost of buildings by means of additional pay, shorter hours, &c., without consideration of the money expended or the outside world in general, permanent success or benefit can scarcely be expected. I can hardly believe that the money spender—the capitalist, if you will—is entirely inhuman and callous, but he frequently feels that he has not been rightly dealt with. Nor is the work that is done up to the highest standard.

Success to the mechanic should mean the turning out of as perfect work as he can do, and he should bend all his thought and energy to this end. It is well to have wives and families and the luxuries of life, but it is better, even if the struggle is hard and lonely, to feel the satisfaction of work done to the top notch of one's ability, and if the distinction is between much money and poor work and little money and good work by all means let it be the latter. Good work will, however, generally bring its own reward in money as well as otherwise; if it does not something is wrong, and indeed it would seem sometimes as if the unions put a premium on mediocrity. All work is not the same, for it is done by human beings who, the generality at least in America—think and reason. If intelligence, skill, method, speed, &c., are rated at the same value as their opposites they will not continue and all work will deteriorate. As in the public schools the advance of a class depends on the progress of the dullest scholar in it, and as, in a fleet, the speed of the whole is regulated by the hour knots of the slowest vessel that forms part of it, so must the technical advance of labor, if all are graded alike, depend on the slowest and least intelligent. If a brainy, active man can only get so much, whether he works well or poorly, slowly or rapidly, he will have to be greatly above the average if he does not retrograde instead of progress. The spur to do the best is gone if there is but one reward for all. To the two avowed objects sought for by the labor unions—both most desirable—more money and fewer hours should be added the third, thoroughly good work. Nor should they even stop there. Let them see to it that their members lend helping hands to their brothers associated in kindred occupations. Thus would better results be gained in every department. And to assure still greater things the employers themselves should be more liberal and not strive to secure more than they are rightfully entitled to. In these days of close competition generosity is hardly to be looked for in business, but righteous dealing should always obtain and the upper millstone of capital should not be set so firmly in place as to grind the lower one of labor; together they should combine without friction and without jarring of the machinery to turn out a satisfactory and first-class product.

Combinations to Increase.

Combinations of every kind are bound to remain with us and increase in number, for they fill a need of our times. This fact being true, we must consider by what means so-called trusts, corporations and unions can be so regulated as to subserve the well being of every member of the human family, and not only of those for whose benefit they are instituted. This is the burning question with which this generation has to grapple. A few suggestions may not be out of place. First of all there should exist a sense of their own responsibility to do what is morally right; secondarily, there must be a responsibility before the law so that any overt acts committed can be legally dealt with, and, thirdly, the general government "of the people and for the people" must be delegated with the power to so control all organizations among its citizens that only those that are founded and run on right principles shall continue to exist. Above all, personal and individual rights must be respected; every man must have the privilege of doing his work in the manner he thinks best, provided he does it honestly, and no man must be allowed to become the industrial slave of another man or of any body of men. If such a state of affairs can exist within our country our Constitution needs recasting, for it will eventually cause the fall of our social system, it having within it the first growth of a moral wrong which, if allowed to spread, will soon, like some great vine, destroy by strangulation whatever it encounters. As these combinations grow so will their power to control the world, for they will be able to supply or withhold from its inhabitants, as they please, the necessaries of life. How great, then, is the responsibility of all concerned to see that this power is used for the good of all. If, in the building trades, capital and labor can be induced to work together through the heads of divisions, and if those heads of divisions can so control those in their divisions as to cause them to do the best they can and to accept the dictum of those in authority, strikes would probably be rare and great progress would be made toward bridging the gulf that has opened.

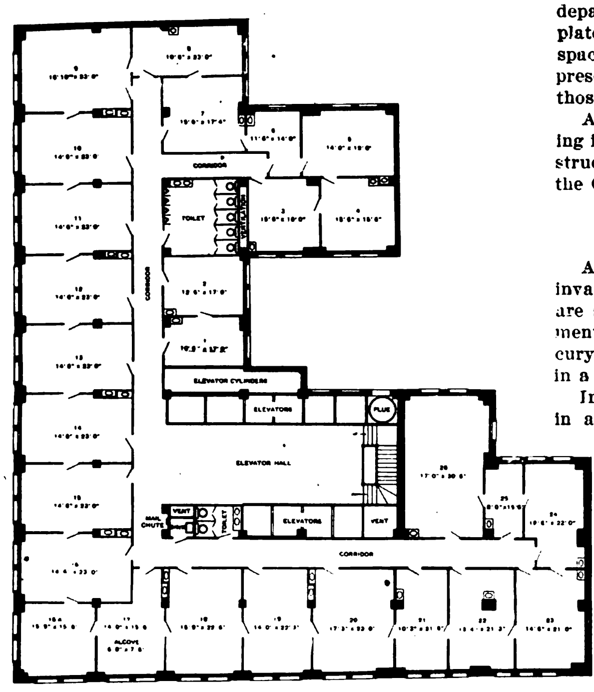
There is one evil that must be corrected before labor can assume its greatest strength, and that is the evil of intemperance. It may be said that this has nothing to do with the question at issue, but it has. Strong drink in excess enervates, undermines the physical strength, wastes the substance, destroys reasonableness and reliability. For any union to be at its best every man in it should be at his best, mentally, physically and financially. The drink problem then should have attentive consideration, for it affects all economies and solutions of the labor question. It is difficult to deal with, for it involves the personal equation, besides which the fact exists that drink in moderation is in no way hurtful, but a way to stay excess must be found, for it is a cancer that is preying continually on the vitals of labor and destroying its efficiency and ability to serve best its own interests.

Let us sum up. For the changes and developments of this twentieth century, so far as capital and labor are concerned, how are we prepared? Badly enough. Selfishness runs rampant and largely controls action. Capital grinds and exacts the last penny. Labor is not up to what is required of it. The opposing hosts rarely, in any part of their extent, come together on the common ground of good pay for good work and *vice versa*. We are all in this matter somewhat like mariners in a waste of waters, beset with mud banks; buoys may exist to mark the dangers, but in our blindness we do not see them and we will not until the yet obscure searchlight of unselfishness is turned on full.

PITTSBURGH'S TALLEST OFFICE BUILDING.

(WITH SUPPLEMENTAL PLATE.)

We show by means of one of the half-tone supplemental plates which accompany this issue a general view of the tallest steel skeleton frame skyscraper in the city of Pittsburgh, Pa., being that of the Farmers' Bank Building, located at the corner of Fifth avenue and Wood street. It has a frontage of 120 feet on the former thoroughfare and 140 feet on the latter, is 24 stories above the street level, and in addition has a basement and sub-basement. Our picture was made direct from a recent photograph taken especially for the purpose and shows the structure with the incasing masonry nearly completed. The aim of the architects, Alden & Harlow, of 314 Fourth avenue, Pittsburgh, has been to make an office building which in dignity of design and excellence of arrangement and finish would be second to none in the country



Typical Floor Plan, Representing All Above the Third Story.

Pittsburgh's Tallest Office Building.

For the first four stories the exterior is of white marble, handsomely wrought, the remaining stories being of dark brown pressed brick with white trimmings. The interior is finished in mahogany and white marble, the walls of the different rooms being decorated in light colors, and as every room has outside windows, there is an abundance of light. The heating is by steam under thermostatic control and the ventilation is by means of large power fans and air ducts. There are ten hydraulic elevators, of which four are express. The entrance to the building is in Fifth avenue, through a wide hall finished in marble.

The Farmers' Deposit National Bank occupies that portion of the first floor located at the corner of Fifth avenue and Wood street, there being on either side of the banking quarters five store rooms. On the mezzanine floor under the banking room is the safe deposit department of the bank, equipped with the largest armor plate vault in that section. Above the first floor the space is utilized exclusively for office purposes. We present herewith a typical floor plan, representing in fact those above the third story.

As affording an idea of the magnitude of the building it may be stated that there were about 10,000 tons of structural material used, all of which was furnished by the Carnegie Steel Company.

How to Heat a Village House.

Although hot air furnaces, hot water and steam are invading the country, yet the majority of village houses are stove heated, and as a result of defective arrangement are very poorly heated, especially when the mercury falls below freezing, says Dr. Harvey B. Bashore, in a recent issue of the *Sanitarium*.

In stove heated houses the halls are always cold, and in addition, even in the rooms containing stoves, the floors are from 6 to 8 degrees colder than the temperature 4 or 5 feet above, a fact easily proved by experiment. As a consequence one's feet are just so much colder than head and shoulders. These two defects, cold halls and floors, are certainly factors in producing catarrhal inflammation of the throat and nose, if nothing worse. To reduce these defects to a minimum, it is necessary to alter somewhat the construction of the rooms. Every one knows the value of the open grate, not so much as a heater, but as an equalizer of room temperature, and herein lies our remedy. Every room should have such a grate or its equivalent, simply an air shaft connected with the chimney, and opening into the room at the floor level. An air shaft so arranged, and of suitable dimensions, answers almost as well as an open grate, and furnishes the means whereby rooms may be heated very well with ordinary stoves.

When a room, which has no fire place, is heated the heated air rises and spreads along the ceiling in a thick cloud, and if a window is opened the warm air rushes out before it has done much good; if, on the other hand, there is an open grate, some of the hot air, escaping up the chimney, creates a partial vacuum; this, consequently, creates in the room a movement toward the opening and the upper heated air is more diffused about the room, making the temperature more uniform.

The halls, whether they contain a stove or not, should have an air shaft, for it will assist somewhat in "sucking out" the heated air of the adjoining rooms. A small oil heater, placed in the lower hall, will be of assistance in keeping the hall temperature at the right point.

A CORD of stone, 3 bushels of lime and 1 cubic yard of sand will lay 100 cubic feet of wall.

DOORS AND DOORWAYS.—I.

BY FRED. T. HODGSON.

As all modern design in building is founded upon ancient examples, I may be excused for introducing in these papers a few remarks, and some illustrations, pertaining to those standards of excellence which time has spared or which poets and historians have described for our information and delight. "There are two kinds of entrances—doors and gates," says Sir Wm. Chambers. "The former serve only for the passage of persons on foot, but the latter are likewise contrived to admit horsemen and carriages. Doors are used as entrances to churches and other public buildings, to common dwelling houses and as communications between the different rooms or apartments; gates serve as inlets to cities, fortresses, parks, gardens, palaces and all places to which there is a frequent resort of carriages. The apertures of gates being always wide, they are generally made in the form of arches, that figure being the strongest; but doors, which are usually of smaller dimensions, are commonly of a parallelogram figure and closed horizontally. The ancients, indeed, sometimes made their doors, and even their windows, narrower at the top than at the bottom. In the Temple of Vesta, at Tivoli, there are examples of both, and Vitruvius, in the sixth chapter of his fourth book, lays down rules for the formation of Doric, Ionic and Attic doors, by which the apertures of all are made considerably narrower at the top than at the bottom. This oddity has been very little practiced by the modern architects.

"It must, however, be admitted that they, like some other uncouth things, have one valuable property—they shut themselves, which in a country where neither man nor woman takes thought or trouble about shutting doors after them deserves its praise, and was, perhaps, the original cause of their introduction among the ancients."

The general proportion for the apertures, both of gates and doors, whether arched or quadrangular, is that the hight be about double their breadth, or a trifle more. Necessity probably gave birth to this proportion, which habit confirmed and rendered absolute. In the primitive huts the entries were doubtless small, perhaps in imitation of those of swallows' nests, no larger than was sufficient for a man to creep through, for those rude buildings being intended merely as retreats in the night or in times of bad weather, it is natural to suppose they made the entrance to them as small as possible, to exclude the air and rain. But when architecture improved and methods were discovered of shutting the door occasionally, they made it of such a size as was necessary for giving admittance to a tall, bulky man, without stooping or turning aside; that is, they made it about 3 feet wide and 6 feet high, or twice as high as broad, which proportion, being suitable, became habitual, was preferred to any other, and observed even when the size of the entrance was considerably augmented and other proportions would have been equally convenient.

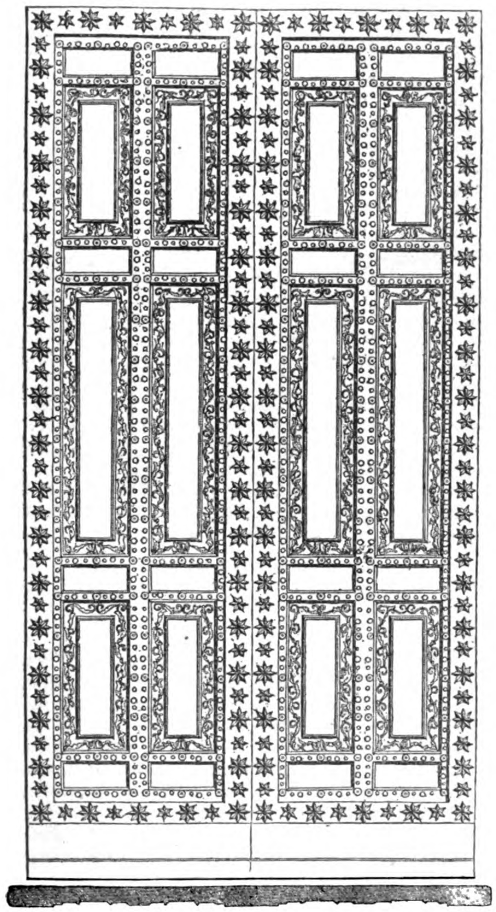


Fig. 1.—Door of San Giovanni in Laterano, Rome.

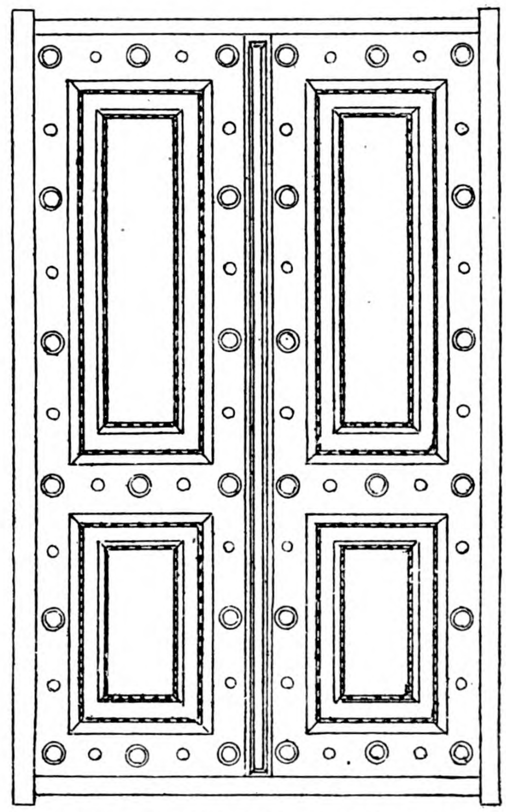


Fig. 2.—Door in Church of SS. Cosmo and Damiano, Rome.

Doors and Doorways.

Modern practice and requirements, however, have increased the hight, so that the generally accepted proportion for doors is that the hight of a door must be one-sixth more than double the width, so that a door 3 feet wide to be in proper proportion must be 7 feet high. This seems to make a very satisfactory proportion and accommodates itself to modern wants and conveniences.

From the earliest times the door and doorway have been treated as the most important features in and about a building. Beautiful designs, costly materials and the most exquisite workmanship have been lavished upon them. They have been made interesting by every means that art can devise. I will quote one word picture of a doorway because among ancient writings it is the oldest, the finest and the most familiar. Homer tells ("Odyssey," Book VII) how Ulysses, approaching a certain palace, stood admiring before the brazen threshhold. It was like the shining of the sun or moon through the lofty roofed house. Golden doors closed the entrance, the pillars of the jambs were of silver, carrying a silver lintel. Of gold was the ring that moved or fastened the door.

To get down to dry history, in the temple built by Solomon the doors were of fir, hung folding to posts of olive wood; they were carved with cherubim, palm leaves and open flowers, and were covered with gold, fitted upon the carved work. In the East, whence such gorgeous ideas have come, remains of wooden doors have been found that were covered with plates of bronze, adorned with scenes illustrative of the conquests and the triumphs of kings and great generals. The Romans used in their doors such woods as cedar, cypress, elm, oak and ash, and of more precious materials, iron, bronze, ivory and gold, but not silver it seems. One rich Roman was reproached for being the first to introduce dressings of Numidian marble in his doorway, another for having bronze jambs to his porch, as being unwarranted innovations.

The doorways of the Temple of Minerva at Syracuse were finished with gold and ivory, ornamented with heavy golden knobs and with historical subjects most elaborately wrought. St. John the Divine tells of a city whose walls were ornamented with all manner of precious stones, every gate or portal being of one pearl. In the Pantheon at Rome the ancient bronze doors, cast in thin plates, still are in service after doing duty for over 2000 years. They are adorned with rosettes and studs and measure 14 feet wide by 24 feet high. The bronze doors from the old Senate House at Rome, now in San Giovanni in Laterano, measure 15 feet wide by 29 feet high, and are richly ornamented with stars, studs and foliage, as shown in the illustration, Fig. 1.

The bronze doors now in the church of SS. Cosmo and Damiano, at Rome, are framed with stiles, rails and panels, and molded with ogee moldings and enriched beads, as may be seen in Fig. 2, in the manner of modern practice. Indeed, all these bronze doors bear witness that the ancient workman had a thorough knowledge of wooden construction, which was imitated not only in bronze, but also in stone and marble. The Temple of Diana at Ephesus had doors of cypress wood, that were said to be uninjured by exposure after 400 years. But of far more value than costly material is the art of the skilled workman. In the church of St. Salina at Rome there are now doors of olive wood perhaps a thousand or more years old. They are boldly carved with scenes from Scripture history fairly well preserved.

The church of San Zenone, at Verona, in North Italy, has wooden doors of the twelfth century, on which are nailed bronze plates adorned with figures of many kinds.

It is not my intention to do more than barely touch on the famous doors of the mediæval or Gothic period. Many doors of the early days of this period were covered with plain, upright boarding, nailed on battens or ledges, similar to the ordinary batten doors, the hinges being developed into the most intricate and beautiful patterns the blacksmith could execute. Sometimes the boarding was made to alternate, one board being plain and the next molded. Later they were framed in designs similar to those of the contemporary window tracery or carved with figure subjects. There is one such composition in the Cathedral of Burgos, in Spain. The magnificent brass gates or doors of Henry VII's Chapel, Westminster Abbey, must not be forgotten. These are of wood, skeleton framed, and covered with elaborately ornamented castings, which were gilded, as bronze appears to have generally been treated at all periods.

The baptistery at Florence was provided with doors that still exist. One pair, finished in 1330, is adorned with panels containing Scripture subjects. But those made by Lorenzo Ghiberti, a hundred years later, are the glory of the Italian art, and were said by Michel angelo to be fit for the gates of Paradise. A copy of these doors, gilded as they were originally, is set up in the South Kensington Museum, London, England, and bits of the ornamentation are used as models for students in all schools of art. In the same museum are also casts of the wooden doors from St. Maclou, at Rouen, made in the middle of the sixteenth century, and covered with an abundance of figure sculpture characteristic of that period of the Renaissance.

These old examples illustrate nearly all the points that it is desired to consider in relation to the modern door. Practically the modern door is, with rare exceptions, a construction of stiles, rails and panels. Some doors in the church of St. Sauveur, at Bruges, dated 1544, but looking much later, are an early instance of the modern type; each is divided, vertically by a muntin and horizontally by two rails, into six equal molded panels, each panel having a molded sinking filled with carved ornament. Le Pautre published in 1654 many examples of highly enriched internal doors, single, folding and sliding, each being of two or three panels variously proportioned. There were no muntins in any of these doors, the general design corresponding with the French doors of to-day and which are now to popular. The bronze doors taken from the Senate House at Rome, which have muntins, illustrate the former method, and those of the Pantheon and the Church of SS. Cosmo and Damiano, which have no muntins, illustrate the latter. We shall see the importance of this distinction. Le Pautre's designs were made at the commencement of the reign of Louis XIV. That and the reign of Louis XV must have been the golden age of joiners and decorators. France, and all the countries under its influence, became impoverished by the erection of ruinous palaces and princely mansions too grand for habitation. The time of Louis XV was marked by a profuse use of carved or molded ornament in the shape of scrolls and shells arranged in wildly distorted patterns.

Roman Villas.

In the construction of Roman villas there was no limit in the size and no regularity. The opulent patrician indulged in many, spread over the fairest districts of Italy, in situations either adapted to the changes of the season and to the taste of the owner, or dictated by his caprice and the fashion of the times. The arcaded substruction of numerous ancient villas still remains, while the buildings above are in ruins, either by the depredations of those who are in after ages demolished to erect other buildings, or by the silent waste of time on such as were erected of the soft tufa. On many of the Roman villas convents and monasteries were erected, as materials were at hand, and the arcades of the substructions formed conveniently storehouses and cellars. How long the Roman villas remained habitable after the many invasions of Italy is not easy to ascertain, says a writer in a London exchange. One of the celebrated villas of Lucullus, formerly belonging to Marius, and afterwards an imperial residence of Tiberius, situated on the promontory of Misenum (Capo Miseno), existed in the year 480. The villa had gradually been changed into a strong castle to protect it against the sea attacks of the Vandals. These invasions by sea of the Vandals, and subsequently of the Normans and Saracens, ruined probably the crowd of Roman villas on the Neapolitan shores. The villas on the fertile plains of Italy would suffer by the invasions by land; but many villa castles or fortified residences remained after the tenth century in the hilly districts of the Vicentine and Veronese territories, as their rural nobility descended into the cities of Padua, Verona, Vicenza and Trevisa and took part with the Guelph faction.

CABINET WORK FOR THE CARPENTER.*

BY PAUL D. OTTER.

THE subject here illustrated exemplifies the idea which should be uppermost, as expressed by the great master of arts and crafts, William Morris: "Have nothing in your house that you do not know to be useful or believe to be ornamental."

Certainly a frowning black coal hod standing in the corner of one's sitting room jars on the sense of propriety. It looks bad enough behind the kitchen stove, and is only tolerated because it is a useful article—an instrument of torture from which the man of the house cannot very well flee. The coal chest is an "accessory to the fact," yet in having one we find that in itself it is pleasing to look at and also serves a double purpose of a comfortable seat under the window sill or where one has a mind to place it. We have then to consider an article of furniture which admittedly is useful and in harmony with our better desire to banish the unsightly useful necessity. It will be found not only desirable for the stove heated room, but for the gentleman who, in his steam heated residence, likes to run a little fire department of his own in the library grate just for "auld acquaintance" sake and watch again the glow in the chimney breast.

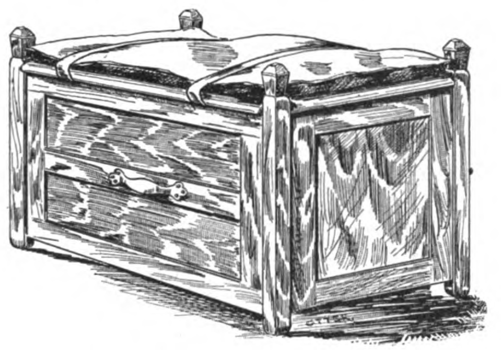


Fig. 1.—Fuel Chest and Window Seat.

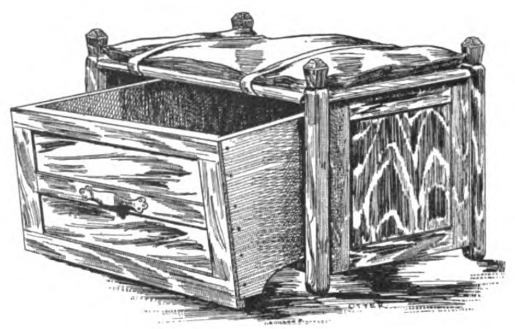


Fig. 2.—Showing the Chest Open.

Cabinet Work for the Carpenter.—A Fuel Chest.

As here shown it will be very readily constructed. It is seat high—that is, 18 inches from the floor to top, without cushion. The width at the ends, outside, is 18 inches, the front 22 inches. The construction is held between four posts, 2 inches square, 21¼ inches long, making the end frames 14 inches wide by 15¾ inches, the back frame 15¾ x 18 inches and the front frame 15 x 18 inches.

The frames for the ends and back are made of ⅞ x 2 inch rail and stile, with a ⅜-inch plain panel set in a groove 3-16 inch from front face. Allowance should, of course, be made in getting out the frame stock to permit of dressing the edges to size given after the frame and panel are glued up and handled as one part. The back and end frames are secured to posts 1¼ inches from floor line by means of 7-16 x 2 inch dowel pins, three pins to a joint. Set the frame ¼ inch back from face of posts. Care should be taken in edging evenly the post and frame before scribing and properly locating the boring points on each part. In this way there will be no failure in having projecting dowels drive into their corresponding holes when setting up for trial and gluing. Long bar clamps should be used in drawing up tightly after gluing.

The plan, Fig. 3, shows open bottom framing, which is to be secured even with lower edge of outside framing. This consists of some soft wood cross rails, as shown, 2 inches wide, and the two front to back stiles are to be of 1 x 2 inch hard maple or other hard wood not easily worn by the rolling of the two casters seen on rear corners of fuel box end, Fig. 4. Secure this framing, after it is glued and dressed to fit, by means of three 2½-inch screws, driven on the inside edge of the two maple strips, glue having previously been applied to the parts. Shoulder the projecting ends of the maple pieces, front and back, to fit corner of posts and secure by screws to posts. The front ends are to be trimmed afterward to stop the front frame, which is part of the box, as shown in Fig. 4, from moving back more than ¼ inch from face of front posts. The outline of end of the box proper, with section of front panel framing, is shown in Fig. 4. In Fig. 3 the plan and measurement of box are shown directly over bottom framing of chest.

With the exception of the front this box is constructed from ⅞-inch pine or whitewood and is put together with nails in the back. The front frame is similar in construction to the other frames, with the exception of intervening rail, to which the handle is applied. This frame is rabbeted on the back face of the stiles to within ⅜ inch of the front to accommodate the front ends of side pieces and through which screws are driven diagonally into framing, the parts being glued before so doing. To further strengthen this part of the construction, which is subjected to a pulling strain, apply with glue and nails triangle corner blocks on back in line with middle rail and at lower corners, as indicated in Fig. 4.

We have now a box frame without a bottom. Where the cleat is marked in Fig. 4 glue and nail a piece ¾ x 1 x 9½ inches. From the top rail of front frame and in a curved manner, as shown by dotted line, neatly bend and secure with tinners' ⅝-inch nails a sheet of galvanized iron or sheet steel, about No. 20 gauge. The size of the sheet is 18 x 25 inches. Previously prepare the sheet for proper bending by cutting out notches to permit of bending to the curve and where it is bent up against the back of the box. The allowance is for 1 inch to turn up on each side, which do by hammering on a square edge, punching nail holes on this turned up margin ready to drive the nails into the wood. By making careful calculation in bending the sheet should go in the box opening with ease, and when secured to top rail of front frame it may be made to readily conform by pressure with the curve and lay against the angle made by cleat at bottom. Bend an easy corner up onto back of box, where finally secure by a row of nails along the margin. By the use of the metal bottom the usual annoyance of digging coal from at least two corners will be overcome and the curve causes the coal to center to a position most convenient when the box is drawn out, as shown in Fig. 2. Upon the rear corners of the box, and in line to "track" along the maple framing underneath, secure firmly a caster on each corner. In this instance it will require casters which will

* Continued from page 11, January issue.

not raise the box above ¾ inch. A single-wheel caster, such as those used on a dressing stand or trunk, will do nicely.

The top of the chest, which if used without the cushion should be of good figured 1-inch stock, is jointed to a finished panel 18 x 22 inches, shouldered at the corners to fit between the posts and the edges molded to a quarter mold and even with outer face of posts.

The Cushion.

The illustration shows an unconventional way of providing a cushion for this primitive structural form. It is one which may be made by the handy craftsman or handed over to a carriage trimmer should there be no

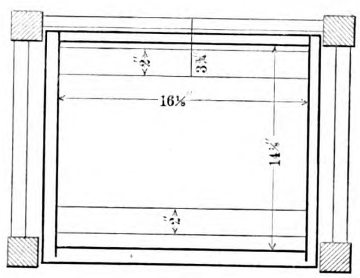


Fig. 3.—Plan of Chest and Fuel Box in Position.

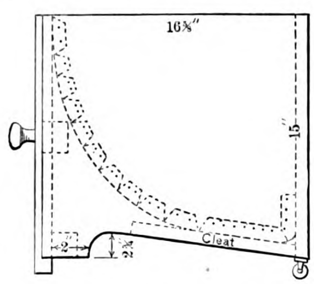


Fig. 4.—End View of Box, Showing Front Frame and Metal Bottom.

upholsterer available. It consists of a covering made of the prevailing Spanish brown leather, a soft material harmonizing well with oak whether it be finished "natural," "golden" or in the "weathered" tone. The cushion for this would be very much like a flat stuffed pillow, the filling being of hair or moss. The leather cover is made of better grade leather on top, with a lower grade leather, or "pantasote," in color to match, for the under part. The two pieces are cut out and sewed in length to fold and form a mail-bag-like pouch, with ample flaps over the opening. Sew edges of material, when folded to size of seat, with the good sides face to face, then when finished turn inside out. Insert the cushion and lay the pouch on seat, with flap side against the seat and at back. With two soft leather straps of same color tack under back edge of seat and draw them down across the bag, as shown, and secure on the front edge.

A lower cost covering could be made altogether of imitation leather or "pantasote," corduroy or velour in tans or brown. As an article of furniture in close proximity to heat, the wax, or dull gloss, is a preferable finish.

The Handle.

There are a number of plain cast bronze or brass handles kept by hardware dealers answering this purpose. It should, however, be strong and drilled to secure it through the middle rail with a washer and rivet or by a round head bolt with nut and washer from back. A hand hole in a corresponding position on back of box should be made, which will permit of the box being taken from the room for more coal.

Another Suggestion.

In Fig. 5 is offered another idea for a coal or wood box of an ornamental form and yet a part of the room furnishing. It is given for the reader to lay out the section of the fuel containing space as it best suits his purpose, the form of this four-sided box being somewhat dependent on the idea of ease in using the shovel and also in forming in a pleasing manner the outline of the end pieces. The carving of a claw foot on the two base pieces would be proper and pleasing. A generous opening in the sides over the slanting top suggests its use as a handle. A strip of 1-16 inch thick polished brass, almost covering the edge of side panels from under front point and down to support in back, will add much to the appearance. The stock for this piece should be not less than 1 inch, better 1⅛ inches thick. The proper dimensions of the box would be contained within 19 inches square.

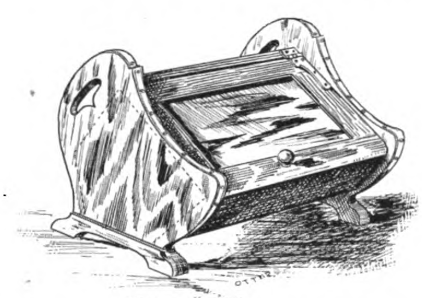


Fig. 5.—Another Suggestion for Design of Fuel Box or Chest.

Cabinet Work for the Carpenter.—A Fuel Chest.

British Labor Unions.

The report of the chief labor correspondent of the Board of Trade on trades unions for 1901, issued about the middle of December, shows that the separate unions number 1236, with a total membership of 1,922,780. During the year the unions decreased 16 in number, and the membership increased 12,166, an increase of 6 per cent., compared with an increase of 5.9 in 1900, and of 9.4 in 1899.

The falling off in the rate of growth is attributed to the downward movement in the labor market. The figures indicate that the membership of the unions, especially in the less skilled industries, tends to expand more rapidly in the years of improving trade, while the trend is checked or even shows actual decline in the periods of diminishing employment.

The income in 1901 of a hundred of the principal unions, which include more than 50 per cent. of the total membership, was £2,062,000 and the expenditures £1,556,000. One-eighth of this expenditure was devoted to labor disputes and two-thirds to other benefits, the remainder being devoted to working and miscellaneous expenses. The accumulated funds at the end of the year amounted to £4,162,000, equaling 71 shillings 8 pence per head. The figures on income, expenditures and accumulated funds show an increase over 1900, both absolutely and proportionately, to the membership.

Coating Cement for Painting.

Portland cement work which is to be painted must be thoroughly hardened and perfectly dry, says a writer in an exchange. It is advisable to let the work stand for a year before oil paints are applied. The durability of the paint will be assured by first brushing over the surface with dilute sulphuric acid—one part of acid to 100 parts water—and allowed to dry before painting. A preparatory coating for oil paint is a solution of common water glass in three or four parts of water. Two applications of this, followed by a washing with water, and then another application of water glass will be found effective.

FRAMING ROOFS OF EQUAL AND UNEQUAL PITCH.*

BY MORRIS WILLIAMS.

REFERRING to the illustrations, let Fig. 6 represent a half plan of a roof of unequal pitch, one roof to have a run of 12 feet, the other a run of 8 feet, and both roofs to have a rise of 12 feet; thus one roof will have one-half pitch and the other three-quarter pitch.

For the length and cuts of rafter No. 1, take 12 and 12 on the square, run along the scantling 12 times, or multiply the bridge measure of 12 and 12 by 12, the run.

For the length and cuts of rafter No. 2, take 12 and 18 on the square for the cuts and multiply the bridge measurement by 8 for the length. The 18 gives the top cut and the 12 gives the bottom cut; 12 and 18 will also give the top and bottom cuts for the jacks, and as the top and bottom cuts of jacks are alike, 18 in this case will cut both top and bottom.

To find the cut across the back of jacks on the right side, marked 2 on the figure, take the length of the rafter on this side on the blade and the run of rafter No. 1 on the tongue; the blade will give the cut.

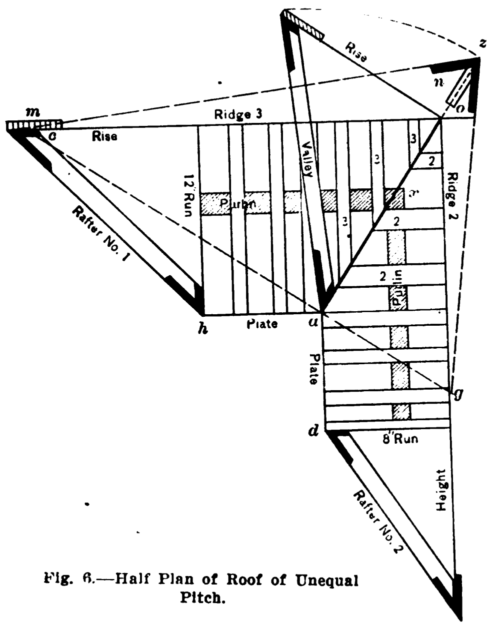


Fig. 6.—Half Plan of Roof of Unequal Pitch.

Framing Roofs of Unequal Pitch.

To find the cut across the back of jacks on the left side, marked 3, take the length of rafter on this side on the blade and the run of rafter No. 2 on the tongue; the blade will give the cut.

While this method of finding the back bevels of jacks is applicable in all cases, it should be kept in mind that the method explained in Fig. 2 is applicable only for roofs of equal pitch.

To find the lengths of jacks on each side, divide the length of the rafters by the number of jacks required.

For example: On the left side are shown four jacks, counting the one in the corner at *a*. Divide 17, which is the length of the rafter on this side, by 4, and we have 17 ÷ 4 = 4 feet 3 inches. According to this process the first jack will be 17 feet long, the second 4 feet 3 inches shorter, &c.

Proceed the same way to find the lengths of the jacks on the right side, marked 2. Divide the length of the rafter on this side by the number of jacks required, counting the long jack from *a*, the divisions will determine the length of each jack.

To find the bevel to fit the valley against the ridge proceed as was explained in Fig. 5. Draw a line from *a* square to the seat of valley, intersecting the ridge of both roofs, as at *c* and *g*; continue the seat of valley, and make *a z* equal the length of valley; connect *z g* and *z c*; the bevels are shown at *n* and *o*, respectively; *n* will fit against ridge 3 and *o* against ridge 2.

Cuts for Purlins.

The shaded lines in Fig. 6 represent the purlins. They are shown intersecting the valley at *x*.

Although it seldom happens in frame buildings that cuts for purlins are required, it is almost the rule in stone and brick buildings to place them as shown in Fig. 6, necessitating the finding of two bevels for each purlin to fit against the valley—viz., the top across the back and the one for the side of each.

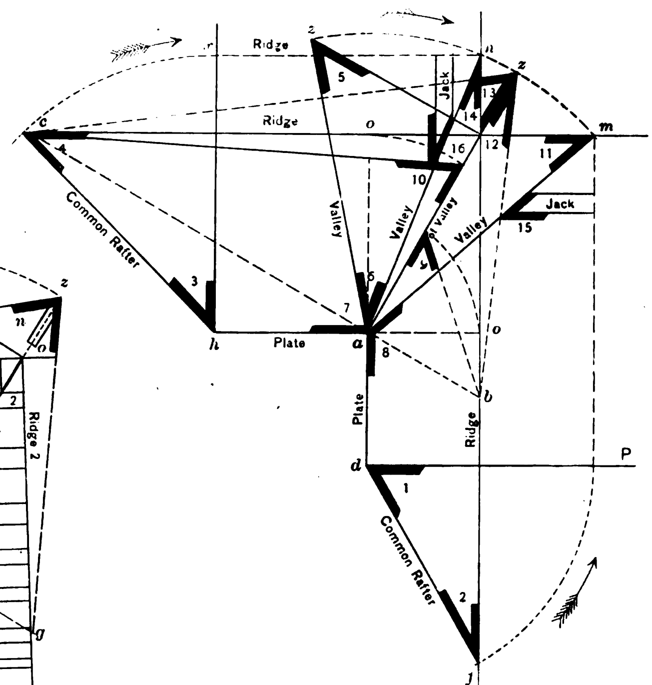


Fig. 7.—Diagram Showing How Bevels Can Be Obtained from the Plan Drawings.

In Fig. 7, which is a reproduction of the plan in Fig. 6, is shown how these bevels can be found from the plan drawings. In this figure is also shown every other bevel that is called for in the construction of roofs of different pitch intersecting one another.

The bevels are numbered in the figure as follows:

No. 1. The bottom bevel for common rafter.
No. 2. The top bevel for common rafter.
No. 3. Bottom bevel for common rafter.
No. 4. Top bevel for common rafter.
No. 5. Top bevel for valley.
No. 6. Bottom bevel for valley.
No. 7. Top bevel for purlin.
No. 8. Top bevel for purlin.
No. 9. Side bevel for purlin.
No. 10. Side bevel for purlin.

Nos. 11 and 14 are the bevels to fit the valley against the ridge when the valley is backed to conform with the intersecting planes of the roofs.

Nos. 12 and 13 are the bevels to fit against the ridge when the valleys are left square on the upper side.

Nos. 15 and 16 are the bevels for the upper side of the jacks, to fit against the sides of the valleys.

As all these bevels, except those for the purlins, have already been explained it will be necessary now only to explain these.

From the corner of the plates at *a* draw the dotted

* Continued from page 14, January issue.

line *a o*, which is the run of common rafter on the left side.

Put one leg of the dividers in *a*, extend the other to *o*, and revolve point *o* until it intersects the seat of the valley; connect this intersecting point with *c* on the ridge. In this manner bevel 10 is obtained, and it is the bevel to cut the purlin sideways.

The bevel to cut the same purlin on top is shown as bevel 7, in the figure; the stock of the bevel follows the plate and the blade follows the valley, as shown from *a* to *n*.

The valley in the position indicated at *a n* is assumed to be lying flat, having been revolved on point *a* as a pivot from its actual position in the oblique plane of the roof.

When the valley is placed in this position the bevels for the jacks may be obtained as shown at bevel 16.

The bevels for the purlin on the right side of the

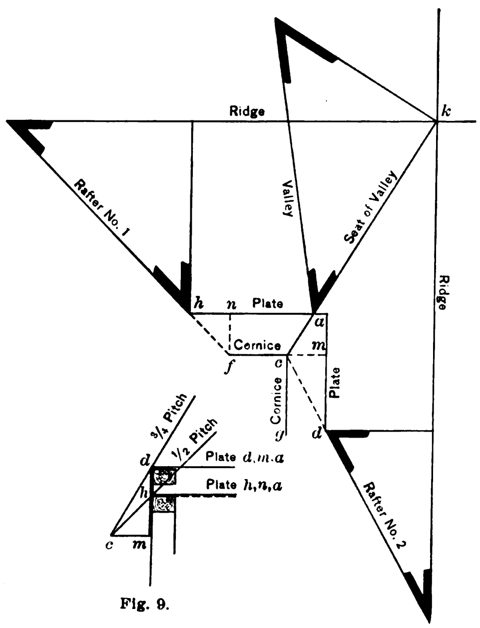


Fig. 8.—Reproduction of Plan Shown in Figs. 6 and 7, but with the Addition of Lines Representing Projection of Cornice.
Fig. 9.—Showing Relative Hight of Plates from Planceer.

Framing Roofs of Unequal Pitch.

roof are found in the same manner as shown at bevel 9 in the figure.

The run of the common rafter is revolved, as shown at *o* on the left side, to the seat of the valleys, and the point of intersection is connected to point *b* on the ridge, which is a point obtained by drawing a square line to the seat of valley through point *a* on the plate, as also is point *c* on the other ridge.

I may state here that the foregoing method to obtain purlin bevels was never before demonstrated in any book or magazine, and in view of it being my own creation, I hope the reader will favorably accept my possibly mistaken assumption of its superiority over all other methods previously demonstrated.

Its extreme simplicity will be evident on comparing it with any other. I am acquainted with at least half a dozen methods, probably more, all of which are more or less intricate; containing more lines, and some of them requiring for their elucidation a diagram other than the plan drawing.

Before leaving Fig. 7 I would suggest the advisability of a thorough study of it, inasmuch as it contains a complete summary of all the bevels in one diagram which are required for the most complicated piece of roof construction. If drawn to a scale, say, of 1½ inches to 1 foot, it will give the lengths of all the common rafters, jacks and valley, as well as all the bevels.

It will be noticed that the projection of the cornice has been left out entirely from Figs. 6 and 7, the rafters and valley being assumed to terminate at the face of the plate, but as this arrangement is almost exclusively applied to stone and brick buildings and as a cornice is invariably an appendage of frame buildings, the treatment of roofs of unequal pitch would be incomplete if left at this stage. So we will now proceed to demonstrate how to frame a roof of unequal pitch having a widely projected cornice.

Referring to Fig. 8, which is another reproduction of the plan in Figs. 6 and 7, with an addition of the lines *f c* and *c g*, to represent the projection of the cornice, it will be noticed that the seat of the valley is so modified as to intersect with the cornice instead of, as in the other figures, with the plates.

The seat of the valley in this figure is shown from *c* to *k*, meeting the plate *a h* somewhat to the left of *a*, where the two plates intersect.

From this change in the angle of the seat arises a change in the top and bottom bevels of the valley, also a change in the hights of the plates.

The plate upon which the valley leans will be lower than the plate *d a*. To determine how much proceed as follows:

Continue rafter No. 1 to the cornice, as at *h f*, draw *f n*, also continue rafter No. 2 to the cornice, as at *d c*, and draw *c m*.

This process determines the relative hight of the plates from the planceer. Plate *d a* will be equal to *d m*, plate *h a* will be equal to *n h*, and the difference between the two will be the difference in the hight of the plates from the sill. This is clearly shown in Fig. 9, where *c m d* is made to equal *c m d* of Fig. 8, *c m* being the planceer. Point *d* determines the hight of the plate *d a* from the planceer. To determine the hight of plate *h n a* make *m h* in Fig. 9 equal *n h* in Fig. 8.

Point *h* determines the hight of plate *h n a*, and the difference in hight between the two plates is indicated at *h d*. Now in preparing the studding for this roof, it is evident that if plate *h n a* is, say, 18 feet high from the sill, the plate *d m a* will have to be as much higher as *d* is higher than *h*, as shown in Fig. 9.

From the foregoing remarks relating to roofs of unequal pitch it is observable that the main points to seriously consider are: 1, The seat angle of the valley or hip, as the case may be; 2, the difference between the bevel to cut the jack rafters across the back and the bevel that will cut the jack rafters for a roof of equal pitch; 3, the difference in the hight of the plates from the sill. With only these exceptions the treatment of roof framing of both equal and unequal pitch is similar.

(To be continued.)

A Huge Lumber Flume.

There has just been completed in the heart of the redwood forests of California a huge flume, 53½ miles in length, for carrying large timbers to the railroad at Madera, in the State named. The flume is V-shaped, solidly constructed of double 2-inch planking, with 36-inch sides, and is 46 inches across the top. It has a carrying capacity of 400,000 feet of timber daily, required 5,700,000 feet of lumber and 21,000 kegs of nails in its construction, and with its several feeders has a total length of 71 miles. The cost was $270,000, the work of construction being a gigantic undertaking, as great gorges had to be bridged, mountains circumvented, deep forests penetrated, and steep hillsides and precipitous cliffs blasted to make secure foundations for the heavy trestle work supporting the flume.

All the logs are cut into huge timbers at the head of the flume, and these in a continuous chain, each touching the one before it, move down the flume at the rate of about 3½ miles an hour, until they are finally caught upon a railroad siding at Madera.

The water for operating the flume is taken from the mountain streams which supply the Madera Canal, and after it has served its purpose of transporting the lumber it is turned back into the canal at its lower end and used for irrigation purposes. As the climate in this part of California is mild throughout the year the flume never freezes over.

WHAT BUILDERS ARE DOING.

THE reports which we present below indicate in a most striking manner the extent of building operations in some of the leading cities during the year which has just been brought to a close, and show to what extent the volume of work has exceeded that of the year previous. There are, it is true, some centers which show a falling off in the degree of activity as compared with 1901, the most notable perhaps being New York City. The record of the country is all the more gratifying, however, in view of the high prices which have prevailed for nearly all materials entering into building construction and the advances which have been made in the wages of labor. These conditions have no doubt in many cases been the cause of deferring much work that would have been executed, and many plans have been held in abeyance until conditions are regarded as more favorable for the completion of the projects. At the present writing the field of building operations is comparatively free from labor disturbances, although here and there friction exists, but not in sufficient degree to seriously interfere with the general progress of work in the aggregate.

Baltimore, Md.

The feeling among architects, contractors and builders is one of gratification at the record which has been made in the building line in the city during the year which has just been brought to a close. Early in the season it was predicted that 1902 would break all previous records, and the close of the 12 months shows the prophecy to be literally fulfilled. A summary of the bulletins of the Builders' Exchange shows that the total amount invested in building improvements during the year aggregated more than $12,000,000, of which amount $3,112,000 was put into business improvements, $1,165,000 in public buildings, $354,000 in apartment houses, $477,000 in churches, $420,000 in bank buildings, $386,000 in private residences, including both city and suburban dwellings, and $1,031,000 in miscellaneous structures, such as institutions, clubs, theaters, power houses, &c. To this must be added for dwelling house blocks and for small improvements costing less than $5000 each, $5,450,000. Contemplated improvements, some of which are ready to be commenced, amount to $2,000,000, and with such a prospect, equally as encouraging as that which greeted the advent of 1902, there is every reason to expect the present year to equal or exceed that just closed, so far at least as building operations are concerned.

At the last quarterly meeting of the Builders' Exchange a radical departure was made in that ladies were invited to be present. Despite the heavy downpour of rain, very many were present, and the innovation was regarded as a great success. Floral decorations and orchestral music were provided, lunch was served by a popular caterer, and the meeting was a most enjoyable one in every way.

Boise, Idaho.

Builders in this city are well satisfied both with the results of the past year and with the outlook for the future. Official statistics show that during the year just closed a total of $980,000 was expended for building purposes, while during 1901 the total was only $416,000. Among the most notable buildings constructed during the year were the Adelman & Wills Block at the corner of Seventh and Idaho streets, costing $30,000; the Gem Block at the corner of Main and Tenth streets, costing $18,000; the Gibbons & Knight Building, costing $10,000; the John Noble Building, costing $22,000, and the Union Block on Idaho street, costing $35,000.

Buffalo, N. Y.

The year which has just been brought to a close was marked by a degree of activity in the way of building operations which cannot fail to be other than gratifying to those having the material progress of the city at heart. Notwithstanding the high prices of all materials entering into building construction, the labor troubles which occurred at intervals and the advances which have been made in wages, the year 1902 shows a very decided gain in the volume of its building operations, as compared with the previous 12 months. In fact, the total amount of building in the last year exceeded any corresponding period since 1896. It is true that in December of last year there was a heavy shrinkage as compared with the same month in 1901, but it was due to special causes and did not prevent the total for the year assuming liberal proportions. There were issued last year 2109 permits for building improvements estimated to cost $5,433,078, as against 1058 permits for building improvements estimated to cost $4,338,771 in the 12 months of 1901. Prominent among the operations commenced during 1902 were the Lafayette Hotel, costing $425,000; the improvements by the Larkin Soap Company, costing over $250,000; the machine shop and foundry of the International Steam Pump Company, costing $205,000; the residence of J. J. Albright, costing about $100,000, and the Buffalo Foundry Company's new building, costing $100,000.

The outlook for the coming year is regarded as very gratifying, all conditions pointing to increased activity in building circles.

Columbus, Ohio.

The members of the Builders' and Traders' Exchange held their annual election and open house on the afternoon and evening of Monday, January 5. The affair was a success in every particular, there being more than 300 members and their friends present, the gathering being one of the largest ever known in the history of the organization. During the day a Dutch luncheon was served to the members and their guests, and there were intervals of music, both instrumental and vocal. An invitation had been extended to the Exchange at Newark, Ohio, and representatives from that organization were present, as were also several from the newly formed Exchange at Zanesville.

The polls were open from 11 in the morning until 8 in the evening, and the voting was spirited, and it is said that more ballots were cast for new officers than at any previous election. The result was the selection of Richard Edgar as president, E. T. Bingham as first vice-president and John Stewart as second vice-president. The directors elected were J. W. Hechert, J. E. Kuntz, D. W. McGrath, E. J. McNamara and S. W. Nichols.

During the afternoon and evening there were many expressions of admiration on the part of those present at the newly remodeled quarters which the exchange now occupies. The organization has been in existence for ten years, has the names of over 200 of the leading firms of the city enrolled in its membership, and is generally in a vigorous and healthy condition. The newly elected officers are all stanch business men and well known throughout the State.

The directors held a special meeting on the evening of Monday, January 12, for the purpose of organizing, selecting as secretary R. J. Gardiner, who has very acceptably filled the office for several years past.

The Master Carpenters' Association of Columbus was incorporated early in December for the protection of mutual interests and promoting the welfare of the trade, the incorporators being R. A. Edgar, F. E. Bues, William E. W. Cherry, S. W. Nichol, J. W. Heckert and F. H. Nichol.

The Master Stone Masons' Association of Columbus was incorporated at the same time, and for the same purposes as those named. The incorporators were J. Stixel, Walter Collins, Charles O. Goss, Justus Sandrock and Henry Moss.

Detroit, Mich.

Just at present there is no great amount of new work in sight, although the impression seems to prevail in building circles that the ensuing year will prove to be better than the one which has just closed. There is always more or less going on in and about the city in the way of construction of new dwellings, which are an important factor when totals are considered.

According to Permit Clerk Charles W. Brand, the estimated cost of building improvements for which permits were issued last year was $6,052,400, as against $5,977,400 in the 12 months of the previous year.

Gloucester, Mass.

The master mechanics of Gloucester, including all trades affiliated with the building business, have recently formed a permanent organization to be known as the Master Builders' Association of Gloucester and vicinity. For a long time the matter of forming such an association had been under consideration, but it was only recently that the movement assumed a concrete form. The objects of the new organization are mutual help and protection, but the leading spirits in the movement were doubtless influenced to some extent by the attitude of labor. A constitution and by-laws have been adopted and meetings are held on the first Wednesday of each month.

The officers for the ensuing year are John W. Day, president, Simon Garland, treasurer, and Nathaniel Maddix, secretary.

The volume of business in the building line during the past year has been about the same as for the previous 12 months, but the outlook for 1903 is not of the most flattering character. Many contemplated improvements, we understand, have been abandoned on account of the uncertainty of the labor market, and the feeling among leading builders and contractors of the city is that trouble may develop in this branch along about April 1.

Holyoke, Mass.

At a meeting of the Master Builders' Association, held at their rooms in the Masonic Building, Monday afternoon, January 5, the following officers and directors were elected for the ensuing year:

Charles Thorpe, resident.
D. J. Toomey, vice-president.
F. J. Curley, secretary and treasurer.

The directors are L. Trowbridge, Arthur Liberty, M. Cleary, E. Hart and L. Curran. The Board of Arbitration consists of F. F. O'Neil, Joseph Liberty, John O'Shea and S. Ducharme.

A motion was made to amend the by-laws and after February 1 the initiation fee will be $25, and after July 1 it will be $50.

Kansas City, Mo.

The outlook for the coming season is very flattering, and it is stated on good authority that there is at present about $2,000,000 worth of buildings in the hands of the local architects. Materials have decreased in price and it is now possible to obtain plenty of labor with no strike conditions with which to deal.

The figures of Superintendent McTernan show little if any difference in the volume of building operations conducted in December of the past two years, the total for 1902 being $446,155, and that for December, 1901, being $444,180. The total for the last 12 months, however, shows a small, though gratifying increase as compared with the corresponding period in 1901, the figures being $6,617,161, as against $6,323,360.

Lake Charles, La.

The leading architects, contractors, builders, supply men and others connected with the building business in Lake Charles have just organized a Builders' Exchange, in accordance with the form prescribed by the National Association of Builders. They have elected the following officers for the ensuing year: Conrad Murphy, president; R. G. Maginnis, vice-president, and T. W. Murphy, secretary.

The amount of building done the past year has been far ahead of that of the year before, the major portion of the capital invested going into two-story brick and stone buildings designed for business purposes. The outlook for the new year is very encouraging, as the amount of work projected is already nearly equal to that done during the past 12 months. During 1902 first-class carpenters' wages were advanced from $3.15 per day of nine hours to $3.20 per day of eight hours; bricklayers are getting $6 for eight hours' work, and painters $3 for eight hours' work. The contracting painters granted their men an eight-hour day with same pay as before, without the men asking for it. The carpenters asked for eight hours with nine hours' pay, taking effect September 8, and it was granted by the contractors. On November 3 the carpenters were locked out by the members of the Builders' Exchange for refusing to work with nonunion men, but the trouble was adjusted on the 7th of that month by the men agreeing to work with nonunion labor and now everything is moving along nicely. Work was a little slack over the holidays, but the outlook is encouraging.

Lincoln, Neb.

According to the records of the City Building Inspector there was residence building during 1902 to the amount of $500,000. Inasmuch as the local system of building inspection is quite loosely conducted this amount is probably too small. The general showing is very satisfactory for a city of some 50,000 population, with comparatively small manufacturing interests.

The volume of residence building for 1903 promises to be quite as large as last year, if high prices of materials do not interfere. At present the architects' offices are full and contractors are busy.

The State Legislature is in session and bills will be introduced providing for licensing architects and the repeal of the lien law. The latter measure is being championed by the contractors with the organizations of Omaha and Lincoln taking a leading part. Looking toward this end a State convention of contractors has been called to meet at Lincoln January 21, a report of which will appear in the next issue of *Carpentry and Building*. It now appears probable that a State association of contractors will be one of the results of this convention. The calling of the contractors' convention has resulted in the calling of the State association of lumber dealers to meet at the same time in this city, presumably to take steps to checkmate this latest move on the part of the contractors, and a lively contest is in prospect. The Nebraska Lien law might have been more properly termed "a law for the relief and protection of material dealers," and it is because of its partiality for this class that the contractors have organized for its repeal.

The Contractors' Exchange has opened new and commodious permanent offices at rooms 12 and 13 Brownell Block. This organization is in a flourishing condition, and is doing much aggressive work for the benefit of its membership.

Los Angeles, Cal.

The total amount invested in building improvements in Los Angeles during the year 1902 was $9,613,231, as compared with a total in 1901 of $4,376,917 and a total in 1900 of $2,519,451. During December the building activity in the city was greater than that of any previous month in 1902, and more than double that of December, 1901. The total amount of the permits for December was $1,139,922.

Milwaukee, Wis.

The outlook for the building business in Milwaukee and vicinity for the coming spring is regarded as very bright by those who are in a position to know the feeling among architects, builders and contractors. There is considerable new work in prospect, and the high prices of materials and labor do not thus far appear to act as a serious deterrent to building operations.

The city has made steady progress in the building line during the past few years, and each 12 months has shown a gratifying increase, as compared with the corresponding period. According to Building Inspector Michael Dunn, there were issued last year 2141 permits for building improvements, estimated to cost $5,655,423, these figures comparing with 1484 permits for building improvements, costing $5,024,695 in the 12 months of 1901 and with 1170 permits for building operations, involving an estimated outlay of $3,111,158 in the 12 months of 1900.

The largest permits issued last year covered additions to the plant of the Schlitz Brewing Company, calling for an expenditure of $270,000, the power house of the Electric Power & Lighting Company, costing $100,000; improvements by the Johnson Service Company, also costing $100,000, with several others ranging from $65,000 to $100,000 each. It is stated that of the total amount of work done only $600,000 of it was planned by architects from outside the city.

Minneapolis, Minn.

The city has shown a steady and gratifying increase in the amount of building which has been done from year to year, and the record for 1902 will stand ahead of any that has gone before. A striking feature of the operations is found in the number of dwellings erected and in the magnitude of the work executed by railroads entering the city in the way of extensions to freight sheds and warehouses, with a view to increasing their facilities for handling freight.

During the year just closed there were 7475 permits issued for building improvements, estimated to cost $7,087,053, as compared with 6265 permits for improvements, costing $6,766,303, in 1901. Of the total for the past year 1079 permits were for dwelling houses involving an estimated outlay of $2,230,960. In commenting upon the situation, Inspector James G. Houghton states that only twice in the history of the city has this number been exceeded in a single year, and that the houses erected have, in nearly every case, been intended for the occupancy of the owner rather than built for speculation.

New York City.

The amount of building which was done in that portion of Greater New York represented by the boroughs of Manhattan and the Bronx during 1902 makes a very creditable showing, when compared with other years, although not by any means up to the record of 1899 and 1901. A noticeable feature of the new work was the increased capital invested in office buildings, lofts, factories, &c., and the decrease in the number of flats, tenement houses, apartment houses, &c., as compared with the year before. During the 12 months of last year there were something over 1700 new buildings projected, estimated to cost $87,959,000, as against $112,176,640 invested in building improvements in the year previous. The figures indicate that the average cost per building was much in excess of that of the year before, and in fact for any year in the recent history of the city. The capital invested in private residences, strictly speaking, was more than $2,000,000 greater than in the year before, while the number of residences increased fully 30 per cent.

In Brooklyn there was a slight gain in 1902 over the previous year, the figures showing that permits were issued for 4986 improvements, estimated to cost $20,611,000, as against 5000 permits for building improvements, costing $19,548,000, in the previous 12 months.

Oakland, Cal.

Oakland and the suburban towns of Berkeley and Alameda are essentially residence districts, and during the past year this has been accentuated by a phenomenal increase in residence building. An accurate idea of the amount of new residences which have been built during the past year is given by the report of the Water Company for the year just closed, which shows that the company made 609 new connections with residences in Oakland, 361 new connections with residences in Berkeley and 150 new connections in Alameda. The building records in Oakland show that 800 new residences were started during the year, the greater number of them having already been completed. Beside the construction of residences several large business blocks have been completed and others are now under way, these ranging in price from $60,000 downward.

Philadelphia, Pa.

The members of the Master Builders' Exchange celebrated the closing of the old year with an entertainment in their rooms on South Seventh street on the afternoon of Wednesday, December 31. A large representation was present and all seemed to enjoy the programme which had been prepared for the occasion. After an informal luncheon there was a musical and vaudeville entertainment and a smoker, prepared by the Entertainment Committee, composed of J. L. Little, chairman; A. B. Barber, F. R. Whiteside, J. R. Huhn, C. P. Hart, W. J. Collins, J. R. Wiggins, F. H. Reeves and W. J. Gear, Jr. The talent included both amateurs and professionals, and not the least interesting feature feature of the occasion were well-known songs by members of the exchange.

The candidates nominated to fill the seven vacancies in the Board of Directors, and to be elected on January 27, are M. Magee, F. M. Harris, Jr., A. J. Slack, J. Lindsay Little, A. A. Reeves, Jr., Turley Allen, George M. Lewis, William Conway and Thomas F. Armstrong.

The aggregate of building operations during the year just brought to a close exceeds all previous records for a corresponding period of which the Building Bureau has data. Many large hotels, apartment houses and office buildings were commenced, and if one may judge from the extent of the operations now in progress and contemplated in the outlying districts, there is likely to be plenty of work for building mechanics during the months to come. The annual report of the Bureau of Building Inspection for 1902 shows that there were 8954 permits issued, covering 12,846 operations, the estimated cost of which was $29,973,195. These figures compare with 8713 permits covering 12,840 operations, estimated to cost $29,519,710 in the 12 months of 1901. The principal work of the year comprises 4279 dwellings, most of which are two stories in hight, involving an estimated cost of $9,335,615; 35 office building, costing $2,026,445; 20 churches, $462,205; one apartment house, $18,000; three hotels, $2,547,500; 60 stores, $813,115; two tenement houses, $459,000; 132 factories, $2,868,535; eight schools, $789,825, and seven hospitals, costing a total of $262,000.

Pittsburgh, Pa.

From present indications there is likely to be a great deal of building during the ensuing year. The talk among architects, contractors and builders is hopeful, and at this writing there is the prospect of considerable new work the coming spring. The volume in the aggregate, however, will probably not reach the total it otherwise would if prices of materials were not so high. The cost of about everything entering into the construction of buildings is such that there is some tendency to restrict operations.

The figures for the month of December, as furnished by Superintendent J. A. A. Brown, of the Bureau of Building Inspection, show a gratifying increase in the capital involved in building operations as compared with the same month of the year before, although the showing for the entire year is not quite so flattering as for 1901. In December of 1902 permits were issued for 182 new buildings, additions and alterations, estimated to cost $697,724, as against 151 permits for building improvements estimated to cost $515,139 in December of the previous year. Taking the figures for the 12 months of 1902, it is found that the permits issued were 3906, involving an estimated expenditure of $17,430,550. Of this total 2405 permits were issued for new buildings, estimated to cost $15,342,300. These totals compare with 4591 permits issued during the 12 months of 1901 for building improvements estimated to cost $19,858,936. There were 3200 permits issued for new buildings involving an estimated outlay of $18,247,917; additions and alterations accounting for the rest.

Portland, Ore.

Notwithstanding the fact that building in Portland was checked during the summer months by the great building strike, the records show that nearly $3,000,000 was expended during 1902. The situation will be better appreciated when it is known that, while a few large buildings were constructed, the overwhelming majority of building permits issued was for the erection of small cottages and dwellings ranging in cost from $1200 to $2500 each.

Salt Lake City, Utah.

The total amount of the building operations undertaken in Salt Lake City during the year 1902 amounted to a little more than $2,500,000, an increase of more than $1,000,000 over the amount expended for building in 1901. The greater part of the amount expended during the past year is represented by frame dwellings, but there was also a large expenditure for modern buildings. Among the latter are the Deseret *News* Annex, an eight-story building, costing $150,000; the State fair building, costing $30,000; the University Memorial Building, costing $35,000; the Holmes-Emery flats, costing $40,000; the Harmon Hotel Building, costing $40,000, and the Zion Co-operative Mercantile Institution Building, costing $80,000.

San Francisco, Cal.

The year which has just closed was the largest from a building standpoint in the history of the city, the expenditures for buildings amounting to $15,000,000. The banner year for the building trade previous to 1902 was that of 1891, when something over $11,000,000 was expended in this line. At present apartment houses of a substantial character, running in cost from $100,000 upward, are a prominent feature of the building situation. Architects' offices show abundant signs of coming construction, although much of the work will not be undertaken until after the winter rains.

After a period of consideration covering about three years the proposed new building code of San Francisco, originally drafted by the Board of Public Works, has failed to pass.

St. Louis, Mo.

The outlook for the building business in the city for the coming spring possesses many encouraging features as viewed from the standpoint of increased operations. Several large projects are being planned, and there is the usual amount of smaller work in the way of dwellings in and about the suburbs which is to be noticed every year. The prices of materials and cost of labor, together with the deferring of the World's Fair to 1904, have undoubtedly had the effect of delaying more or less work.

With regard to the year which has just closed, the records of the Commissioner of Public Buildings indicate a slight falling off as compared with the year before. In the month of December there were 282 permits issued for improvements estimated to cost $1,026,488, as against 224 permits for buildings involving an estimated outlay of $2,350,301. For the 12 months of 1902 there were 4502 permits issued for improvements estimated to cost $12,854,035.50, as compared with 3722 permits issued in 1901 for improvements estimated to cost $13,207,991.

The greatest problem of the year, and one which has been emphasized in oral and printed speeches, has been the construction of hotels. Capitalists, up to the present time, have been content to allow outsiders to step in and float enterprises of a hotel character, and so pronounced has this been that the World's Fair people are awakening to the needs of the hotel question, and already A. Busch has started a movement with a subscription of $100,000 to secure the erection of two $1,000,000 hotels.

It must not be understood that the demands for hotels is essentially a World's Fair necessity. A local growing need for more rooms has existed for several years, due to ever increasing vists of traveling men, merchants and buyers, and others who prefer hotel life. The demand will, however, from all indications be met promptly and efficiently, since St. Louisians have come out boldly and announced their intention of erecting hostelries.

At the annual meeting recently held the following named were elected officers of the Master Builders' Association of St. Louis for the year 1903:

President, H. C. Gillick.
First Vice-President, W. M. Sutherland.
Second Vice-President, N. L. Wickwire.
Secretary, C. D. Morley.
Treasurer, Jno. Low.
Assistant Secretary, Joseph H. Furber.

The newly elected president has been for the past two years, and is for 1903 also, president of the Master Bricklayers' Association. He is a recognized leader, having had a wide experience in association matters, with advanced ideas pertaining to the building business, and with plenty of energy to carry them through. Mr. Gillick proposes, with the aid of the officers and members, to place the association on a business basis, and second to none in the country.

St. Paul, Minn.

At the annual meeting of the Builders' Exchange, held in December, reports from various officers were submitted, that of Secretary Williams showing the membership of the exchange to be 200, as compared with 133 a year ago. In his annual address President Corning advocated a closer relation on the part of the building contractors and a general effort in the direction of common interests.

The election of officers for the ensuing year showed the following choice: President, J. W. L. Corning; first vice-president, J. L. Carlson; second vice-president, John H. Donohue; treasurer, William Rhoades, and secretary, A. V. Williams.

Worcester, Mass.

The figures which are available covering the building operations in the city for the fiscal year, which ended November 30, 1902, indicate an aggregate somewhat less than for the year before. This falling off is not particularly significant, as the difference is less than $200,000, while comparing the totals for 1902 with those of 1900, it is found that an increase is recorded. The number of permits issued during the last fiscal year was 326 for wooden buildings and 38 for brick structures, calling for an estimated outlay of $1,646,735, while for additions and alterations 671 permits were issued, calling for an outlay of $1,193,373. For the fiscal year ending November 30, 1901, the total number of permits for building improvements was 730, involving an estimated outlay of $2,023,472.

As indicating the character of the frame buildings for which permits were issued last year, it may be stated that there were 74 for one-family dwellings, 29 for two-family houses, 84 for three-family apartment houses, 5 for four-family apartment houses, 4 for six-family apartment houses, 33 for barns, 10 for buildings designed for manufacturing purposes, 5 for offices, 20 for stores and store houses and 22 for sheds. In the way of brick structures, there were 7 permits issued for four-family apartment blocks, 3 for eight-family apartment blocks, 1 for a seven-family apartment block and stores, 7 for buildings for manufacturing purposes, 1 for a factory, 1 for a library building, 2 for engine houses, 2 for school houses, 4 for stores, 1 for a church and 2 for foundries.

The prospect for the building business the coming year is regarded as very encouraging, although nothing like a boom is expected, especially in view of the prevailing prices of materials and cost of labor.

Zanesville, Ohio.

There was recently organized in Zanesville a Builders' Exchange, which promises exceedingly well for the builders and material men of that city. The matter of organization was taken in hand several months ago by R. L. Queisser, general manager of the Ohio Press Brick Company, and after considerable efforts was launched with a membership of over 65, making it from the start one of the strongest in the State. While the subject of a Builders' Exchange had been given considerable thought and work in the past it was never brought to a head until the present time.

The new exchange starts out under auspicious circumstances. The directors have already rented a suite of two offices and an exhibition room, 30 x 60, in which will be exhibited the usual building material, supplies, &c. In addition, various others of the industries of this city will have exhibitions. The directors have also arranged for a number of special spaces which will be used as offices by the various contractors; a consultation and a plan room are also arranged for; an attorney will have his offices with the exchange to look after its business and that of its members, and a library and reading room are also one of the features.

It must be remembered that Zanesville is called the "Clay City," from the fact that in and about Zanesville is a territory in which are made and from which are shipped an extremely large tonnage of brick, sewer pipe, tiling and pottery wares. This city, in addition to a number of extensive brick plants, boasts of the largest encaustic tile works in the world. It also has a Mosaic tile works which ships floor tiling to all parts of the world; has the largest art pottery, and in many ways can be identified as a city in which particularly a Builders' Exchange will prove of vast benefit and importance.

Besides taking up matters directly bearing on the building industries, it is the intention of the promoters to take up such civic matters as also bear a relation to their line of trade. Zanesville is the largest and most important city in Southeastern Ohio, and owing to its distance from other large cities is the acknowledged business center of this section of the State. The new exchange includes in its membership nearly every one of the contractors in all lines and all of the material and supply men in this county, making it, therefore, an exceptionally strong organization.

A secretary has been placed in charge of the rooms, and will devote considerable of his time to the work of the exchange. In addition to the regular membership the exchange has a special "subscribing membership," who have the floor privileges of the rooms, but no voice on any questions relating to the mechanical arts.

The officers and directors for the ensuing year are:

President, R. L. Queisser, general manager of the Ohio Press Brick Company.

Vice-president, Gilbert Snyder of the Snyder Roofing Company.

Treasurer, Wm. M. Shinnick, secretary of the Mosaic Tile Company.

Secretary, Clyde Reasoner.

The other directors are Wm. Adams of Adams Bros., contractors; T. B. Townsend of the Townsend Brick & Contracting Company; Wm. C. Handshy, general contractor; H. B. Mechling, painter and paint supplies; G. E. Clossman of the Clossman Hardware Company; J. C. Bolin, president of the South Zanesville Brick & Sewer Pipe Company.

Notes.

Arrangements have been made for a joint dinner of architects, material men and masters in the building trades of Hudson County, to be held at Meyers' Hotel, Hoboken, N. J., on the evening of Thursday, January 29. At this dinner there will be present representatives from the above named crafts engaged in the building business. The committee having charge of the matter are George W. Von Arx, chairman; Charles E. Hendrickson, Jr., treasurer; Henry A. Griswold and William J. Cross.

The bricklayers of Evansville, Ind., received on January 1 an advance in wages of 5 cents per hour, making the rate 50 cents.

The annual meeting and banquet of the Master Builders' Association of Westfield, Mass., was held on the evening of Friday, January 2, in the Park Square Hotel. The officers elected were president, H. C. Wood; vice-president, P. J. Mahoney; secretary, Arthur C. Moseley, and treasurer, George C. Webb.

The largest building enterprises in progress in Denver, Col., last year were the six-story Adams Hotel, costing $1,200,000; the nine-story Majestic, costing $450,000, and the two six-story buildings for D. C. Dodge, costing $200,000 each. The outlook for 1903 in the building line is said to indicate a record breaking business.

LAW IN THE BUILDING TRADES.

LIABILITY WHEN MATERIAL MAN DOES NOT COMPLETE CONTRACT.

Where a contractor for materials to be used in a building furnishes a large portion of them, which are accepted and used, he may recover the value of same, less the damages sustained by reason of his failure to complete his contract.—112 Fed., Rep. 634.

WHEN ARCHITECT IS ENTITLED TO ADDITIONAL COMPENSATION.

A contract with an architect provided that he should draw plans and specifications for a court house not exceeding in cost $100,000, and should make changes and furnish new plans without additional cost in case the bids should exceed $100,000, or the commissioners for any reason required new or changed plans, and that as compensation the architect should receive "5 per cent. of the total cost of the completed building." It was held that, where the commissioners ordered changes and additions, so that the total cost of the building exceeded the $100,000, the architect was entitled to 5 per cent. of the actual cost.—62 N. E., Rep. 477.

CONTRACT FOR MATERIAL CONSTRUED.

A material man offered to furnish a contractor two classes of stone, distinguished by their average thickness. Each shipment of stone was billed to the contractor at a price depending on the average thickness of the shipment. The contractor made no objection to the billing, but paid considerable amounts on the stone received, and raised no objection as to the classification of the seller until all the stone was delivered. The court held that the contract price of the stone was to be based on the average thickness of each shipment and not on the average thickness of the entire lot delivered.—74 N. Y. Supp., Rep. 1050.

LIMITATION ON PAYMENT OF INSTALLMENTS.

A provision in a building contract that a certain per cent. shall be paid as the work progresses does not affect the entire and indivisible nature of the contract, and where, at a given time, the per cent. specified has been paid, the balance of the estimated value has not accrued, and is not due to the contractor.—68 S. W., Rep. 87.

LIABILITY FOR DELAYS.

The sole limitation on the absolute character of a building contract was that if completion was delayed by damage caused by fire, lightning, earthquake, cyclone, &c., the time fixed for completion should be extended. It was held that where an unprecedented storm destroyed the building before completion the loss would fall on the contractors, though the payments were to be made as the work progressed.—66 S. W., Rep. 70.

OWNERS WITHOUT NOTICE NOT BOUND BY RULES OF ARCHITECTS.

An owner not apprised of a schedule of charges obtaining among architects is not bound by same. And a rule among architects binding an owner to pay a percentage on a building such as the architect may figure out, and at a price which is put upon its probable cost, will not be adopted by the court.—31 So., Rep. 601.

CORRESPONDENCE.

Design Wanted for Brick Hospital.

From W. E. H., *Greeley, Col.*—Will some of the architectural friends of the paper send for publication floor plans, elevations, details, &c., of a two-story brick hospital suitable for a city of 5000 inhabitants and to cost in the neighborhood of $15,000? The best heating apparatus is desired, as well as good plumbing and electric or gas lighting. What I particularly desire is the arrangement of the rooms necessary for a building of this character.

Some Suggestions on Filing Saws.

From W. S. M., *Tampa, Fla.*—For the benefit of some of the younger carpenters and perhaps the older ones, too, I wish to offer a few suggestions on filing saws. It always seems queer to me to see men carrying their saws to the filers when they could do the filing themselves and at a time when the saw needs it. Take, for example, a rip saw. By referring to A and B of Fig. 1 the shape of the teeth will be seen, while the arrow shows the direction of the file, the hand being held just a little lower than the horizontal. This position favors the file, which ought to be considered, for in the life of a $2.50 saw one may wear out $6 or $7 worth of files. With the amount of hook to the teeth given at B, I would suggest setting the handle down on the blade, as shown in Fig. 3, and in all cases cut the lower nib off the handle, as indicated in this sketch. This allows of holding the hand lower and in direct line of resistance, which is a decided advantage, as one may learn by trying some old saw—that is, the teeth worn up nearly to the handle. Notice, too, the difference in appearance of the dust on the floor from this saw and one filed some other way. The dust will be in little chunks and look mealy, while the other will look dusty and fuzzy. Now with regard to a hand saw. This is filed for soft wood and rapid work, too, and must be kept sharp. By reference to C of Fig. 2 it will be seen that the point of the file is toward the point of the saw and the greatest bevel instead of being on the back of the tooth is on the front. For hard woods file the same as you would a new saw. In the sketches the set is shown somewhat exaggerated in order to make everything plain. As a rule carpenters buy too fine a saw. It is not always the fine saw that does the fine work. For a saw used in a miter box I file about as I would a rip saw—that is, with loose hook and a little more bevel to the teeth. The most important point of all to be considered is to keep the teeth even or of equal size on each side. If the teeth are longer on one side than the other the saw will have the most set on that side and will " run " off the same way. If a part of the teeth are long then only a part of them are working and the mechanic might just as well have a 20-inch saw as one 26 inches.

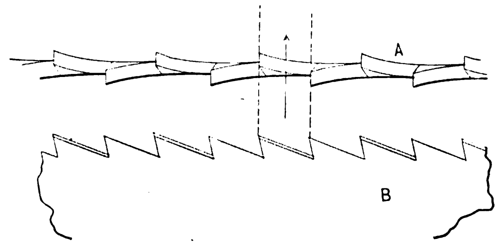


Fig. 1.—Showing Shape of Teeth of Rip Saw, with Arrow Indicating the Direction of the File in Sharpening.

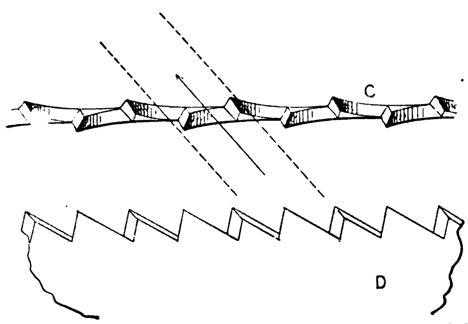


Fig. 2.—Showing that Point of File is Toward Point of Saw, the Greatest Bevel Being on Back of Tooth.

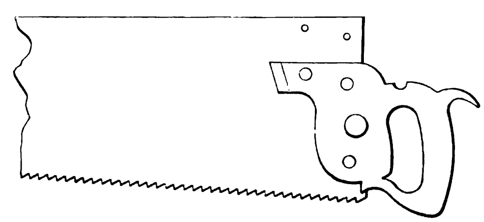


Fig. 3.—Showing Position of Handle on Saw Blade and Lower Nib Cut Off.

Some Suggestions on Filing Saws.

Advantages of Carefully Reading " Carpentry and Building."

From SAW SQUARE, *Coopersburg, Pa.*—I have been looking over the back numbers of *Carpentry and Building* which I have on hand and discover that the present will be the twentieth year that I have been receiving it. I have all the numbers for the period named and the greater part of them I have bound in book form. I find them very instructive and useful, for they have been a great help to me during the years that I have had them, but I could have learned a great deal more had I studied each number more carefully as I received it. I would therefore take this occasion to advise those who are beginners in their craft to study each number of *Carpentry and Building* carefully, learning all they can from what is there presented, and they will, I am sure, receive the worth of their money sixty and a hundred-fold.

Suggestions Wanted for Picket Fence Design.

From J. F. H., *New Marion, Ind.*—I think it would be interesting if some of the readers would furnish a few designs of picket fences for yard and garden. What is the depth to which the posts should be sunk in the ground and should the posts have gains cut in for stringers, or is it best to cut the stringers in between the posts and toe nail them in place? These may appear simple question to some of the readers, but it is often noticeable that picket fences as well as plank fences which have been up only a short time commence to lean and finally fall down. The reason must be that the work was not properly done.

Concrete Construction for Buildings.

From T. V. S., *Wheeling, W. Va.*—The article on " Concrete Construction for Buildings " which appeared in the January issue of the paper recalls a job I executed about three years ago and I believe it to be the only way to make such work permanent. I had two porches to repair for a partner of the firm for which I then worked. I suggested concrete, and the materials—ashes, lime, stone, sand and cement—were on hand. The bottoms of the columns, porch floor and joist were rotten, just as many carpenters have often seen them. I propped up the porches, then tore out the floors, joist and sills, after which I nailed together rough joist for a temporary guide, placing the inside joist where the old finish had been. I then commenced with the filling and finally finished the top smooth and thin with a white sand mixture. The old columns were hollow, so I nailed together a small mold and made concrete footings. These footings were made square at the base with a slight taper toward the top and a square tenon on the end. When these had become hard I placed them on the cement flooring and under the columns, after which I spliced the decayed columns down to the shoulder of the concrete footing. When finished I removed the props and the job was done.

I worked a nosing on a floor of concrete while it was still soft. The wood or bottom of the column sets about 4 inches above the concrete floor and is protected from rain or snow, which, as every knows, tends to decay wooden construction. I have seen different kinds of iron footings used and other methods adopted, but in every instance decay has resulted and the work spoiled. Last winter I did the carpenter work in a tunnel for a railroad, where concrete was used for the side walls and when finished looked like stone courses 12 inches thick, with only the face showing smooth. This summer a battering wall, probably 30 feet high, was built to hold a road for travel, even the coping being concrete. This material is evidently a good thing and has come to stay. I was very favorably impressed with the concrete porch floors and footings for the columns, and I trust that now the subject has been brought up for discussion other readers will describe their experiences with its use.

Note.—We heartily indorse the suggestion of this correspondent regarding the discussion of concrete in building construction and hope that many of the readers who are executing work involving this material will send us an account of their experiences.

Give the Young Men a Chance.

From M. L., *Newark, N. J.*—I trust, dear readers and fellow workmen, that you will not be wearied in seeing the result of my pen so often in the Correspondence department of the paper, but I must praise "Wandering Wood Butcher" for his letter in the December issue, especially the latter part. I would say to the young men of the country, "Read it; it is good advice to any one." If a man will not try to help himself he must not expect others to help him. The young man may say, "How can I help myself?" Again I repeat, read "Wandering Wood Butcher's" letter. Read the Correspondence columns of *Carpentry and Building*. Carefully work out the problems given. Note the answers and the difference in the opinion of the different readers. "Wandering Wood Butcher" says "Get good books." They are a good investment. Study them, for there are many good ones on the market. I have books by many writers that could not be bought from me could I not replace them. I often refer to them when my memory slips, as the saying goes.

But do not try to get the knack of fitting, hanging and locking 20 doors a day or laying all the shingles in the country in a day. Learn to lay out work; lay down rules and a system for yourself and follow them. One can soon see the best way to keep ahead of the men under him. Mistakes? Yes, they will occur with the best framers we have in the country. I have made them, and when seen, I had to laugh to know how simple and easy it was to do it; but the great point is when you make a "bull" put the horns on it—that is to say, do not let it get so far as to spoil the timber. Do not be afraid to take hold. Remember, we all had our first job to frame and mine looms up before me now.

Be kind to the men under you and you will win their respect, for one kind word is worth a thousand cross ones. Therefore, "C. W. B.," let me again say, Get good books (a request to the publishers of *Carpentry and Building* will bring you a catalogue). Study them; obtain drawing tools and learn to draw, for in order to be able to read a plan you should know the art of making one. Do not get discouraged, for your time will come.

Sharpening a Hand Scraper.

From BRITT & PAGE, *Lynn, Mass.*—In a recent issue of the paper we noticed an inquiry from a correspondent who desires to know how to sharpen a wood scraper. In reply we beg to say that it is a rather lengthy process to explain, but we will offer some suggestions which we trust may be of interest and value, not alone to the correspondent in question, but to other readers of the paper.

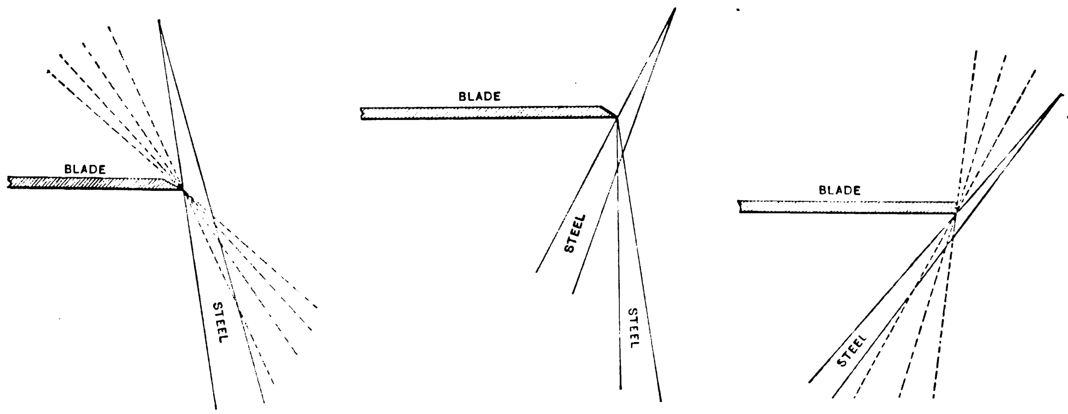


Fig. 1.—The Burnisher Held Slightly at an Angle with the Bevel.

Fig. 2.—Method of Finishing with the Burnisher.

Fig. 3.—Showing How to Hold the Burnisher when Sharpening for Fine Work.

Sharpening a Hand Scraper.

We are practical carpenters and have had considerable experience with scrapers, having made several improvements in tools of this kind, and we therefore feel competent to give the information desired by "C. C. H." In the first place procure or make a proper steel or burnisher with which to turn the edge. We have found that the only sure way is to take about 3 inches from a three-cornered file and grind it down to a point, making it perfectly smooth on a fine oil stone. Care should be taken not to start the temper in grinding, for the harder it is the better. As to the sharpening process, we use different methods for various kinds of work. For floors where there is a lot of wood to remove and one does not wish to use the plane, it is well to file or grind the scraper to a bevel, the same as a plane iron, and bring it to a keen edge on the oil stone; then proceed to burnish it. Hold the burnisher slightly at an angle with the bevel as indicated in Fig. 1. and draw it lightly across the blade. Then increase the angle and the pressure, repeating the process until the burnisher is at nearly right angles with the blade, after which run the burnisher back and forward a few times, first one side and then the other, as indicated in Fig. 2, when it is ready for use. When it becomes a little dull do not turn the edge back, as a great many mechanics do, but use the burnisher, as shown in Fig. 2. A good blade will stand for two or three hours without filing or grinding.

For fine work file or grind the blade perfectly square on the edge and get it perfectly smooth on the oil stone. Then hold the burnisher as shown in Fig. 3, the dotted lines indicating how to start and the full lines how to finish. In all cases finish the operation as shown in Fig. 2. If unsuccessful the first time, do not give up the job, for the scraper is a tool that requires a great deal of practice in order to become expert in sharpening. We might say a great deal more on the subject, but have made this as short as possible and hope that it will be understood by interested readers.

What Constitutes an Average Day's Work for a Carpenter.

From FRANK G. ODELL, *Lincoln, Neb.*—The discussion on "What Constitutes an Average Day's Work?" has already taken much of your valuable space, and I feel that my only excuse for again touching this matter is my profound conviction that this is one of the most important topics that can come up for consideration and that the real object to be gained by the discussion has been generally lost sight of. What we are trying to ascertain is "what is an average day's work for a carpenter," not how fast one man may be or how slow another.

Pardon me for saying that up to the present time, with few exceptions, the appearance of this discussion to an outsider would be that of a bragging match, in which each fellow was trying to tell the biggest story, with an occasional and quite natural expression of incredulity. In this I am not without fault, having myself told some remarkable (to some) stories in my former communication, but it was my effort to also state quite plainly that in no case were these exploits of exceptionally fast men to be taken as a safe average on which the contractor could estimate his work. It appears that this point was not made sufficiently clear, for the brethren have been impartially jumping on me ever since because of my "big stories" and losing sight of my sage counsel.

I sincerely believe that much of the current discussion is wide of the mark and that this thing may talk itself out without having accomplished the purpose sought. At least, if any person can determine from the communications already received what is an average day's work he must be wiser than I. So far the exploits noted are the work of specialists, and in probably few cases that of an all round carpenter. While it is true that the carpenter can get valuable hints from these specialists and will often do so, that still does not touch our problem of "the average man." If we can determine what is just to require of the average man, the contractor will be on a safe footing and the exceptionally capable man will get his due, which is more than the average.

Suppose we say that the average man will in a day of ten hours do something like the following quantities of work:

Ordinary shingling (including scaffolding), 2000.
Six-inch siding (average work), 2 squares.
Four-inch flooring, 2 squares.
Four-inch siding, plain, 1½ squares.
Four-inch siding, mitered corners, 1 square.
Sheathing, 3 to 5 squares.
Hanging doors, ordinary pine, 6.
Hanging doors, hard wood or veneered, 3 to 5; these estimates in both cases to include mortise locks and stops.
Common window frames, 2 per day.
Inside finish, plain work without moldings, 1 hour per opening for casing.
Fitting base and shoe, 3 to 5 hours per room.

These are simply suggestions, which may be considered too low by some and too high by others, and are submitted only as suggestions in order to get an expression of opinion. If we can discover what is fair to demand of the average man everybody will be taken care of.

If some of the craft who are contracting would tell us on what basis they are estimating their carpenter work it would shed some important light on this matter. I think this could be done without revealing any trade secrets which would injure any one, and would greatly aid in forming an average basis of estimating.

My own somewhat intimate relation with a contractors' organization has developed the fact that it is difficult to estimate carpenter work high enough to carry out contracts with a fair margin of profit. If this has been the experience of others, which I do not doubt, is it not time for us to pause and consider the formation of some reliable basis of estimating which shall be founded on actual experience in dealing with the average journeyman carpenter?

If such an end can be attained this discussion will be valuable beyond computation; if not, much of its value will have been lost.

From F. L. B., *Blue Earth, Minn.*—This great question seems to be as yet unanswered and I am of the opinion that it cannot be. Before I proceed, however, I wish to ask a question. Do any of our brother chips ever do anything else than hang doors and lay shingles? If so, let us hear from them. Carpenters here do but very little shingling, as we have men who make that a business, the same as lathing, and they can put on all the way from 5000 to 9000 shingles on good roofs. As for the 12 and 15 door men, however, they are scarce in this section. I have just been working under a foreman who during the last year worked with us chips on our school building. During the finishing he claimed to be a 12 to 15 door man, but when he came to tackle an oak door he managed to hang three and two transoms, which constituted an average day's work. I worked under him this last summer and found that we all did more work on an average than he did. So, brother chips, you see that words and work are entirely different. It seems to me that we have argued this shingling and door business long enough, so now let us hear from some one who can do something else. I propose that we leave the question to some good contractor or an architect, and let him give us an estimate of a day's work in all the different kinds of work and then comment on that. We have got to erect a building before we shingle it or hang doors. "Slow One" has very kindly figured out the seconds the "B. E." man had in which to drive his shingle nails, for which we are thankful. Now will he be kind enough to figure out the same for the 15-door man? Can he do it? Fifteen doors means to hang one every 40 minutes. "M. L." of Newark, N. J., comes to the point exactly and I say to him, "Come again," and to "Hee H. See" I would say, "Your head is level." Let us try and learn something new and assist each other in work concerning which we doubt our ability to do, and in this way give some one a chance to better his trade. We all can learn, but for the editor's sake do not shingle any more. Get your building ready and we will get up a "bee" and "invite ye editor" to be our judge.

Note.—The above correspondents raise questions which we shall be glad to have the readers seriously consider, as a discussion of them will tend to throw light on other phases of carpenter work than the one now forming the basis of so many of the communications which reach us from all parts of the country.

From JOHN THUR, *Philadelphia, Pa.*—I have been a reader of *Carpentry and Building* for several years and a subscriber for at least two years, being greatly interested in the Correspondence department. After reading the article from "C. A. S." of Homestead, Pa., in the issue for January I feel moved to write a few lines for publication. I would like to hit those fast "wonders" a whack such as "Slow One" from Long Island has done in the January issue—that is, if I am able to do so. In my opinion it is all nonsense, as well as misleading to the young chips, for any one to talk about laying from 4000 to 10,000 shingles in nine hours. They simply want to hear themselves talk. I consider myself a fair workman, at least as to the amount of work performed, and I can say there are few who can beat me as to the quality. About four years ago I ran up against a "wonder" in the shingling line, we being at work on a roof that was rather flat and only about five or six courses up from the eaves. The "wonder" started to carry five courses of shingles across the roof at one time. I started in behind him with five, but he was in the way, so I went back and started two more courses, making seven in all. When he got to the end of the roof with his five courses, a distance of about 40 feet, I was as close to him with my seven courses as it was safe to work. He left the job and I stayed on to the finish of the building.

There is a right and wrong side to most shingles, and I will warrant that the "wonders" cannot take the time to see which side should be laid up and which down. I quote the old saying, "What is worth doing at all is worth doing well." What is there about a building that looks worse than a poorly laid shingle roof?

In reference to the number of nails to a shingle, I consider that one nail is sufficient for either a 4 or 6 inch shingle, and if the shingles are wider I prefer to split them. I like shingles laid as follows: After putting down the first course in the usual manner, lap the shingles in the second course one-third over the joints of the shingles of the first course; lay the third course in like manner and so continue to the finish. Putting the nail in the one-third lap will give each shingle two nails, one about 7 inches from the butt and the other 13 inches from the butt, but on the opposite side of the shingle from the first nail. These measurements are intended for shingles which are laid 6 inches to the weather. This manner of nailing allows the shingles to shrink without splitting so much, and if they do split, which is usually in the middle, the crack will not be over the joint below.

In order that a door may be hung properly, time and careful work are required. A door properly hung has even joints on both sides, swings clear of the carpet and does it with ease. Both the knob and the key should turn easily. To meet these requirements a man cannot hang 20 doors in a day—no, not even a "wonder."

From C. E. C., *Youngsville, Pa.*—From early boyhood up to a few months ago I had always had the impression that carpenters were modest, unassuming and, above all, truthful, but through means of the communications as to what constitutes a day's work printed in *Carpentry and Building* during the latter part of the year my ideals have received something of a shock. I have read *Carpentry and Building* since the first number, but have always bought it at the news stands, owing to the fact that I have not been in one place long enough to have a permanent address. You may infer from this that I have worked in a good many localities, and in none of these places have I ever had the pleasure of meeting one of those fellows who do a big day's work described by the numerous romancers who have favored the columns of late. Now it may be I did not note with sufficient exactness the "Prospectus" in the December number and that you have, with your accustomed generosity, offered a prize for the biggest "whopper" told during the year. In other competitions there have been those who have objected to the award of the committee, but in this particular case, if it be true that you have offered such a prize, I am of the opinion that if you award it to any of those shingling or door hanging liars no fault will be found. In conclusion, allow me to express the wish that the award be made at as early a date as possible, and that with the advent of the new year they will all resolve to do a better, but not bigger, day's work in the future. My respects to "Slow One," who has given some figures which seem conclusive.

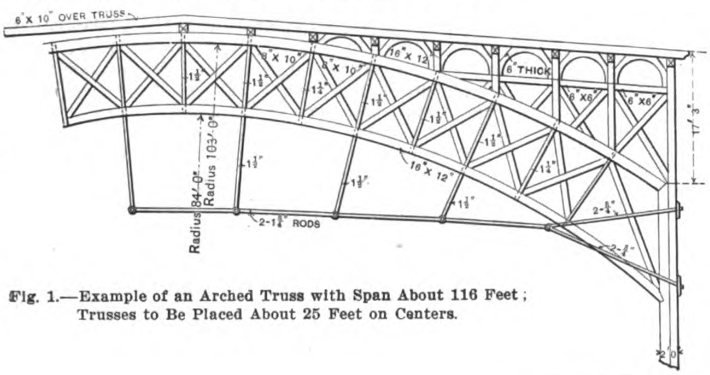


Fig. 1.—Example of an Arched Truss with Span About 116 Feet; Trusses to Be Placed About 25 Feet on Centers.

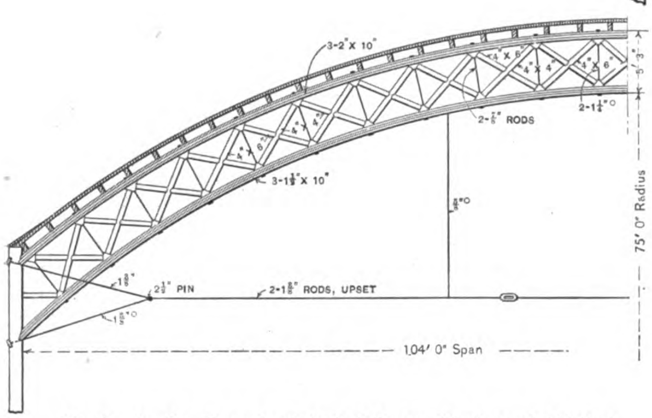


Fig. 2.—Another Example of Arched Truss with Span of 104 Feet.

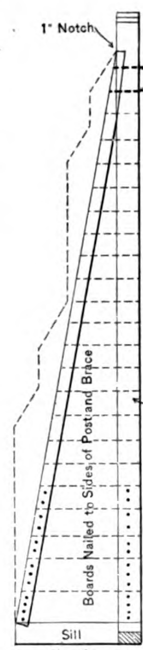


Fig. 3.

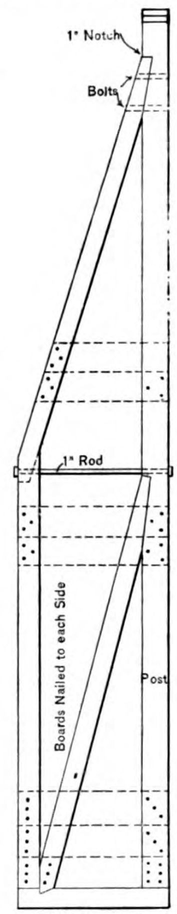


Fig. 4.

Showing Manner of Framing Wooden Buttresses.

Ornamental Trusses and Framing Wooden Buttresses.

From J. R. W., *Webster City, Iowa.*—In the December issue of the paper I find a number of interesting communications from various correspondents on what is a day's work for a carpenter. I had about 25 years' experience as a contractor and that experience taught me that spurts and racing by workmen do not pay. I had one man carry in, cut and nail ten squares of 6-inch flooring in ten hours, but the next few days he did not earn enough to buy salt to drop on a humming bird's tail. The problem that interests the average reader is what is an average day's work for one man under surrounding conditions. For instance, a man can lay the Oregon red cedar shingles, which average about 7 inches in width, with greater ease and cover a greater surface in the same time than the same man can lay white cedar shingles, which wil laverage about 3½ inches in width. Then again, in some places there are specialists who, like lathers, do only one thing, and hence become more rapid and expert at that particular work than the average carpenter. Hence in such localities one might just as well ask how many lath can a carpenter put on in ten hours. Again, I have had men who at certain stages of the work would develop extraordinary speed, but in summing up the profits earned by different workmen the account has always been in favor of the steady (oftentimes called slow) workman, who was always on time and every day did a good day's work and did it well.

Ornamental Truss and Framing Wooden Buttresses.

From ZEALANDIA, *New Zealand.*—I am interested in the erection of a hall, 100 x 100 feet in area, in which it is desired to have the entire floor space clear of obstructions, such as columns, &c. Will some of the practical readers of the paper, or might I suggest Mr. Kidder, whom I notice is a frequent correspondent, be kind enough to furnish for publication in the columns sketches of a slightly ornamented (inside) timber roof truss to cover it. I would state that the roof material will be corrugated iron.

I would also be much obliged if some one would offer suggestions for framing timber buttresses to large buildings.

Answer.—In accordance with the suggestion of our correspondent we submitted his inquiries to Mr. Kidder, who furnishes the following comments with accompanying sketches.

A span of 100 feet is too great for a strictly ornamental truss, and about all that can be done with such a span is to use a truss of graceful proportions. An arched truss always looks lighter and has a more pleasant appearance than any other type of wooden truss that would be practical for a span of 100 feet. Two examples of such trusses are given herewith. Fig. 1 represents a section of a truss of about 116 feet in the M. C. M. A. Building, Boston, of which W. G. Preston was the architect. In this case the trusses were placed about 25 feet on centers. In Fig. 2 is shown the half section of a truss over a temporary hall erected in Philadelphia in 1897, Hazelhurst & Huckel being the architects. In both of these trusses the braced arch supports the roof load and the iron tie resists the thrust of the arch. The frame work above the arch in Fig. 1 does not form a part of the truss, but is merely a series of braced posts to support the purlins. By giving a steeper pitch to the roof these posts would be much shorter.

The truss shown in Fig. 2 was designed only for a temporary roof, and for a permanent roof the sectional area of the members should be increased 20 per cent. Both of these roofs should be supported by posts, as shown in the illustration, and the posts should be well braced.

The best methods of framing a wooden buttress that is intended to give strength or stiffness to a structure are shown in Figs. 3 and 4. If the wall is more than 16 feet high the framing indicated in Fig. 4 will offer the most resistance with the same projection. If the appearance of a stone or brick buttress is desired, as indicated by the dotted lines in Fig. 3, it should be obtained by furring. The braces should be well tied to the wall post, particularly at the bottom.

Design for Small Ice House Wanted.

From J. F. H., *New Marion, Ind.*—Will some of the readers of the paper furnish a design for a small ice house, say 20 x 24 feet in size, and using 12-foot siding? I would like to have shown the best method of constructing a house of this kind, with an intimation of the quantity of ice which it would store.

Area Covered With Four Bundles of Shingles.

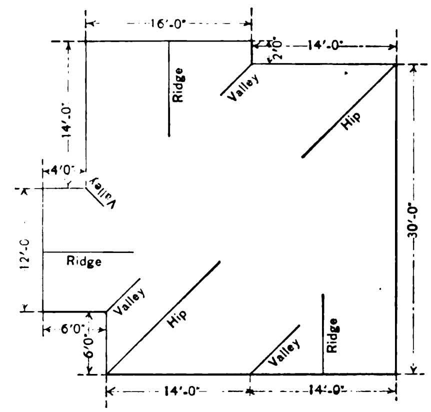
From R. N., *Stockton, Cal.*—In connection with my comments on the amount of work a carpenter can do and published in the December number of the paper, it is stated that "1000 shingles, or four bundles, will lay 925 feet when the shingles are exposed 4½ inches to the weather." This is obviously an error and the statement should read that four bundles, which in this section are counted 1000, will lay 95 feet of surface when exposed 4½ inches to the weather, or if exposed 4¾ inches to the weather they will lay 100 feet of surface. In other words, the man to whom I referred as laying 10,000 shingles in a day laid 40 bundles after they were on the roof.

Reading Architects' Drawings.

From J. R. W., *Webster City, Iowa.*—I indorse the articles on "Reading Architects' Drawings," which appeared in the November and December issues of the paper. It would be to the advantage of all concerned if every man made a careful study of the business and was frank and honest in doing his best and treating others fairly. If an architect or workman makes a mistake a frank acknowledgement and mutual effort saves loss and delay and at the same time makes good friends. It is very much easier in this way to get good construction and desirable results.

Best Method Wanted of Constructing Half-Pitch Roof.

From H. M., *St. Louis, Mo.*—I inclose herewith a partial plan of a roof for the consideration of the practical readers of the paper, and would ask some of them to describe the best method of carrying a half-pitch roof over it, following the general lines indicated as regards hips, valleys and ridges.



Best Method Wanted of Constructing a Half-Pitch Roof.

Plastering Stained from Brick Work.

From O. H., *Paris, Tenn.*—Last summer I erected a brick house and among the material were some smutty or black brick, these coming from an old building which was torn down and reconstructed. The walls are plastered and the black brick have now stained the plaster. My object in presenting the case to the readers of the paper is to have some of them tell me what will remedy the trouble so that when paper is put on the walls the stain will not show through. The trouble is one I have never before experienced, but there are doubtless readers who can tell me what I want to know.

Tables Wanted for Regular Polygons.

From T. D. R., *St. Paul, Minn.*—In looking over back numbers of *Carpentry and Building* I notice in the issue for June, 1900, a very fine table for hexagon rafters presented by a correspondent signing himself "E. E. H.," Knoxville, Tenn. In the course of his communication he offered to furnish for publication, if desired, tables for regular polygons of from 3 to 20 sides, but in looking over subsequent numbers I failed to find anything of this kind and I am inclined to the opinion that he did not furnish them. I would like very much to see these tables published, as I have no doubt that many others besides myself will be interested in them, as they would be first class.

Removing Stains from Lumber.

From J. E. N., *Freedom, Ill.*—Will some of the practical readers of the paper tell me what painters use for removing dirt spots, weather stains, &c., from lumber before filling?

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

BY CHAS. H. FOX.

A CIRCLE is a plane figure formed by the uniform curved line called its circumference; thus A F D of Fig. 13 is the circumference of a circle. The center of a circle is the middle part of it, as O, and the line A B drawn through the center and terminated by the circumference is called the diameter.

The radius of a circle is a line, as O F, O E, &c., drawn from the center O to the circumference and is the length with which the curve A F D may be drawn. A chord of a circle is a right line drawn from one point of a circle to another and dividing it into equal or unequal parts, or segments. In the former case the chord is also the diameter; thus A B is also a chord as well as C D A.

A segment of a circle is that portion which is cut off by a chord. A sector is the portion of a circle formed by two radii, as O F, O E, and the intercepted part of the circumference, as E F. Thus the sector is contained in O E F, while O F B, which is one-quarter of a circle, is called a quadrant. An arc is any portion of the circumference of a circle.

Any circle being given, to find its center we proceed as follows: Draw any chord, as C D in Fig. 14, then bisect it with the line *a b*; then bisect *a b* with the diameter A B and the intersecting point O is the center.

A tangent is a right line which touches the curve at one point only, but does not cut off any portion of its circumference, and is always at right angles to the radius drawn from the point at which it touches. As tangent lines and planes have a very important part in the projection of the joint surfaces of the radiant arch, we will in Figs. 15 and 16 show methods by means of which tangent lines may be drawn to the given points at the circumference of a circle.

In Fig. 15 let the given point be A. Join O A, then square with O A draw A E, and the tangent line required may be obtained; or, with A as the center and with any radius, as A *a*, draw an arc, *a c*. With the same radius and *a* as center cut the arc in *b*; then with *b* as center draw the arc *d c*; with *c* then as center draw an arc, *b d*; through *d* A draw the right line E F, which will be the tangent required. A line drawn from A square with the tangent E F is said to be normal.

In Fig. 16 let the given point be C. Set off C A, C B, equal to each other; draw then the chord line through A B; then F E drawn through C parallel with A B gives the tangent line desired.

In Fig. 17 is shown the method of bisecting an arc.

To find the center with which a curve, as A C E, may be drawn we proceed as follows: Take any three points, as A, C and E of Fig. 18, as centers, and with any equal radius, draw arcs meeting in E F and G H. Through these points produce lines which intersecting in O give the required center. The same result may of course be obtained by taking A, B, C as the centers and any equal radius, as before.

To divide a straight line, as C D of Fig. 19, in the same proportion that another line, A B, may be divided, we first place C D parallel with A B; then through C A and D B produce lines meeting in O. From O through the given points, as *c*, *f*, *g*, &c., draw lines O *e* E, O *f* F, &c., which will divide C D in E F into parts proportional to *e*, *f*, *g*, &c., in A B.

Let O A and O B in Fig. 20 be the given lines, and O, I, H, G, &c., the given points. Place O B at any convenient angle and join A B; then parallel with A B draw C *c*, *d* D, &c., which will divide O B into parts proportional to those in O A.

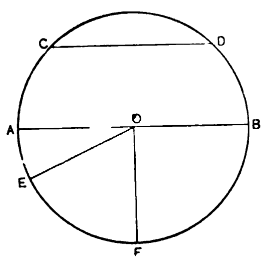


Fig. 13.—A Circle Showing Diameter, Radius and Chord.

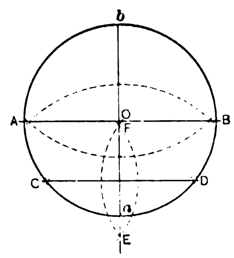


Fig. 14.—Finding Center of a Circle.

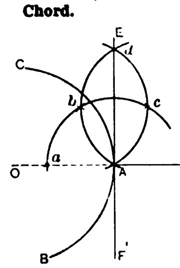


Fig. 15.

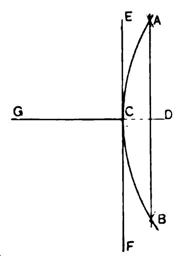


Fig. 16.

Showing Methods for Drawing Tangents to Given Points in Circumference of a Circle.

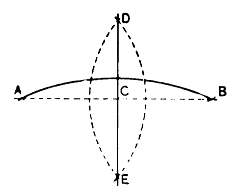


Fig. 17.—Method of Bisecting an Arc.

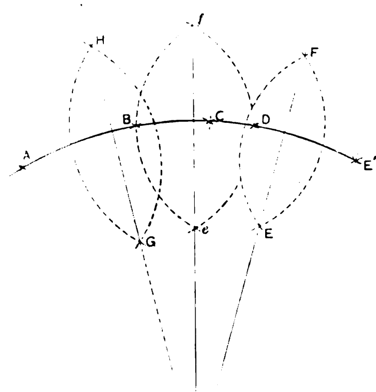


Fig. 18.—Finding Center from Which to Draw a Curve.

Laying Out Circular Arches in Circular Walls.

* Copyright, 1902, by Charles Horn Fox.

Flat House Amenities in London.

The subject of flat houses is always a prolific source of discussion, and some of the experiences of people living in them are often amusing to say the least. In a letter to one of the daily papers in this country, its London correspondent presents the following account of the amenities of flat house life in that great maelstrom of human activity:

I often wonder when, in the dead of night, I awake and my soul confronts me with its thousand and one "quakings," what would happen to all the inhabitants of flats if the buildings were to get on fire! For there is no doubt that about one-sixth of the population of London live in flats. Some of the buildings are six stories high, and have four different families living on each floor. A long flight of steps goes right up to the top, all front doors open onto these steps, and there is, as a rule, a very handsome entrance common to all. I mentioned my fears to my landlord the other day, and he assured me that the stairs were built of iron and stone, and the walls and ceilings of concrete. I believed him—till I went to see a friend of mine, who also lives in a flat, and noticed on the dining room wall scratches and obvious signs of a hole. I asked her what it was, and she said:

"Oh, it's only the man next door who has been having his wall plugged, in order to put up a heavy shelf."

And yet that same woman assured me she heard no pianos or noises in other flats near her. They must have been a very quiet lot—that's all!

Of course, there is no doubt that pianos and pianolas are the curse of the flat to-day. However thickly padded one's walls or carpets may be, it is impossible to deaden the eternal jingle of a piano, and in the summer months, when all windows are flung open (one would fling the walls open if it were possible), the noise is appalling. The lady with the steam whistle voice and the man who sings "throatily" flat, to an accompaniment picked out with one finger, are not to be desired neighbors.

Still, on the whole, flats are most desirable places of residence, especially to people wishing to get about a lot and keep up the appearances of a town establishment. One can lock up one's entire establishment—send the maids home—and so depart for a clear week without having the anxiety of one's supposed misbehavior of the domestics or the fear of burglary. A flat thief is, however, to be met with, but he is a very uncommon occurrence. He has three stout doors to open before he gets into your domain, and a hall porter, who, as a rule, is

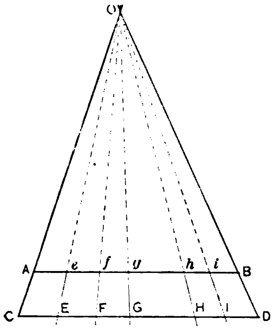


Fig. 19

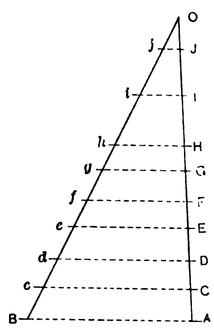


Fig. 20.

Diagrams Showing How to Divide a Straight Line in the Same Proportion as Another Line.

Laying Out Circular Arches in Circular Walls.

of a most obnoxious kind, to circumvent. These same doors are a matter of no little annoyance to the late night outer, who has to open all three from the outside with different keys, and tiny ones at that! I heard of a man who, coming in not long ago at two o'clock, traveled slowly up five flights of stairs behind a coffin—which was allowed to be brought in only at that time. He assured me that when he got to the top his state of mind was lunatic!

Maids in these buildings have, to my mind, a beautiful time. They have exactly the same food as their masters and mistresses, are allowed out almost every day—in some cases every day—and have very little to do compared with the work of a house. They have neighbors all round—one often wishes they hadn't, for their pleasantries are usually audible when one has a particular visitor! One is not bothered very much by these noises, except in the early mornings. Then, of course, greetings have to be exchanged. The postman must have something dropped on to his head, to remind him that his Lucy or Ada is saying, "Good-morning" to him. And the milkman—"hang the milkman!" you say—does 10,000 times more shouting and rattling than are necessary. My last guest asked me if my back square (where all the kitchens and maids' rooms look out) was the general milk emporium for all London!

I am speaking, of course, of the flats where the rentals are £60 to £160 per annum. I can't understand any one paying more for a flat, when a charming house can be rented for the same money, with, of course, rates and taxes added on. The only thing that ought not to be allowed in a flat is an animal. One sees sometimes several living in a flat, dogs and cats, and I have known monkeys. When one considers the want of space and pure air—one realizes there is none of either to spare for dog or cat.

There is no doubt that these habitations are ideal for young married couples and bachelors—both men and women. One can regulate one's expenses so well, although one has not one's own front step to scrub. The stairs and passages are kept spotlessly clean. I certainly think that the supply of flats is outdoing the demand. and that one day the whole lot of them will be used as workmen's living places. It is a craze to live in them at present, but after all one's house is one's own, and one gets very tired of being huddled up in a large building with any one wealthy enough to pay the required rent, with no front door to call one's own—and so be looked upon in the eyes of one's landlord as merely a number!

An Electrically Equipped House.

It is considered highly probable that no other house in America has so many applications of electricity made within its walls as the residence of Charles R. Barnes, 69 Glasgow street, Rochester, N. Y. Mr. Barnes is the New York State electrician, which goes a great way in accounting for his many uses of the electric current in the house he calls home. The question of economy has not been allowed to enter into the arrangement of the various apparatus, for the application of electricity is a science and fad with Mr. Barnes, and in the work he has found ample opportunity to display his inventive genius. Of course, it costs a great deal more to heat a house by electricity than it does by coal, even in this period of fuel scarcity.

The supply of current is taken from an electric light circuit, and the switchboard is installed in the library. This switchboard is equipped with five double throw switches, so arranged that it is possible to regulate the supply of current for each heater, and it is possible to give a minimum, medium or maximum amount of current to the heaters, or to turn all the energy into one room, which of cours regulates the supply of heat given off. Electric heaters are placed in the front hall, the front and rear parlors, the library, the dining room and in all of the sleeping rooms. The heaters are about 2 feet long, 12 inches high and 8 inches wide, very much resembling an oblong box painted black. Each heater has a fuse that will blow in case of a short circuit. In the sleeping rooms it is possible for the occupant to turn off the current by a switch at the head of the bed, and to throw it on in the morning, if the room be cold.

The kitchen is equipped with electrical cooking devices that would make any woman happy. It has an electric stove with an electric oven. Coffee and tea may be made, meats cooked and pastry baked by electricity. In the dining room an electric chafing dish is operated from one of the sockets of the chandelier. It is also possible to heat flat irons and curling irons by electricity in this up to date residence. Electric fans are numerous. Last Christmas Mr. Barnes had an electric Christmas tree decorated, it is said, with about 600 one candlepower lamps of three colors, red, white and blue. Still another electrical feature of the house is an electro-therm, a novelty on which Mr. Barnes is likely to seek a patent. It is a flexible electric pad 14 x 10 x ¼ inches, made up of a number of flexible wires, carefully insulated from each other, covered with asbestos and wound with flannel. It is used for medicinal purposes, and takes the place of a hot water bag or similar device.

THE new headquarters of the Brotherhood of Carpenters and Joiners of America were opened on January 2 on the fifth floor of the Stevenson Building, Indianapolis, Ind., in accordance with the decision reached at the last convention of the organization. It is stated that *The Carpenter*, the official organ, will be printed in Philadelphia for the present, although Secretary Frank Duffy intimates that the concern having the contract may possibly establish a branch in Indianapolis.

Induction Motors in a Wood Working Establishment.

In view of the interest which attaches to the use of small power in wood working shops it may not be inopportune to call attention to a striking example of the application of induction motors to the driving of shop machinery as afforded by the plant of a concern in Brooklyn manufacturing tobacco pipes and walking sticks. The plant consists of two buildings, a three-story brick factory, 200 x 600 feet, and a small brick power house at a distance of but a few feet from the factory. The original intention of the operators of the establishment was to make use of direct current from the distribution system of one of the Brooklyn power companies, but a polyphase alternating system was finally installed on account of its many attractive features. Power for the factory is furnished by two Westinghouse two-phase compensated field alternators, driven by Corliss and Ball & Wood engines having a close speed regulation. Excitation is furnished by small multipolar dynamos driven from the main generator shafts. The switchboard contains three panels for generators and feeders. The main power system operates at 220 volts and all motors are wound for this pressure. Lighting is also supplied from the two-phase mains, special balancing transformers being introduced between the 220-volt leads for the purpose of furnishing a 110-volt three-wire lighting service and equalizing unbalanced loads upon the lighting system.

Motive power in the factory is furnished by 14 Westinghouse type C induction motors, varying in capacity from 5 to 20 horse-power. The majority of these motors are mounted overhead upon wooden sleepers bolted to the beams of the floor above. They require no care further than an occasional replenishing of the oil wells. Many of the motors operate in an atmosphere heavily laden with wood dust from the wood working machinery and are completely covered with this oil soaked dust, but show no injury therefrom. The motors are belted to short line shafts, which in turn drive various types of belted machinery, including turning and mounting lathes, circular and band saws, buffers, blowers, drill and machine shop tools.

The motors are started at a reduced voltage by means of Westinghouse starting coils, and when near synchronous speed are thrown directly upon the 220-volt system. The power equipment has been in operation for over one year and has been thoroughly satisfactory in every respect.

New Publication.

The Hard Wood Finisher. Compiled and edited by Fred. T. Hodgson. Size 5 x 7½ inches; 110 pages; numerous illustrations; bound in board covers, with gilt back title. Published by the Industrial Publication Company. Price, $1, postpaid.

This is the second edition, greatly enlarged, of a well-known work on finishing hard wood and embodying rules and directions for finishing in natural colors and in antique such woods as mahogany, cherry, birch, walnut, oak, ash, sycamore, red wood, pine and, in fact, all woods common to this country. There are also given miscellaneous rules for filling, staining, varnishing, polishing, dyeing, gilding and bronzing, as well as hints on the preparation of wood work for the finisher. The matter is issued in attractive form and is well calculated to serve as a convenient reference book for the wood worker and especially to those giving attention to cabinet work.

Home makers in general will doubtless be interested in the "all around house" described in the *Delineator* for February. The example is a house of moderate cost, equipped with modern conveniences, and in arrangement artistic and comfortable. The well-known but often violated principle of architecture that buildings should be in perfect accord with the environment is exemplified in this case; and the interior, in decorations, furnishings and practical workings is a model of taste and convenience. The illustrations offer numerous suggestions that can be carried out in other homes.

A most striking indication of the remarkable construction movement now in progress in the country is the merging of the Thompson-Starrett Company, a concern prominently identified with the building business of New York City by reason of the important contracts which they have lately executed, with the United States Realty and Construction Company, which have a capital stock closely approximating $60,000,000. The latter concern were created by a combination of the George A. Fuller Company and the New York Realty Corporation, the former representing construction work and the latter real estate operating. Some of the more recent important work executed by the Thompson-Starrett Company was the annex to the Marie Antoinette Hotel, at Broadway and Sixty-seventh street, the contract involving something over $1,000,000 the skyscraper known as "No. 68 William street," in connection with which they made a record in speedy construction, and the Aeolian Building. They now have under way the Hotel St. Regis, at Fifth avenue and Fifty-fifth street; the new 20-story office building of Kuhn, Loeb & Co., reference to which was made in our last issue; the Childs Building, on Thirty-fourth street, and a loft building in University place.

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PITTSBURGH'S TALLEST SKYSCRAPER—THE FARMERS' BANK BUILDING.

ALDEN & HARLOW, ARCHITECTS

SUPPLEMENT CARPENTRY AND BUILDING, FEBRUARY, 1903.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

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

MARCH, 1903.

Tenement House Legislation.

A number of bills introduced in the interests of certain owners of tenement house property are now pending in the New York State Legislature, which are designed to amend certain features of the existing statutes governing tenement house construction in New York City. The law, as it now stands, makes it practically impossible to put up the cheap and unsanitary dwellings such as have for long existed in the slum quarters of the city, while buildings which are unhealthful or unsafe for human occupation are, under its provisions, being gradually eliminated, to the benefit of the city at large. The argument is advanced in support of a letting down of the bars of restriction imposed by the existing tenement house law that cheap and inferior dwellings are needed to accommodate those classes of the city's population who do not want improved and more sanitary accommodations. But this should weigh for nothing as against the public interest. The New York Academy of Medicine, at their meeting a week or two since, adopted a resolution of emphatic protest against any lowering of the standards embodied in the present statutes governing tenement house construction in the city, on the ground that the public welfare would be menaced by the concessions involved in the pending bills. The old unsanitary style of tenement was a hotbed of disease, especially of consumption, which could not be controlled or stamped out while such unhealthy accommodations were permitted to be rented for human habitation. Any legislation that would tend toward a return to such conditions as have heretofore prevailed should be resisted by all who are interested in the physical and moral welfare of the community. It is understood that very strong pressure is being brought to bear on legislators to pass the bills exempting from the operations of the existing tenement house law certain property of this class in Manhattan and Brooklyn, and if determined resistance is not made by those who represent the public interest, the measures may be successful. This would mean a backward step in tenement house reform, which would probably take years of time and labor to recover.

Compulsory Trade Education?

In view of the difficulties met with by the young man who is ambitious to learn a trade, one of New York's successful business men, who has risen from the ranks to a leading position in his line of trade, suggests that the Government exercise the same supervision over mechanical education that it now exercises over general education in the public schools. It is well known that in many lines of trade there is opportunity for intelligent young men to make a place for themselves provided they are equipped with a knowledge of the technical rudiments of the particular branch in which they desire to engage. The restrictions in regard to apprentices and the obstructions that must be overcome by those who desire to enter into an apprenticeship, however, in order to learn a trade are the great drawbacks to the advancement of young men at the present time. The Government recognizes fully the force of the old adage that "knowledge is power," and provides truant officers to see that young people attend the schools long enough to obtain the elements of knowledge. If benefit to the Government is derived through the general education of citizens, certainly greater benefit would attend the specific training of young men in the mastery of some trade whereby they would become self supporting citizens and producers, to the advantage of the whole country. It is possible that the beginning made by the introduction of manual training into the public school system may eventually lead to compulsory education in the trades. But by the time boys have grown to an age when they are strong enough to take up a trade they have, under our public school system, acquired sufficient general education to appreciate both the necessity and the value of acquiring some means of earning a livelihood. Compulsory education, therefore, is probably less necessary than legislation to remove the existing arbitrary restrictions that interfere with their training in the trades. Recognition of the necessity and striking proof of the value of trade training is afforded by the excellent trade school established in New York City through the efforts of the late Colonel Auchmuty. The splendid results achieved by the New York Trade School have made it the model for similar institutions which have since been established in various parts of the country. If a sufficient number of trade schools were started, based upon the successful methods of the New York institution, the problem of trade training for the young men of the United States would rapidly solve itself.

Fire Losses in 1902.

While aggregating some $9,000,000 less than in 1901 and $19,000,000 below the total of 1900, the fire losses of the United States last year amounted in round figures to $160,000,000, or an average of about $13,500,000 a month. This is a sufficiently heavy total to have made 1902 a period of continued restriction of profits to the underwriters, notwithstanding the almost universal advance in fire insurance rates throughout the country, induced by the disastrous record of the previous three or four years. Nevertheless, it is taken as a welcome sign of improving conditions, which had become so severe in the last few years as to threaten the life of even some of the stronger insurance companies and to have caused the actual demise of a number of the smaller concerns. The year 1902 was marked by the great conflagration in Paterson, N. J., which wiped out a part of the business district of the city at a loss of over $7,000,000; the Waterbury, Conn., disaster, in which more than $2,000,000 worth of property was destroyed; a fire at Atlantic City, N. J., involving a damage of about $1,500,000, and the destruction of the Armour plant at Chicago, with a loss of $900,000. The heavy annual fire losses in this country are an economic waste which, it would seem, should be checked to a greater extent than is the case at present, in view of the improvements in fire fighting facilities and the increased adoption of fire proof construction, so called, in our modern buildings. That property to the average value of $13,500,000 should have been wiped out by fire in each month of 1902 is a peculiar comment upon modern progress.

Convention of New York State Association of Builders.

The seventh annual convention of the New York State Association of Builders was held in Albany, January 21, 1903, the various cities of the State being represented by delegations, as follows:

Amsterdam.—Henry C. Grieme, J. G. Turner.

Buffalo.—C. B. Jameson, B. I. Crooker, A. I. Holloway, F. C. Kempf, J. M. Carter, E. C. Rumrill, J. W. Henrich, Geo. W. Maltby, Henry Hummell, T. Dwyer, J. G. Wickser, E. Drier.

Binghamton.—G. N. Balcom, C. J. Moffatt, C. H. Mitchell, W. J. Manning, E. W. Seymour.

Little Falls.—J. D. Clarke.

Niagara Falls.—M. F. Ryan, Chas. N. Mayer, John Sandstrums, E. E. Joralemon, W. J. S. Cadne.

Rochester Exchange.—F. P. Stallman, J. E. Summerhays, F. Gleason. Carpenter Contractors' Association.—Henry Stallman, J. L. Stuart, A. E. Beale. Mason Builders.—R. Williamson, H. F. Stallman, F. L. Hughes, Wm. Albaugh.

New York.—C. A. Cowen, S. M. Wright, W. A. Conover, F. M. Weeks, E. F. Eidlitz, C. M. Hart, L. A. Burke.

Utica.—B. McDermott, James Wicks, C. T. Fuller, W. Fisher.

Ilion.—C. Ripple, E. Cole, F. Harte, A. F. Dennis.

Troy.—Daniel F. Neal, C. P. Boland, J. P. Boland.

Albany.—Alexander Bell, Blake, Dyer, Dollard, Davis, Ensdiem, Feeney, Sheehan, Fisher, Filkins, Flemming, Gich, Sayles, Sanders, Gabriel, Havens, P. Keeler, E. Keeler, Kerman, A. Kreith, J. Kreith, P. Laird, A. Laird, McCann, J. J. Maas, Mead, Moleton, A. Moleton, Jr., Nichols, Reeman, W. Ryder, E. Ryder Stocker, A. Wesley, J. Waldbilling, W. Wensley, White, Wickham, E. Walsh.

The headquarters for the convention were at the New Kenmore Hotel, but the business session of the convention was held in the Council Chamber, City Hall.

The business session of the convention was called to order Wednesday morning at 9 a.m. by President F. P. Stallman of Rochester, who introduced Mayor Gaus of Albany, who extended a cordial welcome to the delegates present.

In responding to the Mayor's remarks, President Stallman gave assurance that the delegates had already felt the cordiality and the warmth of the hospitality of the people of Albany.

Secretary James M. Carter gave a detailed report of the year's doings of the association, showing that financial and numerical growth had taken place the past year, telling that two distinct builders' exchange organizations had been formed during that time because of the State Association's efforts, and stated that now there was hardly a city or town in the whole State that did not have either a builders' exchange organization or a number of individual builders that are interested in and friendly to the work of the State body. Ernest F. Eidlitz, the counsel of the State body, gave a most interesting detailed report of the legislative work, explaining in detail the bills enacted the past year that affected the building trades. His report was broad, liberal and logical and did much to give the delegates an understanding knowledge of the inner laws of the State.

Considerable informal discussion was given to the following spbjects:

Should builders be paid a compensation for submitting estimates on all plans?

Are not the builders' profits, considering the financial and moral risks, too small?

Should the general contract system be encouraged or not?

Is the present wage scale of building mechanics unreasonably high?

Should contracts be made with the various union bodies controlling the building mechanics?

The latter subject was particularly interesting. The delegates were almost unanimous in their opinion that contracts should be made with the labor bodies, but that the labor unions should be forced to assume a state of responsibility, and that the walking delegates should be dispensed with. The subjects proved of such interest that a motion was made and carried that the secretary be instructed to have papers prepared on these topics by various members of the association, and have them read at the next meeting of the organization.

In the evening at 8 o'clock a banquet was served in the banquet hall of the New Kenmore Hotel, the delegates being the guests of the Carpenter Contractors' Association of Albany, Richard Wickham, the president of that body, acting as toastmaster. Responses to toasts were made as follows: "My Experience as President," by F. P. Stallman of Rochester; "Labor Union, Yes, No," by C. A. Cowen of New York; "The Greater Need of Building Apprentices," by J. E. Summerhays of Rochester; "Experiences as Counsel," by Ernest F. Eidlitz of New York. Other speakers were: H. N. Fuller, Adolph Fleishman, E. D. Flannigan and William Allen.

Officers of Iowa Brick and Tile Association.

The twenty-third annual convention of the Iowa Brick and Tile Association, which was held at the dates announced in our last issue at Ames, Iowa, was a very successful affair. A number of valuable papers were read and discussed and reports were presented by various members as to the state of the season's business.

The election of officers resulted in the following choice:

President, O. T. Denison of Mason City.
Vice-President, D. T. Morrey of Ottumwa.
Secretary, I. W. Williams of Ames.
Treasurer, C. J. Holman of Sergeant Bluff.

Connecticut Valley Master Builders' Association.

At the annual meeting of the Connecticut Valley Master Builders' Association, held in the Board of Trade Rooms, Springfield, Mass., on January 14, there were present delegates representing the various cities in the organization.

The following officers were chosen for the ensuing year, nearly all being re-elections:

President, H. C. Wood of Westfield.
Vice-President, F. F. O'Neil of Holyoke.
Secretary, Edward Hart of Holyoke.
Treasurer, H. B. Philbrick of Hartford.

The directors are: T. B. Gilbert of Springfield, F. F. O'Neil, H. B. Philbrick and M. C. Bailey of Northampton, and H. A. Wood of Westfield.

The Carnegie Technical School.

A site has at last been selected for the Carnegie Technical School at Pittsburgh, Pa., the money for the building to be furnished by Andrew Carnegie. The ground selected is known as the Flinn-Magee tract and contains about 32 acres. It is on Woodlawn avenue, overlooking Schenley Park, and the property has been optioned for $350,000. Funds are in the treasury of Pittsburgh to purchase this site, and it is likely councils will soon authorize the acquiring of the land. As soon as a site is secured work on the building of the Carnegie Technical School will be started.

Minnesota Brick Manufacturers.

At the annual meeting of the Minnesota Brick Manufacturers' Association, held in Minneapolis the last week in January, the following officers were elected:

President, E. M. Farnham of Princeton.
Vice-President, George W. Higgins of Minneapolis.
Secretary and treasurer, H. M. Farnham of Princeton.

AN interesting example of domestic architecture in the way of apartment hotels is the 12-story building which is now in process of erection in Thirty-second street, just east of Fifth avenue and occupying a plot 50 x 100 feet in size. The structure will be of the French Renaissance style of architecture and will cost about $350,000. Up to the third story it will be of limestone and the remaining nine stories will be of brick. The interior will be elaborately finished, the dining room being in mahogany and the vestibule and staircase in marble. The plans were prepared by Neville & Bagge, who expect to have the building ready for occupancy by September of the present year. The first floor will be devoted to dining rooms, a palm garden, reception room, smoking rooms, &c., while the upper floors will be arranged in suites of one, two and three rooms and bath.

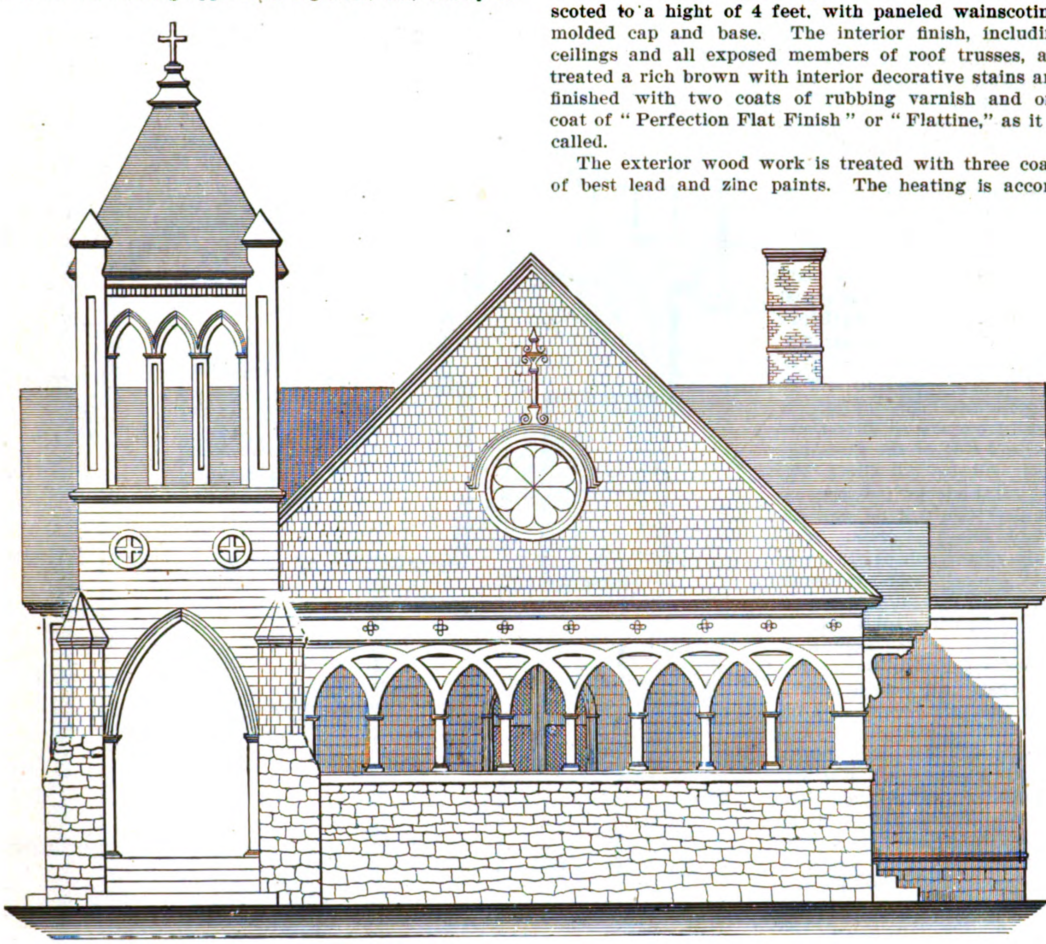
EPISCOPAL CHURCH AT LOUISBURG, N. C.

WE take for the subject of our supplemental plate this month what is known as St. Paul's Episcopal Church, erected a short time ago at Louisburg, N. C. An idea of its general appearance may be gained from an inspection of the two half-tone illustrations. We show by means of the main floor and foundation plans, the general arrangement of the interior, with the position of the heating apparatus, registers, &c., clearly indicated. The front and side elevations with the various details show the general style of construction and finish. The foundation walls are of brick, and the exterior of the brick walls above the grade line are faced with hard burned brick of uniform color, laid in mortar stained red with an approved brand of mortar stain. The porch wall and buttresses for the tower are laid up with granite blocks forming an uncoursed rubble wall, topped with a hammer dressed granite cap. The steps are also of North Carolina white granite.

According to the specifications of the architects, Barrett & Thomson of 115½ Fayetteville street, Raleigh, N. C., the framing lumber throughout is of local pine, the sills and girders being 8 x 12 inches, the floor joist 2 x 12 inches and the studding 2 x 6 inches spaced 16 inches on centers. The roof covering is supported on timber trusses with all members exposed and dressed. The roof sheathing is ¾ x 3 inch tongued, grooved and beaded ceiling, laid face down on the rafters. The main and tower roofs are covered with 20 x 10 inch No. 1 Virginia black slate. The outside walls are covered with ⅞-inch surfaced sheathing, on which is laid a good quality of water proof building paper, this in turn being covered with 5½-inch resawed weather boarding. The porch is laid with a floor of Portland cement concrete.

The finished floors are No. 1 long leaf pine ⅞ x 2½ inch face. The side walls above the wainscoting are plastered and finished with light sand finish floated to a true and uniform surface. The interior finish throughout is of bright long leaf pine. The church is wainscoted to a hight of 4 feet, with paneled wainscoting, molded cap and base. The interior finish, including ceilings and all exposed members of roof trusses, are treated a rich brown with interior decorative stains and finished with two coats of rubbing varnish and one coat of "Perfection Flat Finish" or "Flattine," as it is called.

The exterior wood work is treated with three coats of best lead and zinc paints. The heating is accomplished by means of a hot air furnace located in the basement, as indicated on the foundation plan.



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

Episcopal Church at Louisburg, N. C.—Barrett & Thomson, Architects, Raleigh, N. C.

Wiring Buildings at St. Louis Fair.

The wiring of the Educational Building by the Electrical Department of the St. Louis Exposition has been commenced and will be pushed to completion as fast as possible. For the night decoration of the building Chief Rustin has devised an attractive scheme, the effect of which will be to make the structure seem an immense cornice of light supported at the four corners and at the centers by great pavilions of light. This effect is to be obtained by marking the upper and lower cornice lines with eight-candle power incandescent lamps 10 inches apart. The vertical lines of the corner pavilions are marked similarly, and the rest of the façade, consisting of a splendid sweep of fluted columns, will be so treated that the columns will be silhouetted against the screen wall, which will be a luminous blaze of white light. This effect will be gained by inserting in the rear fluting of the column a line of electric lamps which will be invisible from the front of the building.

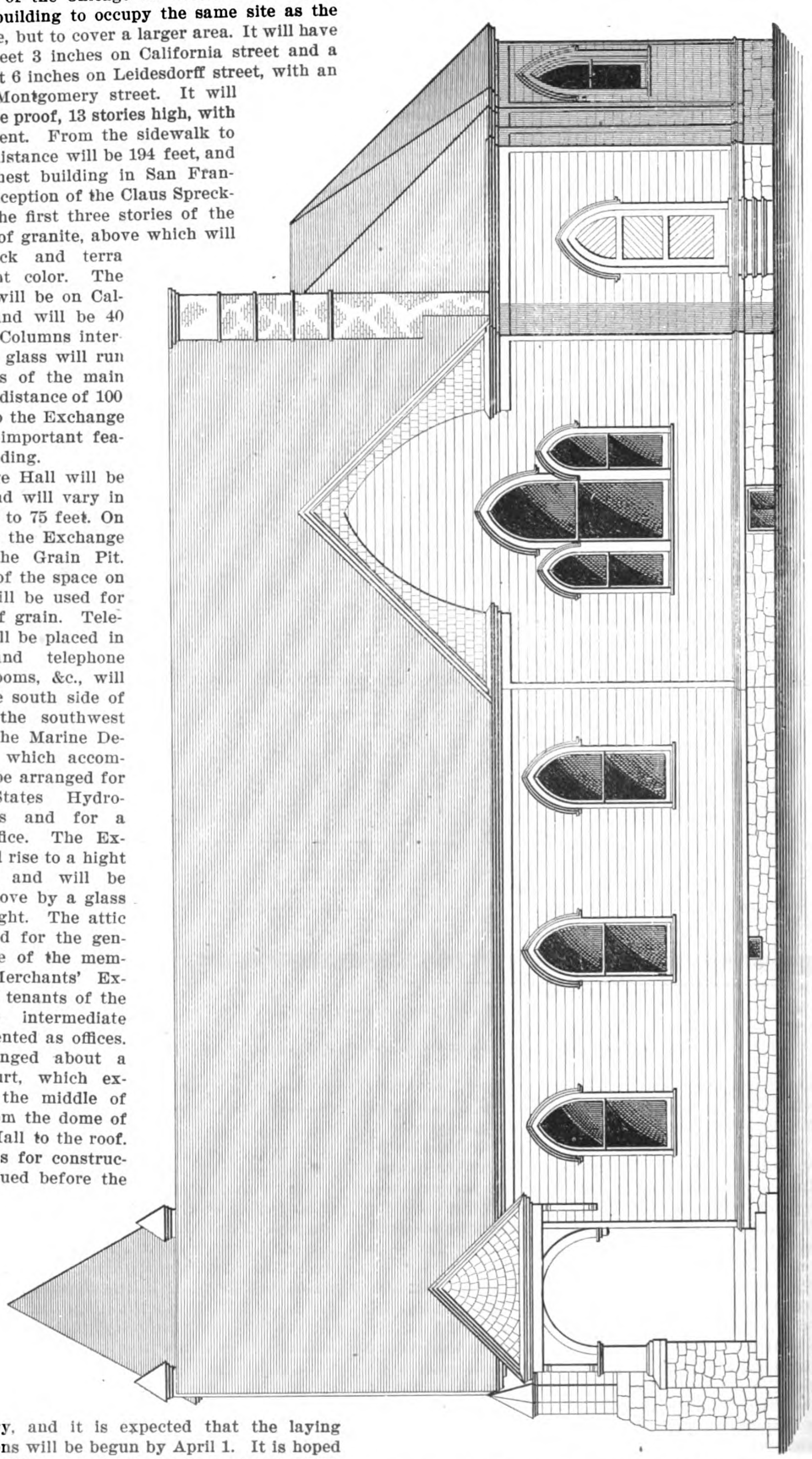
San Francisco Merchants' Exchange Building.

The plans and specifications of the new Merchants' Exchange Building, which were sent to San Francisco from the offices of the Chicago architects a short time ago, call for a building to occupy the same site as the present structure, but to cover a larger area. It will have a front of 123 feet 3 inches on California street and a depth of 147 feet 6 inches on Leidesdorff street, with an entrance from Montgomery street. It will be thoroughly fire proof, 13 stories high, with attic and basement. From the sidewalk to the cornice the distance will be 194 feet, and will be the highest building in San Francisco with the exception of the Claus Spreckels Building. The first three stories of the exterior will be of granite, above which will be pressed brick and terra cotta of a light color. The main entrance will be on California street, and will be 40 feet in width. Columns interspaced by plate glass will run along both sides of the main hall, which, at a distance of 100 feet, will lead to the Exchange Hall, the most important feature of the building.

The Exchange Hall will be 110 feet long and will vary in width from 65½ to 75 feet. On the east side of the Exchange Hall will be the Grain Pit. The remainder of the space on the east side will be used for sample tables of grain. Telegraph offices will be placed in the center, and telephone booths, cloak rooms, &c., will extend from the south side of the hall. At the southwest corner will be the Marine Department, near which accommodations will be arranged for the United States Hydrographic officials and for a branch post office. The Exchange Hall will rise to a hight of two stories and will be lighted from above by a glass dome and skylight. The attic will be arranged for the general convenience of the members of the Merchants' Exchange and the tenants of the building. The intermediate floors will be rented as offices. They are arranged about a large light court, which extends through the middle of the building from the dome of the Exchange Hall to the roof.

Calls for bids for construction will be issued before the end of February, and it is expected that the laying of the foundations will be begun by April 1. It is hoped to have the building completed by December 1, 1904. The estimated cost is placed at $1,250,000.

AT the monthly meeting of the Illinois Chapter of the American Institute of Architects, held at the Art Institute, Chicago, January 19, there was a larger attendance than at any time for several years past and keen interest was manifested in the proceedings. The chair was occupied by President W. Carbys Zimmerman. An interesting review of the meeting of the American Institute of Architects, prepared by W. S. Patton, was read by Secretary Beaumont, and was followed by a brief discussion. The committee having in hand the

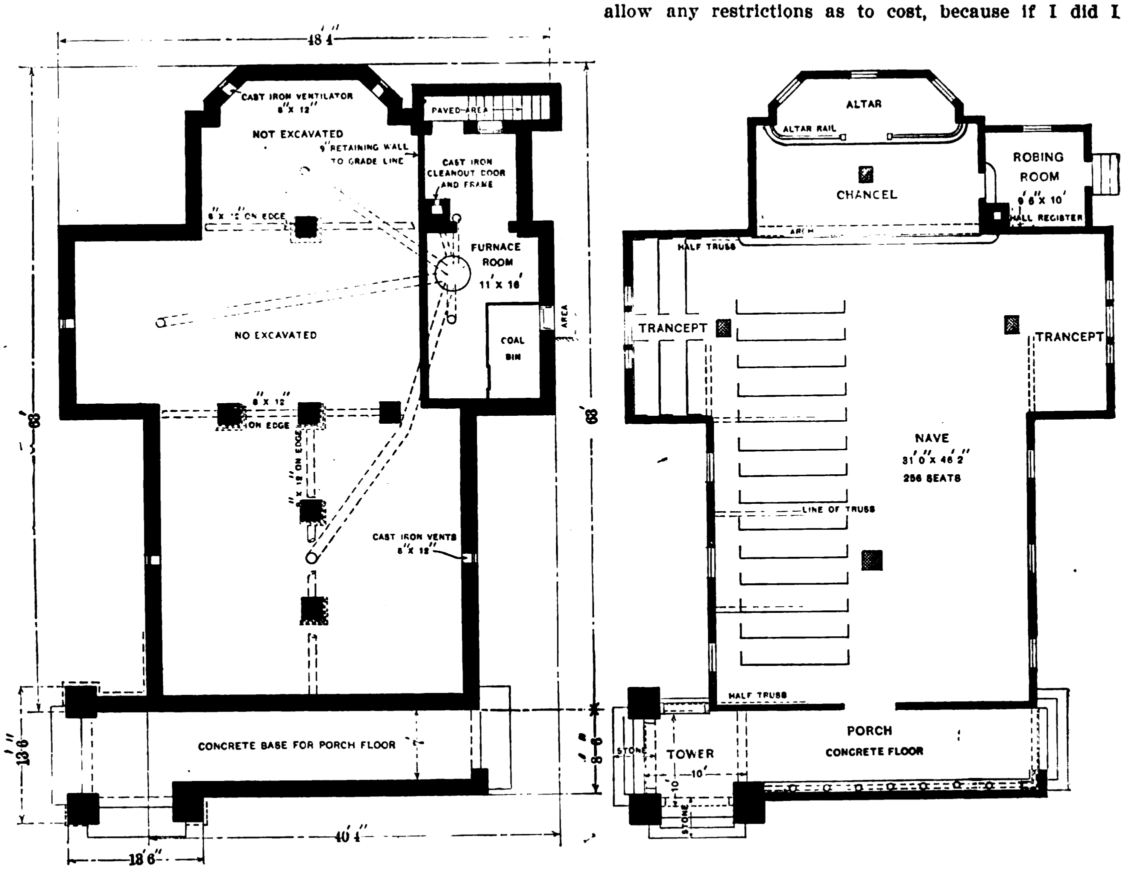


Episcopal Church at Louisburg, N. C.—Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

matter of lectures for the apprentices of the Masons and Builders' Association reported progress, and that President Zimmerman would discuss some phases of practical building operations later in the season. On January 22 W. K. Fellows delivered a lecture on "Italian Brick Work of the Middle Ages."

Some Comments on Smoky Chimneys.

I am daily called on by some sufferer to give my advice and provide a remedy, but I must confess I am often sorely puzzled, says an engineer in one of the London building papers. I may here say I never undertake a cure unless I can do whatever I please. My first duty is to find out if there is a down draft in all weathers or only when the wind is in a certain quarter. After getting all information possible, I commence my careful examination at the bottom and trace the course of the brick or pipe flue up to the chimney pot. I also pay a visit into the false roof and frequently find a defect there. To save money very often the chimney stack here has never been plastered, and there is a suck of cold air through the defective brickwork; this would cause any well constructed chimney to smoke. Again, I find a crookedly built chimney (no dips) often smokes badly, while in the same house a perfectly straight chimney draws well. I go a little further on and find just the reverse—the crooked chimney pulls well, but the straight one will not go at all. Sometimes I fancy a tree in the immediate neighborhood causes mischief. Against this theory, I find a great many chimneys situated far away from trees or buildings smoke badly, although the house enjoys an elevated position. I have a theory that on a stormy day the wind current may strike a house at a certain angle and make the chimneys smoke; but, strange to say, while on these stormy days one chimney refuses to act upward, all the rest draw powerfully, and I have known all these peculiarities occur in well built chimneys. If the door and windows of a room are air tight, then the room may try to supply itself with fresh air down the chimney. A good plan in such a case is to put in a Tobin's ventilator; but there are many chimneys which refuse to act with both windows and doors open. I have known smoke emitted from a chimney carried across a wide street by the wind, and when it reached the houses on the other side of the street it was sucked down a chimney and the room was partly filled with smoke. There was no fire in this room. I ventilated it and raised the chimney, and the nuisance did not occur again. As I mentioned before, I do not allow any restrictions as to cost, because if I did I should mostly fail in my object, as others do. I see that the grate is properly constructed; if it is not I alter it or condemn it; if the latter, I recommend an Abbotsford. Great care is required in setting all grates and none but thoroughly experienced men should set them; there should be no flat coverings over for the smoke to kick against nor any unbuilt corners behind the grate for the lodgment of cold air—another friend to a smoky chimney. The backing up of a grate should be solid and gradually gathered up right into the throat of the main flue. Having made all right at the bottom and assured myself that the upright shaft is free from obstruction (built straight or dog legged, I do not think it matters much which), I examine the chimney pot, and frequently find the outlet very much contracted. Here is danger, because the sweep, finding his brush tightens, considers he is at the top, whereas his brush has not gone through by 2 or 3 feet. This, repeated every three months, rams the soot into a solid mass and eventually closes the smoke vent. I come across many such cases. I prefer

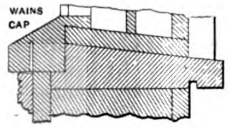


Foundation. Main Floor.

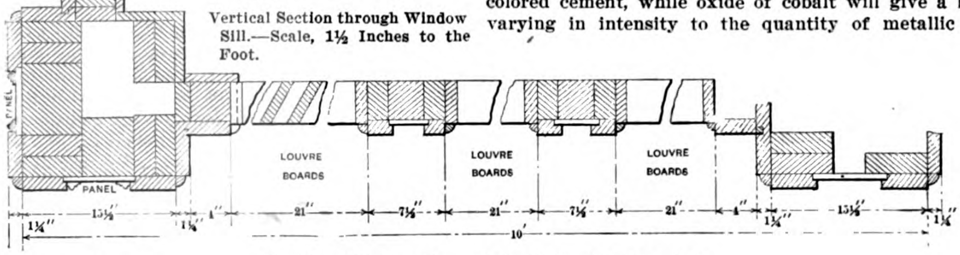
Scale, 1-16 Inch to the Foot.

Episcopal Church at Louisburg, N. C.

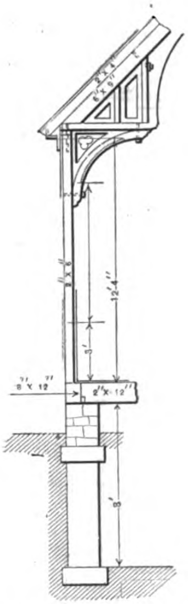
the outlet being a little wider than the main flue. Generally I have come to the conclusion that theory will not cure smoky chimneys. A man undertaking these duties must be experienced and painstaking, and not afraid of soot.



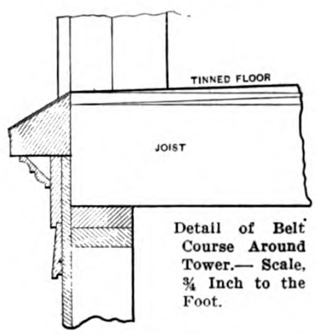
Vertical Section through Window Sill.—Scale, 1½ Inches to the Foot.



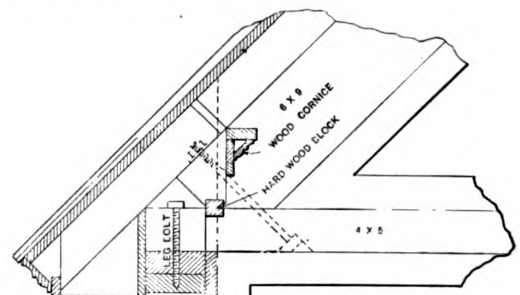
Details of Wainscoting.—Scale, ¾ Inc hto the Foot.



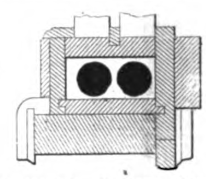
Section Showing Hight of Ceiling.—Scale, ⅛ Inch to the Foot.



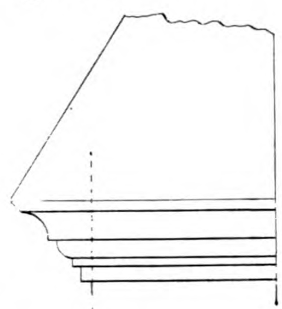
Detail of Belt Course Around Tower.— Scale, ¾ Inch to the Foot.



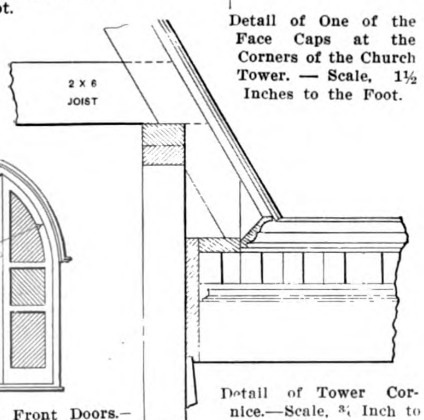
Detail of Main Cornice.—Scale, ¾ Inch to the Foot.



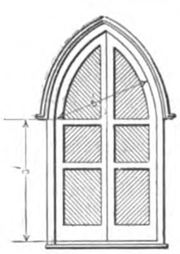
Horizontal Section through Window Frame.—Scale, 1½ Inches to the Foot.



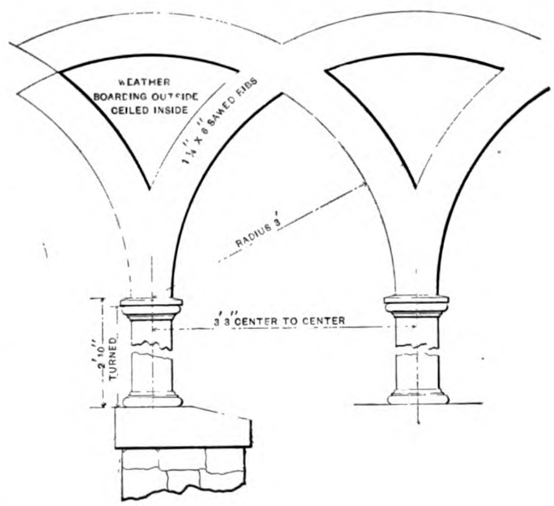
Detail of One of the Face Caps at the Corners of the Church Tower. — Scale, 1½ Inches to the Foot.



Detail of Tower Cornice.—Scale, ¾ Inch to the Foot.



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



Details of Porch Finish.—Scale, ½ Inch to the Foot.

Miscellaneous Constructive Details of Episcopal Church at Louisburg, N. C.

A WRITER who has demonstrated the fact says that 3 pecks of lime and 4 bushels of sand are required to each perch of 22 cubic feet of masonry when built in a wall.

Unfading Colored Cement.

A writer in discussing the subject states that various colored cements can be produced by incorporating certain metallic oxides or metallic salts directly with the ground raw materials used in the manufacture of Portland cement, and then burning the resulting mixture in the usual manner. A small quantity of chromic oxide added to the raw cement mixture will produce a green colored cement, while oxide of cobalt will give a blue, varying in intensity to the quantity of metallic salt added. Oxide of copper will yield a peacock, or blue-green, cement, and a small quantity of oxide of iron, oxide of manganese and oxide of cobalt, in almost equal proportions, will produce a black cement. Tints produced in this manner will be found to be perfectly fast or unfading.

RAZING A MODERN STEEL FRAME BUILDING.

VARIOUS features in connection with the erection of the modern steel skeleton frame building have been described in these columns to such an extent and the towering skyscrapers are of such comparatively common occurrence in all large cities as to attract no special attention at the present day. The demolition of one of these buildings, however, is a matter of particular interest because of the methods pursued. The first case of this kind is the taking down of the Pabst Hotel, at Forty-second street and Broadway, New York City, made necessary by work on the subway at that point. As this building was erected only four years ago it furnishes no indication as to the probable life of a steel frame structure, the time being much too short for corrosion to have made any perceptible inroad upon the metal. In fact, the entire frame was found to be in perfect condition—practically as perfect as the day it was put up. The Subway Realty Company recently acquired the property and will erect a much larger building, which will also form a part of the station of the subway. The old building, which is only 30 x 60 feet in plan, will be taken to another site.

How the work of wrecking was done will be understood from the accompanying engravings. The interior was first stripped of everything of value and a chute built in the elevator shaft. The roof, floors and partitions were torn away and dropped down the chute, from the bottom of which the *débris* was carted away. The floors were of cinder concrete, laid on stiffened wire centers, and the partitions were a single thickness of expanded metal covered on both sides with plaster. The girders and beams were wholly incased in cinder concrete and, as stated, were in most excellent condition.

The most difficult part of the entire undertaking was the removal of the walls. These were of brick, laid up in cement mortar, and could only be removed in small pieces broken off with drills and sledges. Fig. 1 represents a view of the building as it appeared shortly after the work of demolition had commenced. Fig. 2 indicates the manner of cutting off rivet heads at the foot of a column. Fig. 3 the method of lowering the beams. Fig. 4 the method of swinging off a beam from its joint, while in Fig. 5 is shown the operation of taking down the masonry.

The entire frame as it was uncovered was carefully numbered, so as to facilitate re-erection. The work resembled exactly that of erection, only performed in the reverse order. The rivet heads were all cut off by hand, sledge and chisel being used, and the body of the rivet was then driven out. Before being cut entirely free each member was attached to the hoist of the sheer legs, located just above, and when all the rivets had been cut the piece was swung clear of the building and lowered to the ground. If the job had been one of greater magnitude it is more than probable that a compressed air plant would have been installed and the rivet cutting done with compressed air tools instead of by hand. Even in this case such a plant would certainly have expedited the work, which would have been accomplished with a much reduced force.

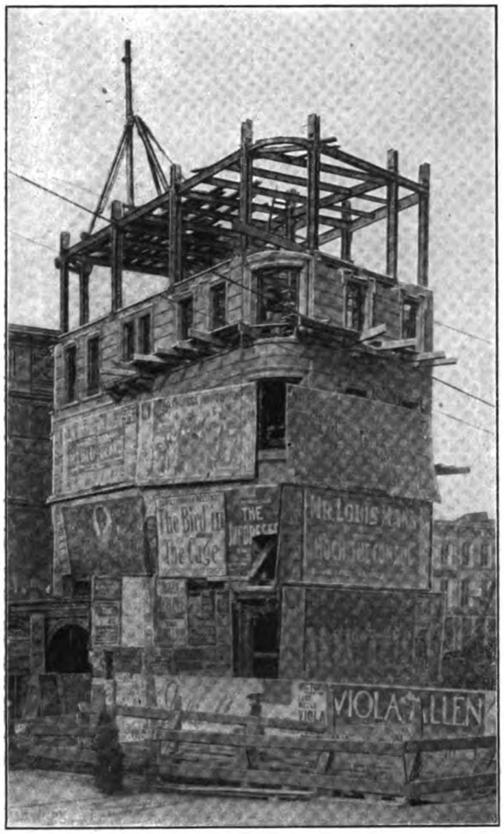


Fig. 1.—Condition of Building December 20.

Fig. 2.—Cutting Off Rivet Heads at Foot of Column.

Razing a Modern Steel Frame Building.

A German Labor Exchange.

The central bureau for unemployed workmen in Berlin, says the London *Times*, is managed by a committee of employers and workmen in co-operation with the Imperial Insurance Department. The municipality of Berlin subscribes 20,000 marks annually toward the expenses of the institution. Skilled artisans, unskilled laborers and women are dealt with in different departments. An unskilled laborer who is out of employment registers his name and other particulars in the books of the bureau, and then has access to a large hall where, while waiting for the chance of work, facilities are afforded to him for mending his clothes and boots and for obtaining good food at moderate prices. Employers who are in need of labor telephone to the bureau, and an official announces in the waiting hall the nature of the employment offered. If several men apply for the sam place the officials of the bureau decide between claims of the applicants. The bureau is int serve primarily as a means of exchange bet ployers and employed, and its officials do not to find work for applicants if the supply should er than the demand. In the case of w the procedure is the same, but it is fo to whether gated by the age demand for female labor is greater than the supply, and while the large waiting hall for men is crowded the women's rooms are comparatively empty. Skilled artisans enter the building by a separate entrance and are accommodated in separate waiting rooms, according to their trades, and arrangements are made for personal conferences between employers and would be employees. The Berlin labor bureau is in communication with similar institutions in other large towns in Germany, and representatives from these institutions meet annually in Berlin to discuss labor problems.

Stopping Ceilings.

Cracks may be filled with plaster of paris mixed with a little vinegar, and a little salt added to it to make it hard, says a writer in an English journal. The vinegar acts so as to prevent the plaster setting so quickly that it cannot be worked. But salt is a bad thing for plaster, so that great care must be taken not to use more than suffices for the purpose. A plasterer mends ceilings with chalk lime putty. It is desirable in one sense, since the mending is then of a similar nature to the surrounding surface, but it has the vices of new plaster—it takes too long to dry, and it has a different suction to the rest of the ceiling. Unequal suction is the cause of a great deal of trouble in all painting. Keene's cement is the handiest and best material for the purpose, as it dries hard quickly, and does not contract in drying.

Again, sometimes plaster and whiting mixed with thin glue is used, but great care must be taken that too much glue is not used, or the mending will show after the ceiling is finished on account of unequal contraction.

The places may be sized after being mended with clean plaster. Sometimes the old distemper is used for this purpose (that which has been washed off the other par . ceiling). In any case an equal amount of suct t be got to have a good finish and an equal effe duti afra ly plaster of paris is used. A skillful hand will be able to spread these quick-drying materials level before they set.

In stopping a ceiling, have a bucket of water, and first wet the hole thoroughly, then press the plaster well into the hole till it fills it up level with the surrounding surface. A hole which is unduly large will require a part of the old plaster to be cut away so as to form a sharp edge to the hole; and it should be bevelled a little inward to help to hold the patch in its place.

A WRIT...
pecks of lime
perch of 22 cu

Fig. 3.—Getting Ready to Lower Beam.

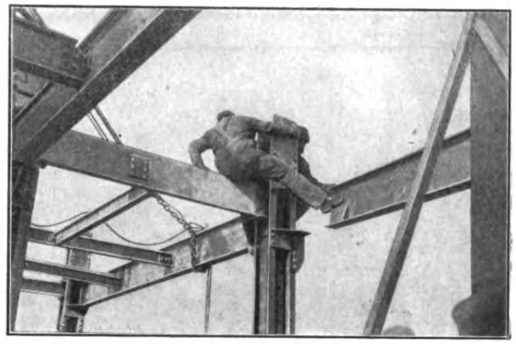


Fig. 4.—Swinging Off Beam.

Fig. 5.—Taking Down Masonry.

Razing a Modern Steel Frame Building.

Tin Roofing for Government Buildings.

The National Association of Builders, through its officers, has entered a protest in the Treasury Department at Washington against the action of Supervising Architect James Knox Taylor of the Treasury Department, in what they claim is a discrimination against American made tin plate. Mr. Taylor has invited bids for the erection of the building of the Bureau of Standards in Washington and in specifying for the tin roofing made a requirement which, it is claimed, compels the use of foreign tin plate, inasmuch as the charcoal iron plates called for in the specifications are claimed not to be made by American manufacturers. Mr. Taylor says that in the last six months he has stipulated that genuine charcoal iron tin plate shall be used in roof construction on Government buildings, for the reason that, in his opinion, it is the best quality of tin plate obtainable, and he expresses his intention to continue to call for this class of roofing tin, believing that by so doing he is consulting the best interests of the Government.

Convention of Nebraska Builders.

In response to a call recently issued by the organized builders of Omaha and Lincoln, Neb., about 100 of the leading contractors from various points in the State met on January 21 at Lincoln for the purpose of considering matters of general interest to the craft and to perfect a State association. The proceedings were opened by D. B. Howard of Lincoln, who was the chairman of the committee calling the convention, and who in a few remarks outlined the objects for which the gathering was held. Mr. Howard was then made permanent chairman and Frank G. Odell of Lincoln was selected for permanent secretary.

The customary routine committees being appointed the convention resolved itself into Committee of the Whole to consider the bill introduced by the Lincoln organization for the repeal of the lien law. This bill provides that all liens shall be abolished except the lien for labor, and is now under consideration by the Legislature. Anticipating this discussion an extensive correspondence had been entered into by the committee in charge, which showed that the contractors of the entire State are practically one in their desire to see this law repealed. This sentiment was unanimously indorsed by the convention; the work of the Preliminary Committee was approved, and the necessary funds to prosecute the work to a conclusion were quickly contributed.

The evening session was given up to a public meeting, which was addressed by leading members of the Legislature who favor the contractors' bill and by prominent contractors. This meeting was productive of much enthusiasm and encouragement for the members of the convention.

The Nebraska Builders' Association.

The second day's sessions were given over wholly to the work of organizing the State association. It was decided to incorporate the new organization under the title of the Nebraska Builders' Association, with a capital stock of $5000, divided into 500 shares of the par value of $10 each. The executive powers are vested in a Board of Directors consisting of nine members, the general elective officers being members *ex-officio* of this board.

The organization was perfected by the convention electing the following officers and directors: President, John H. Harte, Omaha; vice-president, D. B. Howard, Lincoln; treasurer, Lewis T. Geer, Grand Island. Directors: J. J. Butler, Lincoln; F. A. Mason, Lincoln; J. W. Phelps, Omaha; J. D. Harrison, Grand Island; L. G. Larson, Plattsmouth; L. H. North, Beatrice.

The Legislative Committee of the Lincoln Contractors' Exchange, which initiated the call for the convention, assumed all the preliminary expense and carried it to a successful issue, was honored by being selected as an Executive Committee to manage the legislative fight to a conclusion, the committee being reinforced by the election of a general Legislative Committee of 25 chosen from the membership at large.

The Board of Directors held a meeting immediately after the adjournment of the convention, and by unanimous vote selected Frank G. Odell, secretary of the Lincoln Exchange, to serve as secretary of the new organization, with headquarters in Lincoln.

Mr. Odell has established his headquarters in Rooms 12 and 13 Brownell Block, Lincoln, and has already entered upon an extensive campaign for pushing the State association. The active literary work and legal matters connected with the legislative contest have been delegated to him by the Executive Committee in charge, and the results are already seen in a marked expression of public sentiment favorable to the bill.

The contest has developed some active opposition on the part of the lumber dealers, and a controversy has been going on in the State daily papers in which the contractors have come out with their share of honors and the advantage in argument. An extended opinion by a leading lumber dealer in favor of the present law, which is being extensively circulated, has resulted in the issuing of a complete reply by the Legislative Committee, which has been sent out in pamphlet form to every contractor in the State and to every member of the Legislature. Present indications point to the passage of the measure.

The next convention of the Nebraska State Association will be held in Omaha in January, 1904.

Remedy for Creosote from Wood Burning.

In sections of the country where wood is being used largely as a fuel there has been more or less complaint of creosote forming and running down the chimney into the cellar and creating a bad odor throughout the house. Various remedies have been suggested for obviating the difficulty, but so much depends upon local conditions that these are not always successful. One writer in discussing the matter says:

As the weather gets colder, I expect to hear that people in all wood burning sections of the country with big, cold chimneys are having trouble from creosote. Usually this trouble comes from a chimney which has none too good a draft, and in many instances where a flue is much larger than is necessary, presenting a large cooling surface. In consequence, the products of combustion do not escape from the chimney before condensation takes place. Where a man has a chimney in his house he is indisposed to rebuild it to meet the necessities, and where the chimney is large and cold, the heat of the gases passing through is not sufficient to keep it at a temperature which will insure such a draft as will discharge them before they condense. It is fortunate that the chimney belongs to the man; otherwise, he might insist on the furnaceman changing it for a better one, which is what he needs. If a man will provide his wood furnace with a bigger pipe and give it full draft he can heat the chimney, but as his first trouble would probably be less than the trouble from overheating his house, he would be satisfied to keep the poor chimney, instead of suffering a bigger trouble. If the man is willing to run a smoke pipe up inside of his chimney to the top, the smoke pipe will, in all probability, keep hot enough to overcome the trouble. If it does not, it is a simple matter to let the liquid run out through suitable openings provided for the purpose in the bottom. Then he will get rid of the nuisance caused by the stain and the odor. If the creosote is sufficient to drip down from the stove pipe into the cellar he has only to reverse the joints in the pipe to make the liquid flow back into the heater, where it will be disposed of by the fire without nuisance.

San Francisco's New Building Ordinance.

The San Francisco building ordinance, which has been under consideration for the past two years, was finally passed by the Board of Supervisors on February 2. By its provisions the hight of frame buildings is limited to 50 feet, and all spires of churches and towers of breweries above that hight are required to have such parts covered with fire proof materials. Buildings of other materials are divided into three classes. Class A includes absolutely fire proof buildings, which are limited in hight to 201 feet. Buildings in Class B are required to have the exterior walls and piers of masonry or of masonry and steel, and all exterior surfaces other than masonry covered with noninflammable materials. The hight of buildings of this class is limited to 100 feet. Building in Class C are the same in requirements of construction as those of Class B, except as to requirements for interior lathing, and are limited in hight to 82 feet.

In determining the hight of buildings, the ordinance provides that it shall be measured from the curb line opposite the center of the principal front of all buildings, except those on the street corner. For buildings erected on a street corner the measurement is to be taken from the curb line opposite the center of either front. The hight measurements are to be taken from the above lines to the underside of the ceiling joists, for flat roofed buildings, and to one-half the hight of the roof of pitched roof buildings. Pitched roofs are not allowed to have a slope of more than 45 degrees. No special provision is made for hospitals, which another ordinance requires to be of brick. The question has come up as to whether or not this previous ordinance is abrogated by the new general building ordinance.

FRAMING ROOFS OF EQUAL AND UNEQUAL PITCH.*

BY MORRIS WILLIAMS.

A PROBLEM often encountered in roof framing is that of two roofs of unequal pitch intersecting one another, as illustrated in Figs. 1, 2 and 3 accompanying this article. To many who are adepts with the steel square this problem frequently offers an insurmountable difficulty, in that it calls for, to say the least, some knowledge of lines.

The difficulty arises out of the inequality of pitch between the two intersecting roofs, which causes an indefinite diversion in the angle of intersection. In equal pitch roofs the plan angle of the valleys invariably forms a right angle, while in unequal roofs the plan the plan of the point on the main roof where the two valleys will intersect. By drawing a line from *a* to *d*, and extending it to *b*, the plan of the long valley is determined. A line drawn from *c* to *d* will determine the plan of the short valley.

To find the cuts and lengths of the two valleys proceed as shown in Fig. 4. The plan of the long valley in this figure is shown at *a b*. On *b* and square to *b a* erect the line *b b''*, equal in length to the hight of the main roof, which is 19 feet. Connect *b'' a*, which gives the length of the long valley. The bevel at *a* represents the bottom cut and the bevel at *b''* the upper cut.

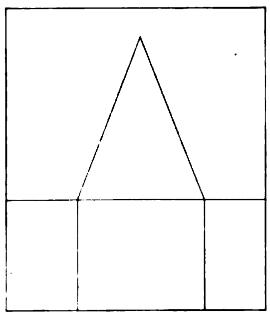


Fig. 1.—Elevation of Front.

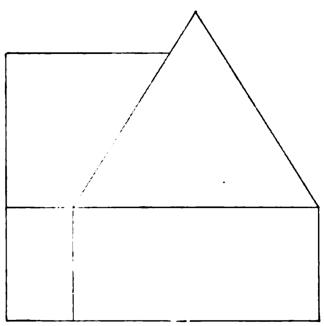


Fig. 2.—Elevation of Right Side.

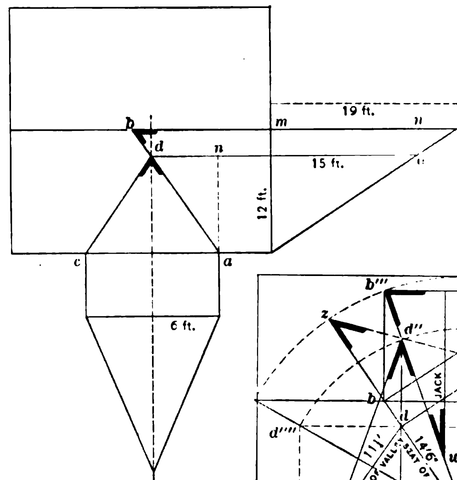


Fig. 3.—Plan of Roofs Shown in Previous Diagrams.

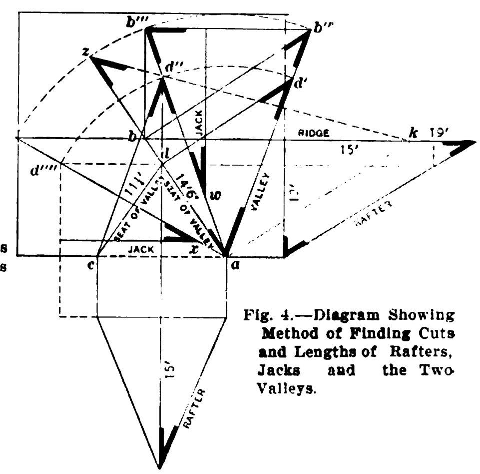


Fig. 4.—Diagram Showing Method of Finding Cuts and Lengths of Rafters, Jacks and the Two Valleys.

Framing Roofs of Equal and Unequal Pitch.

angle invariably deviates from a right angle, and is determined by the variation in the pitches.

If architects would supply the carpenter with all the necessary drawings much of the difficulty would be removed, but the general rule is to furnish merely the elevational drawings, such as those represented in Figs. 1 and 2, omitting the plan drawings and leaving the carpenter to draw one, thus forcing him to do not only what the architect should do, but very often what is beyond the technical capacity of many calling themselves architects whom we often come across in the suburban districts.

In Fig. 3 the plan drawing of the elevation shown in Figs. 1 and 2 is exhibited. The measurement of the narrow roof is 12 feet span and 15 feet rise, so that 12 on the tongue and 15 on the blade, stepping six times, will give the cuts and length of the common rafter. The measurement of the wide or main roof is 24 feet span and 19 feet rise, so that 12 on the tongue and 19 on the blade, stepping 12 times, will give the cuts and length of the common rafter for this roof.

To find the cuts and lengths of the two valleys it will be required to determine the plan of each of them. From *m* on the right hand side of the wide roof, measure to *n*, the hight of the narrow roof, which is 15 feet. From *n* draw *n o*, and from *o* draw *o d*. The point *d* intersects the ridge of the narrow roof extended, and determines

* Continued from page 38, February issue.

On *d* erect *d d'*, cutting the long valley in *d'*, thus determining the portion of it from *d'* to *a* as the length of the short valley. The top and bottom cuts are shown to be the same as those of the long valley.

Place one leg of the compass in *a*, extend the other to *b''* (the length of the long valley), and turn as shown to *b'''*. Connect *b''' a*, which will be the long valley placed in the requisite position to determine the back cuts for the jacks that extend from the long valley to the ridge of the main roof. This cut is shown at *w*. Again place one leg of the compass in *a*, extending the other to *d'* (the length of the short valley), and turn around, as shown, to *d''*, intersecting the long valley. Now draw the line *d' b c*, which will be the short valley placed in its requisite position to determine its top cut across its back to fit against the long valley. Continue the arc *d' d''* to *d''''*; connect *d''''* with *a*, which will represent the short valley in its position to determine the jack cuts that extend from the short valley to the ridge of the narrow roof. This cut is shown in the figure at *x*.

We have now found all the bevels or cuts, except the one to fit the long valley against the main ridge, and this bevel, as mentioned in the previous articles, is the least understood of any by those carpenters that rely on following prepared methods more than on pure geometrical solutions. The bevel shown in Fig. 4 at *b''* is the one generally made use of, and if the carpenter who uses it will prepare the back of his valley to conform to the planes of the intersecting roofs, it is the correct bevel; but it should be applied by placing the stock of the bevel to rest on the hollowed back of the valley instead of from its side.

Valleys in roof construction are never backed. It would be a waste of time and money to do it. They are always left square as received from the lumberman, and when this bevel is applied intending for it to fit the valley against the ridge it often turns out a sickening sight of a misfit.

The bevel shown at *z* in Fig. 4 is the correct one, and the method of determining it as here exhibited is universal in its practicability. Note that the seat of the valley *a b* is extended to *z*, and that the extension makes *a z* equal in length to the length of the valley *a b″*. Now from *a* and square to the extended seat *a z* draw the line *a k*, intersecting the line representing the plan of ridge in *k*. Connect *k* with *z*. The angle at *z* is there formed, and it is one that will fit the valley against the ridge when applied to the side of the valley timber across its back when its back is left square.

In Fig. 5 a perspective view of the long valley is shown in its position intersecting the two roofs; its back is shown to be square and the top bevel is shown to closely fit against the ridge pole. The line *a k* in this figure is shown drawn square to the seat of the valley and parallel with its back, and the line *k z* delineates the angle of the bevel or cut, as shown at *z*. These two lines are shown in Fig. 4 as factors in determining this bevel, as at *a k* and *k z*.

In the December issue there appeared a geometrical solution of a problem analagous with the one under consideration here. It is there represented in Fig. 3 and Fig. 4. The problem as there represented was to find the length of a line lying in an oblique plane, the elevation of the plane and the plan of the line being given.

Fig. 6 illustrates the same solution applied to the long valley in our illustration. Let *a d* represent the plate, *d b* the run, *b b′* the hight of the main roof, *b′ d* the rafter, which represents also the inclined plane. Let *a b* be the plan of the line (in this case it is the seat of the long valley).

Our problem is to find the length of this line projected into the oblique plane *b′ d*; in other words, the length of the long valley. Place one leg of the compass in *b*, and extend the other to *a*; revolve the point *a* to *n* and connect *n b′*, which will represent the length of the valley, and as determined here it gives the top and bottom cuts, as shown at *n* and *b′*, respectively.

Our roof problem calls for more than this. It is required for this valley to be placed in such a position as will determine the angle or bevel that will fit the jacks against its side. The solution of this portion of the problem was demonstrated in Fig. 5 of the December issue, and here the same solution is applied to the valley and simply consists in revolving the rafter from its vertical position, as at *d b′*, to the ground line, as at *d b‴*; and then connect *b‴* with *a*, which is the point on the plate where the foot of the valley rests. The valley as here placed represents the angle of its inclination on the roof, and therefore by drawing the jacks at right angles to the plate the cut across the back of same is determined in the intersection of the jack with the line of the valley, as shown at *x*.

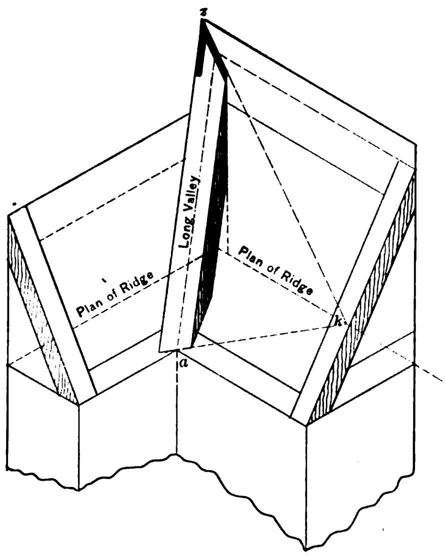


Fig. 5.—Perspective of the Right Hand Corner, Showing the Valley Intersecting the Two Roofs, Its Back Square and Its Top Cut to Fit Against the Ridge Pole.

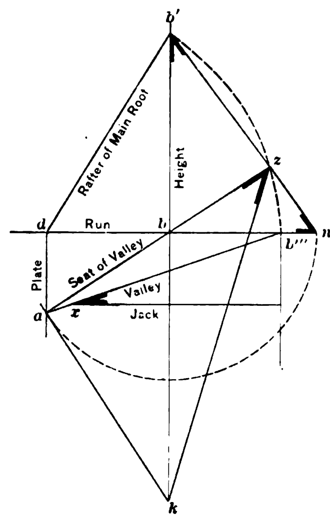


Fig. 6.—Diagram Illustrating Method of Finding Length of Long Valley, Its Vertical Cuts and Its Top Cut, to Fit Against the Ridge of Main Roof.

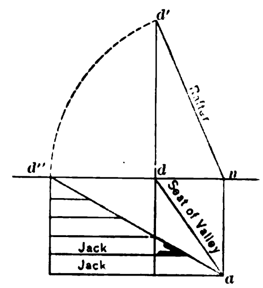


Fig. 7.—Obtaining Lengths and Cuts of the Valley and Jacks for the Narrow Roof.

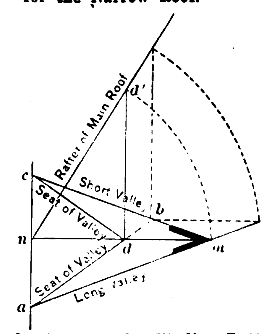


Fig. 8.—Diagram for Finding Butt Bevel to Fit Short Valley Against Side of Long Valley.

Framing Roofs of Equal and Unequal Pitch.

In Fig. 6 is also shown the bevel to fit the valley against the ridge. The line *a k* is drawn square to the seat of valley from point *a* and extended to cut the lines of the ridge at *k*, and the seat of the valley *a b* is extended to *z*, making *a z* equal the length of the valley. Then a line drawn from *z* to *k* will determine the angle at *z* which will fit the valley to the ridge.

In this figure we have found with but very few lines all the bevels or cuts for all the timbers of the main roof. By similar process, which is exemplified in Fig. 7, the lengths and cuts of the timbers for the narrow roof may be found. Let the line *n d′* represent the rafter of the narrow roof, and *a d* the seat of the valley and the portion *a d* of the long valley, as shown in Figs. 3 and 4. Now place one leg of the compass in *n*, and extend the other to *d′*; turn over, as shown by the arc, to *d″*, and connect *d″* with *a*. The line *d″ a* will represent the valley placed in its requisite position to determine the cut across the back of the jacks, as shown. The position of this line is shown in Fig. 4 at *a d″″*.

In Fig. 5 of the December issue a solution for finding the angle between two lines lying in an oblique plane was demonstrated. Applying the same to the problem encountered here, to find the butt bevel that will fit the short valley against the side of the long valley, as indicated in Fig. 3 at *d*, proceed as in Fig. 8.

Let *a d c* represent the angle between the seat of the valleys, reproduced from Fig. 3, and the line *n d' b'* the pitch of the main roof; *d'* indicates the point of intersection of the valleys on the roof, and is therefore the elevation of point *d* of the plan. Revolve point *d'* to *m;* connect *m c* and *m a*. The angle thus formed at *m* will be the one required to cut the short valley across its back to fit against the side of the long valley. The line *m c* represents the short valley, and the line *m a* a portion of the long valley, and the two valleys as here placed are assumed to be flatways on a level surface. In technical language they are said to have been constructed into the horizontal plane, and while thus placed their intersection as at *m* indicates the correct angle between the two valleys.

The principle of construction is clearly illustrated in Fig. 9, which will need no explanation, in that all the lines made use of in Fig. 8 are shown in Fig. 9 in perspective, the reference letters in the two figures corresponding.

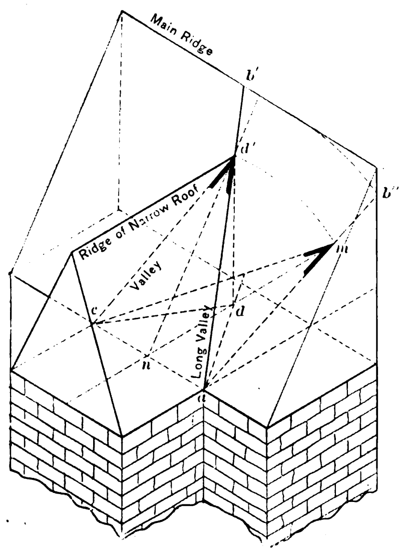


Fig. 9.—Perspective Illustrating the Principles of Construction.

Framing Roofs of Equal and Unequal Pitch.

To make a successful job of a problem like the one under consideration it is better to make a drawing, say to a scale of 1½ inches to 1 foot, and take all measurements and bevels from the drawing. A drawing similar to Fig. 4 of this article will be all that is necessary. It gives the lengths and bevels for every timber, the other figures having been drawn merely to explain the nature of the detailed construction.

Large Building Projects and New Construction Companies.

While there is a vast amount of new work contemplated in connection with the rather radical changes which are being wrought in and about New York City, the tendency seems to be to concentrate a large proportion of the work in the hands of the new construction companies, which, to a considerable extent, have in a measure supplanted the small individual contractors and builders. It is intimated that when the time comes for putting in bids for the new stations of the Pennsylvania and New York Central railroads it will be found that the bidding will be largely confined to the corporations that make a specialty of large structural work, or to individuals who are capable of handling extensive contracts. Even the work of excavating for large cellars and tunnels seems to have passed into the hands of large concerns, whose equipment is of an elaborate nature and represents the investment of much capital.

In referring to this tendency or change in the work of building which has become so marked in the last five years, Theodore Starrett of the Thompson-Starrett Company recently said: "The work has been systematized gradually, or, to coin a word, 'departmentalized.' The growth has been the same as that of the department stores. This, I must confess, has driven out of existence what might have been termed the middlemen. Building came to a practical standstill five years or a little more ago, because of the tremendous expense, and then came the present innovation—the construction companies. Through them the work of building became very much less expensive. The construction company takes hold of the ground, and up goes the building and all it contains, until it is turned over to the owner with the keys. This has not been without opposition, naturally, and even to-day there are architects and the old fashioned builders who are opposing us. They have from the very first, but in time they will come to think our way. We have our own architects, but I cannot say that we are interfering with the latter. There is plenty of room for them and for us. When it comes to arranging the interior of a building so that it will be given the greatest possible amount of room and light—that is an engineering problem and not architectural."

New Mining Building at the University of California.

The corner stone of the new mining building at the University of California was laid a short time ago with imposing ceremonies. This building is the first of those to be constructed according to the Phoebe A. Hearst plans, which were adopted several years ago. It is expected that it will take nearly two years to complete the structure, although the concrete work of the foundation is already done. When finished the building will be 181 feet from east to west and 227 feet from north to south. It will be two stories, an attic and a basement, high. The general plan is that of a gridiron, with four interior courts symmetrically placed and giving light and air to all portions of the interior. Flanking this are wings 53 feet in hight, and a main structure 65 feet in hight.

The chief entrance in the center of the south facade opens into the memorial vestibule and museum, a lofty room measuring 40 x 88 feet, rising through three stories and surrounded by a balcony at the level of the second and third floors. The room will be paved with marble and finished in buff, pressed brick. Here will be placed a collection of models, ores and apparatus appertaining to mining. A memorial tablet and a bust of the late Senator Hearst will also be placed here.

Opening from the west of this vestibule will be the administrative department, public and private offices, and a room for records. A lecture room and an office for the curator of the museum will open from the east of the vestibule. Marble stairways in double flights leading to right and left and opening into the large laboratory court will rise from the north. The laboratory will occupy the entire central area, extending 46 x 118 feet. It will be open for three stories to the roof and will be lighted entirely from above. A traveling crane, running the length of the hall, will be used for the moving of heavy mining machinery. Broad galleries, at the hight of the first and second stories, will serve as corridors. In the east wing will be located metallurgical laboratories for juniors and seniors, research laboratories will be placed in the west wing, and in the central northern portion of the building will be a dry crushing tower three stories high. The tower will be flanked by two rooms, 40 x 62 feet each; one to be used as a smelting room for copper and lead and the other for a gold and silver mill. Two lecture rooms and a private study and drafting room for the dean will be placed on the second floor. The library and stock room will occupy the third floor. Private studies will adjoin each lecture room and laboratory. Two large locker rooms, provided with shower baths, forge rooms, heating and ventilating apparatus, carpenter shop, store rooms and janitor's quarters, will be placed in the basement.

CORRESPONDENCE.

Correction Regarding Shingles in a Bundle.

From H. R., *Oakland, Cal.*—I wish to correct the statement of "R. N.," Stockton, Cal., in regard to what he says is the custom in this section as to the number of shingles in a bunch. There is no shingle mill on the Pacific Coast packing more than 200 shingles per bunch, except the dimension shingle, which runs 216 to a bunch. In this section shingles are sold by the thousand, but you get only four bunches of 200 shingles each. It is the same way in laying, the shingler calls four bunches a thousand. I have known shinglers to put on 35 or 40 bunches in a day, but everything was in their favor and 200 shingles to a bunch.

Sharpening a Hand Scraper.

From HEE H. SEE, *Montreal, Can.*—In answer to "C. C. H.," Brookville, Pa., I submit the following suggestion regarding the sharpening of a wood scraper. First, get a good scraper, which must not be of too hard a temper, and in this connection I would state that a piece of hand saw makes a very satisfactory one, although it can be bought for about 10 cents. Place it in a vise and with a smooth, flat file make the edge perfectly square and as straight as possible after the manner of jointing a hand saw. Next place the file squarely across the edge and pass it from end to end of the scraper two or three times. This operation is known as draw filing, a plan view of the position and direction of the file being shown in Fig. 1 of the accompanying sketches.

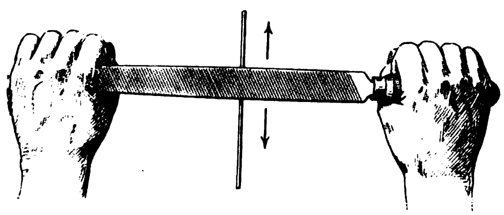


Fig. 1.—Draw Filing.

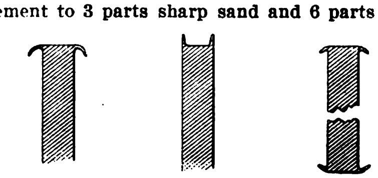


Fig. 2. Fig. 3. Fig. 4.

Showing Various Stages of the Sharpening Process.

Sharpening a Hand Scraper.

Treat all four edges the same way. The edge, as it will now appear, is shown enlarged and exaggerated in Fig. 2. Many men who do not properly understand the sharpening of a scraper, use it as it now appears at this stage of the operation, but the edge breaks off after the first few scrapes and then it has to be filed again. Remove the scraper from the vise and lay it flat on the bench, then taking the steel burnisher mentioned by Paul D. Otter in his article, rub out straight all the wire edges, keeping the burnisher flat on the scraper and passing it quickly back and forth after the manner of stropping a razor. The edge will then appear as in Fig. 3. Now, taking the scraper in the left hand and holding it firmly edgewise on the bench, place the burnisher across the edge, making a small bevel with the side of the scraper, and draw it upward two or three times, using considerable pressure. This will turn the edge back as it was after filing, but it will now be straight instead of grooved, and smooth instead of ragged. All of the eight edges must be treated in the same manner when they will appear as in Fig. 4, and the scraper should now take off a shaving like a smoothplane, but much finer.

In order to resharpen the scraper it is not necessary to go through the filing operation again for some time—simply flatten out the edges and turn them again with a little more bevel than before. This can be done very rapidly. In order to avoid too many stops, I keep three or four scrapers at hand and sharpen them all at once. I find the best thing with which to hold the scraper is a piece of sandpaper, with the sanded side next the scraper. This gives a good grip and prevents the tool from burning the fingers.

Some people file the edge of the scraper rounding to prevent the corners from catching. This is not at all necessary, as the action of pushing the scraper bends it slightly, which raises the corners somewhat. I hope this tedious article will be of use to "C. C. H." and others of the readers of the correspondence pages, as I have often gathered good things from there myself. The sharpening of a scraper, however, like the sharpening of a hand saw, takes considerable practice and no little knack, so if at first one does not succeed it is only necessary to keep pegging away at it until success crowns the efforts, for it is well worth all the trouble. I would mention incidentally that a burnisher may be bought all ready at any good hardware store. Leather curriers use them for turning the edges of their knives.

Fixing a Cistern.

From D. P. B., *Redford, N. Y.*—In the January issue "J. F. H." of New Marion, Ind., wants to know how to fix a cistern. I have had some bad work done in this line, and would say that neither of the ways he mentions is right. Dig a hole square or hexagonal, about 2 feet greater in diameter than it is desired to make the cistern. Set a 2 x 4 in the angles plumb, well braced inside and suspended 10 inches from the bottom. Board outside the 2 x 4's with 2-inch stuff 6 to 8 inches wide, leaving 10 inches between the ground and the plank. After the boards are fitted, number them and take all out except two all around. Then carefully and rapidly fill the bottom up to the studding, and between the plank and the ground with concrete made of Portland cement, slow setting. The mixture should be in the proportions of 1 part cement to 3 parts sharp sand and 6 parts crushed stone, 2 inches and less in diameter. Always keep 1-inch board between the concrete and the plank, and when the concrete is up to the top edge of the board pull it out and pour in previously prepared facing, made of 1 part cement and 1 part fine sharp sand, 1/8 inch and less in diameter. Tamp thoroughly after each batch is put in and while the next is mixing. Put conical top on, leaving a man hole and cover with concrete. After three or four days take out all the wood forms and dress up with facing. If the work is properly done it will last indefinitely.

Concrete in Building Construction.

From E. D. K., *Scranton, Pa.*—I have just received the February number of *Carpentry and Building*, and in it find an article from "T. U. S." of Wheeling, W. Va., relating to some concrete work that he did, and as I have been doing nothing else but concrete work for the last three years, I thought I would write and tell some of my experience for the benefit of the readers of your valuable paper. One of the jobs which I executed last summer was a concrete and brick floor and sidewalks on a highway bridge that carried the heavy city traffic over the railroad. The bridge was a three girder affair, each girder being 8 feet high and 90 feet long. Each girder weighed 30 tons, and all were lifted in place with a 50-foot gin pole. The floor beams were of the I-pattern, 20 inches high, 23 feet long and spaced 5 feet on centers. I had enough wooden arches made in sections of 5 feet 9 inches to fill eight spaces between floor beams, using four arches to a space. I had these arches made in short sections so I could handle them easily, as I only had enough to do two days' concreting, and had to use a hanging scaffold to take them from underneath the concreting, and then carry them up on the bridge again and use them over until all the concrete was in place.

After setting the arches I put on 1½ inches of material, mixed in the proportions of 2 of sand and 1 of cement, then put in expanded metal 3-16 inch thick, 3-inch mesh, bent in the shape of the arch, and the ends resting on the bottom flange of the floor beams. Then I put in the rough concrete, consisting of 2 parts sand, 5 parts gravel and 1 part cement, all American Portland, bringing it up to 1 inch above the tops of the floor beams. I then gave it 1½ inches of sand cushion and put on the vitrified paving bricks, ramming them down to a smooth surface and grouting.

The sidewalks were laid on iron brackets 6 inches wide, 5 feet centers, and extending 6 feet from the outside of the two outside girders. I made a false floor, and blocked it up under these brackets on which the sidewalks were laid. I first put down 1 inch of the material, mixed in the proportions of 2 sand and 1 cement, then expanded metal, then 3 inches of fine trap rock screenings and cement, mixed 4 to 1, after which a top coat of fine granite, mixed 3 of granite and 2 of cement was troweled to a smooth finish. This bridge had two sidewalks, two driveways and two street car tracks, and was in use while I was doing the job. In an article of this kind I cannot give all the details, but if any of the readers would like to know anything about cement work that has come within my experience, I would be glad to write again at any time. I have put up cement arches, sewers, floors, sidewalks and bridge work.

Note.—The general subject of cement and concrete construction has evoked such widespread interest at the present time that we trust our correspondent will, without further invitation, see his way clear to send for publication a description of his method of laying concrete floors and building cement arches. The tendency seems to be more and more toward the use of concrete in building, and anything which our practical readers can contribute on the subject of its use cannot fail to prove interesting and instructive.

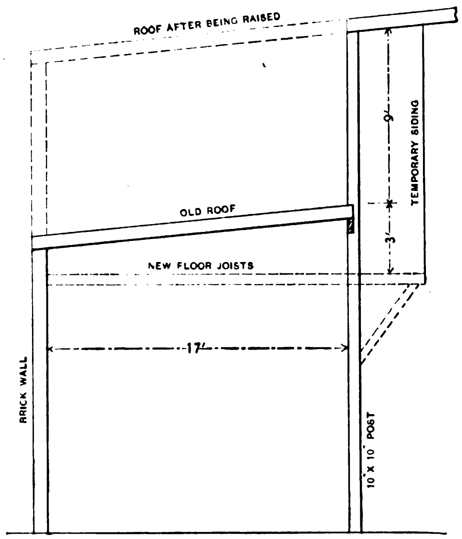


Fig. 1.—Sectional Elevation, Showing Old Roof and Position of New One When Raised.

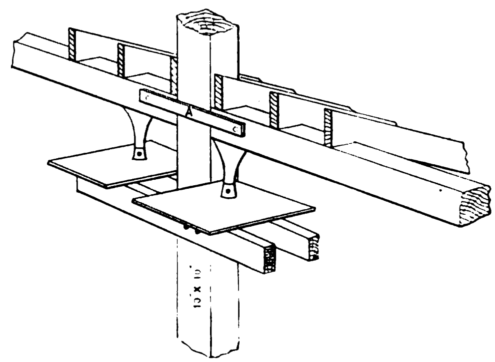


Fig. 2.—Showing Inverted Position of Jack Screws in Raising.

Raising the Roof of a Frame Building.

Location of Purlins in Roof Construction.

From W. F. G., *Omaha, Neb.*—I have been an interested reader of the paper for many years and have learned a great deal from its columns. I desire in the first place to thank Morris Williams for the great work he is giving us on roof construction, and, if not asking too much, I would like to have him show in the Correspondence columns a diagram of the last article—that is, the one in the February issue showing in perspective the purlin in position. Not having had much to do with purlins in my time, this diagram would aid me, and perhaps others in connection with several points which are not altogether clear to my mind.

Raising the Roof of a Frame Building.

From L. H. H., *Glenwood, Ill.*—We have recently been engaged in raising a roof, 17 x 161 feet, in order to give a second story for light machinery, &c. The hight to be raised was 9 feet and we found the same contrivance as that described in my previous communication very useful on the post side, only that we reversed the method in the present case. The post being stationary the "hutchicks" was moved up the post as the roof rose, resting the roof on shores while relieving jack screws when run out. Fig. 1 of the sketches shows the position of the old roof, as well as that of the new one after it was raised into position. Fig. 2 shows the position of the inverted jack screws in raising the roof, this position having been found more convenient for a man to work when the roof was near the top. The block A was loosely bolted across the post as a measure of safety and to hold everything plumb. The roof raised was a heavy gravel one, and about 250 men were working at benches, lathes, &c., on the first floor. The shop is steam heated and it was necessary to temporarily fur the front of the balcony to keep out the snow which was falling at the time. This temporary siding is indicated in Fig. 1 of the sketches.

Removing Portland Cement Stain from Limestone.

From M. E. S., *Worcester, Mass.*—Will some of the interested readers tell me through the Correspondence columns if there is any way of removing from limestone the stain of Portland cement.

Cast Iron Columns in Building Construction.

From F. D. B., *Boston, Mass.*—I was very much interested in the article of W. D. Cowles on "Flat House Construction," appearing in the November issue of *Carpentry and Building*. The article treats on a subject which I should like to see more fully discussed in this magazine, although it covers a branch which may be considered a little out of the province of *Carpentry and Building*. I do not quite agree with Mr. Cowles' conclusions regarding cast iron columns, for it seems to me that they have several quite serious drawbacks.

There is a liability to imperfections in manufacture which are difficult to guard against as often the metal is not of a uniform thickness throughout the cross section and where this is quite marked an unequal cooling results, frequently causing cracks which many times are difficult of detection, and of course weaken the column to a greater or less degree.

In case of a fire of sufficient intensity to thoroughly heat one of these columns, the sudden cooling by the water from the fire stream is almost sure to crack it, and should it be supporting considerable load it would in all probability fail altogether, or if it does not give out then its strength is practically destroyed and may cause serious trouble at some future time.

In this connection it is interesting to refer to an article appearing in the *Engineering News* of January 1, 1903, on the destruction of two large spinning mills by fire, one in Stockport and the other in Patricroft, England. These mills were what are commonly called fire proof construction, having cast iron columns, not protected, the floors were of I-beams supporting brick arches, the I-beams being all covered excepting the bottom flanges. In concluding their reports, the inspectors found that in both cases the collapse of the floors was due entirely to the failure of the cast iron columns. It seems to me in view of these facts and in line with present ideas on fire proof construction that an I-beam or small built column, protected everywhere by at least 1½ or 2 inches of cinder concrete, would be much better and but little more expensive.

Relative Tensile Strength of Scarfed Joint and Solid Timber in a Truss Chord.

From E. H., *Hailey, Idaho.*—Will Mr. Kidder please state through the correspondence columns what is the relative tensile strain in an 8 x 8 inch truss chord with scarfed and keyed joint framed, as in Fig. 1 and the solid timber.

Answer.—The question of our correspondent was referred to Mr. Kidder, who furnishes the following in reply: "The strength of a scarf joint like that shown by the correspondent in Fig. 1 of the sketches depends upon the resistance of the bolts and the small lugs at each side of the key. It would take so little stress to shear off the latter that it is not safe to count on their resistance. The joints shown would probably not have more than one-tenth of the strength of the solid timber to resist tension, and perhaps one-quarter to resist a cross strain. The best joint without going to great expense, for a solid timber tie beam, is one made by means of steel fish plates, as indicated in Figs. 2 and 3, which represent plan and elevation respectively. Such a joint would be about four-fifths of the strength of the solid timber, which is about as much as can be obtained by any joint. When it is not practicable to obtain a single stick of the required length, the writer usually prefers to build a tie-beam of 2-inch plank, breaking joints and bolted together, as described in the issue of *Carpentry and Building* for June, 1902."

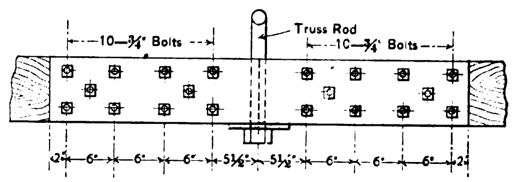


Fig. 3.—Elevation.

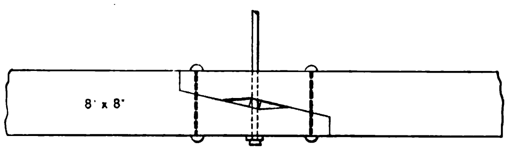


Fig. 1.—Sketch Submitted by Our Correspondent.

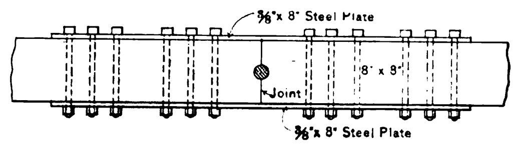


Fig. 2.—Plan of Joint Recommended by Mr. Kidder.

Relative Tensile Strength of Scarfed Joint and Solid Timber in a Truss Chord.

What Constitutes an Average Day's Work for a Carpenter.

From A. E. C., *Vancouver, B. C.*—Although I am one of the late subscribers to the paper, I would be glad if the editor would grant me a little space in the Correspondence department, as I think it is part of my duty to express my views on different topics. If others will do the same we are all likely to receive much valuable information. I am a practical builder, but am always willing to learn. I notice that most of the correspondents are located in the Eastern or Middle States, which is the section of the country from which I originally came, so I will endeavor to give the readers some of our Western ideas on different parts of the trade, because I think there is much to be learned by the readers discussing various phases of their work. I can plainly see just now that the topic is shingling and door hanging, or what constitutes a day's work of nine hours.

My suggestion on that subject is this: Out of ten men there will be found no two who will do the same amount of work in a day. Some are natural born carpenters and some are natural born plowmen, but putting these two men together on a job, what we get for a day's work I do not need to explain. One pulls ahead and the other pulls back. The trouble of to-day is that the poor workman handicaps the good mechanic and the latter gets the blame from the foreman. There is no such thing as making a carpenter in 12 months or five years, and some are never made. The average carpenter becomes competent in from 10 to 12 years, providing he takes an interest in his work and not in his timepiece.

Now in regard to the correspondent "Hee H. See" of Montreal, Canada. No doubt he is a record breaker in door hanging, especially batten doors and drums, but how he is on panel doors he does not say. He speaks of traveling around the globe looking for those 15 and 16 doors a day men, but says he has failed to see the color of their hair. He did, however, find a stray one who hung 12 doors, and just escaped hanging himself when the boss appeared on the scene. I do not wonder at his close shave of the rope, but probably the man never saw a door before. If he had not that would make some difference, but still I am inclined to think if that same man was given 25 to 30 years' practice on door hanging he would be able to hang his 16 doors a day. I will admit that some men are better at hanging doors than others, but a good deal depends on the conditions. One man may hang 16 doors on a certain job and not more than 12 on another job. In order to do a good day's work, or to hang 16 to 18 doors, it is necessary to have the door jambs set square at the head and to be sure that they are out of wind, for if they are not the door will not go in the rabbet. Neither must one get too many tools around his feet, but have some system in executing the job.

I notice that "Hee H. See" would like some of the swift door hangers to explain their methods, but I confess I do not quite understand what he means by putting in the door sill, unless he is referring to an outside door or to the threshold of an inside door. We do not use door thresholds here in good houses, as the carpets run through under the doors. They are only used on outside doors. Wherever they are used the door is hung first and the thickness, ½ or ⅝ inch, is scribed off the door and the door threshold put in afterward. Again, while we find one man using a door rod to mark the hinges there will be found 20 who would not use it, as it would be considered another unnecessary tool, and my idea is to get as few tools as possible, but get the best and keep them sharp.

In the first place, joint the hinge side of the door straight and have it square at the hinge bed, then put up the door and it will be found that it will just joint; scribe the bottom and top and measure 7 inches down from the top and 10 up from the bottom, also the top edge of the hinge. Use a sharp pencil or penknife, but before marking for the hinge see that the top fits with 1-16 inch play all around the door except at the bottom, where it should be ⅝ or ½ inch. Set the hinge square with the door and flush on top, giving the hinge 1-32 inch more margin from the inner angle of the rabbet than on the door, so that the door will not bind on the jamb when shut. With these rules a good man will hang his 16 or 18 doors in nine hours and hang them well, for I have seen it done. At home we call that an average day's work.

I have seen 23 doors hung, the doors in question being 2-8 x 6-8 x 1½ cedar and hung to a solid rabbet frame, which is more difficult in my estimation than to a stop frame. This does not mean putting on locks. The best way is to first fit on the doors and then go back and hang them.

"Hee H. See" of Montreal also speaks of taking three-quarters of an hour to put on a mortise lock. I do not know what kind of a mortise lock he has in mind, whether in connection with an inside or a front door. Although very good on batten doors, he certainly loses time on the mortise lock job if it takes him three-quarters of an hour. I have put them on, lock after lock, in 24 minutes, and some even in 20 minutes, and with long escutcheons on each side—old copper Tilden and Gurney locks—and they were put on in good shape, using ¾-inch bit for the mortise and ½-inch for the keyhole. As I said before, I do not use many tools, but have them of the right size and in good order.

Now, while we are dealing with the lock question, I would like to have the opinion of some of the readers as to the proper hight from the floor a lock should be placed. For my part I should say 2 feet 9 inches from the floor, but a close observer will notice that they are put on all the way from 2 feet 8 inches up to 3 feet 6 inches. I fear the editor will think my "short space" has grown to be a pretty long one, but I hope the readers will express their views on the points which I have raised and thus continue a discussion which seems to be growing in interest.

From W. I., *Shelbyville, Ill.*—In regard to the matter of what constitutes a day's work for a carpenter, I would say that I have never yet met the lightning door hanger nor the man who could lay 7000 shingles in a day, but I have myself hung and trimmed eight 2-8 x 6-8 x 1⅜ inch white pine doors in ten hours, using mortise locks. I believe that by hustling I could have hung two more. I have worked with men who could not hang more than five doors, and I think under ordinary circumstances five or six doors make an average day's work. In the case above stated I had exceptionally good surroundings and good doors. Of course with hard wood doors and of larger size the result would be quite a different thing.

In regard to shingling on straight roofs, say 30 to 60 feet long, I have laid 4000 shingles, and sometimes a few more, and have worked with several men who could do as well or better. In my opinion, however, it will not do to take this as an average day's work, owing to the fact that ordinarily roofs are not so long as above stated and are often cut up with hips and valleys. I have constructed shingle roofs where if a man laid 1500 shingles I thought he had done a good day's work. My experience has taught me that a day's work depends largely upon circumstances, the style of the building and the kind of material. For instance, a man will lay 500 to 1000 more good shingles than he will bad ones, as it takes time to guard against defects. A competent foreman can tell when his men are doing good, honest time from the conditions surrounding the work and from the way they move and take advantage of the opportunities. Estimates of work must also be based on these conditions.

From F. W. C., *Levering, Mich.*—This question of day's work for a carpenter, which has been in process of discussion in the Correspondence Department, has great interest for me. I am now finishing my third year as contractor, and these three years have seen my calculations badly twisted. I have stopped looking for the man who *can* and want the man who *will*—the man who wants to make it profitable for me to employ him; the man who is willing to do a fair day's work each day—not the lightning man, but just the reasonable man. I find such men will put on 2000 shingles one day with another and will hang and trim five or six doors a day. I think "M. L." of Newark, N. J., gave us a good estimate in the October number, but, oh! for the every day workman. If I can have him I will sleep nights, yet I am getting experience and so are my creditors.

From R. F. W., *East Chicago, Ind.*—I have formed the opinion from reading the correspondence columns that "C. E. C.," Youngsville, Pa., is entitled to three cheers for his communication in the February issue, and also "Wandering Wood Butcher" for his thoughts on the subject under discussion. As to the question itself, I being an amateur in the business cannot say much, but from what little experience I have had I will say that the following is considered an average day's work throughout this locality.

Laying 3000 shingles.
Siding, 3 to 4 squares.
Flooring, 4 to 5 squares.
Sheathing, 5 to 6 squares.
Fitting and hanging 10 doors, but not putting on locks, is a good day's work.

I saw a young man last summer put on 6 to 7 squares of siding in a day and keep it up right along, although I could not do it myself. The man said he could nail 10,000 shingles on a roof, but I think he ought to be down at the Elgin Asylum. Of course, he might have just laid them on the roof and not nailed them, still he left people under the impression that he did the work as it should be.

From S. C. F., *Maud, Pa.*—I have taken considerable interest in the discussion touching "What Constitutes a Day's Work for a Carpenter," and would say that many of the answers are far from the point, and seem to have narrowed down to a case of brag, some of them needing the proverbial pinch of salt to make them go down easily. My experience, both as a workman and foreman, is that not much dependence can be placed on the exceptional fast worker. He may be all right in doing certain kinds of work, but the next day another man on work of a different nature will leave him far behind. The steady all around workman; one who does not have a bottle hid somewhere to which he must give attention several times a day, or the one who does not lose considerable time during the day in lighting a pipe, is the one whose work counts at the end of a month or a year.

My opinion is that an exact estimate cannot be given as to the amount of work a man can do. In the first place, in any building if a foreman is not careful in all details, he cannot expect fast work afterward. Some men seem to think that any one can set joist, put up studding, nail on shingle lath, &c., but if you do not start right you cannot expect to end right. If the joist are not level and true, can any one lay flooring fast? If the rafters are not set true, and if the lath is nailed on any old way, can you expect to have a good shingle roof? A contractor for whom I worked once, said: "Do your work right. If you are sheathing a roof, it does not take any longer to cut the boards to fit than it does to half do it." Again, if the studding are set out of plumb and have to be chopped, in order to get the jambs in plumb, considerable time is lost; also if the jambs are not put up straight and plumb the man who trims them will have lots of fun with his miters, and the next fellow who hangs doors will bless him again and again. Enough to fill a volume of *Carpentry and Building* could be written on this subject and still the end would be far off. My contention is that a man to get along fast must have everything in his favor from the very start. My advice is, "Do the work right, and have everything plumb, level and square from the beginning." How many botch carpenters we see who do not care how a thing is done so long as it is done, and how many bosses we see who think, "What a lot of work this man did today?" But they forget when it comes to the finish who put up the rough work, and the result is that the man who finishes the botch job of some one else gets blamed for being slow. If the average carpenter would study his work more, take some good paper like *Carpentry and Building*, pick up many useful hints and do his work in a workmanlike manner, he would not have so much time for bragging about what he did or what he saw some one else do. No one is too old to learn, and I am free to confess that I have obtained many a valuable point from *Carpentry and Building.*

Constructing a Half-Pitch Roof.

From M. W., *Scranton, Pa.*—I propose the following method of treating the half-pitch roof, the partial plan of which was presented by "H. M.," St. Louis, Mo., in the February issue of the paper. He stipulated the conditions, "follow the general lines indicated as regards

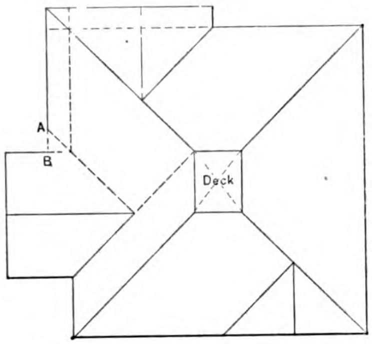


Fig. 1.—Plan Presented by "M. W."

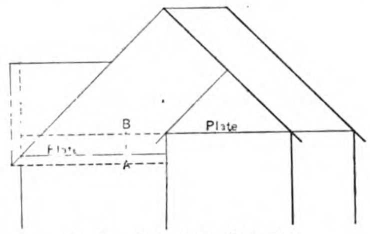


Fig. 2.—Left Side Elevation.

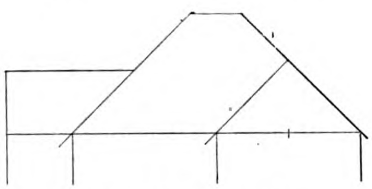


Fig. 3.—Front Elevation.

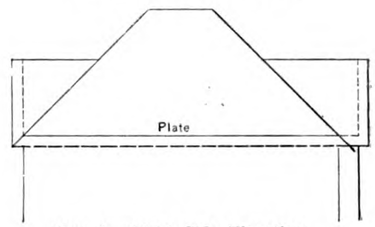


Fig. 4.—Right Side Elevation.

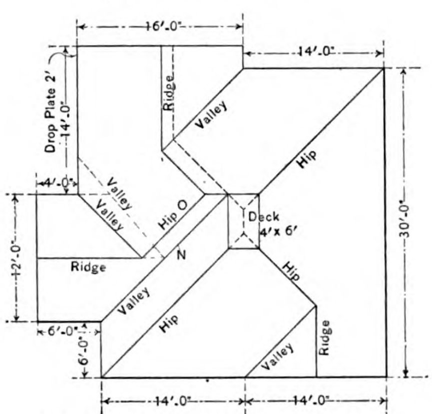


Fig. 5.—Solution Suggested by "A. J. R."

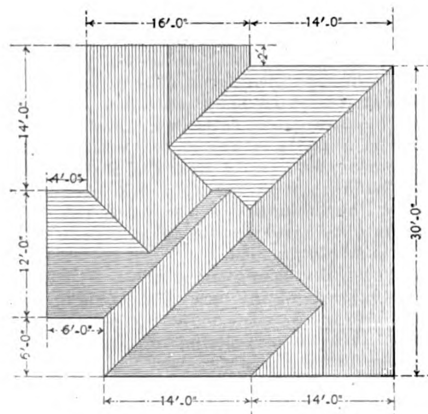


Fig. 6.—Roof Plan Contributed by "O. N."

Constructing a Half-Pitch Roof.—Suggestions of Various Correspondents.

hips, valley and ridges." He will find that the plan presented here follows these general lines faithfully and that to do so it was necessary to lower the plate on the back portion of the left side, as indicated at A B in the plan, Fig. 1, and elevation, Fig. 2. In Figs. 3 and 4 are shown front and right side elevations. A roof of greater ornamental effect might be constructed based on the outlines of his plan if no restrictions as to the general lines were attached, but probably this was not his motive in presenting the query. I shall be greatly interested in any other solutions that may appear.

From A. J. R., *Cooperstown, N. Y.*—In the February issue "H. M.," St. Louis, Mo., submits a partial plan of a roof and asks for the best method of carrying a half-pitch roof over it by following the general lines indicated as regards hips, valleys and ridges. I submit herewith two methods, one of which is by putting on a deck, 4 x 6 feet, as indicated in the plan, Fig. 5, or drop the plate 2 feet, as indicated. The dotted lines show where hips, valleys and ridges would come if the plate was dropped. This I think is the best way of solving the problem, for it makes a straighter and stronger roof. In the latter case stated the hip marked O and part of the valley N would be dispensed with.

Note.—We have a similar solution to the problem from "N. A. B." of Shelby, Ohio.

From O. N., *Atkinson, Ill.*—Inclosed herewith find sketch of roof, Fig. 6, asked for by "H. M.," St. Louis, Mo. If it is necessary to support it entirely on the outside plate of the building it will be a difficult roof to construct. I would like the opinion of brother wood butchers as to whether it can be erected that way, and a description of their method of doing the work. I have been a subscriber to the paper for several years and am much interested in the Correspondence Department.

Note.—We have similar solutions of the problem from "C. W. H." of Ft. Dodge, Iowa; "J. D." of Springfield, Ill., and substantially the same from "F. L. S." of Wheeling, W. Va. The latter suggests a false pair of hips; that is, the points and heels be extended temporarily and until the roof proper is in position. This would then form a base for construction, after which the temporary parts could be cut off. Otherwise temporary supports will be required in order to construct the work.

HEATING AND VENTILATING A PUBLIC LIBRARY BUILDING.

ONE of the very interesting papers read at the ninth annual meeting of the American Society of Heating and Ventilating Engineers, held in New York City, January 20 to 22, was that of W. H. Switzer, describing the furnace heating and ventilating system in the public library at Ilion, N. Y. The paper attracted a great deal of attention on the part of those present at the meeting, and as it touches a subject in which many of our readers are more or less interested we devote considerable space to a presentation of it herewith:

There is one method of heating buildings that has received less attention from the graduated engineer than any other, yet it enjoys a popularity that has continued, under the support given by purely practical men alone, in the face of competition that of recent years has not spared expense and has been aided by the employment of qualified engineers to secure the introduction of other methods of heating. It is to secure some attention and assistance from the men who lead as heating engineers that this description of a working hot air furnace system is presented for your consideration. Unfortunately, the most successful and best representatives of this method of heating have not tabulated their experience so as to afford an opportunity for comparison with the methods that are understood and can be utilized with certainty by the engineers engaged in competing lines. The absence of such data is responsible for many failures in furnace heating by those who have no experience to guide them, and is sufficient reason even at this late date for some effort to be expended in reducing to a comparatively exact science a method of heating that has been in vogue about three-quarters of a century and still retains a distinct field of usefulness.

The plant under consideration has demonstrated its efficiency through ten successive winters, having been installed in the Public Library Building at Ilion, N. Y., in the fall of 1892, satisfactorily maintaining a comfortable temperature throughout, with an average consumption of about 20 tons of coal per winter. An exterior view of the building is given in Fig. 1. Erected on a corner lot facing east, it is exposed on all sides. It is constructed of brick and stone, the walls being about 16 inches thick, stripped, forming an air space, and then lathed and plastered. Cathedral glass is used in the upper sash of the front and rear windows of the main building, with a 9 x 10 foot circular top window above the bookcases on the north side. Ordinary windows are used in the other rooms which open into the main library room.

A study of the first-floor plan given in Fig. 2 will show the arrangement of the part of the building that is heated and also the location of the fire places, which have a 6 x 32 inch throat tapering to a 12 x 16 inch flue. These fire places are never fired and only serve as an outlet flue to aid the ventilation of the building, and under an anemometer test have shown the air movement to be 250 feet per minute. The main room is 25 x 70 feet with a ceiling averaging 25 feet in hight. The ceiling is an oval arch finished with lath and plaster on the rafters, which support a tile roof. The main room has a capacity of 43,750 cubic feet, with a wall surface of 3045 square feet and a glass surface which amounts to 355 square feet. The reading room, vestibule and office have a capacity of 16,350 cubic feet, with a wall surface of 1976 square feet and 174 square feet of glass surface. This makes a total air space of 60,100 cubic feet, a wall surface of 5031 square feet, and a glass surface of 529 square feet, exerting a cooling effect which must be counteracted by the heating apparatus to the extent of maintaining a temperature of 70 degrees in the building, located at a point where the mercury at times sinks 18 degrees below zero. The important fact is that the furnaces have fulfilled the requirements under these conditions.

Two furnaces are used, of the portable type, having 52-inch galvanized iron casings, a broken view of which is shown in Fig. 4. The casings are double lined with asbestos paper and heavily corrugated bright tin to prevent loss of heat by radiation into the cellar and to prevent the heat from causing the zinc coating to peel from the iron forming the casing. The interior construction provides a deep ash pit supporting a bar grate of the triangular patern, heavy for durability and of open construction to allow a free entrance of air to support combustion, and having an effective diameter of 22 inches and an area of 378 square inches, or 2.62 square feet, and a total of 756 square inches, or 5.24 square feet. The ash pit supports a substantial two-part cast iron fire pot, the lower section being 7 inches deep and having anticlinker fingers cast on the lower edge, affording a further entrance for air to the combustion chamber with a beneficial effect. The upper section is 11 inches deep, having vertical flanges ½ inch thick and extending 4 inches cast on its outer circumference at intervals of 5 inches, largely increasing the heating surface at an effective point. The fire pot is 18 inches deep and 26 inches in diameter at the top. Immediately above the fire pot is a central steel combustion dome, having an opening at the front for supplying fuel. This central dome is made of 10-gauge steel plate and is 28 inches in diameter and 30 inches high. This dome is surrounded by a circular radiator 46 inches in diameter, having inner and outer walls of steel plate 15 inches high, and cast iron heads so connected as to be absolutely gas tight. The products of combustion enter this radiator from the combustion dome at the front and pass each way, making a complete circuit, then passing down a reverse draft pipe to the smoke outlet. This reverse draft pipe also connects with the ash pit to serve as a dust flue when the fire is stoked and to allow any dust collected to drop to the ash pit when opened. The radiator is so located as to allow air to pass between it and the combustion dome, and also up along its outer side, the spaces being properly adjusted to insure heating the air thoroughly without retarding its flow. The fire pot, combustion dome and radiator of each furnace expose 88 square feet of effective air heating surface, or a total of 176 square feet.

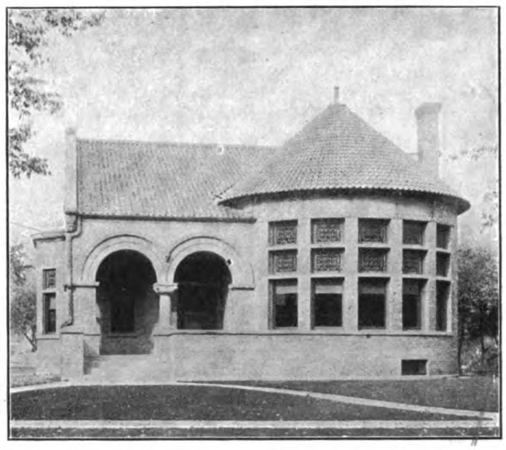


Fig. 1.—View of Public Library Building, Ilion, N. Y.

Heating and Ventilating a Public Library Building.

By referring to the basement plan given in Fig. 3 the location of the furnaces can be seen and the hot air pipes and the cold air supply ducts leading from outside and from the return registers in the floors of the reading room and library.

The method of connecting the air supply ducts is shown in Fig. 5, from which it will be seen that air in the building can be kept in circulation when few people are in the library or in extremely cold weather, and that the supply, by means of dampers, can be taken conjointly or entirely from out of doors to freshen the

atmosphere at will as may be necessary. This method of supplying air is widely practiced in furnace heating, as its advantages outweigh its disadvantages. It saves fuel, enables quick heating and insures successful heating in extremely cold weather. When all the air is taken from outside there is a certainty of frequent changes of air in the building, as the heated air cannot enter to keep up the temperature without a corresponding volume of air passing out. In this building the fire places continually remove a considerable quantity of air to make room for fresh air. The basement plan shows that the north furnace supplies one 12-inch and three 14-inch hot air pipes, having a combined area of 575 square inches. The south furnace supplies one 10-inch, two 12-inch and one 14-inch pipes, having a combined area of 458 square inches; the 14-inch pipes in every instance being tapered to 12 inches to connect with the register boxes, and all the pipes are covered with asbestos paper. The pipes are reduced in capacity in excellent condition, capable of many years of further service. The fact that this furnace system has now been giving satisfactory service for ten successive winters will lend interest to a comparison of various proportions. The building has a capacity of 60,100 cubic feet, a glass surface of 529 square feet, a wall surface of 5031 square feet. Figuring that 6 square feet of this wall have a cooling effect equal to 1 square foot of glass shows, by dividing 5031 by 6, an equivalent glass surface of 838 square feet in the walls, which, added to the 529 square feet of glass surface, gives a total equivalent glass surface of 1367 square feet. The furnaces have a grate surface of 756 square inches, or 5.24 square feet, and a heating surface of 176 square feet. The cold air supplies have an area of 1152 square inches and the hot air pipes of 1033 square inches. The grate bears a proportion of 1 square foot to 33.8 square feet of heating surface, to 11,278 cubic feet of space, and of 1 square inch to 1.8 square feet of equivalent glass surface. The heating surface bears a proportion of 1 square foot to

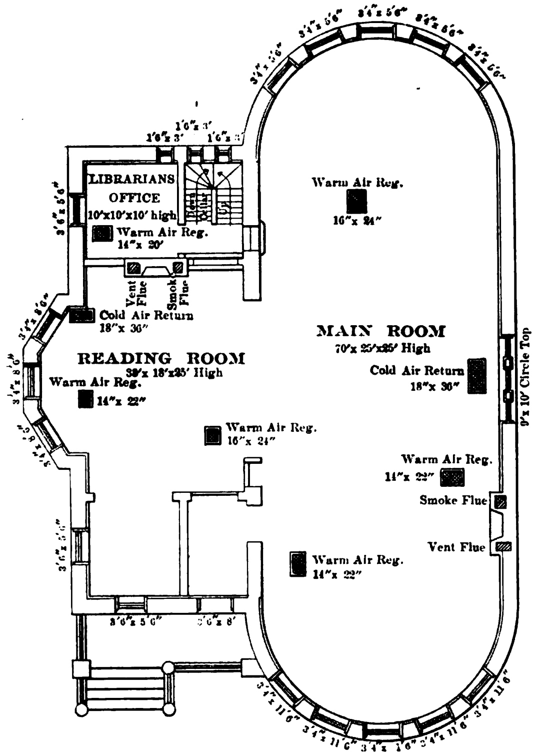


Fig. 2.—First Floor.

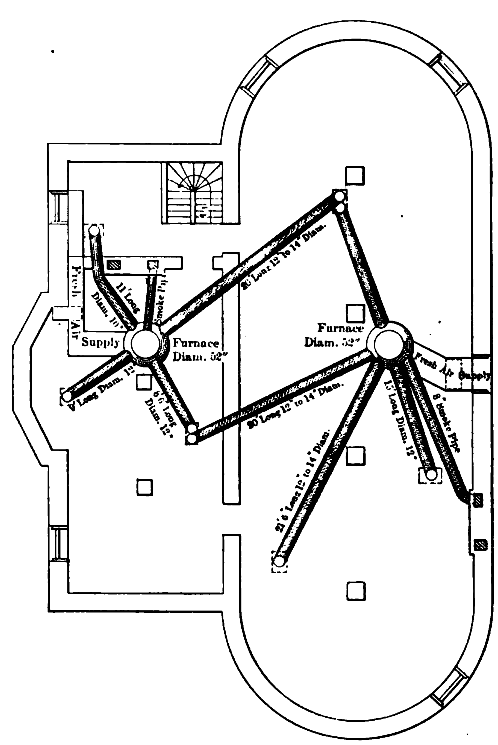


Fig. 3.—Basement Plan.

Heating and Ventilating a Public Library Building.

by tapering as the air in transit contracts in bulk with loss of temperature, and this method avoids conflicting currents in the pipes and a consequent retarding of the velocity of the flow. This practice is followed by many experienced furnacemen with beneficial results. Two of the registers are connected with each furnace to secure a distribution of the heat when but one furnace is used in the milder seasons.

The registers are of the open Persian pattern. The air ducts leading from the outside, shown in Fig. 5, are 16 x 40 inches, with an area of 640 square inches, and run across above the basement floor, connecting with the bottom of the furnace casing, with an opening 16 x 36 inches, having an area of 576 square inches, or ample to fill all of the heating pipes. The return air registers are 18 x 36 inches in size. Each furnace is connected with a smoke flue 12 x 12 inches in size by means of an 8-inch smoke pipe. With the mercury at 18 degrees below zero no difficulty has been experienced in keeping up a temperature of from 68 to 74 degrees, and nothing has been expended for repairs up to this time. A recent examination shows the entire apparatus to be

341 cubic feet of space and to 7.76 square feet of equivalent glass surface. The hot air pipe area bears a proportion of 1 square inch to 58.1 cubic feet of space and 1.33 square feet of equivalent glass surface. The coal consumed bears a proportion of 1 ton to 3005 cubic feet of space and to 68.8 square feet of equivalent glass surface per season. There being an equivalent glass surface of 1367 square feet and at zero the heat units lost by 1 square foot is practically 1 heat unit per hour for each degree difference between inside and outside temperatures, and as this is 70, by multiplying by 1367 it is found that there are 95,690 heat units lost per hour, and for 24 hours 2,296,560. Figuring that 1 pound of anthracite coal gives off 14,000 heat units, it will be found by division that 164 pounds of coal will be required per day. By figuring the season that heat will be required at 180 days and multiplying by 164 and dividing by 2000, it will be found that 14.75 tons of coal will be required. But this would consider no loss by imperfect combustion, no waste in the chimney, by radiation from furnace and piping, and by the vent flues, and it is a matter of record that 20 tons of coal

have been the average yearly consumption. The discrepancy between the amount of coal that would be necessary according to the figures and the actual amount used is not greater than the allowance that would naturally have to be made on a common sense estimate based on experience, giving consideration to the fact that the 14.75 tons figured necessary provide for the consumption of as much coal on fall and spring days as on midwinter days. Figuring that the season contains 180 days, a consumption of 222.2 pounds of coal each day is necessary to consume 20 tons of coal in a season; so divide 222.2 by 24 and then by 5.24; it will be found that 1.76 pounds of coal per square foot of grate surface must be burned per hour on the average, or more in cold and less in mild weather. As uncertain as are the records of an anemometer test, the following records are given, having been taken when the mercury stood at zero: Flow of air at outside cold air supply inlet, 350 feet per minute; at point of connection with furnace, 220 feet per minute; at the two 16 x 24 registers with two 12-inch hot air pipes to each register, flow of air 380 feet per minute; at the three 14 x 22 registers connected with one 12-inch hot air pipe to each register, flow of air 300 feet per minute; at 14 x 20 register connected with one 10-inch hot air pipe, flow of air 210 feet per minute. Temperature of warm air at register, 140 degrees.

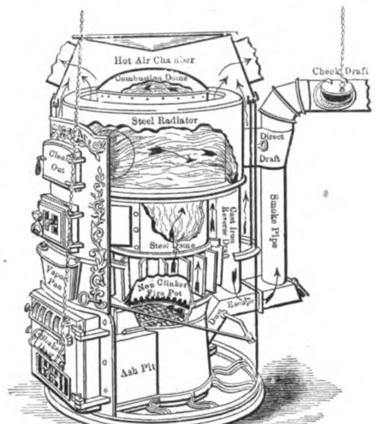


Fig. 4.—Broken View of Furnace.

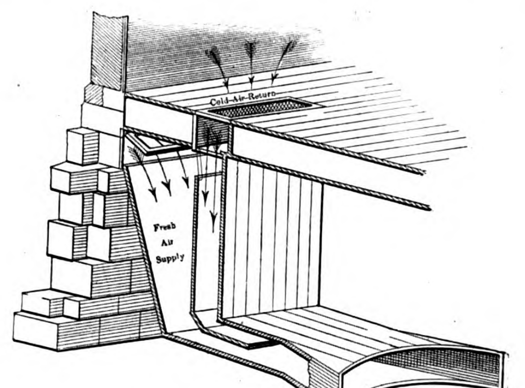


Fig. 5.—Method of Connecting Air Supply Ducts.

Heating and Ventilating a Public Library Building.

Restoring the Hall in Nuremberg Rathhaus.

It has been decided to restore the great hall in the Rathhaus, or City Hall, at Nuremberg, says an exchange. This hall, which belongs to an older part of the building, erected in 1522, is decorated with frescos by Dürer, representing the triumphal procession of the Emperor Maximilian, town musicians and minstrels, and the discomfiture of Midas; it also contains remarkable stained glass by Hirschvogel. On the central buttress is represented an execution by the guillotine, dated 1522, which shows that those terrible instruments date far back of the French Revolution. The cartoons now to be restored were already touched up and altered in the seventeenth century, and German artists are doubtful whether much will remain of Dürer's work. The German art journals which discuss this question also note the recent discovery at Frankfort, in the Church of St. Leonard, of a curious fresco containing a large face of Christ; experts place the date some time in the thirteenth century. Also in the Church of the Holy Spirit at Nuremberg there has been brought to light, back of an old plaster partition, several curious paintings of the fifteenth century representing the death of the Virgin, a meeting of the 12 Apostles, and a colossal St. Christopher. The church dates from 1390.

A San Francisco School Gymnasium.

A gymnasium containing some novelties in construction and appearance is to be erected by the Jesuit College of St. Ignatius in San Francisco, Cal. Including the bathrooms the gymnasium will have a frontage of 167 feet, with a depth of 102 feet, and will rise 30 feet in hight. The principal entrance is on Franklin street, and from the vestibule will be reached the visitors' gallery, overlooking the gymnasium, broad flights of stairs leading down to the gymnasium floor. On the level of this floor will be the trainer's room, near the foot of the stairs, whence he can see every one who passes to practice, and adjoining it is the consulting doctor's room. Close to the foot of another stairway will be the office, and adjacent and convenient to the entrance will be the reading room, 20 x 40 feet, and the billard room, 20 x 44 feet, supplied with four tables. Both of these rooms will be 18 feet high. In addition there will be ante and store rooms and the entrance to the south court.

At the west end of the gymnasium there are to be two bowling alleys, and on the north end a magnificent swimming tank, 50 feet long and 9 feet deep, with spring boards and fittings of the best description, while a neat iron railing will run along the sides of the plunge, and steps will lead to the water at one end of the tank. It will be supplemented by a heating room and lockers. A passage way will lead from the swimming room and the gymnasium proper to the toilet room, which is to be 20 x 60 feet, and contain tub baths, lavatories, shower baths and other delights and conveniences. The floor of this room is to be tiled, while an exit will lead to the north court, where are to be situated the handball and tennis courts.

The gymnasium hall, 60 x 102 feet, and 28 feet in hight, will be lighted from all sides and by skylights in the roof. It is intended to fit this large room with ropes and rope ladders, climbing poles, vaulting and suspending bars, traveling rings and trapezes, bicycles, jumping and leaping standards of the most approved patterns. Special culture machines will find place under the gallery and against the walls, and mirrors will be so placed that the professor in training may point out defects to his students.

Encircling the gymnasium hall and partly suspended from strong roof trusses will be a running track of 21 laps to the mile. It will be reached by stairways at each end from the gymnasium hall floor and also by one flight from the visitors' gallery. On a level with the sidewalk of the street, having its separate entrance, is to be the bicycle room, where 75 or more machines may be stalled. The whole will be constructed of brick, covered by cement, as in the case of the church and other college buildings.

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

BY CHAS. H. FOX.

An ellipse may be taken as a section of a cylinder when cut by a plane oblique to its axis. Thus in Fig. 21 we may suppose A′ c B′ to be the plan of a cylinder, the elevation of which is given in A B C D above. Let us suppose the cylinder to be cut by a plane as the one shown in C D, then the section found at the oblique plane in question will be an ellipse. The section may be readily found as follows: First draw the diameter line A′ B′, then square with it draw 1 a, 2 b, &c.; these are termed the ordinates of the plan. Now square with A′ B′ draw A C, a 1, b 2, &c., then at the angle desired draw the cutting line C D. Parallel with it draw E F. Then square over the lines 1′ a′, 2′ b′, &c., making the length of these equal to that of the corresponding plan ordinates. A curve traced through the points given in E, a′, b′, &c., will be an ellipse and will be the true section found at the oblique plane C D.

The lines 1′ a′, &c., are termed the ordinates of the

Let A B and C D of Fig. 25 represent the given axis of an ellipse, from which to draw the curve. With O A as the radius and C as the center cut the axis A B in E F. These points are termed the foci of the ellipse. Place pins in C E F, then pass a string around them and tie it securely, remove the pin at C and substitute a pencil; moving the pencil around within the loop will trace the curve of the ellipse.

To draw a tangent to the curve at any point, as H, join E H and F H and produce the lines as shown. With H as center and any radius draw an arc, as e d; now with any radius and e d as the centers draw an arc in f; drawing K J through f H gives the tangent desired, and

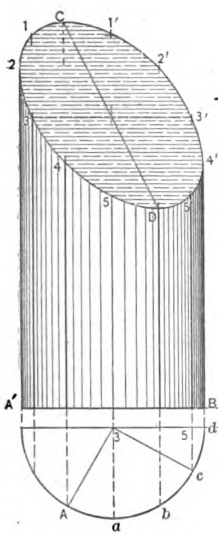


Fig. 22.—A Front View of Cylinder Shown in Fig. 21.

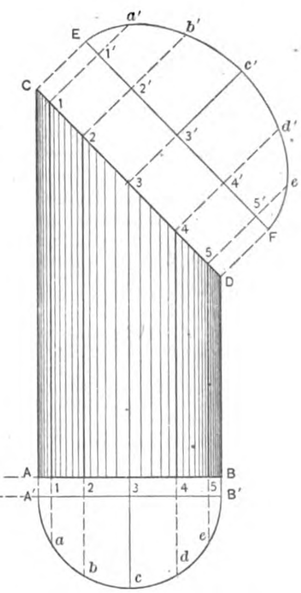


Fig. 21.—Plan and Elevation of Cylinder Cut by Plane Oblique to its Axis.

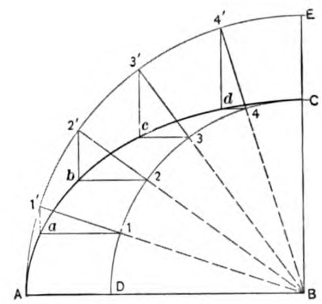


Fig. 23.—Co-ordinate Method of Drawing an Ellipse.

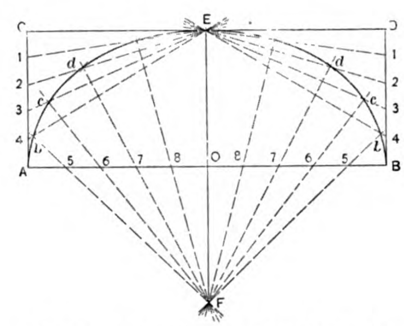


Fig. 24.—Constructing an Ellipse by Points.

Laying Out Circular Arches in Circular Walls.

of for finding the section is called the ordinate method.

In the diagram Fig. 22 the cylinder, Fig. 21, is shown in a revolved position; the major axis is seen in C D, the minor in 3 3′.

Let A B of Fig. 23 represent the semimajor axis and B C the semiminor axis of an ellipse. To draw the curve section plane. The line E F is called the major axis, and the line 3′ c′ the minor axis. The method just made use of the ellipse take B as center, and with B A and B C respectively as radii draw the quadrants A E and C D. Now through any points, as 1, 2, &c., draw the radial lines B 1 1′, B 2 2′, &c.; then parallel with A B draw 1 a, 2 b, &c.; then square with A B draw a 1′, b 2′, &c. A curve traced through the points A, a, B, &c., will be the ellipse required. This method is termed the co-ordinate.

To construct an ellipse by points, let A B and F E of Fig. 24 represent the axis. Divide O A and A C into the same number of equal parts. Now draw F b through 5, F c through 6, &c., and in a similar manner draw E 4, E 3, &c. The points given in A b, &c., are those through which to trace the curve.

Fig. 26 shows a similar method, the construction being apparent from the diagram.

H L drawn square with K J gives the normal to the curve at the point H. Or the normal may be found as at point G by simply producing the lines F b and E a, and bisecting the angle a G b with the normal G I.

Chinese Carpentry.

The columns and rafters used in the construction of Chinese houses are rather the bars of a light cage than the support of heavy weights—the perpendicular beams serving less to support than to unite the cross timbers or horizontal rafters. The frame work of the roof is only a light fabric of bamboos placed one above another, supported by ledges and diminishing in size as they rise. The ends of these transverse rafters rise either out of the column which they cross or from the walls themselves and sustain that part of the roof which overhangs the building. Columns in China have no capitals, two reasons having prevented the adoption of this universally admitted part of the pillar. The first consists in the absence of both architrave and entablature; the second in the use of double roofs. The first or lower roof being generally only a lean-to or pent roof, the slope of which necessarily conceals the hight of the column, every species of figure, whether for use or ornament, not only appears superfluous, but has not perhaps entered the mind of the architect.

Bricks are made in great perfection. The Chinese join them together beautifully, so as to form triangles, squares, circles, figures or flowers, &c., which gives to the exterior a very finished appearance. The bricks in size are about 10 inches long, 4 inches wide and rather more than 2 inches thick. A one-brick wall will, therefore, have a hollow of 2 inches between the stretchers of its two faces. Those of the Great Wall are reported as being 15 inches long, half that in width and nearly 4 inches thick.

The walls are constructed of kiln made bricks, which cost 10 shillings ($2.40) per 1000, or of sun dried bricks, which cost about 2 shillings 6 pence (60 cents) per 1000, says a writer in a London exchange. The latter, after setting, make firm walls unless exposed to rain and wind and sun; so to guard against these evil effects the walls on the outside are plastered over with a double coating of chaff and mud or mud and lime, and this process has to be repeated annually. The doors have two leaves having a pin above and another below to serve as hinges. Door sills are movable, with holes in the center to admit cats and dogs. These doors can never be made to close tightly, so there is plenty of fresh air. The windows are made of wooden gratings, fixed in the wall to prevent their being stolen, and are covered with oiled paper. The beds are of adobe and the quilts of all the occupants are piled upon them, while the cooking is done in a large iron pot near the bed, so as to allow the heat to curl up the flues under the bed. The only chimney is a small hole at the corner of the roof, to allow an exit for the smoke; but the rooms are suffocatingly stuffy, and the whole house is festooned with black webs and the ceiling has a thick coating of creosote, all of which are allowed to remain, with no effort to remove the obnoxious things except at the Chinese new year, when a brushing, not by any means thorough, takes place.

The walls of their houses are generally about 18 inches thick. On the foundations they lay three or four layers of bricks entirely solid, after which they dispose them on the two faces of the wall frontways and lengthways (as headers and stretchers) alternately, so that the front ones meet and occupy the whole breadth; but between those that are disposed lengthways there remains a void space in the middle of the wall. On this first range they lay a second, disposing the bricks lengthways, observing to cover the joints of the front bricks in the first range with a whole brick in the second, and so they proceed alternately from the bottom to the top, and by this means the expense both of labor and materials is considerably diminished and the weight of the wall much lessened.

It is uncommon to see anything built even of stone besides bridges and memorial arches, which adorn the streets of the principal cities in each province; and marble is generally applied for pavements, thresholds of gates, the foundations of some of the pagodas and the lining of canals.

Growing Use of Wood Veneers.

As hard wood timber becomes scarcer and of poorer quality it is but natural that the business of making and using veneers should expand, and it is expanding at a great rate. It has now become a large and important section of the lumber trade. Who the genius was who first thought of using a thin covering of quartered oak to hide a cheap table top we don't know, but he laid the foundation of a big business and conferred a great boon on a very deserving class of people.

It is possible now for people of moderate income to put on a good deal of style in the way of furniture, &c., and that is a good thing. Even a newspaper man may flash a quartered oak chiffonier upon the people and have a center table with a fancy top for the price of three or four subscriptions, and anything which permits of the beautiful and æsthetic being brought within the reach of the poor, hard driven and down trodden of the earth is worthy of commendation.

Incidentally the veneer business has affected the hard wood lumber business in divers ways. Throughout certain sections the veneer mills have advanced the price of high-class logs until they are out of reach of those who manufacture lumber and the lumber trade loses the profits which would accrue from making those logs into lumber; but the veneer business has also made a profitable market for a large amount of inferior stock, of which we are producing a constantly increasing quantity. On the whole we believe the veneer business is more of a benefit to the lumber trade than a detriment, although the lumbermen of Indiana and Ohio may not agree with us.

Whether it is a benefit or a detriment, however, is of little consequence now, says the *Hardwood Record*. The veneer business is here to stay and the situation must be accepted and made the most of. If the competition of the veneer people becomes too strong the manufacturer of lumber can do what some have already done—put in some veneer saws. Such action gives the lumberman the advantage, as he can then buy a straight run of timber and utilize all of it. His best logs he may cut into veneers and with the inspection rules of the National Association adjusted as they are at present the balance of the product will still make a pretty good showing.

There are people who object to veneered furniture because of its lack of genuineness, but in our opinion a cheap table is all the better for a genteel coating of veneer. It really makes the table better and is certainly more sightly, on the same principle that a cheap man is all the better for a nicely finished veneer of good manners and good clothes, even though it doesn't deceive many people nor hide the fact that he is really only a basswood man after all.

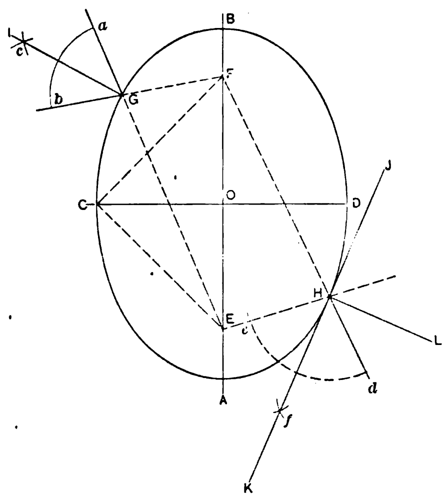


Fig. 25.—Drawing an Ellipse by String and Pencil.

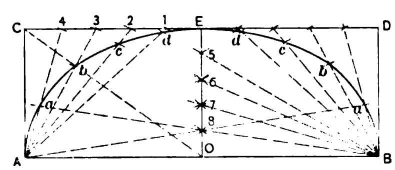


Fig. 26.—Another Method of Drawing an Ellipse by Points.

Laying Out Circular Arches in Circular Walls.

WHAT BUILDERS ARE DOING.

THE figures available touching the building improvements in the city of Boston show that while a very gratifying volume of work was carried out in the year just past, the aggregate falls considerably short of that for the corresponding 12 months of 1901. In considering the figures of the Building Department certain facts should be borne in mind in order to make the comparisons fair, as against other cities. In arriving at the estimated cost of completed structures, the methods adopted in other cities in compiling the estimated cost of the proposed structures, as given at the time of the application to build, is not practiced by the Boston department, but in lieu of it the District Inspectors are required upon the completion of each building to file a final report descriptive of the construction of said building throughout, including their estimate of the cost of material and labor of the building and exclusive of the cost of the land. From this it will be seen that buildings which may be projected and yet never built are included in the building operations of most cities of the country, while in Boston is included only those actually erected and a close estimate of the actual cost at the time of erection. This necessarily reduces the amount of building construction in the city of Boston as compared with other cities.

According to the Building Commissioner there were issued in 1902 permits for building improvement aggregating a cost of $10,064,680, of which $6,958,870 represented brick structures and $3,105,810 frame buildings. These figures compare with a total of $13,909,211 for the 12 months of 1901, of which $10,844,801 were expended for brick buildings and $3,064,410 for wooden structures.

Cincinnati, Ohio.

The Contractors' Association held an important meeting at the Builders' Exchange rooms early in February, at which details of a formal contract were arranged, which will be submitted to the journeymen for consideration. The contractors' agreement provides for a system of arbitration, and covers a great many points that have been mooted questions in the past. The Contractors' Association will ask that the new contract, which leaves blank the hours of work and compensation, be signed.

The principal points considered in the new contract are:

No limitation in amount of work to be done in a working day.

No restriction in use of any manufactured article, except prison-made articles.

No person may interfere with workmen during working hours.

That the foremen shall be the agents of the employers.

That all workmen are at liberty to work for whomsoever they see fit.

That employers are at liberty to employ whomsoever they see fit.

That no member or members affiliating with the journeymen shall quit work if non-union men in some other line of work or trade are employed on the building or job where the said workmen are employed.

That a joint board abitrate all disputes.

That no strikes, lockouts or other stoppage of work shall be resorted to during any dispute or pending decision of the joint arbitration board.

This formal contract was voted on and agreed to by all of the members of the Contractors' Association, and was subsequently submitted to the journeymen for approval.

Erie, Pa.

The annual meeting of the Erie Builders' Exchange was held Tuesday evening, February 3, at their rooms in the Penn building, President R. T. Shenk being in the chair. Secretary B. W. Schafer submitted his report, showing the Exchange to be in a prosperous condition, substantial progress having been made during the past year in the way of financial and numerical growth. Since August 1st, 1902, information has been given on 181 contracts awarded, and advance information has been given on 68 buildings contemplated. There were six new members added to the roll, bringing the total membership up to 112, with 17 applications yet to be considered. The Exchange has grown to such proportions that new quarters have been found necessary, and on April 1 the members will take possession of rooms on the third floor of the Liebel Block, at the corner of Ninth and State streets. An exhibition room will be fitted up, where will be shown building tools, materials, plans and specimens of finish for stores, dwellings, etc.

Directors for the ensuing year were elected as follows: Charles S. Clark, Lyman Felheim, John Sapper, A. Schroeck, James N. Thayer, Adam Karch, C. McCreary, Fred Zesinger, Charles H. Schaper, Joseph Kirschner, Henry Himberger, A. S. Pinney, Fred Goodill, E. R. Carroll and J. H. Braggins.

The new Board of Directors met on the evening of February 5, and elected the following officers to serve for the ensuing 12 months:

President, Charles S. Clark.
Vice-President, J. N. Thayer.
Treasurer, F. R. Carroll.
Secretary, Joseph Kirschner.
Assistant Secretary, B. W. Schafer.

The re-election of the last named official is a testimonial of the young man's abilities, he having managed the offices of the Exchange since its organization, and has done much to promote its welfare. After the new officers had been installed, President Clark named the standing committees for the year.

Evansville, Ind.

The Builders' and Traders' Exchange, which was organized on December 29, 1902, is showing a steady growth, and now has about 90 members, and the full co-operation of the local architects. Ample accommodations have been secured in the Eichel block, which is centrally located, and the rooms are in charge of the secretary. The officers for 1903 are:

President, James Scarborough.
Vice-President, C. A. Espenlaus.
Treasurer, H. C. Kleymeyer.
Secretary, Otis Wood.

DIRECTORS:

Christian Kanzler.	J. T. Herron.
F. C. Johnson.	George Tate.
Anton Kessler.	F. H. Roberts.

There has been considerable building in Evansville during the past year, more especially in the way of factories and residences, and, in the opinion of those competent to judge, the prospects for the coming season were never brighter than at present. A Court house is shortly to be built in Boonville, Ind., which will involve an expenditure of something like $50,000.

Hartford, Conn.

The Master Builders' Association held their annual meeting January 22, and after considering various matters of general interest, and particularly the demand of the Carpenters' Union for a minimum wage of $3.00 for an eight hour day, officers for the ensuing year were elected as follows: President, D. W. Hollis; Vice-President, W. E. Caulkins; Secretary, D. F. Ahern; Treasurer, Robert Barrett. Trustees: P. McKone, W. E. Caulkins, Robert Potous, H. B. Philbrick, O. E. Stenson.

At a later meeting it was decided by the Builders' Association not to grant the demand for an increased wage on the ground that it would have a tendency to deter building operations in the spring when the outlook for business in this line is not particularly flattering.

Los Angeles, Cal.

More than $2,000,000 worth of building improvements were authorized during January by the City Building Superintendent, this being the highest figure ever reached for any one month in the annals of the city. The total number of building permits for the month was 489, with a value of $2,159,000. The highest preceding month was that of December, 1902, when the estimated cost of the improvements amounted to a million and a quarter. It is the general opinion of builders that the price of materials will not be any lower this year than during the past two months. The demand for lumber and other building material is so great that the limit of supply is about reached, and advances rather than declines are to be looked for.

At the last meeting of the Builders' Exchange it was reported that while there was no superabundance of labor, none of the contractors had reported any shortages.

Lincoln, Neb.

The members of the Lincoln Contractors Exchange are congratulating themselves upon the success of the recent state convention which they originated and carried to a successful conclusion. Incidentally this convention resulted in the addition of several desirable members to the Exchange, and served as a stimulus to active work, which is apparent among the entire membership.

Other labor organizations are seeking counsel from the officers of the Exchange, and a close federationn of all building interests is among the promised results of the near future.

The exchange is negotiating for larger office quarters, and expects soon to establish a reading room for the benefit of its members, as well as for all who are interested in building matters. The selection of Frank G. Odell, the efficient secretary of the Exchange, as secretary of the new Nebraska Builders' Association, has made necessary his resignation, and W. B. Hester has been chosen to fill his unexpired term.

The outlook for early spring work is regarded as most encouraging and many plans from the offices of local architects are being sent to the Exchange Rooms for figures.

Milwaukee, Wis.

The Builders' and Traders' Exchange held their annual meeting in January, and decided to increase the membership limit to 120, this action being rendered necessary by the large number of applications recently received. The election of officers for the ensuing year resulted in the choice of F. R. Dengel for president, G. B. Possom for vice-president, George F. Rohm for second vice-president, E. Hesse for Secretary and H. Ferge for Treasurer. The Directors chosen for a period of three years were: A. P. Michie, C. B. Kruse and John Langenberger.

The Builders' Club also held their meeting at the same time, and elected the following officers: President, J. P. Maxwell; first vice-president, D. W. Cutter; second vice-president, J. Skobis; secretary, A. J. Magg and treasurer, Henry Ferge. The trustees chosen were F. R. Dengel and Frank Schmitt.

New Haven, Conn.

At the annual meeting of the New Haven Builders' Exchange, held at their rooms the latter part of January, the following officers were elected for the ensuing year:

President, Louis A. Mansfield.
Vice-President, J. B. McQueen.
Secretary, George A. Sonford.
Treasurer, S. E. Dibble.

The trustees chosen for three years were David H. Clark and J. H. Platt.

The annual reports showed the Exchange to be in a flourishing condition with a total membership of 121, of which 61 members were added during the year. There is a good surplus in the treasury and the outlook is most encouraging.

Portland, Maine.

The members of the Portland Builders' Exchange held their annual meeting and banquet at Riverton Park Casino, on the evening of January 21, a large number being present. Various matters of business were first considered, with President F. A. Rumery in the chair. Reports of officers were read and accepted and then the officials for the ensuing year were chosen as follows:

President, Thomas J. Hollivan.
Vice-President, William J. Rowe.
Secretary, Eugene C. Smith.
Treasurer, Sylvanus Bourne.

After the business meeting the banquet was served, and after doing full justice to the good things which had been provided by the committee, the members and their guests adjourned to the Assembly Hall, where a varied entertainment was much enjoyed.

Philadelphia, Pa.

The members of the Master Builders' Exchange held their annual meeting on January 27, and elected directors to fill the seven vacancies in the board, reference to which was made in our last issue. During the past year 57 new members were added to the roll of membership, seven resigned, three were dropped and three died, leaving the total membership of the Exchange 226. The annual report of the Board of Directors showed a very gratifying financial condition, the Treasurer's report indicating a liberal cash balance on hand. The annual report of the Directors referred to the action taken last March toward the revision of the building laws; the appointment of the Advisory Board to settle labor disputes, and the action of the Arbitration Committee in settling disputes between firms.

The Board of Directors, including the new members, met on the second Tuesday in February, and elected officers for the ensuing year as follows: James J. Ryan, formerly first vice-president, was in accordance with the custom of the Exchange made president; J. Lindsay Little, first vice-president, Thomas F. Armstrong, second vice-president, John D. Carlisle, third vice-president; William Harkness, Secretary, and Charles H. Reeves, Treasurer. Albert A. Reeves was chosen trustee of the endowment fund.

San Francisco, Cal.

Although there has been no settlement of the brick layers' strike, architects and builders are going ahead with the preliminaries of construction work to a large extent. The first week in February thirty building contracts were put on record, aggregating a total value considerably over a quarter of a million dollars. These included some large brick structures.

Work has been begun on thirty modern apartments of four or five, six and seven rooms to be built on Mission and Fourteenth streets, by H. G. Meyer, at a cost of $66,000. Plans have been prepared and a lease has been signed for an apartment house of one hundred rooms, to be built by Dr. Dudley Tait, on the southeast corner of Clay and Larkin streets at an outlay of $45,000. The exterior of the building is to be finished in shingles, half timber and plaster. There are to be two main entrances to the building, and each suite is to have its rear entrance to the kitchen. Other buildings decided upon are a three-story and basement building of six flats, by Geraldine C. Shannon, at the corner of Fell and Schrader streets, at a cost of $23,000; a building of the same size and character by J. B. R. Cooper on the corner of Post and Steiner streets, at a cost of $16,000; and the addition of two stories to a hotel on the south side of Eddy street, at an expenditure of $30,000.

Somerville, Mass.

The Somerville Master Builders' Association was organized Friday evening, January 30, at Hotel Ideal, with sixteen charter members. Ex-Alderman John Stackpole was elected president; ex-Alderman William L. Waugh, vice-president; Walter W. Calkin, secretary, and George F. Mathews, treasurer.

Another meeting was held Wednesday evening, February 4, to take action on the draft of the by-laws submitted by a committee, consisting of ex-Councilman Arthur W. Berry, Zebedee E. Cliff, and Mr. Penney.

The association was temporarily organized on Friday evening, January 23, with the assistance of Edward Hart, of Holyoke, state organizer of the State Master Builders' association.

Youngstown, Ohio.

At the annual meeting of the Carpenter Contractors' Association, which was held in the rooms of the Youngstown Builders' Exchange on Thursday evening, January 22, plans for the ensuing year were discussed and candidates for 1903 elected, as follows:

President, A. D. Fisher.
Vice-President, O. D. Williams.
Treasurer, J. P. Anderson.
Secretary, Roy E. Jacobs.

After the election the meeting was given over to the discussion of timely topics, and it was decided that instead of holding monthly meetings, the session should be held every other Thursday evening. A feature of the meeting on February 5 was a smoker and musicale.

Notes.

At a meeting of the Builders' Exchange of Holyoke, Mass., held the later part of January, T. J. Carmody was elected president, P. J. Kennedy, vice-president, and F. H. Haskell, secretary and treasurer.

We understand that 25 of the leading contractors and builders in Kenosha, Wis., recently met and organized what is known as the Kenosha Contractors' and Builders' Association. James K. Balcom was elected president.

The Master Carpenters' Association of Bridgeport, Conn., has elected Edward Casey president, L. D. Stone secretary and Joseph M. Sanger treasurer, to serve during the ensuing year. The membership of the association has been materially increased recently, and the organization is on an excellent footing.

At the annual meeting of the Master Builders' Association of Davenport, Iowa, the officers elected for the ensuing year were: President, Edward Osborn; vice-president, James Conway; secretary, William Meyer, and treasurer, John Peters. More or less routine business was transacted, and after the session the members went to Lahrman's Hall, where a banquet was served.

One of the leading contractors in Barberton, Ohio, expresses the opinion that there will be a great deal of building done in that section the present spring, and many of the contractors are now engaging carpenters for the work, owing to fears of a scarcity of skilled men when the time comes to commence operations. Houses for renting are very scarce, and notwithstanding the high prices of building materials a large number of new dwellings will be put up.

The annual meeting of the Master Builders and Traders' Association of Quincy, Mass., was held February 10, when reports of the various committees showed the organization to be in a prosperous condition. The following officers were elected: J. W. Pratt, president; William A. Bradford, vice-president; Arthur W. Stetson, secretary, and William Westland, treasurer. The second annual banquet of the association will be held in Hancock Hall on the night of February 18, and it bids fair to eclipse last year's success.

The labor situation in Schenectady, N. Y., has been such for some months past that the leading contractors, master masons, painters, plumbers, &c., have taken active steps looking to the organization of a Builders' Exchange, for the purpose of promoting mutual interests and presenting a united front in dealing with the demands of employees. At a meeting of those interested, held the first part of February, it was recommended that such an organization be formed and we understand it is intended to include practically all employers of labor.

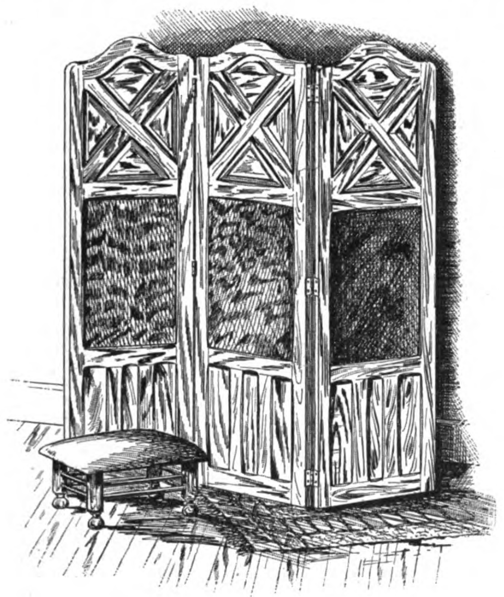
The leading builders and contractors of Bar Harbor, Maine, held a meeting the latter part of January in the office of F. L. Savage, for the purpose of forming an organization to be known as the Builders' Association of Bar Harbor. Asa Hodgkins was chosen chairman of the meeting and Frank F. Sherman secretary. The evening was spent in discussing various phases of the subject, formulating plans, &c., and a committee was appointed to draft a set of by-laws and take steps looking to the incorporation of the association.

CABINET WORK FOR THE CARPENTER.*

BY PAUL D. OTTER.

A SCREEN.

IN these days of "high protection" the screen may seem unnecessary, but there is just as much need of guarding from drafts, or of screening a portion of the room which unavoidably is untidy, as in early times, when by the very hugeness of the rooms a portable screen afforded protection to the occupant of a chair drawn to the fire. As our homes are to-day more evenly heated the screen still remains an article of great service for other purposes than to screen drafts. Artistically it breaks the square character of a room by the ease with which it may be adjusted as a background. From the standpoint of general utility in the modestly furnished home, it will be found indispensable in emergency when a room must be converted temporarily into a sleeping room, or in case of sickness, the privacy or



General View of Folding Screen.

Cabinet Work for the Carpenter.

protection from a high screen will be readily appreciated.

Fashion in furniture dictates the screen, and its importance is such that it is keeping a few small factories turning them out to supply the demand. The screen which you will make will possibly be more substantial than those made to sell in dozen lots. It will also have individuality, and your patron will be the more pleased in this fact as it represents her tastes also.

No detailed description is necessary to the carpenter in constructing the screen here shown as it represents simply the careful joinery incident to making a door frame and the fitting of panels and rails.

The subdividing of the interior space as shown in the illustration, by the paneling at top and bottom, is offered, suggesting a medieval treatment peculiar to interior finish at the time when screens were much used. There is no arbitrary size, the usual proportions for a serviceable screen being 22 inches to 24 x 70 inches outside of each frame; the frame stock is of 1 inch to 1⅛ x 2½ inches. To guard against too much weight the panel and structural features should occupy little space at the top. A very pleasing treatment would be to have such filling at the bottom only.

As to the main surface this is a matter of taste or expense. The higher priced screens are generally filled with leather of an antique finish, but a rich effect is oftentimes produced with low cost materials; and the work incident to it entirely within the range of the intelligent worker. A mortised and tenoned frame of pine, not glued or pinned, and made to fit loosely in ½-inch rabbet ⅜ inch off the face of framing, is required, over which the material selected is stretched, tacking it with 4-ounce tacks upon edge of stretcher, the same way an oil painting on canvas is stretched; small wooden keys or wedges are then driven in the corners along the tenoned strip, giving the final stretch to the surface.

A screen made by the writer has the stretchers covered with a heavy grade of linen dress stiffening, which was treated to three coats of ordinary paint, the last coat being an olive green. Two inches away from and conforming to the inner edge of the frame a ¼-inch striping of gold paint was lined over this painted surface, giving what proved to be a simple, inexpensive treatment, which in combination with the mahagony frames produced a pleasing and substantial appearance.

A good grade of heavy burlap so treated is very satisfactory. While the painted surface is a little "tacky," lightly fleck some gold powder with a cotton wad in a careless way about the surface and this on a warm, brown surface will produce an antique bronze peculiar to old leather or metal. Detail of treatment is generally confined to one side of the screen, and the reverse finished in a more simple way. Raised molded panels inserted in chamfered framing may be shown as the front, with flat surface and square edges on the reverse. The painted paneling should be covered by a one-colored piece of "pantasote," denim or other lower but good grade material, this to be tacked and stretched along a ⅜-inch margin on the outer frames with small tacks. As a covering to the tacked edge a gimp band of some color is secured by evenly spaced fancy head upholsterers' tacks.

Wrought brass, double acting screen hinges must of course be used, three to the fold, and nothing of a projecting character or the framing should prevent them coming together, as a foot rule would when folded either way. These hinges run in size from ⅞ to 1½ inches, in eighths.

(To be continued.)

* Continued from page 35, February issue.

A New Hotel Fire Escape.

The number of different styles of hotel fire escapes is almost legion, but one was recently shown at Seattle, Wash., which embodies some rather interesting features. The contrivance consists of a horizontal bar of flattened steel running around the building underneath the cornice work after the fashion of a trolley rail. Attached to this, at the rear of the building, is a vertical bar extending from close to the ground and connecting with the trolley near the roof. At the point where the juncture is made, the trolley rail is movable. A matrix bar, containing two movable trolley wheels, to which are attached cables, is affixed at the base of the horizontal bar, and by means of another cable is quickly pulled to the top of the bar, level with the trolley rail. The movable piece in the rail gives way at the approach of the matrix containing the wheels, and when these are on a level with the stationary portion of the cornice rails, the matrix sets the wheels free, and they pass to the rail, traveling to any place around the building desired.

Before the matrix is hoisted, a basket, consisting of a solid board floor, net sides, and gas pipe circular railing, is attached to the base of the trolley wheel, and when the wheel slides to the rail under the cornice it carries the basket with it. The baskets are moved to the front of any window desired, and raised or lowered at will. In each is stationed a fireman, who superintends the transfer of the would-be victims from the window to the basket, and by means of the other end of the cable the basket is lowered to the ground and the occupants landed safely. The working of the apparatus is rapid, and the demonstration showed that in the event of a fire a large number of people could be safely brought to the ground without harm, when every other avenue of escape was cut off. The matrix and trolley wheels, with their attachments, are all carried on the fire wagons, and can be attached to the horizontal bar in an instant.

The Baron de Hirsch Trade School.

The sixteenth class of the Baron de Hirsch Trade School of New York City, consisting of 81 pupils, was graduated on the evening of Thursday, January 29, at the school building, 232 East Sixty-fourth street. The presentation of certificates and prizes was preceded by short addresses by Daniel Meyers of the Board of Trustees; A. S. Solomon, general agent of the Baron de Hirsch Fund, and J. Ernest G. Yalden, superintendent of the school. During the term just closed courses of instruction in fresco painting and pattern making were added to the already established classes in house and sign painting, carpentry, plumbing, electrical work and machine work. A number of friends of the trade school and others were present at the graduating exercises, and had an opportunity of examining specimens of the work of the pupils which were on exhibition.

The aim of the Baron de Hirsch Trade School is to fit young Hebrews, in as short a time as possible, to enter one of the mechanical trades. Instruction in the school is free and covers both the practice and the theory of trades. The graduates who are turned out from the institution are said to find no difficulty in obtaining immediate employment.

The Roofing Slate Trade.

The scarcity of roofing slates, which was threatened last fall, has developed with the advance of the winter season into actuality. The market is becoming bare of many grades of slate and the available stocks at quarries have dwindled to the smallest proportions. The manufacturers last month again advanced their prices, a step that was generally anticipated by the trade, and at the same time announced more stringent terms of payment. Present quotations for slates are higher than in more than 20 years past and rule from 50 to 75 per cent. above the figures prevailing two years ago. Many in the trade look for a still further advance to be made on April 1. The unusually active domestic demand for roofing slate in the past two years is partially responsible for the present scarcity, but the more direct cause is said to be the inability of the quarry owners to secure a sufficient supply of skilled workmen to quarry and manufacture the slates. It is claimed that every experienced slate miner and worker in the country is fully employed and not a man is available to put on to the working of new veins. Nor is it possible to get skilled labor of their class from abroad, for a similar condition of scarcity of labor is reported in the Welsh slate quarries. Only skilled men can be intrusted with the work of excavating, cutting, splitting and trimming the roofing slates, and considerable time is required to develop this class of workmen. Consequently the quarry owners are unable to expand their operations, much as they would wish to do so.

This has been an unusually unfavorable winter, too, for the Northern slate quarries. With steady frost, it is often possible to mine the material successfully, as the slate will split up well while the frost is in the rock, but a thaw will entirely spoil the whole mass. This has been the case this winter, frosts having been constantly succeeded by thaws and rain, causing the loss of quantities of slate which had been cut out of the quarry only to be spoiled and thrown on the dump. At present there is no accumulation of roofing slate of any variety at the Northern quarries and a similar condition of things prevails in the Pennsylvania slate region. Under the circumstances it is natural to expect a restriction in the use of slate for roofing purposes this year, and there is no doubt that the high price of the material and its scarcity will tend to the use of some of the many other varieties of roof covering by many who would ordinarily use slate. Yet the dealers say that the demand from certain consumers, such as large corporations and the wealthy classes, who are willing to buy slate at almost any price, is likely to exceed the productive capacity, and a pronounced scarcity is expected throughout the year. Thus it will readily be seen that the manufacturers will have no cause for hesitation about marking up their prices to a still higher point.

It is said that some of the slate merchants have made efforts to import Welsh slates, but the scarcity of the material is so marked on the other side also, where this is the most popular form of roof covering, that there is none available for export. Indeed, a limited export business in roofing slates is still being done from the United States to Europe, Australia and elsewhere. But the export trade in American roofing slates is naturally only a small side line now as compared with four or five years ago, when it was at its hight. Taking the situation as a whole, it is safe to assume that high prices will prevail in the slate market for some time to come.

A Quaint Old House and Garden.

The Bartram House of Philadelphia, a unique memorial of pre-Revolutionary days, is described and illustrated in a paper in the March *Delineator*. John Bartram, the builder, was a farmer who turned his attention to botany, and eventually become the most famous American botanist of his day. His house was frequented by illustrious men, among them the founders of the Republic. It is an excellent example of Colonial architecture, of good proportion and homelike appearance. The interior arrangements exhibit the quaintness and simplicity of the times. As would be expected, the garden is of especial interest, containing rare varieties of flowers, shrubs and trees, some of the latter having attained a great hight and age.

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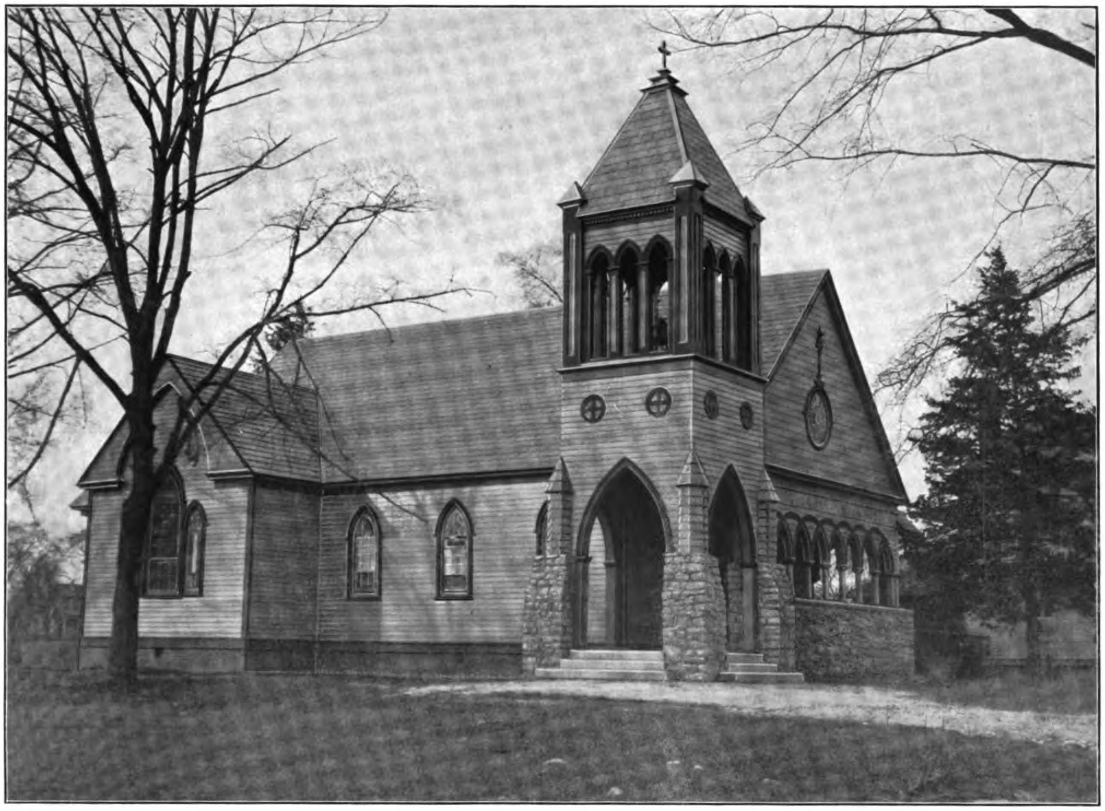
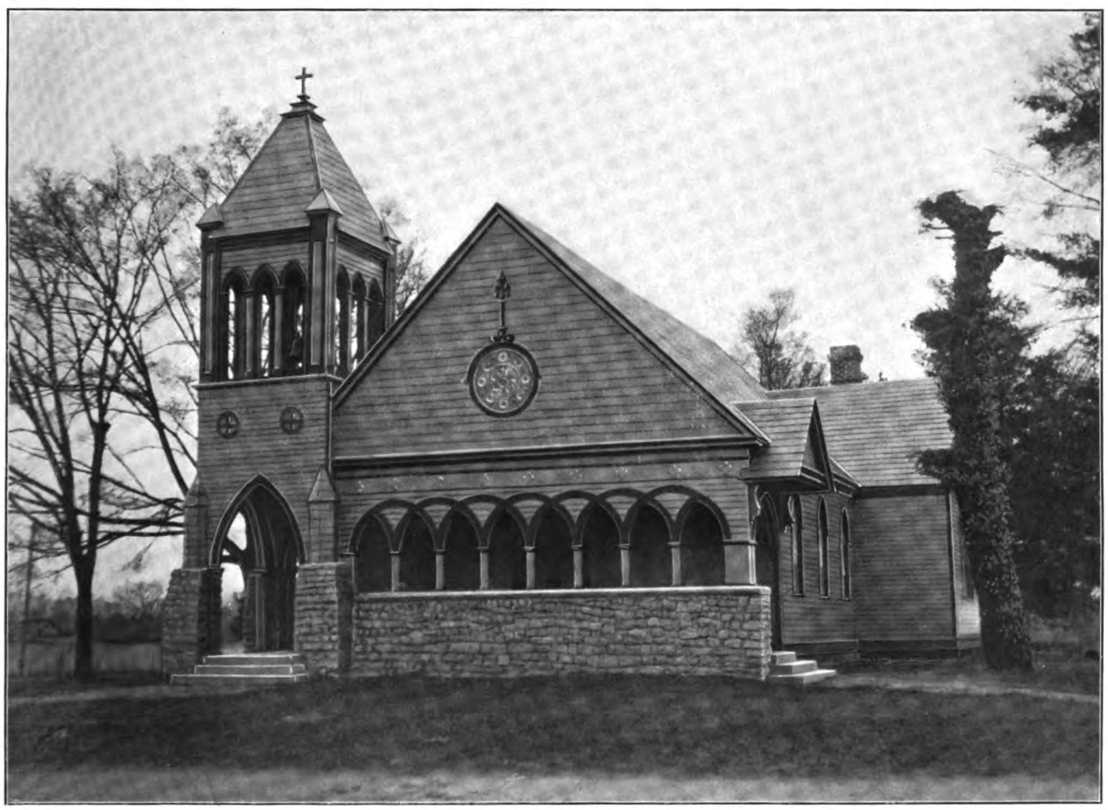




ST. PAUL'S EPISCOPAL CHURCH AT LOUISBURG, N. C.

BARRETT & THOMSON, ARCHITECTS.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

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

APRIL, 1903.

Local Building Operations in 1902.

The official figures of the Bureau of Buildings, now available, covering operations in the City of New York for 1902, fully bear out the estimates recently presented in these columns regarding the extent to which building improvements fell below those of the previous year. While the shrinkage as measured in the capital invested has been heavy, the aggregate for the past year is by no means of small proportions, and under ordinary circumstances would be considered as representative of a very satisfactory degree of activity in the building trades. It must be remembered that the country has been witnessing a wave of prosperity never before even approximated in its entire history, and it is quite natural that a portion of this at least should be reflected in a largely increased volume of building operations, not alone in the great cities, but throughout the length and breadth of the land. While it may be true that high prices of materials entering into the construction of buildings have tended in many cases to delay, if not indefinitely postpone, contemplated improvements, yet these will probably be found to have occurred to a greater extent outside rather than in the leading cities. Taking the country over, the records show a gratifying increase in the extent of building operations as compared with the year 1901, the notable exception being New York City, and this is due no doubt in large measure to the restrictions imposed by the new tenement house law, which went into effect something more than a year ago, and which has been the basis of no little agitation ever since. We have referred to the fact that a number of bills have been introduced in the Legislature of New York which aim to radically change the present tenement house law, the passage of which would tend to remove those safeguards to health and decency which are provided by the law as it now stands. To what extent the present law and its agitation have influenced operations in this particular class of structure may be gained from an inspection of the figures of the Bureau of Buildings, which show the estimated value of tenement houses for which plans were filed last year to have been nearly $35,000,000 less than the amount of capital invested in the same class of buildings the year before. A careful analysis of the records shows the estimated cost of various classes of buildings in 1902 to have exceeded those of the year previous by nearly $14,000,000, while other classes, such as tenement houses, high grade dwellings, manufactories and work shops, show a decline in their estimated cost of about $39,000,000, making a difference specifically expressed of $25,288,286.

Classification of Buildings.

The records of the bureau show that during the 12 months of last year permits were issued in the Boroughs of Manhattan and the Bronx for 1742 building improvements, involving an estimated outlay of $86,888,354, as against 2551 permits for improvements estimated to cost $112,176,640 in the year 1901. In running over the figures for last year the first thing to hold the attention is the heavy falling off in the amount of tenement house construction as mentioned above, while next in importance is the large increase in the capital invested in stores, as compared with the year before. In 1902 permits were issued for 143 buildings designed to be used as stores, and costing $12,766,885, while in 1901 there were issued for similar structures 124 permits, involving an estimated outlay of $7,822,900. In the case of office buildings, the difference in the amount of capital invested in the two years does not strike one as being as large as might have been expected, considering the degree of activity which prevailed in this particular line. According to the official figures, permits were issued last year for 66 office buildings, estimated to cost $12,883,800, while in the year before there were 41 permits issued for this class of structure, estimated to cost $11,095,200. Reference was made in these columns a short time ago to the notable increase last year in the number of theaters erected, and from the official figures it is seen that permits were issued for 29 places of amusement, estimated to cost $4,254,150, as against eight in 1901, estimated to cost $905,500. Another feature worthy of notice is that while there was a falling off in the construction of high grade residences—that is, those costing in excess of $50,000—there was a large increase in the construction of dwellings costing less than this figure. It is found that there were 39 permits issued for private dwellings exceeding $50,000 each in cost, and involving an estimated outlay of $4,407,000, which is a decrease in cost as compared with the year before of $1,557,000; whereas, in the case of private dwellings costing less than $50,000 each, there were issued in 1902 permits for 298, costing $4,683,950, this being an increase over the previous year of $1,597,200. The construction of school houses was on a rather liberal scale, the gain over 1901 being represented by $1,081,600. In the class designated as hotels and boarding houses permits were issued for 49 buildings, estimated to cost $21,344,000, as compared with 46 permits in 1901, for buildings costing $20,421,000. There was also a perceptible increase in the amount of capital invested in houses of worship, there having been 20 permits issued for churches costing $1,309,000, while in 1901 there were 11 permits issued for structures involving an outlay of only $610,600. The statistics covering manufactories and workshops show that last year there were 90 permits issued for buildings costing $3,012,850, which is a decrease as compared with the year before of $1,330,6‹5, and in the case of stables there were 101 permits issued for buildings estimated to cost $1,051,540, as against 46 permits for similar structures involving an outlay of $788,585 in the 12 months of 1901. There were also plans and specifications filed for alterations costing a trifle over $10,000,000, these figures being about $800,000 less than for the year before. The present indications would seem to warrant the belief that 1903 will witness a very gratifying volume of business for both architects and builders of the metropolis.

To Abolish the Sympathetic Strike.

It is a gratifying indication of the improvement which is gradually taking place in the relations between capital and labor that the building trades unions in some parts of the country are beginning to discern the futility of that unjustifiable proceeding, the sympathetic strike, and are taking measures for its abolition. For years this stupid form of practical argument has worked immense harm to the building trades, where the sympathetic strike found its greatest development. In almost every case it has proved a boomerang to those who have used it, entailing an amount of loss and suffering upon workmen who were without grievances and their families out of all proportion to any benefits that may have occasionally accrued to those who were more directly interested in the particular labor dispute which brought about the sympathetic strike. Action to discourage this form of strike has just been taken in Chicago by agreements which have been entered into between the Employers' Association in the building trades and the Architectural Iron Workers' Union and the Bricklayers' and Stone Masons' Union, whereby it is agreed that for a period of three years neither party will tolerate or recognize any rights of any other association, union, council or body of men not directly interested in the controversy to interfere in any way with the agreement, and that they will use all lawful means to compel their members to comply with the arbitration agreement and working rules as jointly agreed upon and adopted. By this agreement the wages of the architectural iron workers are increased from 45 to 50 cents an hour for the year beginning April 1, to 52½ cents for the second year and to 55 cents for the third year. It is understood that other trades in the building lines in Chicago are prepared to make a similar agreement barring the sympathetic strike.

Limiting the Hights of Buildings.

The decision recently made by the United States Supreme Court in the case of the Westminster Chambers on Copley Square, Boston, is of more than ordinary interest in that it recognizes distinctly the right to pass special building laws affecting a portion only of a city. The ostensible reason for the law limiting the hight of buildings on Copley Square to 90 feet was to prevent the light being cut off from the Boston Museum of Fine Arts. The law of 1898 was attacked as unconstitutional, but in the decision rendered by the court, Justice Brewer explicitly states that the statute is not in conflict with the constitution. As it stands completed, the building known as the Westminster Chambers is 6 feet higher than the limit allowed by the law, which was passed shortly after the plans to erect it were announced. As a result of this decision, it would look as though 6 feet of the building would have to be taken off. A substantial gain from the decision is that it seems largely to extend the powers of a State and presumatively of a city with respect to building ordinances, while establishing a valuable principle, which permits a community to protect its choicest localities from disfigurement.

The Royal British Institute of Architects has officially notified Charles F. McKim, architect, of the firm of McKim, Mead & White, that he has been chosen as this year's recipient of the institute's gold medal, which is awarded every alternate year to some foreign architect of distinguished merit. The only other American so honored was the late Richard M. Hunt.

A feature of the architectural treatment of the Farmers' Bank Building, a general view of which formed the basis of one of our supplemental plates in the February issue, is a number of marble statues that will adorn the Fifth avenue and Wood street fronts at the level of the fourth floor. Each figure is about 9 feet high and there will be 18 of them on the building. At the level of the story above will be a number of Roman columns, made of bronze, each supporting a cluster of incandescent lights.

Richard M. Upjohn.

Richard Mitchell Upjohn, an architect of the old school, died a few weeks ago at his home in Brooklyn, at the age of 75 years. He was born in Shaftesbury, England, and came to this country when a boy of two years. His father was a prominent architect and the son became his partner in 1853. After his father's death Mr. Upjohn continued his work and prepared the plans for well-known buildings, among them being the State Capitol at Hartford, Conn.; the Madison Square Church, the Newark Banking and Insurance Building, the main entrance to Greenwood Cemetery, St. Chrysostom's Chapel, Trinity parish, in this city, and St. Paul's Church in Brooklyn. He also drew the plans of St. Peter's Church in Albany and the Central Congregational Church in Boston. Mr. Upjohn was a member of the American Institute of Architects, of the Brooklyn Institute of Arts and Sciences and a life member of the Metropolitan Museum of Art.

Minnesota State Association of Builders.

The leading builders of St. Paul, Minneapolis and Duluth recently perfected a State Association, at which the following officers were elected: President, J. W. L. Corning of St. Paul; first vice-president, C. W. Higgins of Minneapolis; second vice-president, C. E. Evans of Duluth; third vice-president, J. W. Nelson of Minneapolis, and secretary and treasurer, A. V. Williams of St. Paul.

The Executive Committee consists of George J. Grant of St. Paul, W. F. Porter and A. F. Peckham of Minneapolis, G. J. Lounsberry and H. D. Bullard of Duluth.

In the evening of the day the State Association was organized 250 of the members enjoyed a banquet at the "Commercial." Among the toasts were "The Builder," to which response was made by William Porter; "The Manufacturer," responded to by T. A. Abbott; "The Material Man," by J. F. McGuire, and "The Builders' Exchange, by A. K. Pruden.

The Granite Scale of Wages.

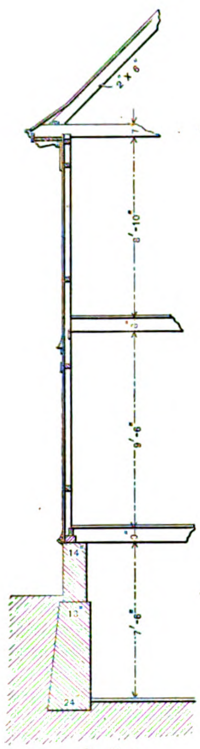
An agreement has just been reached between the representatives of the Granite Manufacturers' Association, of Barre, Vermont, and a committee from the Cutters, Tool Sharpeners, Polishers, Lumpers, Boxers and Derrick men, which it is hoped will prevent any labor troubles in the granite industry for the next five years. By means of the agreement the cutters and sharpeners receive $3 per day as the minimum wage and 8 hours is made a day's work with a half holiday on Saturdays in June, July and August. Pay days will be once in two weeks. By the new schedule it is stated that 24,000 men in Barre and about 400 in Montpelier will receive an increase of wages.

One of the real estate transactions recently recorded in New York City brought to light some rather interesting building history. It was found that less than 14 months after the purchase of the site the building, which was an apartment hotel 12½ stories high and covering an area about 72x100½ feet, was completed, leased and sold. On December 17 title was taken to the property and less than a month later excavations had been commenced by the builders. On May 1 the bases were set and by July 1 the steel frame was finished and the mason work of eight stories completed. By October 15 all the mason work was finished and on November 1 the hotel was in full running order. The structure is a free type of French Renaissance style of architecture and fitted with every modern convenience. The building may be cited as an example of the product of the businesslike system which prevails in connection with construction companies at the present day, where every minor detail is planned and provided for before the work is commenced.

COMPETITION IN $5000 FRAME HOUSES.

FIRST-PRIZE DESIGN.

WE take pleasure in bringing to the attention of our readers the findings of the Committee of Architects and Builders having in charge the award of prizes in the competition in $5000 frame houses, the conditions and specifications of which were announced in detail in the issue for December last. As might naturally be supposed the announcement of this contest developed a widespread interest among the friends of the paper, which was manifested in a practical way by entries from nearly every leading section east of the Mississippi River, as well as from scattered cities beyond. The limitations of cost were placed higher than in any of the recent competitions conducted under the auspices of *Carpentry and Building*, with prizes advanced accordingly, all of which tended to bring out a higher grade of work, and in many instances from cities not hitherto represented in our contests. In connection with a number of the studies submitted photographs accompanied the drawings, some showing the appearance of the completed buildings and others various interior views, thus affording an excellent idea of the way these particular designs had been actually worked out.



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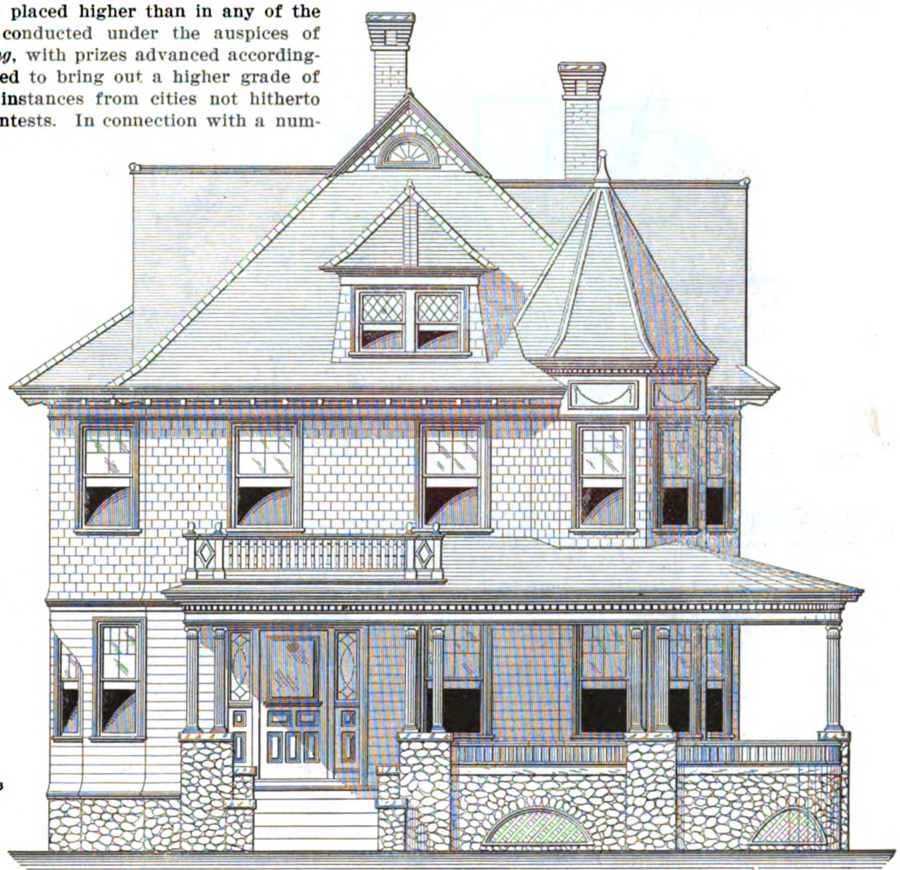


Front Elevation.—Scale, ⅛ Inch to the Foot.

Competition in $5000 Frame Houses.—First-Prize Design.—John P. Kingston, Architect, 518 Main Street, Worcester, Mass.

It will be remembered that the conditions of the contest called for a frame dwelling not to exceed in cost $5000 in the section of country from which the drawings were sent, but the house was to be modern in all its appointments and finish, of attractive exterior, convenient arrangement and suitable for erection as a detached building in the smaller cities and towns and upon suburban sites. With each set of drawings submitted the author was required to furnish a front and one side elevation, foundation or cellar plan showing divisions, location of heating apparatus, &c., first and second floor plans, attic and roof plans, together with a good selection of details embracing exterior and interior finish and construction. There was also required an estimate of cost in detail under the heads of "excavation," "mason work," "carpentry work," including roof, "plastering," "painting," "plumbing and tinsmith's work." It was specificially pointed out that the estimate must show the cost in detail of the work and materials included under each of the headings named, and the cost of each in the aggregate was to be stated, as well as the cost of heating. Another requirement was that each estimate should be accompanied by a certificate from some responsible builder to the effect that he would be willing to erect the house indicated by the drawings and specifications at the price named in the estimate. It was also stated that any house which was made to figure $5000 or less by manifest deficiencies in construction or finish, or omissions of important parts, would be rejected.

With these requirements in mind the first duty of the committee was to ascertain if the contestants had complied with the conditions, and the drawings of such as had not were at once rejected. We are very sorry to announce that there was quite a percentage which came under this ruling, the offense of the majority being the omission of the estimate of cost in detail. It will be found by reference to the December issue that the requirements in this respect were stated as explicitly, it seemed to us, as the English language would permit, and that so many contestants should ignore the call for an estimate of cost in detail and simply give the aggregate under each of the headings named is difficult of understanding, except on the grounds of carelessness.

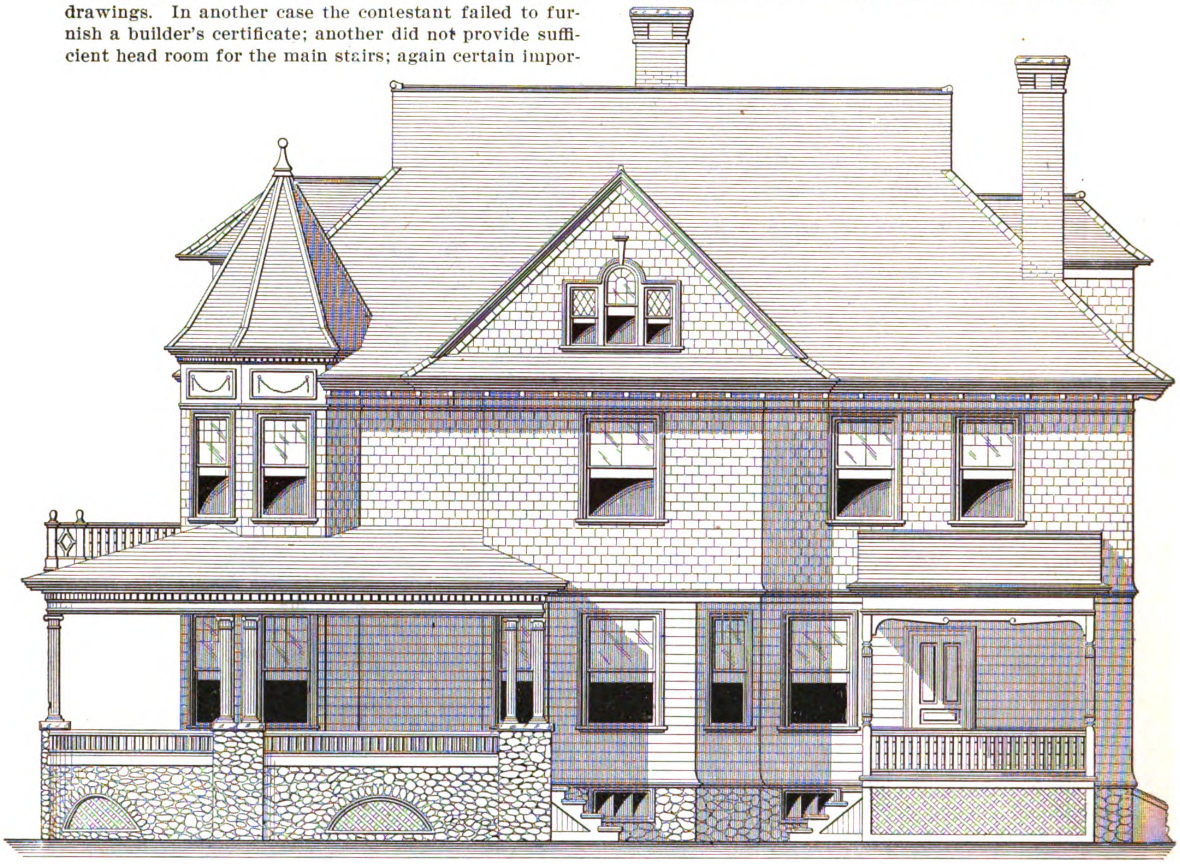
While in many instances the studies submitted involved commendable features, they also embodied certain objections which placed them on a plane below the prize winners. In one instance the contestant omitted all details of construction, but forwarded several photographic views of interiors, expressing the opinion that they would probably answer just as well. It is true they served an excellent purpose and rendered his study much more attractive than would otherwise have been the case, but they were not scale drawings of details as called for by the conditions, and to this extent did not comply with the requirements of the contest. The committee, therefore, had no alternative but to reject the drawings. In another case the contestant failed to furnish a builder's certificate; another did not provide sufficient head room for the main stairs; again certain important items were omitted from the specifications and estimate, which, if included, would have carried the total cost beyond the $5000 mark, but the builder furnishing the certificate cleared himself by stating that he would be willing to erect the house "according to the plans and specifications" for the sum named.

The main floor plan of one competitor showed no window to light the butler's pantry, and he placed the main stairs so as to rise directly from the parlor, a feature to which strong objection is usually made by the careful housewife, as it practically necessitates the cleaning of that room every time the stairs are swept Another design showed the wood work of the frame extending below the grade line, while the foundation under the veranda was but 4 inches thick and not sufficient to safely support this part of the house. The billiard room which the author provided was only 12 feet wide and therefore too narrow if a table of standard size was to be used. Another competitor failed to provide any means of lighting or ventilating the water closet on the second floor of the house, an omission which from a sanitary standpoint is a menace to health and decidedly bad practice. Other contestants furnished studies which obviously could not be executed within the limitations of cost prescribed by the competition.

The results of the deliberations of the committee of experts show that under the conditions of the competition, John P. Kingston of 518 Main street, Worcester, Mass., who submitted drawings under the designation here shown is entitled to the first cash prize of $150; that D. P. Slitor of 133 South avenue, Penn Yan, N. Y., whose *nom de plume* was "Idle-Wild," is entitled to the second cash prize of $90, and that Mark H. Whitmeyer of 15 North Vermilion street, Danville, Ill., whose *nom de plume* was "Tuscan," is entitled to the third cash prize of $60.

There were several designs submitted in the competition, which, though not entitled to a prize, were in the opinion of the committee worthy of special mention. Among these are the drawings designated by "An Owl Sitting on the Limb of a Tree" and hooting "Who;" those bearing "A double cross in a circle," "Three Crescents," "Comfort," "Higginson House," "Gothic," "Design No. 190," "Quaker," "Rouge Tête" and "H. P. G.," many of which we hope to publish in due course.

In their comments upon the design awarded the first prize, the committee say: "The general appearance of the house is good, with the exception of the tower cornice and roof lines, which it seems to us are not designed to make a thoroughly proportioned and architectural effect. The stone work around the porch is very effective and not costly considering the kind and the manner in which the stone is laid. The rooms on the first floor are well arranged, with one exception, this being the necessity of passing through the dining room to reach the front door. It is, however, common practice, and may not appear at all objectionable in many parts of the country. The author has, however, access to the front door by way of the library, which is a good feature, as in case of the family dining the front door may be reached from the kitchen without annoyance to them. The second story is very well planned, although we note the author does not show a connecting door be-



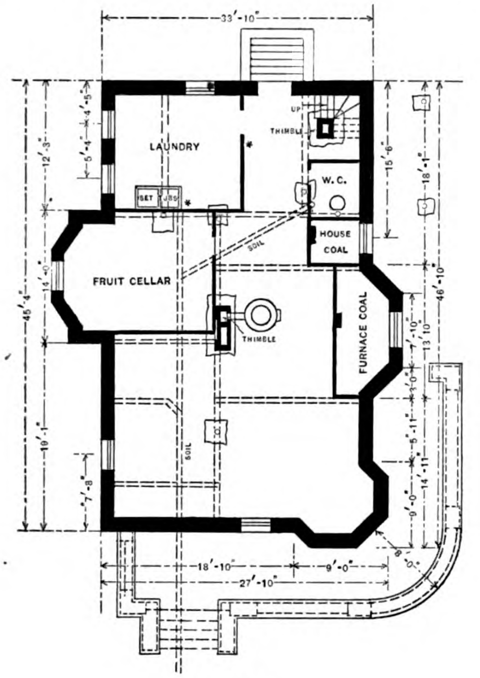
Competition in $5000 Frame Houses.—Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

tween the bedrooms, which we consider desirable especially where there are children and in case of sickness. The arrangement of the rooms, however, is such that this change could readily be made.

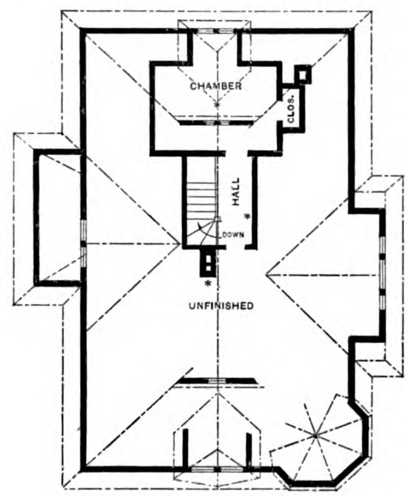
"The details about the house, while not elaborate, are very neat and clean, and this feature would enable a chimney passing through the linen closet, as it does, keeps the heat out of the rear bedroom in summer, which all must appreciate as a good point. There are many other good features about this plan which could be commented upon at length, but enough has been said to show the reasons for our placing it first and especially as it can be built for an amount well within the figure allowed."

We present herewith the design awarded the first prize, giving in this connection the specifications of labor and materials. At the same time we quote the author's comments relative to some of the special features:

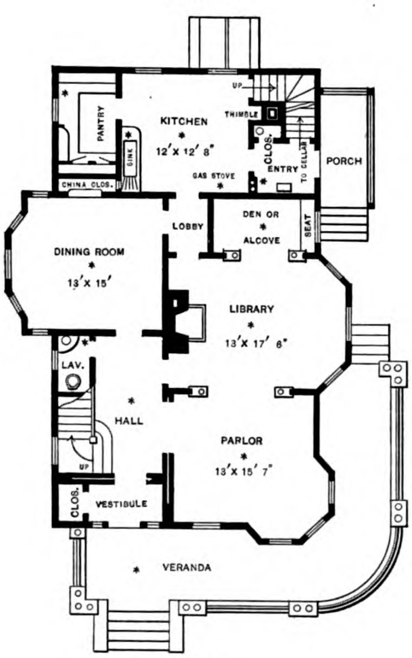
"The author takes pleasure in submitting for your consideration this design for a $5000 house as one that has been already constructed not only once but several times—twice with some alterations and three times practically as shown in the photograph accompanying the



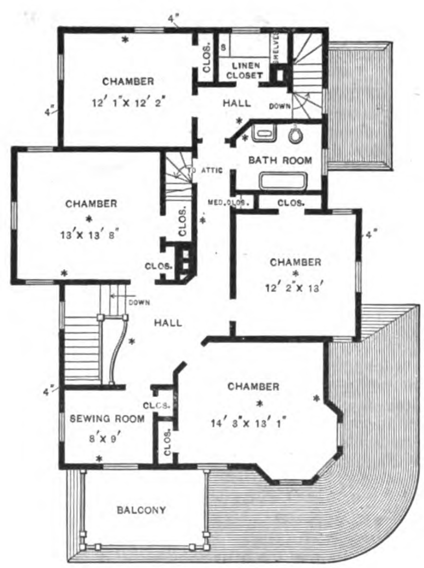
Foundation.



Attic with Roof Outlines.



First Floor.



Second Floor.

Competition in $5000 *Frame Houses.—Floor Plans.—Scale,* 1-16 *Inch to the Foot.*

saving of money, which could be put in the extra plumbing called for in the house. The bathroom being situated directly over the kitchen range is a desirable feature in house building, as it enables a supply of hot water immediately to the faucets without the necessity of first drawing out the cold water. It also protects the plumbing in winter, and makes shorter pipes and less worry and expense regarding leaky joints, &c. The kitchen drawings. It has attracted considerable attention, and one party has journeyed from the further end of Nova Scotia to see it and had his house built from these designs.

"After the original house was finished the owner had a billiard room finished off in the front of attic, and the space is supposed to be left clear for that future purpose. When the estimates were passed in for this house several and most of all of them were under the price given above, all from good responsible builders, and when the contract was given out it was not to the lowest, but to the third lowest bidder.

"The house is thoroughly built and neatly finished in the most substantial manner, and the full specifications, which cover over 21 sheets, call for this house to be done in the same manner. I have endeavored to make this specification as brief as possible, and still outline the construction and indicate the materials to be used.

"One of the special features of this design and which attracts most attention is the cobble stone and granite work of veranda and underpinning, but there is an air of harmony and attractiveness in the whole design. The general arrangement of the interior is roomy and convenient for the size of the house, and the rear part, while within easy reach, is well separated and secluded from the front.

"The clapboards of the house are painted a fawn color, the trimmings a cream and blinds dark green. The wall shingles are stained a tan color, and the roof a very dark green."

Specifications.

The following are the specifications as submitted by the author of the first-prize design:

Conditions.

Each contractor is to provide all materials and labor necessary for the complete and substantial execution of everything described, shown or reasonably implied in the drawings or specifications for this work, including all transportation, scaffolding apparatus and utensils requisite for the same. All materials to be the best of their respective kinds. All workmanship to be the best quality to conform to the character of the work or building.

Batter Boards.—The contractor will put up batter boards in proper manner and leave for the use of all concerned.

Excavation.

Scrape off loam and deposit on lot where directed.

Excavate the cellar to a clear depth shown. To be made 8 inches larger all around than outside of stone walls. Excavate for foundation walls, footings and other places required by the drawings to complete the work. The bottom of foundations to be at least 4 feet below finished grade, 4 inches below finished cellar bottom and rest on good natural hard ground.

Grading.—All earth to be left on lot and rough graded up around building, as shown. Do all finished loam grading using the loam taken from the building site.

Foundations.

Build all foundations, footings and piazza stone, foundation for steps and other work necessary to complete the work, according to sizes shown on drawings. All stone to be of quarried junk stone, laid dry in best manner and pointed full inside. Leave out all necessary openings for drain, water and gas pipes and refill when required.

The wall to be 18 inches at top and 24 inches at bottom. The chimney stone to be at least 7 inches thick and 8 inches larger all around than brick work. Pier stone to be at least 6 inches thick and 24 inches square. The bottom of all foundations to be at least 4 feet below finished grade and 4 inches below finished cellar bottom and rest on good natural hard ground.

Sewer.—To be drain pipes from cellar to connect to street sewer in all respects to conform to city sewer rules of salt glazed vitrified drain pipe.

Water Supply.—Lay from water main in street to connect to cellar a service water pipe, with a stop and waste cock complete.

Gas Supply.—To be laid from cellar to connect to service in street.

Cobble Stone.

Build all exposed underpinning and piazza work shown above foundations of good, clean cobble stone. Turn arches shown the full thickness of wall. Corners and angles to be laid as true as possible, and top level to receive sills and cap stone. The work is to be laid up in cement mortar mixed one of cement and two of clean sharp sand. All the work to be pointed up with Portland cement, and ruled with round jointer in best manner, the thickness of wall, as shown by drawings. The remaining part of underpinning covered by piazza to be built of stone same as foundation laid in cement mortar.

Cut Stone Work.

All the cut stone work to be of granite. The cap stones are to be 6 inches thick, and to project over walls 1 inch on all sides. Tops to be six cut work, bottoms pointed straight, edges rock face, and all corners and edges clean and sharp. The four steps to show 11 inches tread and hight to correspond to grade. Front and top to be six cut work. All stone to be set true and even, and bedded in cement mortar in the best manner.

Mason Work.

Chimneys.—All brick work about the building to be done in best manner. Do all cutting, fitting and repairing in connection with this work for and after the several workmen. To be 3-pound sheet lead flashing built into chimneys at junction of roof. Chimney flues to be built and to be plastered on outside to roof boards. To have linings, as shown, thimbles and caps. In basement to be thimble for furnace and one for laundry. The caps of chimneys to be stone.

All brick used to be good hard burnt merchantable quality. Those for exterior to be selected of a uniform color. All mortar for the work to be best quality with all exposed parts colored dark red and jointed to a straight edge.

Fire Place.—To be built with rough opening for finished fire place.

Figure in $16 for furnishing lining, dampers, facings and hearth tiles and all other materials, and do all the work in best manner.

Remove all rubbish from time to time as required, and leave work clean and complete.

Lathing and Plastering.

Lathing.—Lath all ceilings, partitions, studded and furred places where plastered with best clear, sound, dry spruce lath. To be well nailed and joints broken to make the best work.

Plastering.—All walls and ceilings of the entire building where finished with one good coat of best plastering mortar smoothed up in best manner. The ceiling of all rooms and side walls of kitchen, pantry, entry and bathroom to have a second coat of sand and putty finish. All the plaster is to be filled out and up to grounds and all carried down to lining floors.

Whitewash with two coats all exposed parts of brick and stone work in cellar.

Concreting.—The whole of the cellar bottom is to be concreted with tar concrete 2 inches thick.

Tinning.—Put on where shown or marked best tin roofs, using good quality M. F. or Taylor's old style roofing tin, with all joints well soldered. Form gutter to carry water to outlet at end of piazza. Do all tinning necessary to make the job complete.

Finial.—To be copper finial 20 inches high on tower.

Carpenter Work.

Furnish all materials of every description, and perform all labor of every kind in connection with carpenter work and helping other mechanics employed. Make and set all centers. Provide all patterns and temporary conductors to carry water from the building.

Framing.—The framing work is to be done as shown by drawings. All in a thorough manner, placing joist, rafters and girders crowning edge up and rounding edge of studs all one way. To have double joist under first floor cross partitions and single joist under all partitions on other floors.

Sills and Caps.—All partitions to have a sill and cap same size as studding.

Truss Openings.—Truss over all openings at right angles to joist. All door studs to be double to hight of header, which will be double and rest on inside stud. Each corner to be braced each way with 3 x 4 braces.

Furring.—All ceilings above cellar to be cross furred with ⅞ x 2½ inch planed spruce strips put on 16 inches on centers.

Rear Piazza Posts.—To be of 2½-inch iron, with iron plate at top.

Girder Columns.—The girders in cellar to be supported by 3½-inch iron posts, with round cap about 7 inches in diameter.

Bridging for Floors and Partitions.—All joist to be bridged with ⅞ x 2½ inch spruce strips cut to fit at both ends and fastened with two nails at each end.

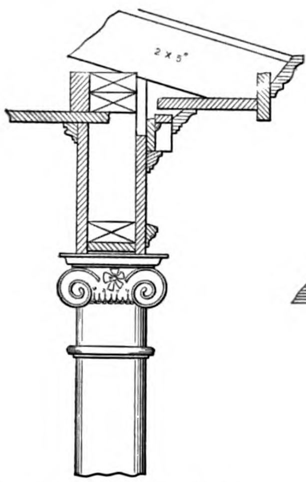
Bridge all main partitions, first floor, with 2-inch stock.

Solid Corners.—All corners and angles to be made solid, and all openings and corners to have a piece nailed on to secure base.

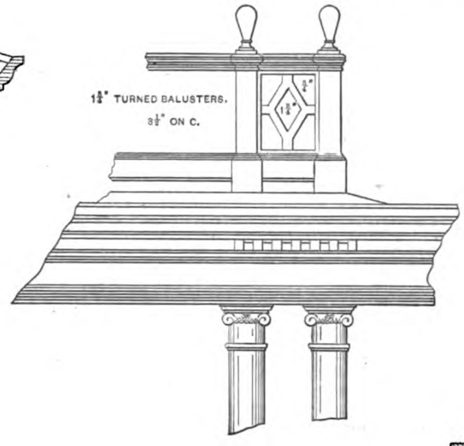
Roof Framing.—The roof to be framed as per drawings. The hips, valleys, jacks and common rafters to fit closely at both ends and all well nailed and spiked.

Timber.—All the framing and dimension timber, unless otherwise marked or specified, to be good merchantable square edged sawed spruce, and to be of the following sizes:

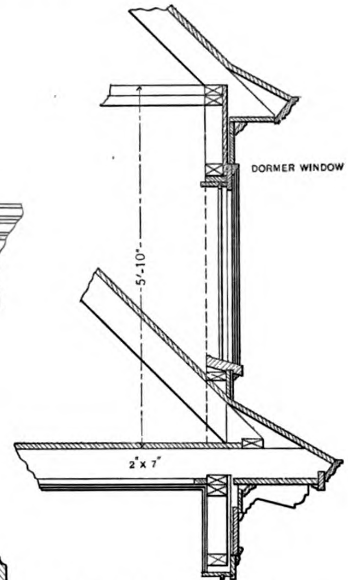
First floor girder	8 x 9	Ledgers	1 x 6
Sills	4 x 7	Braces	3 x 4
First floor joist	2 x 9	Main partition studs	2 x 4
Second floor joist	2 x 8	Wall studs	2 x 4
Third floor joist	2 x 7	Minor partition studs	2 x 3
Collar beams	1 x 7	Piazza sills	6 x 6
Rafters	2 x 6	Piazza joist	2 x 6
Hips and valleys	3 x 9	Piazza rafters	2 x 6
Posts	4 x 6	Wall plates, double	2 x 4



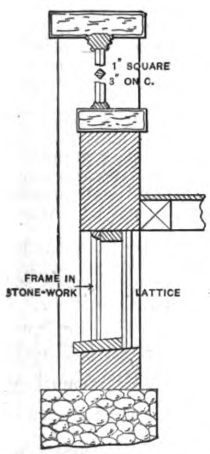
Details of Veranda Cornice.—Scale, ¾ Inch to the Foot.



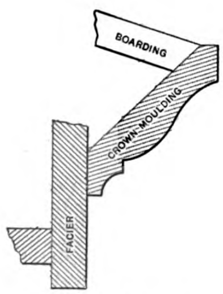
Partial Elevation of Veranda Cornice and Balustrade.—Scale, ⅝ Inch to the Foot.



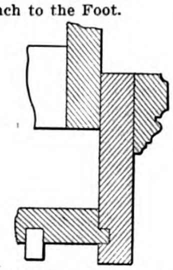
Details of Main Cornice and Dormer.—Scale, ⅝ Inch to the Foot.



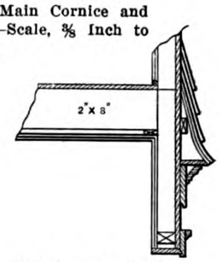
Vertical Section through Veranda Wall Between Pilasters. — Scale, ⅝ Inch to the Foot.



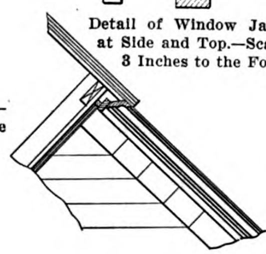
Crown Mold and Fascia.—Scale, 3 Inches to the Foot.



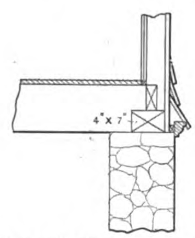
Detail of Window Jamb at Side and Top.—Scale, 3 Inches to the Foot.



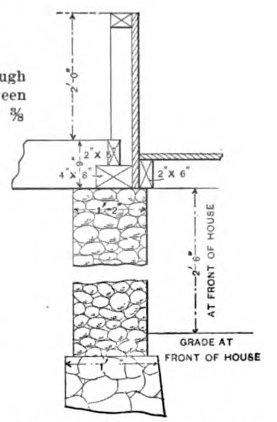
Belt Course.—Scale, ⅝ Inch to the Foot.



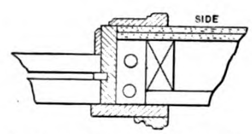
Gable Cornice.—Scale, ⅝ Inch to the Foot.



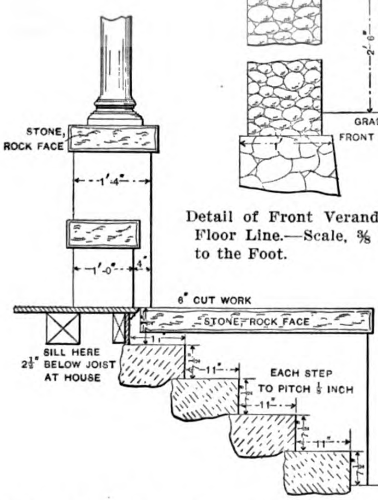
Water Table.—Scale, ⅝ Inch to the Foot.



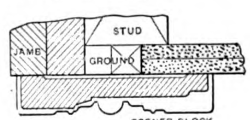
Detail of Front Veranda at Floor Line.—Scale, ⅝ Inch to the Foot.



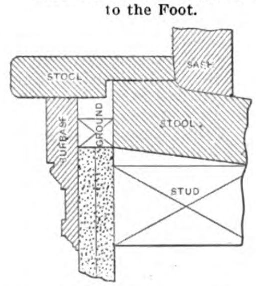
Horizontal Section through Window Frame.—Scale, 1 Inch to the Foot.



Section through Stone Steps.—Scale, ⅝ Inch to the Foot.

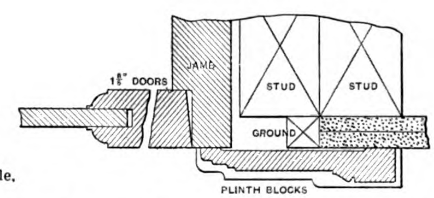


Side Casing in Bathroom, Kitchen, Bedrooms, &c.—Scale, 3 Inches to the Foot.



Details of Window Stool and Apron.—Scale, 3 Inches to the Foot.

Section of Base Mold.—Scale, 3 Inches to the Foot.



Side Casing in Principal Rooms on First Floor.—Scale, 3 Inches to the Foot.

Competition in $5000 Frame Houses—First-Prize Design—Miscellaneous Constructive Details.

Furnish all other framing and dimension timber to complete the work of sizes shown by drawings or directed.

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.

Grounds, Beads, &c.—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. Put on all runs and boxes for hangers, straight and level, and all well fastened in place before plastering.

Lining Floors, Inclosing Boards, &c.—All lining floors to be ⅞ planed hemlock. Inclosing boards, sides of dormer windows and tin roofs to be done with No. 2, ⅞ matched spruce.

Roof Boards.—All roofs, except otherwise specified, to be covered with sound ⅞ planed square edge hemlock boards put on about 2 inches apart. Tin roof of balcony to be covered with ⅞ matched spruce.

Sheathing Paper.—Put good sheathing paper, well lapped under all finish, clapboards and side wall shingling and under all top floors.

To be strips of the paper around all the outside walls bent into angle, up against plaster and out into floor not less than 6 inches each way before top floor and base are put in place.

Clapboards.—Cover all the outside wall surface, except otherwise specified or marked, with best quality spruce clapboards 6 inches wide. To be laid not more than 4¼ inches to the weather, all well nailed. All joints to be smooth and flush. Clapboards will lap together or miter on corners. Do all flashing necessary.

Side Shingles.—The side walls, gables and sides of dormer windows to be covered with extra sawed clear butt 16-inch cedar shingle, put on not more than 5 inches to the weather. Do all flashing necessary.

Roof Shingle.—All roofs, not otherwise specified, to be shingled with extra sawed 16-inch Eastern cedar shingle, put on not more than 4¾ inches to the weather. All to be double nailed, well lapped, and must not be over 8 inches wide. The hips to be covered with a braided course in proper manner. Valleys to be laid open and laid in elastic cement over tin 14 inches wide, soldered in one continuous piece, edges turned over and laid flat. Tin to be painted two coats both sides. Flash up tight against all chimneys, dormers and other places necessary. Put on all ridges 6-inch pine saddle boards, with a 2½-inch, ¾ round on top.

Cellar Partitions.—Put up cellar partitions for store room and laundry of 2 x 3 studs placed 26 inches on centers, and covered with matched spruce boards well fitted up to ceiling. To have a door made of No. 3 pine four panels, hung with two hinges. To have knob, latch and lock. Store room to have two shelves.

Coal Bins.—Build coal bins in cellar of 2 x 4 studs, and matched spruce boards.

Fixings in Cellar.—Put up all strips, shelves and other fixtures in cellar for plumbing, water, electric and other apparatus as directed.

Bulkhead.—To be built where shown with frame well secured in place, finished on top and sides and to have sheathing covers.

Outside Finish Work.

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. To be stereo relief ornaments for panels of tower.

Front Veranda and Rear Porch.—To have a floor of 1⅛ x 5 inch square edge rift grain Southern yellow pine laid open ⅛ inch. The ceiling to be of clear cypress or North Carolina pine sheathing with 2-inch bed molding. The balustrade columns, lattice, &c., to be formed and built, as shown, or marked. To be stereo relief capitals on posts, as shown.

Balcony.—To be built, as shown, with tin roof pitching to end of piazza.

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, steps to be built to grade.

Outside Door Frames.—To be 1¾ inches thick, rabbeted to correspond to thickness of doors, 1¾-inch hard wood thresholds, and casings same as windows. Frame for front door to be as above with division pieces for door and side lights. The side lights to be 1½ inches thick, cut up, as shown.

Window Frames.—To be made to correspond to drawings or described. Cellar frames to be made of 2-inch plank, rebated for 1¼-inch sash. These to have sills made wide enough to project by brick work ½ inch, to have 1-inch staff bead around sides and top.

Frames above cellar to be made in the usual manner, except otherwise shown or mentioned, to have ⅞-inch yellow pine pulley stiles, grooved for 1⅜-inch lip sash. To be fitted with approved 2-inch steel bronze finish face axle pulleys well fitted in place.

Sash and Glass.—All frames, not otherwise specified, to be fitted with best pine double sliding lip sash 1⅜ inches thick, glazed with first quality American sheet glass, double thick for large lights and single thick for small lights. To be hung and evenly balanced with cast iron weights and Silver Lake or Samson best quality sash cords made to run smooth, even and not rattle.

Single cellar sash to be 1¼ inches thick hung at top with two 3-inch wrought butts. To have a button fastener and hook and eye to hold open.

Screens.—All cellar frames to have a ⅞ x 2½ inch frame covered with ¼-inch mesh wire netting. Screens to be fastened to frame with screws.

Blinds.—All sliding windows above basement, except center part of triple window in side gable, to be fitted with best quality 1⅛-inch blinds with lower half rolling slats, hung with approved hinges and fasteners.

Outside 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 where shown, hung with three butts.

The rear door to be best North Carolina pine, 1¾ inches thick flush molded, and No. 1 double thick glass in top panels, hung with three butts.

Art Window.—Allow $18 for window in dining room.

Inside Finish and Work.

All work and finish described, shown or intended to finish and complete the work to be the best of their several kinds, all worked out to drawings from good sound, clear, kiln dried stock. All, not otherwise mentioned, to be hand smoothed and sandpapered before putting in place. To be put up with neat, close joints and where practicable one piece to be housed over the other. The doors and jambs to be made to conform to finish of rooms they face.

Finish on Top Floors.—The top floors in lobby, den, kitchen, pantry, bathroom, second-story hall, attic hall, passage and rear hall to be of best selected planed and matched ⅞ x 3 inch face width birch flooring, blind nailed, laid close with running joints and well smoothed up. Where practicable in room, to be laid crosswise of lining floors.

The dining room, front hall, lavatory and vestibule to have a top finished floor of best ⅞ x 2½ inch red birch flooring, driven together. To be blind nailed, laid close with running joints laid crosswise of lining floors. All hard wood floors to have a small molding ⅝ x ⅝ inch in angle. The remaining finished floors to be well seasoned, ⅞-inch square edge pine or spruce flooring. To be well nailed and joints smoothed over. The library and parlor to have a hard wood border.

Finish.—The finish in the several rooms to be as follows:

The vestibule, front hall, including all of stairs, dining room, parlor, library and den to be finished with birch.

The kitchen, pantry, rear entry, lobby and bathroom to be finished with best North Carolina hard pine.

The remaining parts of second floor and attic and all closets to be finished with best white wood.

Door Jambs.—To be 1⅜ inches thick, double rebated. Sliding door jambs to be ⅞ inch thick, all set perfectly level, plumb and true.

Doors.—The doors leading from front hall, parlor, library and dining room and den to be 1½ inches thick, five raised panels, one-quarter round on edges. Remaining doors to be 1⅜ inches thick, five panels. Slide doors to be 1¾ inches thick, same style as others.

Door and Window Finish.—The front hall, vestibule, parlor, den, library and dining room to have ⅞ x 5 inch side casings, 1⅛ x 5 inch header, with 1⅛ x 2½ inch molding around top and 1 x 5 inch plinth blocks. All other rooms ⅞ x 4½ inch casings, 1 x 4¾ inch corner blocks with turned center or thick header. 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. The cased openings to be as marked by drawings and details.

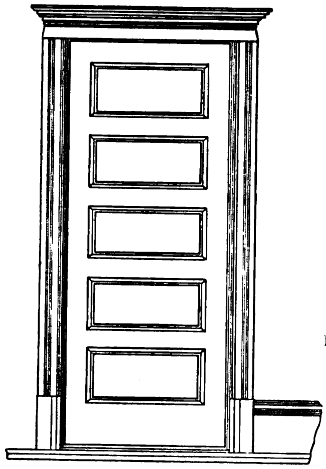
Thresholds.—All swing doors to have ⅝-inch hard wood thresholds.

Base and Molding.—To be a base 9-inch side in all rooms not sheathed, and molding 2 inches wide in vestibule, hall, both floors, parlor, den, library and dining room.

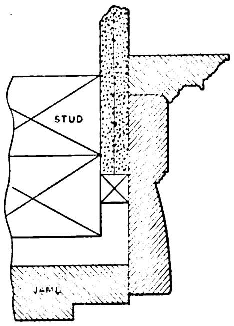
Sheathing.—The kitchen and rear entry to be sheathed 3 feet 6 inches high, bathroom 4 feet high and pantry 2 feet 8 inches high, with narrow beaded sheathing put on vertical, blind nailed, and have a ⅝ x 3 inch molded cap.

Chair Rail.—Put a chair rail 4 inches wide around dining room, and one 3 inches wide around lobby.

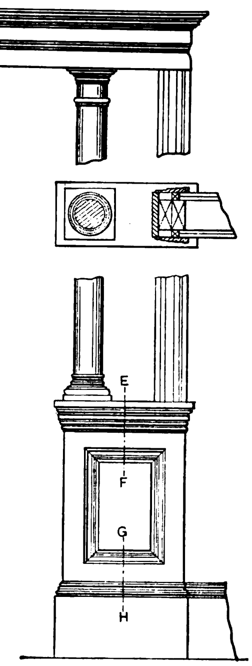
Closets.—The closets to have a 6-inch bevel base and 4-inch plain casings, two rows of beaded strips with wardrobe hooks and shelf.



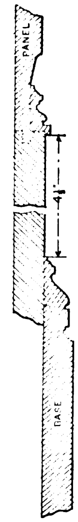
Elevation of Doors in Principal Rooms on First Floor.—Scale, ⅜ Inch to the Foot.



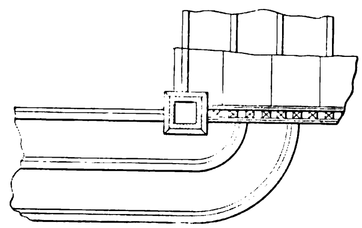
Head Casing in All Rooms Where There Are no Corner Blocks.—Scale, 3 Inches to the Foot.



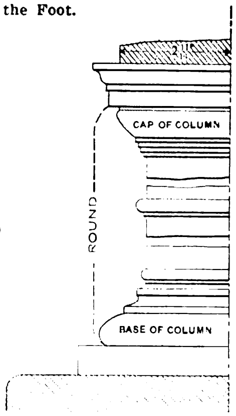
Details of Arch Between Library and Parlor.—Scale, ½ Inch to the Foot.



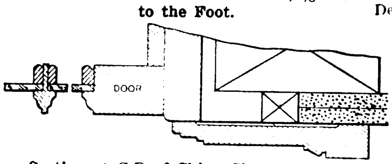
Section of Base of Arch on Line G H.—Scale, 3 Inches to the Foot.



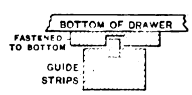
Partial Plan of Main Stairs.—Scale, ⅜ Inch to the Foot.



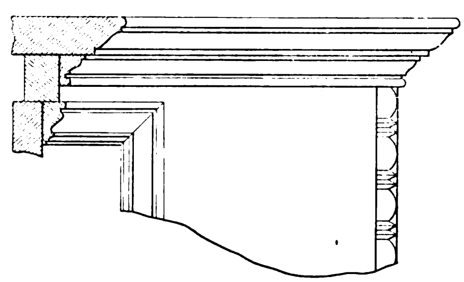
Detail of Column in Arch. Scale, 3 Inches to the Foot.



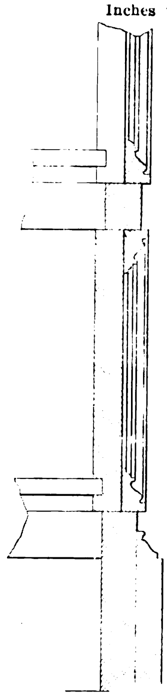
Section at C D of China Closet.—Scale, 3 Inches to the Foot.



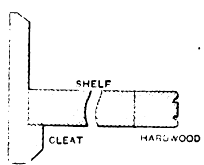
Details of Drawer Construction.—Scale, 3 Inches to the Foot.



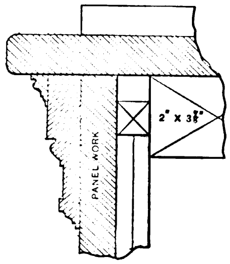
Section of China Closet on Line E F.—Scale, 3 Inches to the Foot.



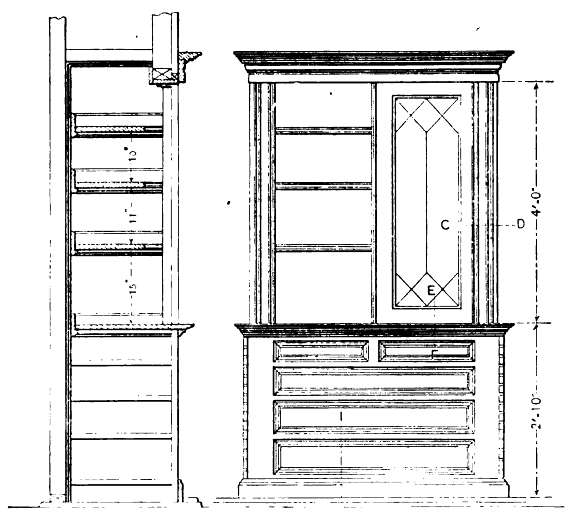
Section through China Closet on Line I J.—Scale, 3 Inches to the Foot.



Detail of Shelves.—Scale, 3 Inches to the Foot.



Section at E F of Arch Between Library and Parlor.—Scale, 3 Inches to the Foot.



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

Competition in $5000 Frame Houses—First-Prize Design—Miscellaneous Constructive Details.

Pantry.—To have broad counter shelf with case of three drawers under. Remaining part to be closed in with beaded sheathing and cleat doors, and have barrel swing to hold flour barrel, above broad shelf to be four 12-inch shelves, all resting on rabbeted cleats. Part of shelves shown to be closed in from bottom shelf to top shelf and have two panel doors.

China Closet.—To have shelf 2 feet 10 inches above floor, as shown. Under to be a case of drawers. Over to be four shelves 18 inches wide, and have two doors.

To be a panel slide where shown.

Linen Closet.—Fit up linen closet with one broad shelf with three large drawers under. Over to be three shelves each side. The blank wall space to have two rows of cleats with hooks.

Medicine Closet.—To have four shelves on rebated cleats with three drawers under bottom shelf.

Sink.—To be soapstone, 22 x 42 x 8 inches deep with grooved drip shelves at each end pitching toward sink. Back and end 14 inches high. All parts cemented and fastened together in best manner. To be a case of three drawers under one end next to partition. On top of sink

and scotia. To have a 2-inch round hand rail on outside wall hung on bronze brackets.

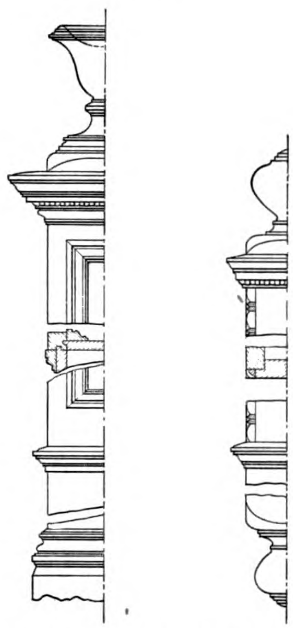
Attic stairs to have 4-inch turned angle posts, 1¼-inch round balusters around well hole and 2½ x 3½ inch hand rail. Treads, 1⅛ inch; risers, ⅞ inch, and scotia, all of white wood.

Cellar stairs to be of spruce or hard pine, with 4-inch square chamfered post, 2 x 3 guard rail on top and 1 x 4 rail between.

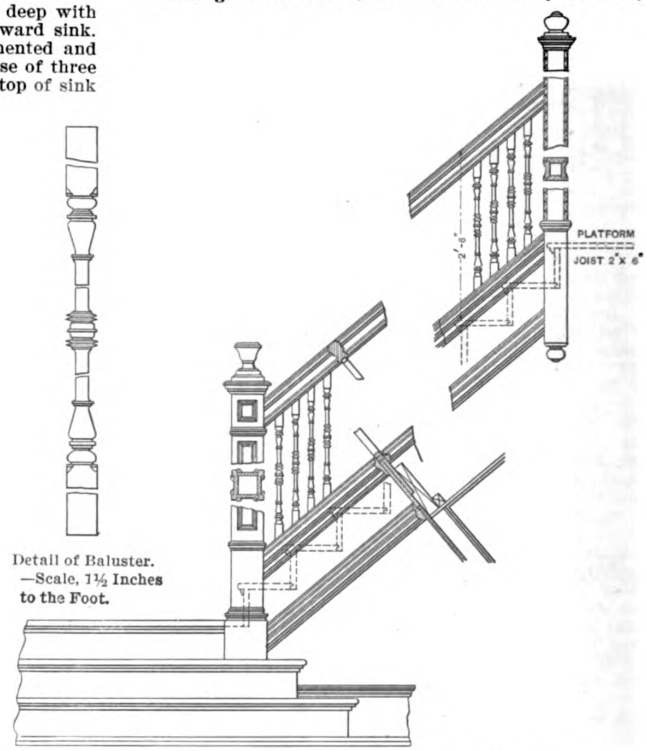
Hardware.—The contractor is to figure in $75 for purchasing the hardware for the whole job, and carefully fit the whole in place. All weights, cords, nails, spikes, screws, &c., outside above allowance.

Wall Decorations.—The contractor is to figure and allow $75 for wall papers, moldings and labor in putting in place.

Heating.—The building is to be heated by furnace,



Details of Newel and Angle Posts of Main Stairs.—Scale, 1½ Inches to the Foot.



Detail of Baluster. —Scale, 1½ Inches to the Foot.

Partial Elevation of Main Stairs.—Scale, ⅜ Inch to the Foot.

Competition in $5000 Frame Houses.—First-Prize Design.—Miscellaneous Stair Details.

back to be a wood shelf 4½ inches wide with a ½ x 4 inch base over.

Set Tubs.—To be soapstone and fitted up 2 feet 10 inches from floor to top, properly supported on wood frame. Back of tubs to be finished over with a board 12 inches high, shelf and base. To have 1⅛-inch covers framed together with two panels flush on top.

Bathroom, Lavatory and Water Closet.—To be fitted up in usual manner for open work. The plumber will furnish seats, tanks, brackets, but the carpenter will put all wood work in place.

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.

Tank.—Build a 40-gallon plank tank made in usual substantial manner of 1½-inch pine. To be lined by plumber and placed in attic where directed.

Clock Shelf.—To be a clock shelf in kitchen.

Mantel.—The contractor is to figure in $25 for mantel for library selected by owner and fitted in place by carpenter.

Stairs.—The stairs to be built on plank stringers accurately cut to the required 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 6 x 6 newel post, 4¼ x 4¼ inch angle post, 1½-inch turned balusters, square bottom and top, and 2½ x 3¾ inch hand rail. To be closed in with buttress. All parts to be built of birch.

Stairs from kitchen to have hard pine treads, risers and the contractor is to figure in $275 for all materials and labor in connection with same.

Bells.

There are to be three 3-inch wood box bells in kitchen, one to ring each front and rear entrances and from dining room. In dining room to be a combination floor push with 6 feet of silk cord and a presser. There are to be two carbon cylinder batteries connected to the bells.

Painters' Work.

The painter is to furnish all materials and labor for the painting and finishing of the entire work about the building. All to be the best of their several kinds. The painter is to consult the carpenter's specification for a more detailed description of the work.

Outside.—All the exterior work of wood, iron, tin, galvanized iron, except otherwise specified, to be painted two coats of best paint, all colors to please owner. Putty stop all nail holes in finish, cracks or other imperfections, and shellac all sap, knots, &c., before painting. Outside of exterior doors to have three coats of paint or best exterior varnish as directed.

Side Staining.—The shingles on side walls, gables and dormer windows to have one coat of pure linseed oil stain and one coat of pure linseed oil.

Roof Staining.—The roof of the entire building to have one coat of pure linseed oil stain.

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. Clean all paint or other finish from glass, marble or other places at the completion of the work.

Hard Wood Floors.—The birch floors in rear parts to have a coat of oil and one coat of Berry Bros.' liquid filler granite. The floors of vestibule, halls, dining room and den to have a coat of shellac and two coats of wax well rubbed and polished.

Finish.—The birch finish to have a coat of best alcohol shellac and two coats of preservative rubbed to an egg shell gloss.

The hard pine finish to have one coat of liquid filler and two coats of preservative. All to be left to an even and smooth surface.

The white wood of second floor and attic to be painted two coats of paint.

The floors of closets, cellar stairs, doors and sash and finish in laundry to be painted two coats of paint.

The inside of sash in finished parts to have two coats of paint and one coat of shellac besides priming.

Painted Walls.—The plastered walls of kitchen, pantry, bathroom and rear entry to have a coat of sizing and two coats of paint.

All the above work to be done so as not to interfere or hinder any other workmen in any way. All finished floors must be protected with paper at all times, and no interior work done unless the building is thoroughly warmed and kept warm.

Gas Piping.

Provide and fit in place in best manner according to schedule of Gas Light Company all gas pipes necessary to light the several parts of the building, as shown. To be properly graded and fastened leaving all ready to connect to meter at house and supply end by continuing supply from where company enters cellar to where meter will be placed without further cost to the owner. Leave caps on all outlets. Lights to be placed about where shown.

Plumbing.

This specification is intended to embrace all the labor and materials to complete the plumbing work of the entire building in every detail according to the plumbing ordinance of the city and to the satisfaction and approval of the plumbing inspector.

Soil and Vent Pipes.—The necessary lines of soil pipes to be run from inside of cellar wall or where left by sewer contractor, continued along and up through the building at points shown as near as possible through 2 feet and flashed tight at roof with 3-pound sheet lead flashing. To have all necessary back air and local vents connected in best manner. Inside of cellar wall to be a running trap with hand hole and fresh air inlet.

Water Closets.—Fit up in bathroom and lavatory one all earthen ware siphon water closet apparatus with noiseless 6-gallon copper lined oak finish panel tank and back, N. P. brackets and oak finish double seats and to be fastened to bowl. Supply from tank and to tank to be brass pipe with all fittings, chains and pull nickel plated.

The closet in basement to be an earthen ware combination hopper closet with unfinished tank, hard wood seats and frames. To have 1¼-inch lead flush and ½-inch galvanized iron supply pipe.

Wash Bowls.—Fit up in bathroom one 14 x 17 inch white earthen ware wash bowl with overflow connections, marble slab 1¼ inches thick, molded edges, sunken tops, resting on nickel plated brackets. The back and ends to be marble, ⅞ inch thick, 12 inches high. To have improved basin cocks, supply and waste pipes, finished fittings, with couplings, chain, stay and plug complete, all nickel plated.

Wash bowl in lavatory to be same as above made to fit in position, shown with back and set on molded cleats.

Bathtub.—Fit up in bathroom one 2-inch roll rim bathtub 5 feet 6 inches long, white porcelain enameled inside and on roll, special compression double cock, supply pipes to floor, connected overflow and waste, rubber stopper, chain and soap cup. All exposed brass trimmings, pipes, &c., polished and nickel plated.

Sink.—To be soapstone, as selected, 22 x 42 x 8 inches deep, with soap dish, and have grooved drip shelves at each end pitching toward sink. Back and end to be 14 inches high above top of sink. To have nickel plated flange and thimble compression bib cocks.

Wash Trays.—Fit up in laundry a set of two-part soapstone wash trays of regular pattern and size. To have nickel plated flange and thimble compression bib cocks, brass strainer, outlets, plugs and stays and chains complete.

Supplies.—All the above fixtures, except otherwise specified, to be supplied with hot and cold water through ½-inch, 2 pounds to 1 foot, lead pipe branches and waste through 1¼-inch, 2½ pounds per foot, lead pipe branches and 4-inch round trap with brass trap screws.

Hot Water Boiler.—Fit up one best 30-gallon hot water copper boiler with cast iron stand. To have all necessary couplings, sediment cock, stop cock under tank and one over boiler and other pipes complete. To be supplied with water through ½-inch, 2½ pounds per foot, lead pipe.

Sill Cock.—Fit in place, where directed, one ⅝-inch nickel plated flange and thimble hose bib sill cock supplied with water through ⅝-inch galvanized iron water pipe with ⅝-inch stop and waste.

Tank.—Fit up in place and line with 20-ounce copper the 40-gallon tank made by carpenter, to be supplied with water through ⅝-inch, 22½ pounds per foot, lead pipe, ball cock and float with shut off in cellar. To overflow into nearest practicable place with ¾-inch lead pipe.

Separate Supplies.—Each floor and set of fixtures to be supplied separately with ½-inch, 2-pound, lead pipe with stop and waste in cellar.

Main Supply.—The main supply pipe through cellar starting from street supply to connect the several branches in cellar to be best ¾-inch galvanized iron water pipe.

All vertical lead pipe must be fastened by metal tacks, soldered to lead pipe, and brass screws or brass slips and round head brass screws; no flat head screws will be allowed to project over the surface of any work.

Refrigerator Waste.—Fit a lead drip pan, 8 x 12 x 1 inch deep, fastened over bevel cleat with copper tacks. To waste into 1¼-inch lead pipe dripping outside.

Incandescent Electric Lighting.

The whole house to be wired for lighting.

Installation to be according to rules of the Insurance Exchange.

System.—To be wired for two-wire system, and wires run as what is known as porcelain work.

Loss.—There is not to be over 2 per cent. drop from entrace of building to furthest lamp.

Voltage.—To be wired for 52 volts.

Switches.—To be one switch in each hall to light lower hall. To be one switch, first floor, to operate one light in cellar. To be a switch in hall to operate light on veranda. All switches, as named, to be solid plate flush switches. Electric contractor to furnish and fit all switches and furnish and connect all necessary cutouts located in convenient place, all plainly marked. Put a good serviceable entrance switch where directed.

The veranda gas outlet to be wired to light the gas by electricity with button in front hall.

Wire.—No. 12 to be used for mains and No. 14 for branches.

Outlets.—All outlets marked for gas are to be wired and all thoroughly taped.

Detailed Estimate of Cost.

The following is the estimate of cost in detail as submitted by the author:

EXCAVATION AND STONE WORK.

163 yards excavation at 25 cents	$40.75	
100 perch stone at $1.25	125.00	
11 perch mortar wall under veranda at $1.60	17.60	
46 perch cobblestone work at $4	184.00	
Cut stone capping and steps	105.00	
		$472.35

MASON WORK.

4500 brick for chimney at $13	$58.50	
115 feet lining at 20 cents	23.00	
2 caps at $2	4.00	
Thimbles and flashings	5.00	
14,000 lath put on at $6	84.00	
975 yards plaster at 12 cents	117.00	
300 yards second coat work at 10 cents	30.00	
Whitewashing cellar	7.00	
117 yards concreting at 60 cents	70.20	
Fire place fittings, $16; incidentals, $25	41.00	
		439.70

TINNING.

150 feet tinning for balcony at 6 cents	$9.00	
Copper finial	15.00	
		24.00

CARPENTER WORK.

Engineer and batter boards	$12.00	
14,000 feet framing lumber at $20	280.00	
3040 feet matched inclosing boards at $20	60.80	
3800 feet bottom floor boards at $18	68.40	
3000 feet roof boards at $18	54.00	
23,000 shingles for roof at $4	92.00	
10,000 shingle for sides at $3.50	35.00	
475 pieces 6-foot clapboards at $50	23.75	
1000 feet outside finish lumber	40.00	
		665.95

EXTERIOR FINISH.

225 feet molding at 3 cents	6.75	
300 feet molding at 2 cents	6.00	
500 feet molding at 1 cent	5.00	
Ornamental work	35.00	
84 cornice brackets at 10 cents	8.40	
Veranda and porch finish	83.00	
8 cellar frames, sash and screens, at $2	16.00	
47 frames, sash and blinds, at $4.10	206.80	
Dining room art window	18.00	
2 outside door frames	12.00	
1 front door	9.50	
1 side door	4.00	
Incidentals outside	25.00	
		435.45

INTERIOR FINISH.

1350 feet hard wood floors at $40	$54.00	
1400 feet pine top floor at $23	32.20	
6 birch doors at $3	18.00	
1 slide door	4.00	
1 slide door	6.50	
29 side birch finish at 85 cents	24.65	
8 door jambs at 80 cents	6.40	
2 finished openings at $20	40.00	
China closet	16.00	
200 feet 9-inch birch base at 5 cents	10.00	
200 feet 2-inch birch molding at 2 cents	4.00	
24 jambs at 60 cents	14.40	
24 doors at $2.25	54.00	
64 side finish at 60 cents	38.40	
280 feet 9-inch whitewood base at 4 cents	11.20	
Closet finish, shelves and cleats	18.00	
520 feet sheathing wainscoting at 4 cents	20.80	
103 feet sheathing capping at 2 cents	2.06	
42 feet chair rail at 3 cents	1.26	
200 feet molding around floors at 1 cent	2.00	
Pantry finish	25.00	
Linen closet	10.00	
Stair work	75.00	
Cellar partition work	20.00	
Mantel	25.00	
Work in connection with plumbing	15.00	
Carpenter labor	825.00	
Incidentals	30.00	
		1,402.87

MISCELLANEOUS.

Water service from street	$22.00	
Sewer service to street	25.00	
Gas service from street	12.00	
Nails, paper and flashing	65.00	
Carting	29.00	
Hardware allowance	75.00	
Bells	15.00	
Electric wiring	45.00	
Wall decorations	75.00	
Heating apparatus	275.00	
Painting	255.00	
Plumbing and gas piping	412.00	
		1,305.00
Profits not included in above		254.68
Total		$5,000.00

The builder's certificate was signed by Fred. J. Goff of 7 South avenue, Worcester, Mass.

The Apprentice and His Tools.

The following letter addressed to one of the trade papers contains some hints that are worthy of attention by many among the younger element in the carpentry business:

Now I have the glue on these boards and am ready to drive some brads in and can't find my hammer. "John, have you got my hammer? I do wish you would try and get some tools of your own; I don't mind lending mine, but it is such a nuisance and inconvenience to me and takes up a lot of my time. You first started by asking my permission to take them, now you say nothing, but come and help yourself; you take them and never think of returning them unless I ask for them, and when I do get them they are in bad order: You borrow my planes, wood bits, chisels, oilstone, and even my pencil. Can't you scrape up a pencil some place? What are you doing with my inch chisel? You have one of your own: why don't you use that?"

"I tried to use it, Mr. Martin, but it is too dull and I knew yours would be sharp."

"John, if you want to learn the trade you must learn to keep your tools in order. You can't do work without tools, and you can't do it with dull tools. If you are going to learn this trade you'd better start in at once and buy some. Get a few at a time, what you need most, and be sure and get nothing but the best.

"Didn't you tell me you took a piece of calico to a hop last Saturday night and it cost you three bucks? If you had put those $3 in tools, don't you think they would do more good and leave you something to show for it? Some fine morning you will wake up and find you are obliged to look for work in another shop; then you will wish you had given more of your attention to your trade and tools, and not so much of your time to calico and money for hops.

"Journeymen are not obliged to, and do not care to lend tools to any person, and less so to apprentices, because they do not understand how to take proper care of them. When I was an apprentice, I took great pleasure in new tools when I knew they were my own, and they gave me a kind of ambition to care and work with them. Try and keep yourself and your bench tidy. You have had that old, dirty, torn apron on until it can stand up alone. A clean apron don't cost much, and your bench looks like a pawnshop window. When you lay anything on it you have to get a search warrant to find it; learn to be neat. Don't forget what I said about saving your money and getting a few tools."

Mammoth Department Store in Philadelphia.

A permit was issued by the Bureau of Building Inspection of Philadelphia, Pa., on March 2 for the erection of a 12-story steel frame fire proof store, which it is estimated will involve the expenditure of something like $5,000,000. The permit was taken out by a representative of the firm of D. H. Burnham & Co., architects, of Chicago, and work will be commenced in a very short time. The erection of the new store will present some peculiar features in that it will be built in sections on the site of the present establishment of John Wanamaker at Thirteenth and Chestnut streets. Business will not be interrupted while the sections are being completed, but as fast as one is finished it will be put into use and another commenced.

The new store will be 250 feet on the Market and Chestnut street fronts. The main entrance will be on Juniper street and will be approached by a driveway 106 feet long and 26 feet wide. A loggia will be constructed along the Thirteenth street side, measuring 48 x 157 feet, and from this side deliveries will be made. The interior will be finished in San Domingo or East India mahogany, and the floors will be rubber, marble mosaic and white maple with concrete foundation. The delivery service will be entirely of automobiles and in the construction of the Thirteenth street front provision has been made for the entrance and egress of the vehicles. These will run into the store, enter special elevators and be carried to the delivery department. When filled they will descend on the elevators and from them pass to the street. We understand that the plans provide for 62 elevators.

A Chicago Organization of Employers.

According to the Chicago *Tribune*, the employers in that city have organized to stop the aggressions of labor organizations. The employers' association will maintain a bureau to hire men and to adjust difficulties arising from the demands of labor. The industrial future of Chicago is believed to hinge on the success of capital dealing with labor. For years the power of trades unions has been growing in that city, until it is now regarded as the strongest labor center in the world. The teamsters' union and their support of strikers in other lines have brought the matter to a crisis. It is stated that among the branches of trade interested in the employers' association thus far are the furniture manufacturers, lumbermen, master plumbers, brick manufacturers, wholesale tailors, coal team owners, associated teaming interests, State street merchants and the interests controlled by the Iron League, Metal Trades Association and Illinois Manufacturers' Association. They propose also to deal with the combines now controlling fuel and other supplies, with a view to securing freedom from oppressive restrictions in that direction. Frederick W. Job is secretary of the organization.

The new office building of Speyer & Co. of this city which was completed and formally opened for business a week or two ago, is unique in that it is only five stories high and was erected exclusively for the use of the firm. It is a handsome structure inside and out, the architects taking as their model a Florentine palace and following it with close fidelity to detail. The front is of white marble with bronze doors. On the ground floor, which resembles the courtyard of a palace, are the private offices of the firm and the bond and arbitrage departments. On the mezzanine floor are the general offices for the public, above which is a floor devoted to a luxurious suite of consultation rooms, with dining room, pantry, bathrooms and room for Board of Directors. The board room has heavy waxed oak paneling. The vaults are on the first story below ground and are the latest products of the safe makers.

DOORS AND DOORWAYS.—II.*

BY FRED. T. HODGSON.

AT the present day taste inclines to classical architecture as evinced by the adoption of Colonial and similar styles, and the doors with which our houses are furnished are generally adapted from classic models that are distinguished by correctness of taste and by an absence of any quality that might make them interesting. The critic can find no fault with them, the artist can take no pleasure in them, nor can the ordinary human being enjoy an honest laugh at them. We may, at least, use them as a foundation for the study of door construction in its simplest form, and as a means of contrasting our own methods with those of other countries. Nearly all panel doors made in England for internal work are not less than 1¾ inches thick when finished, and they are generally from 6 to 12 inches shorter than doors made on the Continent, 3 x 7 feet being about the proportions.

In this country we have adopted the English proportions for hight and width, and the Continental rule for thickness, for in very few cases do the builders on the Continent of Europe make their doors for inside work more than 1⅜ inches thick, sometimes even as little as ⅞ inch thick. The most striking distinction, however, between English and Continetal doors is that all doors made for the former have a muntin down the center, as shown in Fig. 3, and until of late years this was the American practice. In nearly all cases, except when double doors were used, did the same practice obtain with Colonial workmen; now, however, such doors as those shown in Figs. 4 and 5 are almost entirely employed by American architects. In English practice the panels are always flat, similar to those shown in Fig. 4, while in Continental practice the panels are invariably raised, as shown in Fig. 5. In this country we follow no particular rule in regard to this matter, but make our doors with or without raised panels, just as it suits the whim of the designer.

Many doors made in Continental Europe have but one panel, as shown in Fig. 6, the panel being glued up in narrow strips and raised. Often the panel is thicker than the door and is, of course, raised on both sides, being well glued into both stiles and rails. Doors of this type generally are finished with bolection moldings on both sides. These moldings have a good "lap" over both stiles and rails, and are glued in place and well bradded to panel and frame.

Some Continental doors have broad raised panels. Figs. 7 and 8 show doors of three panels. In Fig. 7 the hight is equally divided into three parts by rails and panels, while Fig. 8 has three irregular divisions with rails between. Fig. 9 exhibits rather a fancy door with circular panel near the center and curved rails dividing it from upper and lower panels. Here, too, the panels

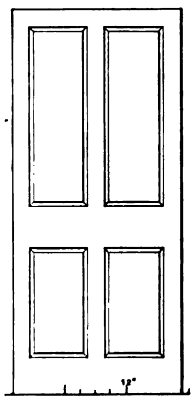


Fig. 3.—An English Door.

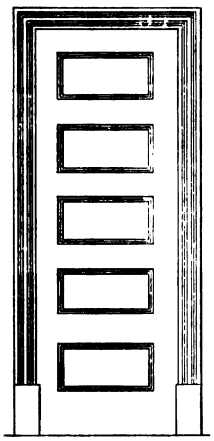


Fig. 4.

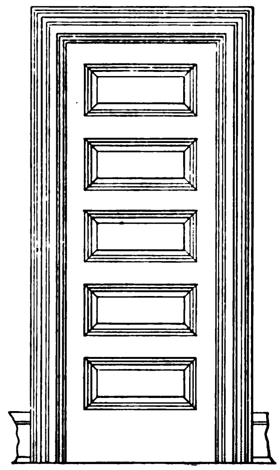


Fig. 5.

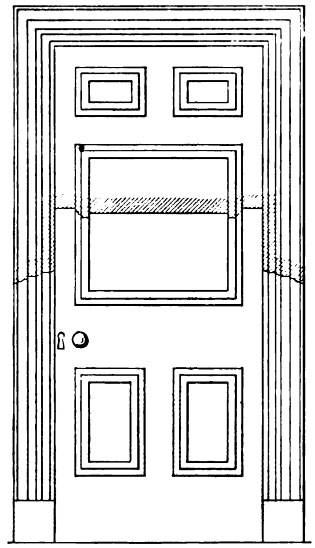


Fig. 10.—Door in City Hall, New York City.

Types of American Doors.

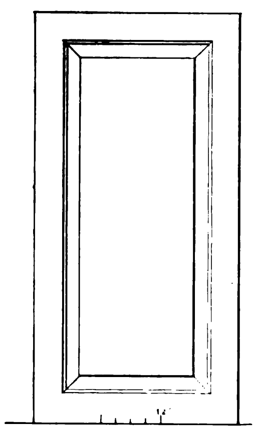


Fig. 6.

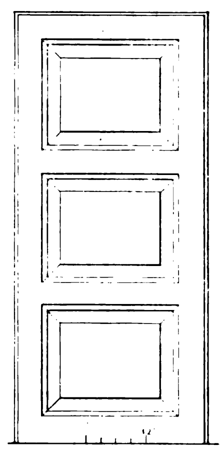


Fig. 7.

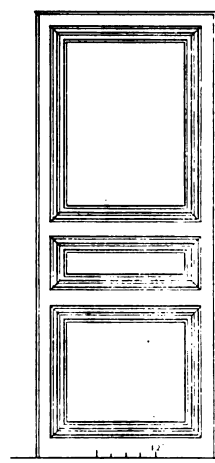


Fig. 8.

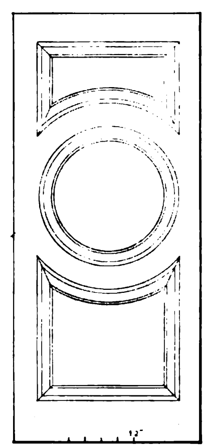


Fig. 9.

Some Varieties of Continental Doors.

Doors and Doorways.

* Continued from page 34, February issue.

are raised and heavy bolection moldings are employed. Another feature of these doors is that the bottom and lock rails are made about the same width, which is very much at variance with English and American practice, where the custom is always to make the bottom rail of a door from one and a half to two times the width of the stiles, and the lock rail is often made wider even than the bottom rail, particularly in four paneled doors, as seen in Fig. 3.

Many of the doors made for American use during the early part of the last century showed a mixture of French and English methods. In Fig. 10 is illustrated a door and finish in the old City Hall, New York. In this example we have the French raised panels with the wide bottom and lock rails. This style of door was much in vogue from about 1800 to 1830; then there came a change and doors having two or four panels were popular for a time, the two-panel doors having two long panels divided by a long muntin.

The bottom rails were made very wide, some of them fully 20 inches. This was necessary to give the frame strength. The four-panel doors were similar to the one

English market goes from Sweden, that country sending hundreds of thousands of dollars' worth of doors, sash and other manufactured wood work there annually. Figs. 11 and 12 show the style of doors sent from Sweden to the English market, with the method of putting them together, which does not differ much from late American practice. These doors, however, are 1¾ inches thick and would be condemned if any portion of them had the slightest show of sap wood in them, or a knot as large as a hazel nut.

The door shown in Fig. 13 is a Swedish glass door introduced into British markets. The details, Figs. 14 and 15, show how the door is made. The molding in Fig. 15, against the stile, is made to carry the glass and the center mullion is made flush with the stops on the inside. Fig. 14 shows the bolection and the panel below. Here it will be seen the panel has a slight raise and is beveled down to the gauge of the groove in the stile. The thin edge of the molding is beveled off to suit the bevel on the panel. On the whole this must make rather a fine door. The reference letters show where the sections are taken. All the doors referred to in this paper have been of the

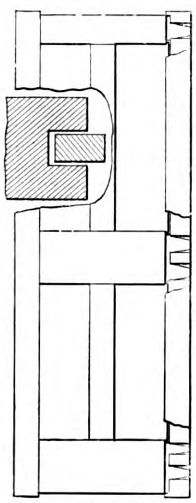


Fig. 11.

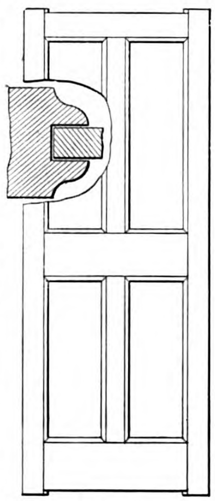


Fig. 12.

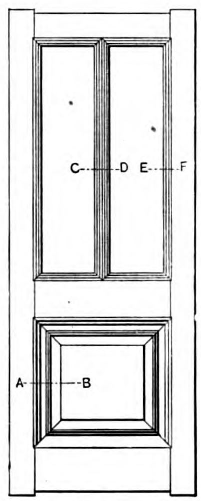


Fig. 13.

Some Swedish Made Doors.

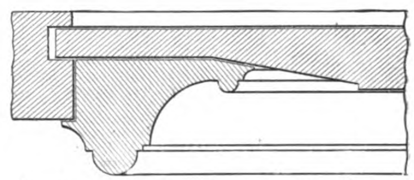


Fig. 14.—Section through Door in Fig. 13 on Line A B.

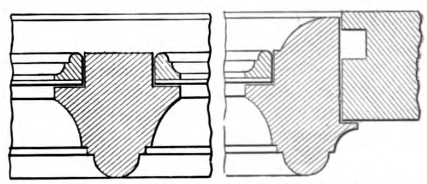


Fig. 15.—Sections Taken on Lines C D and E F of Fig. 13.

Doors and Doorways.

shown in Fig. 3, except that they had raised panels—on one side only—and molded, the molding being "stuck" in the solid, a fact which necessitated very careful workmanship. Many doors of this period are still doing service in New England, New York, Philadelphia, Maryland and Virginia.

Some years ago a wood working firm in New England received an order for a large number of four-paneled doors from a building firm in England. The doors were to be 1¾ inches thick, exact gauge. They were of various sizes and were to be plain. The cost of the lot was decided upon F. O. B., and when the goods were placed on board the money was deposited in a Boston house to pay the bill, the importers running all risks after that. The doors arrived safely, but were condemned on sight. One very important thing had been overlooked—namely, the prejudice of English people against innovations of any kind. The doors had raised panels, and English taste was shocked. Neither the architect nor owner would accept the doors, the builder could not return them, so two alternatives remained—use them elsewhere, or dress down the panels. The latter method was resorted to, so the doors were shipped to the nearest wood working factory and a revolving cutter on a long arm was devised for the purpose and the offending "raise" on the panels was dressed down and the English owner and the architect slept soundly afterward.

Exportation of doors and sashes from this country to England has never reached the proportions it ought to have done, for reasons that are difficult to understand. Most of the manufactured wood work imported into the

plainer sort and intended for the inside of medium cost dwellings. Entrance doors and doors intended for the better class of buildings of course are much more elaborate and costly, as I hope later on to show.

Arbitration and Conciliation in Canada.

From the annual report of the Canadian Department of Labor, just issued, it appears that during the fiscal year 1901-2 applications were made to the Department of Labor for its friendly intervention to aid the settlement of 11 existing strikes or lockouts. The localities in which these disputes prevailed were scattered pretty widely over the Dominion, from the Atlantic to the Pacific. In six of the disputes a settlement was effected within two days after the arrival of the conciliator representing the Government in the locality where the dispute prevailed. In three instances settlements were obtained on the very day on which negotiations were entered upon. In one instance the strikers were unwilling to accept the agreement which the company, in the course of negotiation, were prepared to enter into as a result of the attempted settlement, and continued the strike for a few days longer, accepting, however, at the conclusion of that time the terms originally presented to them by the conciliator. In four cases it appeared that the intervention of the department had been requested at too late a date to admit of any settlement being secured through its good offices. In all these latter cases the employers claimed either to have replaced the strikers with other hands or to be no longer embarrassed by the strike.

HINTS ON READING DRAWINGS.

THE subject of reading architectural drawings has attracted so much attention on the part of those among our readers who are desirous of promoting the good of the craft by stimulating the ambition of the younger element, that what we here present cannot fail to prove valuable as supplementary to that which has already been published in these columns. Although written more particularly from the standpoint of the painter, the article having been contributed to the *Painters' Magazine* by James K. Carpenter, there are many features considered which will appeal to the ambitious mechanic and afford him suggestions which will prove serviceable in his efforts to acquire facility in reading the working drawings of architects. The author says:

What I may say will perhaps seem trite and commonplace to those readers who are accustomed to go every day into architects' offices and there carefully measure the drawings set before them in order to submit their estimates, for I have no special hints to give them nor short cut methods to suggest, but I know by experience that there are many young mechanics to whom a set of plans is a mystery which they cannot comprehend, and it is for their benefit that I am writing.

Now let us start out with the explanation that working drawings are not pictures of the object they are intended to delineate, but they are a conventional means of representing an object so that its different dimensions may be obtained by scale measurement, and so that the mechanic who understands the principles of working drawings may be enabled to construct the object represented. A working drawing is, geometrically speaking, a projection of the object represented upon a plain surface. At least two drawings are absolutely necessary in order to represent any object—a plan and an elevation, and to make a full set of working drawings usually four elevations are required and one or more plans, while in addition sectional drawings showing the object represented as being cut through are made to further illustrate points that require explanation. As a rule the painter will be interested only in such working drawings as come to him from the architect's offices, and these usually consist of the floor plans and elevations of the houses on which he is asked to bid. He is seldom shown the larger details, though these might materially modify his estimate.

With these preliminary explanations, let us start at once to consider a set of working drawings, and for the purpose I have selected the drawings of a small one-story frame office building such as the village painter might be required to submit an estimate upon; just such a building as might be erected for the lawyer or doctor; plain and neat, and with no architectural pretensions.

First, let us examine the plan represented in Fig. 1. A floor plan is the easiest of all working drawings to understand, for it is a conventional diagram, representing the building as it would appear were it cut through by a plane parallel with the ground at a point somewhat above the level of the window sills, so that all the window and door openings are indicated upon the plan. The observer is supposed to be looking down from above, and the drawing is made to scale the same as a map. In short, a floor plan is merely a map of the particular floor of the house which it is intended to represent, and as my readers have all studied geography we may at once proceed with the special points requiring consideration in estimating from plans, and the conventional signs that are used to indicate certain things upon a floor plan. In former days the architects made their plans upon tracing linen, and the sections of the walls that appeared upon the plans were colored yellow to indicate wood, red to show brick, or blue to denote stone; but nowadays mechanics seldom see a tracing, but blue prints, made by a photographic process, are used instead. The use of colors has been practically abandoned and plans are drawn in simple lines just as shown by the figure, though in some offices the sections of the wall are cross hatched, or section lined. Brick work is painted in solid. I have shown the chimney in solid black. On the blue print it would appear solid white.

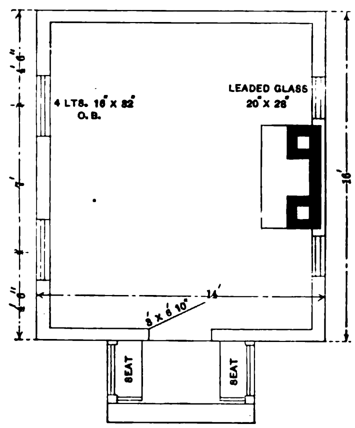


Fig. 1.—Plan.

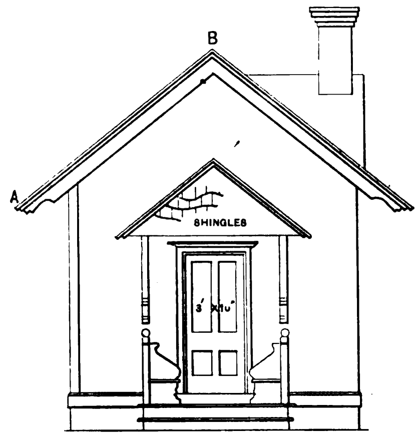


Fig. 2.—Front Elevation.

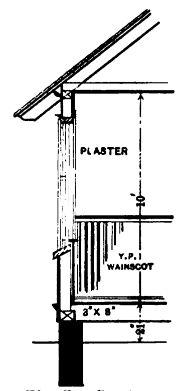


Fig. 5.—Section.

Hints on Reading Drawings.

Every change in level is represented by a line. For this reason two parallel lines are employed to show the walls and partitions, broken only at the doors. In this particular plan a line at the lower side of the door indicates the step leading down to the stoop of front porch. The door itself is indicated by a diagonal line to show on which side it is hung—though this is often omitted—and the size of the door is shown by figures. The windows are indicated by parallel lines running between short cross lines. This only gives the width of each window; the style and general dimensions we must gather from the elevations. But as windows are a very important thing for painters to consider, you must carefully count the windows on the plan and then just as carefully locate them on the elevations, checking up one by the other. Some architects figure the glass sizes on the plans, and also mark whether outside or inside blinds are to be used. Others put this information on the elevations. Still others do not figure the glass sizes on the general drawings, but leave them to be determined by the detail drawings that are furnished after the contract has been let. In this case it is well to scale the width of the window on the plan as closely as possible and deduct 4 inches for the stiles of the sash, dividing the remaining number of inches by the number of lights of glass to get the average width. But in doing this it is well to carefully compare the results thus obtained with the elevations, since a careless draftsman may have made the windows on the plan narrower than they should be.

Now let us look at the question of measurements; working drawings are always drawn to scale. The usual scale for general drawings is either ¼ or ⅛ inch to the foot—that is, ¼ or ⅛ inch on the drawing will represent 1 foot of actual building. These scales are spoken of as "quarter scale" and "eighth scale." In the first every ¼ inch on your 2-foot rule, as you lay it upon the plan, will represent 1 foot on the building; every ⅛ inch 6 inches, and every 1-16 inch will represent 3 inches. On a ⅛ scale drawing you cannot scale closer with a 2-foot rule than 6 inches, which is represented by 1-16 inch. Occasionally sketches are made to a scale of 1-16 inch to the foot, but except for approximate figures the mechanic should refuse to estimate from a drawing on this scale, as it is impossible to make such a drawing sufficiently accurate to permit of anything but guess work. In general ¼ inch to the foot is small enough for accuracy, except in the case of large buildings, though some architects are so particular in making their working drawings that a ⅛ scale drawing from that office is more apt to scale correctly than a ¼ scale from another office where the draftsman is notoriously careless as to accuracy. These, however, are points that you will soon learn after a little experience in figuring out of different offices. On the plan all measurements are considered as being made on the floor or parallel with it. The accompanying drawings have been originally made to a ¼ scale and photographically reduced to a ⅛ scale.

In order to insure accuracy in laying out the building the architect does not depend entirely on scale measurements, but carefully figures the dimensions on his drawings, though this is not always done until after the contract has been let. These figures are placed either in rows across the plans, with arrow points to indicate the places between which these measurements are to be counted, or they are placed outside, with dotted or red lines running to the point indicated by the figures. At the bottom of Fig. 1 you will find a general cross dimension, to the right and outside is the total length, and on the left side is a dimension line indicating the centers of the windows. The rule in all architects' offices is that figured dimensions are always to be taken in preference to scale measurement, and this is a very important rule to consider in estimating. I have seen mechanics figuring on a set of drawings entirely by the measurements which they would read from their 2-foot rule, neglecting plainly figured dimensions. When you consider that often there is considerable discrepancy between the two, the figures being placed on the drawing after it is entirely finished and then being carefully calculated to correct any error the draftsman may have made, the danger of this practice is readily seen.

Now, turning to the elevations, we see that the sloping roof, of which only the edges are seen in the front elevation, Fig. 1, becomes a rectangle in the side elevations, Figs. 3 and 4. If this is to be painted it becomes an important question to determine the number of square feet in this roof. To do so we measure from eaves to peak on the front elevation, A to B, and multiply by the length of the ridge line on Fig 3, C to D. To obtain the number of square feet on the different perpendicular surfaces on each side elevation is merely a simple question of mensuration as given in arithmetics. But to determine the area of any sloping surface we must first examine the drawings carefully to find its greatest length and greatest breadth, just as we have done in the case of the roof. Study carefully in this manner the method of determining the surface of the projecting hood, carried on brackets, shown only by two parallel lines on the front elevation, which extends over the front stoop.

In the sectional drawing, Fig. 5, which represents a piece cut through the building, we can scale the under surface of the eaves, which the specifications tell us are yellow pine matched boards that are to be oiled and varnished. We can also see the hight of the wainscot that is to have three coats of varnish, and the quantity of rough plaster which is to be kalsomined.

In a brief article like this it is impossible to discuss every point that may be brought up in reading a set of plans, but the painter who carefully studies those plans which may come to hand by the same methods we have here employed, and who is guided in his measurements by the system of measurements adopted by the National Association of Master House Painters and Decorators and published by them in book form, need fear no difficulties that may present themselves.

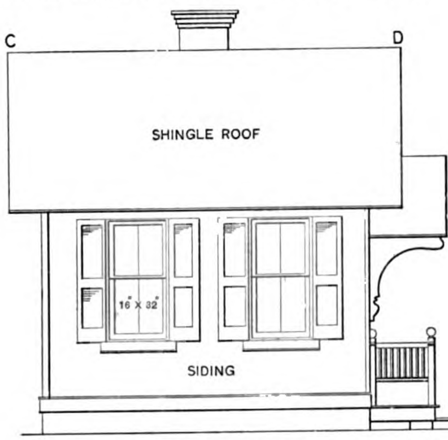


Fig. 3.—Side (Left) Elevation.

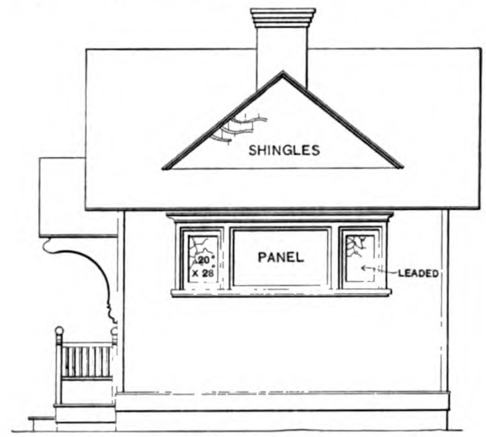


Fig. 4.—Side (Right) Elevation.

Hints on Reading Drawings.

Wages of Building Mechanics in Chicago.

Notwithstanding the highest wages ever paid in the city of Chicago were given last year to the building mechanics, they are now demanding an increase, and there is every reason to believe that their wishes will be complied with in part, if not wholly, says a writer in a recent issue of *Construction News*. The advances in the price of labor are very striking. For example, roofers, who two years ago got 30 cents an hour, are now paid 50 cents and demand 60. Roofers' helpers who were paid 15 cents an hour two years ago, now receive 25 and 30 cents. Bricklayers are now paid $4.40 a day and want $4.80; plumbers are paid $4 and want $5; gas fitters, $4, and want $5; steam fitters, $4, and want $5; plasters, $4 to $4.50; hoisting engineers desire an increase of from $4 to $5 a day; bridge and structural iron workers from $4 to $4.80; sheet metal workers, $3.40 to $4; carpenters, from $3.60 to $4; plasterers' helpers, $2.80 to $3.20, and electricians, $4 to $5 a day.

Flue System in the "Ansonia" Apartment Hotel, New York.

A SHORT time ago we called attention to some of the features of construction and equipment in connection with the Ansonia Apartment Hotel, recently completed in this city. One of the many difficult problems the builders were called upon to solve was the disposition with the Ansonia Apartment Hotel, recently comthe fact that the building was of steel frame construction. Just how the difficulties in this respect were surmounted was told by R. Pelham Bolton in a paper presented by him at the ninth annual meeting of the American Society of Heating and Ventilating Engineers, held in New York City in January of the present year. There is in the paper so much of interest to many of our readers that we give it herewith:

In the course of the construction of this great building, which contains 340 suites of apartments and more than 2000 rooms, the writer, who had designed the system of ventilation of the apartments, was called into consultation upon a difficulty that had arisen with regard to the construction of the parlor and bedroom chimney flues. The building contains 63 fire places on each apartment floor and 12 kitchen gas ranges, making 1133 in all, inclusive of those on the ground floor.

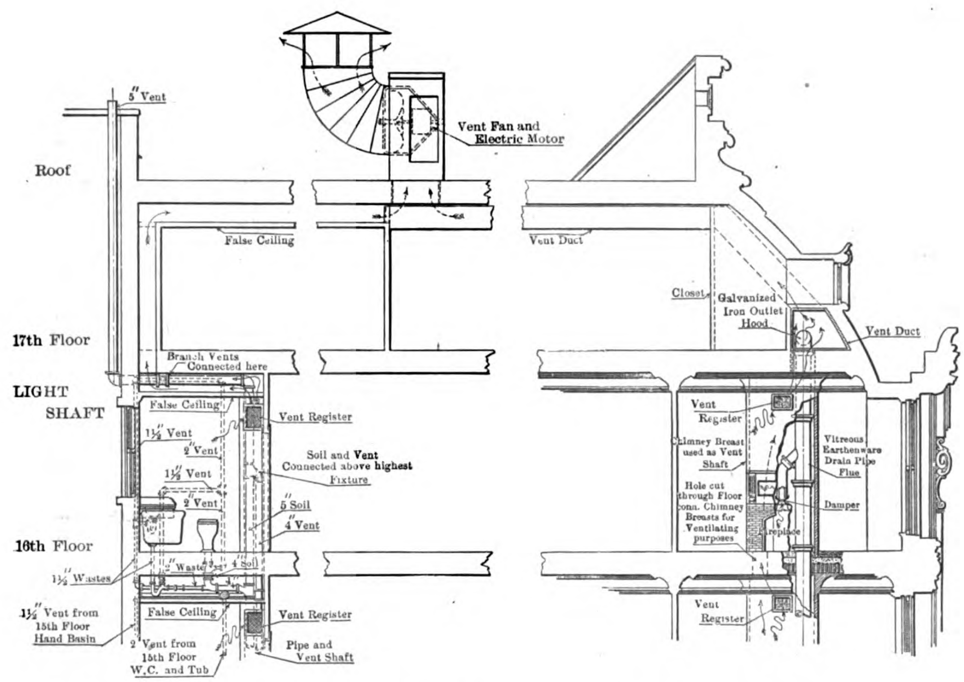
The difficulty in providing flues for the large number of superimposed fire places, necessitating, under usual methods, not less than 268 separate flues, was complicated by the fact that most of the rooms were so designed that the respective fire places were situated on interior partitions, others were placed back to back, and in general they were planned to occupy a corner of a room. In almost every case, therefore, a line of flue in wall or partition cut the lines of steel framing, and, if placed to one side of the latter, required separate framing to carry its load, and in addition, as the flues were added on upper stories, seriously encroached on room space. The flues had been planned in detail, and were so proportioned that four fires were served by each flue. In order to avoid the framing, and especially that due to the change of outline by the mansard roof, they were required to be offset and twisted in a most complicated and undesirable manner.

In addition, the two upper apartment floors, 15 and 16, are reduced by the receding shape of the mansard roof, and not only lost most important space by the bulk of the stacks, but the outer flues themselves were required to be built at an angle on the fifteenth floor to suit the shape of the outer walls.

A still further difficulty presented itself in the impracticability of connecting the interior fire places of the sixteenth floor to the outside chimneys. The connection of the latter to the building being at the level of the seventeenth floor, the interior flues had to be carried over horizintally across the ceiling of the sixteenth floor, thus rendering them practically worthless.

The entire system as proposed seemed to present so much special work as to be very costly, particularly in the special framing and offsets rendered necessary. A study of the conditions led the writer to propose a radical departure from ordinary methods, which has been successfully installed. It consisted in the abandonment of outside chimney stacks as a means of disposal of the gases and the connection of the smoke flues and vent fans on the roof, whereby a definite draft would be maintained in any fire place. By combining the gas range flues with their vents similar results could be effected in the kitchens. The arrangement obviates the necessity of separate flues for limited number of outlets, and enables a long line of fire places to be connected to one flue. The adjustment of draft could be readily set by a fixed damper at each smoke inlet.

Advantage was taken of the existing system of vents already designed and partly installed for the above purposes, the vent fans, of which there are five, being increased in size to suit the additional work imposed upon them. The apartments are ventilated by a supply of tempered air, delivered from flues under pressure inside the private corridor of each apartment suite. The escape for the air there introduced is provided by vent registers in flues passing through each toilet room, bathroom and kitchen, in the latter use being wanted high up under the hood over the gas range. In addition, in each parlor or bedroom a vent was provided over the chim-



Smoke and Gas Flue System in the Ansonia Apartment Hotel, New York City.

ney breast, these being connected into the space behind the breast, with connecting holes through the floors. Each line of chimney breasts therefore forms a vent shaft.

Every bathroom has a vent shaft or flue formed in one of the outside corners, by furring out around the stacks of sanitary, water and heating risers, pipes which are arranged to be grouped at those points. The flue answers a double purpose, as by its means the risers are kept free of the walls and the too common fault of bricking-in piping is avoided. The horizontal connections and the traps of bathtubs are arranged in a space between the under side of the floor beams and a false or hanging ceiling, this space being open to the vent flue. Thus any leakage of sewer gas at the joints or traps is drawn off by the vent system. These various flues pierce the building from the second floor level to the seventeenth floor, where they connect into galvanized steel ducts, by which they are grouped to five centers, at each of which is a 48-inch Seymour disk fan, electrically operated by a direct connected Lundell motor. The connection of the smoke discharge was made in the manner illustrated as follows:

Under the curved portion of the seventeenth floor outer walls, due to the mansard roof, a system of ducts was extended, planned to run as nearly as possible over the line of all smoke flues. Where interior fire places twisted there was provided a separate rising extension to the ceiling of the seventeenth. All were there, as before described, connected to the fans. In the southwest quarter of the building a large dining room occupies the sixteenth and seventeenth floors, and here the rising flues of all kinds are connected together by charcoal iron horizontal ducts covered with air cell asbestos extended over the ceiling of the fifteenth floor to one of the vent shafts connecting to a fan. Vitrified earthen ware drain pipes were proposed and adopted for the vertical flues, and are arranged to stand within the interior spaces occupied by chimney breasts, and, passing up alongside the iron fire hearths, occupy no space in the partitions or walls of the rooms. One line of 8-inch pipe is provided for a tier of fire places, and where two back onto each other a line for each is provided and alternately connected. Some of the outside flues, where an outside chimney stack occurs, have been provided with a by-pass and cut off, connecting them to the outside stack. This was done simply as a concession to nontechnical prejudice and from no feeling that it was necessary or desirable. In most cases, however, no such connection suits, nor can it be made.

The earthen ware pipes are connected by 4-inch bends to the fire places by a spigot specially made the reverse direction to ordinary sanitary patterns. The bend is set into a spigot formed on the top of the iron fire hearth, which was designed specially with a tapered top, contracted to a throat in which a butterfly damper is set at a fixed point by a set screw.

The support of these lines of smoke pipe, each of which is about 186 feet in hight, was very simply effected by arranging as a bed for each fire place a mass of cement concrete with wire rods imbedded therein, forming the floor thickness above the floor arch top up to the finished hearth level. This was extended in any convenient direction so as to reach over the nearest floor beams and obtain a thorough support. In this bed the socket of the vertical drain pipe was set and bedded and connected to the corresponding pipe rising from the floor below. The weight on any floor is, therefore, only that of the length of pipe corresponding to its hight. On the unoccupied side of the interior of the chimney breast a hole was opened through the bed and the arch below. This was simply cemented in any convenient shape, in corner fire places being triangular.

Around the whole the chimney breast was built, the iron fire hearth having been set, and its front arch being made of sufficient strength to carry the center of the breast. Most of the fire places have been provided with gas logs, but the system was planned for dealing with the products of combustion from a certain amount of coal or wood fires, and the opening can at any point be set to suit.

The net reduction in cost by this departure from ordinary methods of flue construction was fully $26,000, and had the outside chimneys been dispensed with as much more might have been saved.

One considerable advantage appears to result—namely, that on starting a fire or a gas log a draft is immediately obtainable. In tall buildings, annoyance is frequently experienced from smoke and gas, due to the cold chimney failing to draw off the products of combustion. For large buildings it may be expected that this system will eventually displace the use of outside chimney stacks.

The House of William Morris.

The recent public sale of the house built by William Morris, the well-known English artist and author, in Bexley Heath, renders interesting the following account of it as given by Symer Vallance in an exchange:

Upon entering the porch, the hall appeared to one accustomed to the narrow ugliness of the usual middle-class dwelling of those days as being grand and severely simple. A solid oak table with trestle-like legs stood in the middle of the red-tiled floor, while a fire place gave a hospitable look to the hall place. To the left, close to the foot of the stairs, is a screen with leaded panes of glass that divides the main hall from the lesser hall or corridor. To the right is a press or cupboard with a seat below (on the outside of its two doors are figure compositions begun in oils, but not finished; inside are some experiments in diapering in black on a gold ground, by Morris) and beyond this press is the dining room. Its fire place is of brick, and stands out from the middle of the wall, and, like the rest of the fire places in the house, is without a mantel shelf, the chimney breast going straight up to within a short distance of the ceiling. The furniture included a wide dresser ornamented richly with painted decoration, a movable settle with high back and leather panels, and plain black chairs with cane seats (the revival of this form of chair is due to Morris' example). The walls were tinted with distemper and the ceiling ornamented by hand in yellow on white, the pattern being pricked upon the plaster and afterward filled in with distemper.

Opposite the front door is the wide oaken stair case, the underpart left open, not boxed in. Upstairs above the dining room is the drawing room with a decorated open roof and, as a chief piece of furniture, a great painted bookcase or cabinet, with a ladder stairway reaching to the top of it, where one could sit; while thence another ladder led into a storage loft in the roof. The walls of the principal bedroom were hung with embroidered serge and here also was a decorated wardrobe —a wedding present from Burne-Jones, who, while on a visit to the Red House, in 1860, commenced a series of paintings in tempera on the end wall of the drawing room.

New Passenger Station for Wabash Railroad.

The new station to be erected in Pittsburgh by the Wabash Railroad Company, who have just secured an entrance into that city, will be located at Liberty and Ferry streets, and will cost more than $1,000,000. It is expected that work upon this magnificent structure will be commenced April 1, and be pushed rapidly to completion, in accordance with plans prepared by T. O. Link of St. Louis, the architect of the railroad company. The new passenger station will consist of an Executive Building, in which will be located the main waiting rooms, ticket offices and general offices of the railroad. This section will be nine stories high, constructed of steel, granite and marble, and will have a frontage of 185 feet in Liberty street and 221 feet in Ferry street. Back of the station building will be the train shed, 450 feet long and 100 feet wide, surmounted by a huge steel arched glass roof. The train floor will be 35 feet above the level of the street and the waiting rooms will be reached both by a grand staircase and a system of passenger elevators. The contract for the construction has been awarded to the George A. Fuller Company, and it is thought that it will require about ten months to complete the work.

CORRESPONDENCE.

Construction of Picket Fences.

From D. P. B., *Redford, N. Y.*—After 30 years' experience and observation, I desire to say that I agree with "J. F. H.", New Marion, Ind., who asks for a design for a picket fence, that good fences are rare. I know a place which had good fences when I was a boy, but which have for years been in a deplorable state on account of bad style of work. When the gains were cut for stringers the stringers and posts are rotted away. The last and best fence I built will I think do to imitate. Set the posts five feet deep. They should not be any less than 6 inches in diameter and have the bark peeled off. The holes should be dug large and the posts set by two lines top and bottom. Drive two stakes 5 or six feet from the post, one stake being parallel with the fence and the other at right angles. With the stay, as shown in Fig. 1, stay and plumb the whole line perfectly straight, then fill in and tamp with a 2-inch pole. Hew as little as possible on the work edge of the post. Use 1¼ x 3 inch stuff for top stringer, 1¼ x 4 inch for middle and 1¼ x 2 inch for bottom. Nail to posts as shown in Fig. 2. The water drip should be 1½ x 1 inch and the base 1 x 6. The best proportions for pickets are ⅞ x 2½ x 38 inches, set 3 inches apart with Gothic points 4 inches

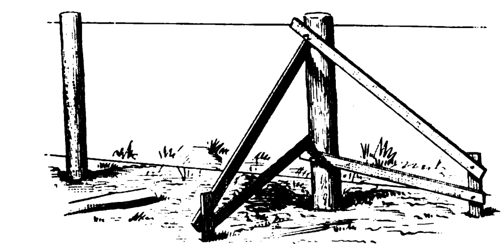


Fig. 1.—Manner of Setting Posts.

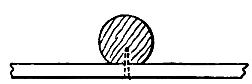


Fig. 2.—Plan View Showing Post Slightly Hewn and Stringer Nailed On.

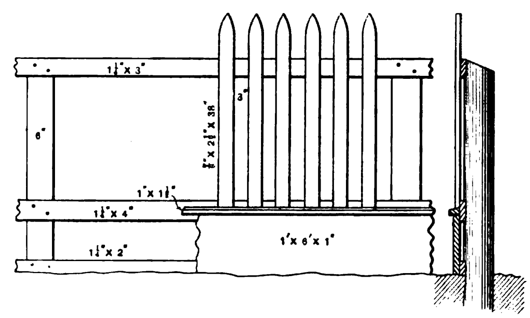


Fig. 3.—General Method of Arrangement, with Sizes of Members.

Design for Picket Fence.—Suggestions Offered by "D. P. B.," Redford, N. Y.

high. An idea may be gained from Fig. 3 of the drawings. The work half of posts should be painted after setting; the back side of stringers, the edges and front before putting on base or drip. The top of base and drip should be painted all around before putting on and the stringers and back of pickets before nailing on. As much as possible should be done before the paint is dry. Use boiled linseed and zinc white. The posts should be charred or pour whitewash around the bottom or the last few inches should be filled with dry ashes and then pour on water. This can be done later on. Good results may be obtained by using properly made whitewash tinted instead of paint.

From Down South.—In the February issue "J. F. H." of New Marion, Ind., asks for a discussion of picket fences. I think this is a very worthy subject and as I have had some experience I will to some extent give the readers the benefit of it. The correspondent well says that "it is often noticed that such fences which have been up but a short time commence to lean and fall down." The reasons for this are two-fold—rotten posts and improper setting. The depth to which a post should set depends up on the nature of the soil and the style of fence. For a picket fence 3 or 4 feet high, if the earth be hard clay or gravel and ry, 12 to 16 inches would do, provided the posts were properly rammed. If the earth is loose, sandy or loamy, and especially if it is wet, the posts should be put in 18 to 24 inches. If the fence is solid board 6 to 7 feet high, which is sometimes the case, the posts might be set as much as 30 inches in the ground. I find that there is more in the ramming than most fence builders appear to recognize. I notice the custom of some is to fill the hole entirely full, give it a few jabs with a large stick, piece of scantling or any old thing that happens to be handy and let it go. How can one expect a post under such circumstances to to hold up against high winds and various other forces that often come against a fence? My plan is to dig a hole large enough so that there will be sufficient room on all sides for the rammer to work freely; put a shovel or two of earth in and then ram down hard all around, filling and ramming gradually to the top where it should be well rammed again. If the earth is so wet that it will not pack well, gravel, small stones or something that will pack should be used. Posts are supposed to set plumb always and a strong line should be stretched about 6 inches above the ground, to which set the face side of the posts. If the weather is windy a shorter section should be taken at a time and the lines stretched taut. It will be found much better to have the bottom end of the posts sawed off smooth, as it is sometimes hard to adjust a post with a sharp or jagged end in the ground. It will probably be found easier, even where the ground is level, to cut posts an inch or two longer than necessary, and when set, line and saw off the tops. This is especially true when running up or down grade.

If timber that is known to be lasting cannot be obtained, I would suggest that posts be put in the fire and charred all sides up to the surface of the ground or a little higher, then smother out the fire, but do not use water for the purpose. While they are hot, swab the charred surface with tar, either coal or pine, and if dry sand is handy roll them in that. It would of course be better if the tar could be heated and the bottom ends of the posts dipped in it, but this might not always be convenient. The charring of the posts will help without any tar.

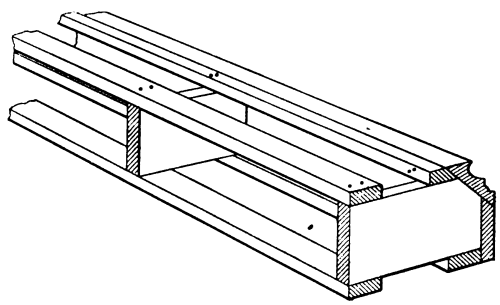
As to the work above ground, I usually set the posts 8 feet, center to center, and have the rails or stringers 2 x 3. I cut the top of the posts to line, spike the upper rail on top of the posts and then put in the lower rail. I prefer to cut the lower rail in between the posts and toe-nail. When gained into the posts there is a tendency to collect moisture and rot both rail and post. The straightest of the rails should be used for the top and should always be put on first so as to keep the posts to their places while putting in the lower rail. If it is intended to do a good job, the face side of the posts and rails should now have the priming coat of paint. When it is dry, put on the base, pickets, etc., and care should be taken to keep the pickets plumb when nailing them in place, as neglect in this respect results in a very unsightly job.

Now a few words as to gates may not be out of place, for I think most people will agree with me that many of them are a disgrace to the owners or builders, or both. Gate posts should be so well set that they cannot work loose. I find it a good plan to take a piece of some durable wood, 2 x 4, or 2 x 6, and cut it to fit close between the gate posts similar to a threshold under the door. This will be found to help very materially in keeping them steady. Use the best material obtainable for the frame work of the gate, put it together well, bracing it so that it cannot sag, then put on such fancy work as may be desirable. Near me as I write is a gate, which I made and hung 25 years ago and is still in good working order, never having been painted. I do not know of another of which as much can be said. I had thought of sending some sketches, but will leave them for some of the fraternity who are more handy with pencil and rule. I think if these few suggestions are acted upon there will be better fences in the country.

I have not seen any criticisms of my tool chest described some months ago. I trust I am not vain about it, but would like to know what others think of the arrangement and construction.

Making Artifical Stone Steps.

From W. C. K., *Kansas City, Mo.*—Having noted the inquiry of "W. A. F." in the January number of the paper, I offer a few suggestions regarding the construction of artificial stone composed of cement. In inclose a sketch showing the form used in shaping the front or riser of the step. All other sides, except the top, which is left open, can be made of rough boards, or the steps can be made in the place where they are to be used, which I think is the better way. Great care should be taken in mixing the concrete. Have two kinds of concrete, one of coarse stone, sand and cement, and one of fine stone, sand and cement. First put the fine concrete against



Making Artificial Stone Steps.

the form and use the coarse for the bulk of the stone. Tamp and repeat the process until the mold is nearly full. Use the fine to finish the top. Use a board to tamp the concrete and be sure to tamp the face wall so that there will be no cavities. After the concrete sets, take off the form and dress with a trowel.

The way I calculate the proportions of broken rock or gravel (broken rock is the best), sand and cement is as follows: Take a measure of broken rock and fill with water. By measuring the water I find the cavity, and this will be the amount of sand required. Then by measuring the amount of water the sand will take I have the amount of cement required. Only use enough water to make the surface damp after the tamping has been completed.

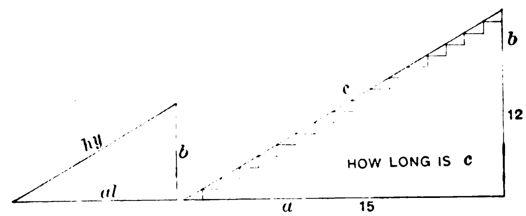
Square Root as Applied to a Flight of Stairs.

From D. P. B., *Redford, N. Y.*—The correspondent signing himself "J. F. H.", New Marion, Ind., in the January number, wants to know something about square root and its application in connection with a flight of ordinary stairs. This being one of my favorite methods and last tester, I will, as briefly as I can, elucidate a little. I have never used it much in stair building, but always prove my rafters by it. There is one very old illustration. Draw a right angle triangle as shown. Now it is a matter of experiment that the area inclosed by a square having a hypotenuse for one of its sides is equal to similar squares having the base and altitude for one of their respective sides.

Referring to the smaller diagram: Let *b* equal 15 feet; *al* 36 feet, then *hy* must be exactly 39 feet, for

$$(15 \times 15) + (36 \times 36) = 39 \times 39.$$

The simplest method of getting the square root is to separate the number into periods of two figures each, beginning at the right hand at units place. Find the greatest square in the first left hand figure or period. Place it on the right for the first figure of the root. Double it, annex a cipher to it and place it on the left for a trial divisor. Find how many times it will go in the remainder with the next period brought down. Add this figure to the trial devisor and multiply. Continue this operation until two or three decimal places are ob-



Square Root as Applied to a Flight of Stairs.

tained. For example let us obtain the square root of 1521.

```
        15.21 | 39 ans.
         9
  60  |  621
   9  |  621
  69
```

Explanation—The greatest square in 15 is 3, placed at the right; doubled with cipher added, and placed to the left equals 60. Now 60 will go into 621 nine times and we have the equation

$$60 + 9 = 69. \quad 69 \times 9 = 621.$$

Square root applied to stairs as indicated in the larger diagram.

$\sqrt{(12 \times 12) + (15 \times 15)} = 19.209$ feet, which is the length of *c*.

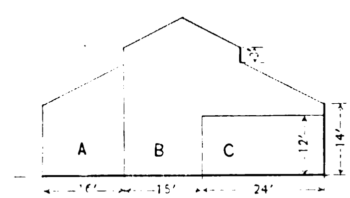
The process is the same as that described above.

Note.—We have a similar demonstration from "S. G. H." of Philadelphia, Pa.

Best Method Desired for Supporting Roof of Lumber Shed.

From J. A. E., *Kiron, Iowa.*—I inclose a sketch of a lumber shed and store and would like to have the practical readers suggest how best to support the roof, which is of shingle and one-quarter pitch. The part marked A is to be a double deck lumber shed and the part B is a store, C being a driveway. The store is to have a floor span of 24 feet.

In this connection, permit me to say that I consider *Carpentry and Building* the best paper of its kind published. The Correspondence department is of great help and the comments on what constitutes a day's work for a carpenter have been read by me with great interest. I have laid 3500 shingles in 10 hours on straight roof



Supporting Roof of Lumber Shed.—Diagram Submitted by "J. A. F."

34 feet long and on doors have put on mortise lock, butts, threshold and stops at the rate of six per 10 hours, and considered this good speed. I would like very much to learn the experience of some of my brother chips as to their method of estimating on labor.

Questions in Door and Window Construction.

From FRANK RIPPON, *Coalville, Utah.*—Is it a first-class job to nail stops on door jambs to form a rabbet?

Will some reader explain his method of putting a box frame in an 8-inch brick wall. I use a ¼-inch board to case in the weights nailed to the pulley stile.

A Barn Constructed of Concrete.

From L. W. C., *East Orange, N. J.*—I am a reader, but not a subscriber to *Carpentry and Building*, as I secure each issue from my newsdealer. In looking over one of the recent issues I noticed an article on Concrete Construction for Buildings. As I have had a little experience in this line, I feel that I would like to add my contribution to what has already been said. About a year ago a barn in Bloomfield burned down and the owner operating an ice cream plant, using ammonia for making ice, and having a steam boiler, engine, dynamo, electric lights, etc., considered the risk too great to put up another wooden barn, more especially as insurance rates were very high. He therefore concluded to erect a fire proof building and came to me with his problem. We looked into the matter of reinforced concrete construction, but neither of us having had any experience concluded it was a task. We went to work, however, and from the photograph (reproduced in Fig. 1) which I send herewith the readers can see with what success our efforts were crowned. The roof it will be observed is shown incomplete at the angle, but on account of other work this part could not be finished before cold weather came on. In putting up the building we first constructed the footing courses, then we made forms to set up with 12 inch offset on three sides, with molding in the angles to form chamfer on corners when they were taken down. We bolted them together, leaving 3 inches between at the center, so when the forms were taken down the panel of concrete would be 3 inches thick. Before filling in we ran ¼ inch and ⅜-inch rods perpendicularly and horizontally about 8 inches apart, so interwoven as to form a screen-like construction. We let the rods in the first story run up about 18 inches into the second story panels. After we put up the first story panels, we formed molds for girders and beams for the second story floor, which is constructed of concrete 2½ inches thick, the panels being 6 feet 6 inches by 10 feet 6 inches. Then when the first story was up and the second story floor down, we put up the second story panels, after which the roof of tar, gravel and felt was put on. In the photograph the owner will be noticed standing on the chicken house roof, which is only 1¼ inches thick with 3-16 inch steel rods through the same, 9 inches apart, crossing but not interwoven. The size of the roof is 4½ feet by 13 feet by 7 feet. The diagram Fig. 2 which I send shows the general outlines of the barn and hennery. In the girders we used ½ inch rods placed near the bottom; in the columns to support the girders 4½ inch steel rods. This was my first experience and as the owner is a baker and never did anything of the kind before, we feel quite proud of our success. We have been unable so far to note any cracks or other ill effects from settling or frost. I think it is only a question of a few years when we shall see many houses built of cement and concrete, for they are springing up all over the country. The main thing is to find a clean gritty gravel and thoroughly mix the same before and after applying water. Our experience has taught us a great deal and we could put up another building very much easier than we did this one.

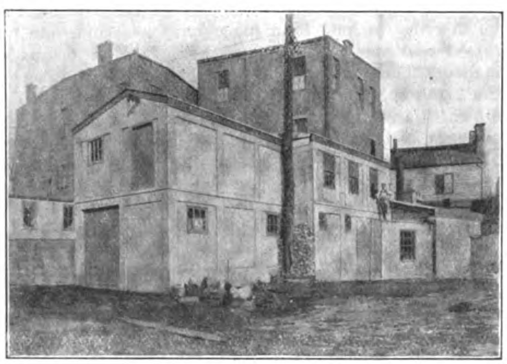


Fig. 1.—Direct Reproduction from Photograph of the Concrete Barn.

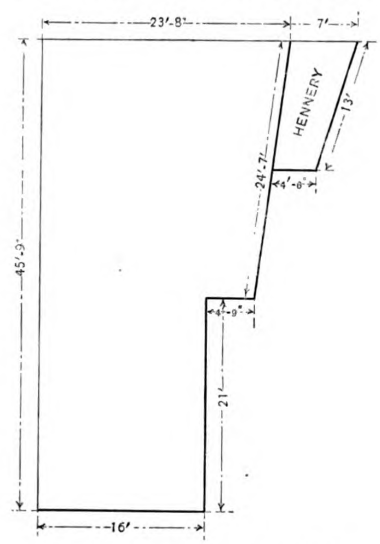


Fig. 2.—Diagram Showing Ground Plan of Barn and Hennery.

A Barn Constructed of Concrete.

Hints on Framing.

From M. L., *Newark, N. J.*—Instead of talking so much about shingling and hanging doors let us take up for discussion the subject of framing, for while there are many framers there are just about as many different ways in which the work is done. To start with, I think the framer should first lay out a set of framing plans. His work is then before him, and he lays out so many beams of this length and so many of that length and checks them on the plans. It is much better to figure out the size of well holes at leisure than to do it when five or six men are asking questions about this, that and the other thing. When the sills are framed, that is to say, cut to the right length and lapped at corners and angles, lay off every beam, trimmer, window opening and stud upon them. Then lay off the posts on the sills, the ties next, by laying them on top of the sills and transfer the marking from the sill to the tie. Next lay out the beams, windows and studs for the second floor, beam marks on top of the tie, second floor studs on the inside, first floor studs on the outside; next the top tie or plate; lay out the beams on top of the tie, second floor studs on outside, gable studs and windows on the inside. All this, of course, being done before the sills are laid on the foundation. I have worked to this system for the past six years, and find that when I raise a building I have every line partition where it comes to the outside wall line so that all that is required is plenty of strength, hammer and nails. When it comes to the roof and having the rafters all cut on the ground, lay out the shingle lath on them, this being done by laying five or six on top of each other, jacks as well, and square down. All this saves a lot of time on the roof, and the courses are all parallel and intersect around the hips. I trust that these few hints may be of use to some one, and if so my paper and ink shall not have been wasted. I think it would be a good thing if the framers would give us their methods of doing things—the short way, of course, is what we are looking for.

Hanging Glass Doors.

From E. E. F., *Wenatchee, Wash.*—Will readers in different sections of the country tell me which is the right way to hang a glass door—with the putty side in or out?

I contend that the putty side should be in, for if the putty side be out and the door slam the glass is liable to come out.

Building Methods of Long Ago.

From J. S. M., *Syracuse, N. Y.*—We often hear the expression "in the good old days," and very likely the people who make it are sincere in their belief that the "old days" were really enjoyable, but I doubt if much real thought is given the subject by the person making the expression. The words "good old days" may be given a very wide latitude, but it is not the purpose of the writer to go into the subject of antiquity in all its phases; rather to make a few comparisons as between how the mechanic of other days did his work and how it is done now. For instance, there are doubtless men living to-day who remember the "scribe" rule by which buildings were erected in the long ago, when timber was plenty and frame structures were the rule. The carpenter and joiner of to-day, as a rule, has no knowledge of how buildings were constructed before the days of the "balloon" frame. In those days—the old days—more timber was used in the frame alone than is now used in the entire finished structure. I do not know how they planned their buildings in those days, for I have never seen anything that gave light on the subject, but I don't imagine they indulged in very elaborate drawings. It would be a strange experience for a carpenter and joiner of to-day to go to the woods with his "scorers"—not of the baseball variety, but men with axes who were to help him form his timbers for whatever structure he was about to build—and select and have felled trees of suitable size of which to form the various pieces of timber required; then to use the "chalk line"—charcoal instead of chalk—and lay out and mark by the use of the chalk line the lines to which his scorers should work, this to be followed up with "broad axe" and "hew" to proper size the various timbers required. But this was what was required by a carpenter in the good old days. After the timber was "hewed" it was hauled to some place near the proposed site of the building being erected and there "laid out," mortised, tenoned, pin holes bored and the work fitted together according to the place desired, and, after being properly marked, so as to know where each piece belonged, was taken apart and laid in proper order against the time when it should again be put together for the "raising"—ah! those raisings!—but we will speak of them later.

This, then, is what is referred to nowadays as the "old scribe rule," the rule by which the now historic building at Yorktown, Va., in which George Washington received the capitulation of the said town from the British in command of Lord Cornwallis of revolutionary frame was built. In the more modern siege of Yorktown, 1862, it was my privilege to go into and about this old building the day after our Southern countrymen had abandoned the place after a stubborn siege which lasted exactly one month. Very little harm had come to the old building, notwithstanding the fact that it was often in the line of spirited cannon firing between the hostile forces. It seemed to possess the peculiar trait attributed to George Washington—that is, not born to be destroyed by being shot—but it did get hit a few times and a few of the clapboards were displaced in consequence, disclosing the "scribe" marks of the builder of the structure. This scribe rule of the good old days does not strike me favorably, for it looks like a waste of time to put together, mark and take apart timber anywhere from 10 x 10 to 16 x 16 inches by 20 to 40 feet. If hard work was a part of what constituted the "good old days," then erecting the frame of a building was "right in it."

Coming down to more modern times, I have often heard of a builder who had taken the job of erecting a church in a nearby village who did not propose to work according to the "scribe rule," but to proceed with the framing according to, it may be supposed, fixed plans so that mortise and tenon would fit their respective places without the labor of putting together and again taking apart the work, and this intrepid builder also proposed another innovation. He proposed to not only "hew" his timber in the woods where it was felled, but to mortise and otherwise prepare it there, and then when ready move it to the building site and put it together. "Raising" day was awaited with more than the usual interest displayed by friends and neighbors, who expected to be invited to the event, so that when the day for erecting the frame arrived there was plenty of help on hand to do the work. As everything moved along without a hitch, each tenon and mortise fitting properly, the builder was looked upon as an uncommon personage and was given the distinction of having delegated to the shades the old cumbersome scribe rule of early date. "Raising" day was yet in vogue when the writer honored the world by being born, and engaging, to a slight extent, in the work of helping erect buildings of moderate size, and memory surely does indulge in a smile as it recalls the fun of "raising" day. It was a day of importance, and no matter what other engagement was occupying the time of the party invited he was expected to respond in person and add his mite toward the raising of the building then being constructed. Men of 55 and 60 years of age were not then, as now, considered to be beyond the period of usefulness, and if not a majority were sure to be of sufficient numbers to be noticed, and when it came time to set up the "bents" to the lusty cry of "Heave, oh! heave" from the "boss," they lifted with the best of them. The daring young fellow was there also, and sometimes a reckless one would be raised with the bent, ready when called upon to nail the stay brace of the first bent set up in order to hold it in place until a second one was raised and the connecting timber with its braces attached. The jug—not the little brown jug, but one of the 2-gallon variety—was in evidence, and while I cannot call to mind a single instance in which an individual overindulged, I know that some grew unusually merry and the majority more or less exhilarated by reason of imbibing the product of the "worm of the still," whose abiding place was in said jug.

There was always the old man who made the pins, which, by the by, required a certain knack, as the size required was always made by the eye, and I never knew of a case in which they failed to fit. When the last timber was in place some person was selected to name the building. The person chosen for this purpose took the jug and, by means handy or otherwise, climbed to the highest place possible, where, after calling the name chosen, he took a drink and then threw the jug to be broken by the fall, and the liquor, if any was left, spilled. After this sports were indulged in, which consisted of wrestling, jumping, &c., by the few and a game of baseball by the many. The ball was not a hard one, but was tested by its bounding ability. Sides were chosen and the fun began. Some old man with a knife and a stick kept "tally" by cutting notches in the stick. "Over the fence was out," unless the side batting it was able to secure it before the other side could do so, and the nimbleness displayed by men with hair of gray was a jolly sight to see. The batter did his best to boost the ball to the limit, and some decidedly long hits were made.

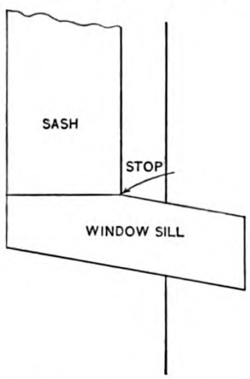
Possibly the memory of these games of baseball is what makes those "old days" seem, after the lapse of years, to be good days, but if one cares to keep the illusion intact he must needs forget some of the stern facts in the case. For instance, if the structure was a house that was to be clapboarded and have anything like a stylish cornice it meant a lot of hard work for some one to prepare the material. The clapboards were usually 6 inches wide, ½ inch thick and 12 feet long, planed on one side and one edge straightened. On the side the jack and the smooth plane were used, and the long jointer, of course, came in play in straightening off the edge. Among other things, moldings had to be produced by hand, and when it comes to shoving a 5-inch OG molding plane—well, one does not gloat over the recollection. Let us suppose that a man could plane a clapboard in five minutes, that would be 12 per hour, and if he worked 12 hours—and in the summer he was liable to work longer—that would be 144 pieces for the day and there was sure to be a very tired man in the game. Good old days? That depends, but I am afraid that when one indulges in comparisons of the then with the now he will come to the conclusion that the "good old days" are only good for the carpenter and joiner because they are past.

Heating and Ventilating Small Churches and School Houses.

From H. B. M., *Lincolnia, Va.*—Will some of the contributors of the Correspondence Department describe for publication the best methods of heating small churches and school houses. By small, I mean in size running from 24 x 36 to 36 x 50 feet, and with ceilings from 12 to 20 feet, and some higher when finished up the rafters. Ventilation is to be an important part of the methods.

A Question in Window Sash Construction.

From H. M., *St. Louis, Mo.*—Will some of the readers of the paper tell me the best way to construct the bottom of sash that are designed to be hung on the side with



A Question in Window Sash Construction.

hinges and to swing inward, so as to keep out the elements?

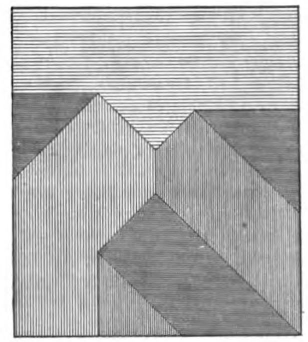
Constructing a Small Ice House.

From F. N. M., *East Woodstock, Conn.*—I have been both interested and amused over the correspondence which has been going on in the columns of the paper. I had an idea that I could shingle just a little bit, but that 40-bunch man is two times too many for me, and more, too. I would like to have him move into my town so I could hire him for a day or two when rushed.

In the February issue, "J. F. H.," New Marion, Ind., asks about an ice house. I have built some and have more to build, so I will try to describe the way the work is done. We cut chestnut posts, which will slab off two sides and leave a thickness of 6 inches. Set them in the ground 3 feet deep and about 3 feet apart. Commence at one corner at the hight desired and saw the tops off level. Next level across to the other side and do the same thing. Then spike on 2 x 6 double for plates. Saw out for a pattern a pair of rafters the desired pitch and set these on the plates, marking the end posts to fit them. Saw the posts and spike the rafters to them good and solid. We cover the inside with chestnut boards put on horizontally. Square the corner posts on three sides so as to lap the corners and then nail securely. Set the posts 4 feet from centers for entrance and leave that section of boards loose. The outside can easily be covered by spiking 2 x 4 on the outside of the posts and boarding vertically with plowed and matched stock. This leaves an air space and helps to keep the ice. When framing rafters plan for a space of 2 or 3 inches between the plate and the roof. Also leave not less than 1-16 inch opening at the point of the gables for ventilation. This gives an overhead circulation, which is very important in an ice house. I think 8 inches of sawdust around the edge is as good as more if well tamped. An ice house built in this way will not spread at the bottom and will last longer than one of framed sills, for with them the tenon soon rots off and away goes the corner. An ice house of the size called for by "J. F. H." will hold when filled 10 feet deep with ice, about 160 tons.

Quantity of Material Required to Cover a Roof.

From W. R. T., *Maquoketa, Ia.*—I want to ask through the columns of your worthy paper if some one will tell

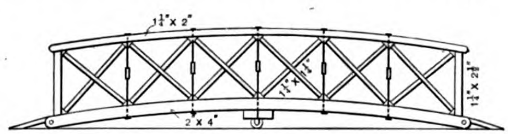


What is the Quantity of Material Required to Cover Roof?

me how much sheathing is required to cover a roof having 4 hips and 3 gables, the roof to be ½ pitch. I inclose a rough sketch showing plan of the roof drawn to a scale of 1-16 inch to the foot. I would like to have the readers tell how to get the length say of the principal rafters, as I wish to ascertain if I can get them according to rule without stepping them off with the square or using the bridge measure. I have been at the trade for a long time, but the boss always does the laying out of everything and always keeps everything to himself. I am liable, however, to take a job myself some day and I would like to know how these things are done.

What Makes the Camber in Steamer Gang Plank.

From W. N. H., *Newport, R. I.*—I enclose an apology for a drawing of a passenger steamer gang plank such as is used on the Fall River line of steamers plying between New York City and this port. Will some of the readers explain what makes the camber? The plank is 18 or 24 feet long, the top rail 1¼ x 2 inches and the bottom rail 2 x 4 inches of oak. The trusses are 1¼ x 1¼ inches hard pine all the same length. The posts are 1¼ x 2½ inches. The top and bottom rails are fastened together with a ½-inch iron rod with a thread and nut on the bottom, or a turn buckle in the middle. I would



What Makes the Camber in Steamer Gang Plank?

say that the bottom rail was straight before using. I know this is a little off the line of *Carpentry and Building*, yet it is a study on trusses and might be useful in the principle involved.

Truing Up a Grindstone.

From M. M. H., *New York City.*—Will some of the practical readers of *Carpentry and Building* tell me how I can true up a grindstone that is hollowing instead of round. The stone was given to me by an acquaintance who had no use for it and allowed it to stand out in the weather all winter. I would also like to know how to true up an oilstone.

Note.—Our correspondent may derive some valuable suggestions in regard to the truing up of grindstones from a number of communications which will be found in the issues of the paper for March, April and June of the volume for 1901. The question was there considered at considerable length and devices for doing the work were described.

What Constitutes an Average Day's Work for a Carpenter.

From H. C. B., *Walloon Lake, Mich.*—In renewing my subscription to your valued magazine, I would like to say for the benefit of those who may not be readers that the paper has been of great value to me and I consider the Correspondence department one of its best features. I have very closely followed the discussion as to what constitutes a day's work for a carpenter and find that "D. B. L." of Alexandria, Minn., is the only man who gives his methods of doing the work, which I think is of more value to the average workmen than for some one to tell of doing a big day's work. If "Billy the Shingler" can put on from 6000 to 8000 shingles in one day and do it right, I would like to know how it is done. I have hired a good many men in the past ten years and have found that the men who will put on and properly nail 2000 shingles in ten hours are not very plentiful, and if there is any special knack about it will some of these "lightning shinglers" please tell us how it is done? I have just finished a roof that required 24,500 shingles, which cost me nearly $1.60 per 1000 to lay. There were 299 lineal feet of hips and valleys to lay, and we had snow and ice to contend with. Of course this is an exception, but if a contractor figures less than $1 per 1000 for shingling he will, on the average, lose money. The hints of "B. B. S." on hanging doors are all right.

Will some of the readers give their views on the number of window frames, fitted with sash, pulleys, &c., a man ought to plow, frame and put in during a day of ten hours, after the stuff is dressed and jointed to proper size? It would also be interesting if some of the "Smart Alecks" would describe their methods and short cuts for doing work of this character.

From CARPENTER, *Republic, Wash.*—I am very much interested in the discussion as to what constitutes a day's work. Out in this section it is no uncommon thing for a man to lay and nail 4000 shingles in a day of nine hours, and right here I want to say that there is a great difference in the width of shingles, the Washington shingles averaging 7 inches. Now, as I understand the measurement of shingles, they are supposed to run on an average 4 inches in width and 250 to a bunch. Consequently it is as easy to lay 4000 of the Washington shingles as it would be to lay 3000 of some of Eastern manufacture. If we were all expected to be experts at shingling and hanging doors, &c., I am of the opinion that some of us would be looking for a job about half the time. My experience is that there is not much difference in the amount of work that a man can do if all are equally willing to work, for while Tom Jones may be expert at hanging doors, John Brown may be expert at shingling, and so at the end of the year one has accomplished as much as the other.

I fear a great deal of the trouble lies in the fact that some are only carpenters so called. To give an instance, I visited my old home in the East some years ago and while there applied for a job on a large church that was being erected. The superintendent asked me from whence I came and I told him from Washington. He says, "Washington Territory?" for it seems some still think it is a territory, and then he asked me if I could frame roofs. I said I thought I could, and went at it and laid off patterns for all the different roofs of that building. One day the superintendent remarked to a number of men that he had had to import a man from the land of log cabins to frame his roof, and the result of that remark was that I had enemies right away. I remember one poor fellow—a Swede coal miner—who was in my gang. I asked him to miter one end of a piece of 2 x 8 inch stuff. He squared across the end, then measured back 8 inches and squared again; then drew a diagonal line and asked me if that was right. Now this is a sample of some of the workmen in the country, and how does anybody suppose they can shingle and hang doors with some of the speedy men we have been hearing about? I think they should go back to the coal mines and not dishonor the name of carpenter.

From M. L., *Newark, N. J.*—It was with no small amount of amusement that I read the letter from "Slow One" in the January issue. He seems to have figured the matter of shingling down to a fine point, and I have no doubt that when those chain lightning carpenters see it their eyes will bulge when they appreciate the rate at which they have been working. As to "C. A. L.," his "Billy, the Shingler" is a daisy, and he is not the only one to take off his hat to a man who can lay 6000 to 8000 shingles per day. Mine will go off when I see it done, and I do not think my head will be exposed to the weather very much at that. I will say that there is a great demand for "Billy, the Shinglers" in this part of the country.

Now in summing up the past four and five months I fail to see where any one has stated just how the work was done, and here in Newark and East Orange, N. J., when we say shingle a roof we mean to make that roof water proof and not like a sieve. When we fit and hang doors we fit them right, so as to show a very neat joint all around between the door and jamb, say a little less than 1-16 inch, and in hanging them we use bronze butts. Generally they will let in flush with both door and jam. as is also the lock and other hardware necessary, the whole being done in such a way as to produce a first-class job. From five to six doors in eight hours is doing all right. Of course this takes in everything—stops, saddle, lock, hinges and knobs. Now I do not wish to throw cold water on the remarks made by some of our brothers, but it does seem strange that those fast men never come this way. I suppose when a master carpenter gets hold of one he ties him fast, and well he may, for others are looking for him.

From H. J. A., *Pleasant, N. D.*—In regard to the discussion in the Correspondence department as to what constitutes a day's work for a carpenter, I beg leave to make a suggestion, more especially as the subject appears to have been fully exhausted regarding the work on doors and shingling. My suggestion is to take a vote on the average day's work on these two subjects, and the most votes that are alike, or nearest alike, should decide the question. The doors should be, say, 2-6 x 6-6 x 1⅜ to 2-10 x 6-10 x 1⅜ soft wood, each to have two butts. The doors generally average, say, 2-8 x 6-8 x 1⅜ in our houses. The work should include fitting, hanging and putting in mortise locks, but not stops or thresholds, as these do not properly belong to the door, but to the frame.

As to shingling a house, a structure about 15 or 20 feet high and 30 x 36 feet or so in size, with three gables, two hips and two valleys, one-half pitch roof, makes an ordinarily plain house. I think by following this plan we would get the average and close the door and shingling account, which discussion has been very valuable. We would thus go on with the average day's work on framing, sheathing, siding, &c. Now if this is agreeable to the readers and the editor would be kind enough to receive the votes and announce the result, I for one think it would be very valuable in the interests of the craft.

From N. A. S., *Titusville, Fla.*—In discussing the question of a day's work for a carpenter "C. A. L." of Homestead, Pa., says that for traveling he has a small box, about 10 or 11 inches deep and the same in width, in which to carry his tools, and that is just long enough for a saw. Now in this State we have lots of men who use the same size box, but they depend upon borrowing from the carpenters what tools are lacking in their own kit. Now I should like to see him shingle a half-pitch roof, where the rafters are 22 feet long, without a scaffold, unless he uses a rope to hang onto. I have worked on the largest wooden hotel in the world, the Royal Poinciana at Palm Beach, where there were between 400 and

500 carpenters, and none of them could lay over 2500 shingles per day, even when racing one another. I think if a man can lay 1800 to 2000 shingles per day he is earning his day's wages. A man hanging 20 doors a day, as a correspondent states, carrying all his tools in his left hand, raises the question in my mind as to how many there were in that hand. "M. L." of Newark, N. J., voices my sentiments in regard to the shingle question.

This discussion has gone a little beyond reach, for in a short time a man looking for work will have to carry a certificate stating whether he is a 2000 or 6000 shingler and a 6 or a 20 door man in order to obtain a position. In that case some of us will have to get a mule and plow and work on a farm.

From CHARLES A. KING, *Director of Trade School, Berea College, Berea, Ky.*—I have been much interested in this discussion of an average day's work, and consider it a topic of most vital importance to both workman and employer, although many of the articles published have had very little bearing upon the subject under consideration. No one but a very foolish person writing for publication in a trade paper will make statements which he cannot substantiate, and I believe that most of the stories told are not unreasonable as a record or emergency day's work. I do not believe the narrators of these "big stories" expected that they would be understood as describing an average day's work, nor do any of them claim that the work was well done.

The local customs are not the same in all sections, and what might be considered an unreasonable average in some places might be all right in others. In some parts of the country doors are hung with loose pin butts, and in other places loose joint butts are the most popular kind. These latter allow some saving in jointing the door and cutting in mortice locks. In some places rim locks are used, and in others mortice locks are the kind generally found even on the cheapest work.

In many places floors are laid, and the base and shoe placed on top of them, while in others the base is put on above an under floor and the flooring fitted to the base with nothing to cover the joints. These are a few of the things which affect an average day's work, so every man must allow his judgment to be governed by his local conditions.

I have seen some wonderful days' work done, some of them as large as most of those described in these columns, but I do not believe that it pays a workman to make a record, as that particular day's work is apt to be frequently compared with the ordinary day's work and the workman will suffer by the comparison. As an employer, I generally found that work done under record breaking conditions was not the kind which a conscientious contractor could afford to pass, and that most workmen would sooner or later even up their side of the work. I endeavor to impress upon the young men under my care the necessity of working fast and continuously, but temper that proposition by stating that there is a limit to the amount of work which can be well done, and that the man who can do a little better than the average and do it as well is a much more valuable man than he who occasionally does two days' work in one.

For more than 20 years I have been in positions where I have had good opportunities of determining what should constitute a fair day's work, and will give the result of my observations. I believe that an average man under average conditions will frame and put in place

600 to 800 square feet of 2 x 6—8, 10, 12 floor joist.
400 to 500 square feet of 2 x 4—6 studding.
500 to 600 square feet of 2 x 6—8 rafters, plain roof—two men.
250 to 300 square feet of 2 x 6—8 rafters, hip or curb roof—two men.
8 to 10 squares of boarding.
140 to 170 lineal feet of outside finish—2 men.
50 to 60 lineal feet of plain cornice, with crown and bed molds, build scaffolds—a day's work for 2 men.
2 squares of siding laid 4½ inches to the weather
1750 to 2250 shingles, with ordinary amount of gables.
Joint in and hang 12 windows before cased.
3 to 4 squares of 4-inch matched flooring.
8 to 10 squares of rough under floor.
5 to 7 squares of square edged flooring, 4 to 6 inches wide.
Case inside doors, sand paper moldings, plinths and corner blocks, lath sides; 7 to 8 openings per day.
Case windows, fit stop bead, return mold on apron, sand paper moldings; 8 to 10 windows per day.
Base, molding and shoe, hand smoothed, fited and nailed, 15 to 20 feet per hour.
Wainscoting 3 feet 6 inches high, hardwood cap, scotia and base 3 to 4 feet per hour.
Hang and trim ordinary doors, loose pin butts, rim locks, 9 per day.
Hang and trim ordinary doors, loose joint butts and mortice locks, 6 per day.
Hang and trim hardwood doors, 4 per day.
Sliding doors, set frame, put in tracks and case, one day per opening.
Sliding doors, fit, hang and lock, one pair a day.
75 lineal feet 10-inch or 12-inch shelving.
100 feet lineal 4-inch cleats with coat hooks.
20 thresholds per day.
Set kitchen sink, open plumbing, dish drawers and spatter board—5 hours.
14 rise flight of stairs, hardwood, with gallery rail, good job—six days.

By making suitable allowance for intricate or fancy work I have found the above a satisfactory basis upon which to estimate.

From F. L. B., *Blue Earth, Minn.*—Brother Odell, give us your hand and let us shake! You are the first man on deck to try to give us an average for a day's work. Following up your idea I wrote to several good contractors and builders for their estimates and also to the Superintendent of Buildings of the C., St. P., M. & O. Railroad, under whom I worked on depots on their lines. Taking their estimates and my own ideas, I have out of them all figured the following as an average day's work for a carpenter; not special work, but common everyday work which we have to do:

Framing balloon frame, 800 to 1000 feet.
Matched sheathing, 3 to 5 squares.
Common sheathing, 8 to 10 squares.
Four-inch flooring, 3 squares.
Six-inch flooring, 5 squares.
Cornice, four member, 2 men, 200 feet.
Shingling, 2000 to 3000.
Six-inch siding, 4⅝ inches to the weather, 4 squares.
Four-inch siding, 3⅛ inches to the weather, 2½ squares.
Lathing, 60 to 80 yards.
Hanging doors, 3 butts, mortice locks, pine, 6 to 8.
Hard wood doors, 3 to 5.
Common window frames, ready to set, 4.
Outside door frames, 1¾-inch jamb, 5.
To set window frame and fit sash, 6 to 8.
To set door frames, 6 to 8
Casing windows, corner blocks, 6 to 8.
Casing doors, corner and base blocks, 10 to 12.
Base boards, 3 member, 200 running feet.
Wainscoting, 50 to 75 running wall feet.
Stair work, plain, 12 to 18 feet run complete.

All of the above work is to be taken on the ten-hour a day basis. I may be high or low on some work, but I give this as my estimate of an average day's work for a carpenter.

The above is open to the critics of the trade. Let each one give his estimate as near as he can from actual experience, and then from all we will find an average. Let this be a starting point, with Brother Odell as No. 1. We will bar all 12 and 15 door men and all 8000 to 10,000 shinglers from this estimate, and give them a class by themselves under the name of "Professional One Line Men." We will admit, "to keep the peace," that men have laid and nailed 8000 to 10,000 shingles in ten hours and hung, all complete, 18 to 20 doors. How many days at a time did they do this? Our "Wonder" here did his big day's work for one day only.

I purpose hereafter to let my shingling and door hanging to some of those fellows and have it all done in a day. I do not deny that some men are fast in the execution of particular work connected with the trade, but the average day's work for all kinds of work is what we are after. Give us your estimates of the average, brother chips, and let us argue the question we first started out to consider. When it comes to special stair work, trussing roofs, framing, &c., we will consider that a little later.

From T. K. W., *Lake Providence, La.*—I am glad to note that shingling and door hanging controversy is drawing to an end. I agree with "C. E. C." that some of those who have written are good enough to receive the cake without going further. I think as "F. L. B." says that we might discuss something more important or at least more interesting. I consider that "Slow One" has clinched the nail. F. G. Odell comes as near to the average as we are likely to get, but I do not quite understand his first item, "Ordinary Shingling, Including Scaffolding, 2000." Why does he scaffold? If a new building he will have a scaffold already. If an old one, he does not need a scaffold, but the amount is about right, and my statement of five hard pine doors with mortise locks and stops per day is about the same thing.

Raising a Frame Building.

From JOHN THUR, *Philadelphia, Pa.*—I would like to make a few comments in regard to the method used by "L. H. H." of Greenwood, Ill., for raising a car shop which he describes in the January issue. I consider his method of raising only a part of the posts at a time a rather unwise expedient. To raise a building properly there should be enough jacks to do all the work simultaneously and keep the building level, otherwise there is danger of a collapse of the structure. I infer from his description that the building was raised from the foundations. I think a better way would have been to cut the roof loose from the side walls and raise it the desired distance, then filling in with the sash. By this method there would have been less weight to lift and no expense in the rehanging of doors, &c.

Proportions of Concrete for Building Construction.

From J. W. M., *Greenwood Depot, Va.*—Will some of the readers who have had practical experience in this line tell me through the columns how to mix concrete; that is, what are the proportions of cement, lime, if any, sand and stone? I have seen one or two concrete buildings put up here and in the work there was used some red clay. Is that advisable? How thick ought the walls to be in order to give best results? I am putting up a dwelling for myself and I think of building the first story of concrete.

Note.—The proportions of the ingredients of which concrete is composed vary under different conditions and for different purposes. We might say that in connection with the erection of some car shops for a railroad company in New Jersey, a description of which appeared in these columns about two years ago, the walls were of concrete, and the proportions used were one of cement, three of sand and six of cinders. Gravel aggregate was also used, composed of gravel as it came from the bank, mixed with sand and unscreened. About 1 per cent. was in cobblestones, 2 inches in diameter and over, the balance consisting of all sizes of gravel and stone down to the smallest. When this was used it was mixed with cement only, the amount of cement being determined by experiment. Where the walls were less than 18 inches thick it was found that hand mixing was more economical, the labor cost for mixing and depositing the concrete being frequently as low as 50 cents per cubic yard. In this case the walls of the different buildings ranged from 12 to 8 inches in thickness. We refer the letter of our correspondent to our readers and shall be glad to have them describe their methods of constructing concrete buildings designed especially for dwelling purposes.

Comments on Tool Chest Construction.

From WANDERING WOOD BUTCHER, *Alexandria, La.*—In looking over the issue for December last, I noticed a plan of a tool chest furnished by "R. S. M." of Dover, Mass., which is only one of many plans that have appeared in the paper during the past 20 years. These have greatly interested me, but I observe that in nearly all cases one thing, which in my opinion leaves the chest incomplete, has been omitted, and that is an ample shoulder box or tray for carrying the tools to and from the place of work—a box 10 inches deep by 12 inches wide, which can be dropped into a chest as a tray or till when the day's work is over, the key turned and the carpenter can go away at peace with himself and his fellow men. I dislike to see a carpenter come on a job in the morning with a hand full of tools and then make 10 to 15 trips during the day to the chest for more. Then when noon or night comes he is running all over the building, fussing with the other men about his tools being lost, stolen, or mislaid. If he is lucky enough to find them in the dark, or even the light, he has to drag them to his chest, possibly necessitating two trips in the operation. Such a chest is a poor excuse, no matter how nicely made and trimmed. In the box as above described a carpenter can take such tools as he usually requires, or the nature of the particular work demands, to any part of the building and have them always ready at hand. When the words "pick up" are given, he can do so in an instant and go home rejoicing, instead of feeling annoyed at the necessity of having been obliged to grope around in the rubbish for his tools. Another thing I might suggest in connection with tool chests is not to put such panel tops on them, but cover with galvanized iron so far as to make the chest sun proof and water proof, and baggage smasher proof, if good corner irons of the same material are put on with clout nails and clinched.

If one cannot have his chest arranged as above described, I would suggest at least having one of which he will not be ashamed to take it to a job or among strangers as a sample of workmanship, skill and taste. Of late years it is not an uncommon sight to sée men calling themselves carpenters coming on a job with a gunny sack for a tool chest, or an old box picked up in the back yard of some store with the name of the manufacturer of snuff, tobacco, boots and shoes, or some other commodity printed all over it until it looks like a bill board or traveling advertisement. If for the latter purpose it is a great hit and a success, for it announces to every beholder that the owner is a hobo, tramp or fraud who travels for notoriety as a wandering wood butcher. Another thing I would suggest to the young chips is that if they cannot have many tools, make sure to have good ones and keep them in good order and looking clean. Do not be like two of those wandering wood butchers who by letter applied to me a few years ago for a job and subscribed themselves "carpenters by profession." I brought them 150 miles to work and found they had pieces of limbs of trees with the bark on for hammer handles and as soon as they landed took a saw in one hand and a file in another and went to nearly every man in the town, from the Section Boss to the Town Marshal, saying "Please, Mister, will you file me a saw?" Now the reader may not be able to understand the sort of an impression they made on the foreman, or what remarks the rest of the crew made about the foreman's new hands, but I do. I did not hear the last of them for a year and even now I meet some one who refers to my "imported carpenters." I would say to the young chip, though he be not a full-fledged carpenter, do not be ashamed or afraid to own up. Tell the boss the truth and nine times out of ten he will help you through, for he himself had to learn by having others show him. If you lie to him he will catch you in the course of time and then you may expect to hear some hard remarks. Right here is the reason some foremen are considered hard to work for and why they get a hard name. When you hear a man speaking hard of a foreman, you may safely assume there is something wrong with himself.

Uses of Various Kinds of Glue.

From H. F. K., *Pennsylvania.*—Will some of the older chips who have had experience explain the uses for the different kinds of glue and tell especially what kind they would recommend for veneered doors?

Making a Wooden Pump.

From W. T. D., *Winchester, Mass.*—Will some of the readers of the paper tell me how to make a wooden pump, 16 feet long, which is intended to be used in cleaning out a cesspool. I made one, but it is not satisfactory. It is slow and tiresome and I want something that will work well. Here is a chance for the pump makers among the readers to show us if there is anything new in this line.

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

BY CHAS. H. FOX.

THE representation of a geometrical magnitude on a plane is called its projection, and the plane on which the representation is made is named the plane of projection. In descriptive geometry two planes of projection are used, and to simplify the constructions they are taken at right angles with each other. If one plane is taken horizontal, the other will be vertical, and this position of the planes enables us to conceive most readily how objects are situated in space when their projections are known. The planes are called, respectively, "The Horizontal Plane" of projection, and "The Vertical Plane" of projection. Their line of intersection, which is horizontal, is called the "ground line," or "common intersection." On one of these, the "horizontal," the representation of the plan of the object is at all times made. Upon the other, the "vertical," the elevation of the object is represented.

Space here will permit of our giving only a few of the simplest of right line projections. For a complete understanding of these the students are requested to procure a piece of cardboard, and on any convenient line, as A B of Figs. 31 to 34, cut about half through the board so as to allow the one portion, as A B C D, to revolve around A B as on an axis until it is at right angles with the lower half, A B E F; then, placing a pencil in the positions indicated by the given lines, looking down upon the pencil the student may see the plan. In like manner looking squarely at the pencil he will see the elevation, and thus have a practical illustration.

In Fig. 27 let *a* be the representation of a point in space. If from *a* be let fall a perpendicular to the horizontal plane the foot of the perpendicular, as *b*, is the horizontal projection of the point. This projection in practice is generally named "the plan." In Fig. 28 let *a b c* represent a line in space, the line being parallel with the horizontal plane. If lines *a d*, &c., are dropped to the plane in question it will give in *d e f* the horizontal projection, or plan, of the line. The same remarks apply equally to the projections of Figs. 29 and 30.

Now in Fig. 31 let us again assume the point *a* in space: A perpendicular, as *a c*, with the vertical plane gives in *c* the vertical projection, or elevation, of the point. In practice a single sheet of paper represents the two planes of projection and in the following manner: The vertical projection A B C D of the plane is supposed to revolve backward until it coincides with the plane of the paper. Hence drawing a line, as A B, from left to right across the paper to represent the ground line, all that part of the paper above the line will represent the elevation, or vertical plane; and all that part below it the horizontal plane of projection, upon which the plan may be represented. In Fig. 32 *a c* represents a line in space, the line being parallel to both planes of projection. In this case the line will be represented at the planes of projection in its true length, for the line, its projections and the two projecting perpendiculars through its extremities form a rectangle of which the line and its projections are opposite sides. In Fig. 33 the line is represented in *a d;* it is supposed to be parallel with the horizontal and perpendicular with the vertical planes of projection. In this case the line will be represented only at the horizontal plane in its true length. In the vertical plane it is represented in the point *c*. This will be fully understood if the student will place the pencil in a position corresponding to that of *a d* of the diagram, then looking down upon it the plan *b e* may be seen; then looking squarely at the pencil it may be seen that only the end corresponding with the point *c* may be seen; the true length of the pencil cannot be established by the front view. This may be readily obtained from the view as seen from above and as given in *b e* of the plan. The position of the pencil may be reversed—that is, it may be placed as at *b a;* then the elevation as at *f c* will give its length, the point as *b* giving the plan. We could give numbers of illustrations of the projection of right lines placed in positions parallel with one but oblique with the other plane of projection, but will conclude with the example shown in Fig. 34, in which the line *a c* is supposed to be in a position "oblique" with both planes of projection. Dropping the projectors *a b*, *c d* to the horizontal plane we may obtain in *b d* the plan, or in like manner drawing the perpendiculars *a f*, *c e* with the vertical plane we may obtain in *f e* the elevation of the line. Now placing the pencil in a position corresponding to that of the line *a c*, it may readily be seen that neither the plan nor the elevation gives the true length of the line. This, however, may be obtained as follows: Take, as in Fig. 35, a line, *h e*, equal with the length given in *b d* of the plan, then make *h f* equal with the vertical *h f* of the vertical plane. This, as may be seen, is the hight of the point *a* of the line above that of *c*. Join *f e* and the true length of the line may be obtained. A similar construction might be made from the projections *e f* of the vertical and *i b* of the horizontal planes of projection. For a further study of this interesting branch of geometry we would ask the reader to procure some good work treating upon projection.

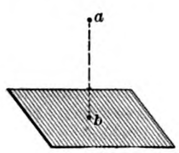


Fig. 27.

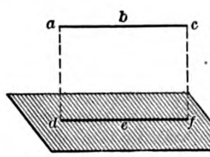


Fig. 28.

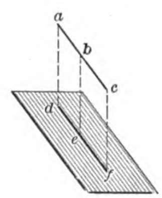


Fig. 29.

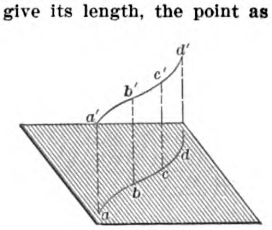


Fig. 30.

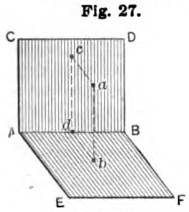


Fig. 31.

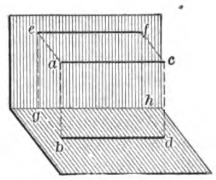


Fig. 32.

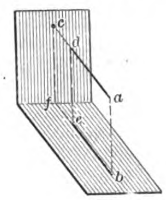


Fig. 33.

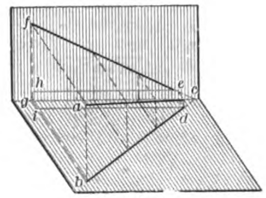


Fig. 34.

Various Diagrams Illustrating Projection.

Laying Out Circular Arches in Circular Walls.

We will now explain the principle which guides us in the development of curved surfaces. Let Figs. 36 and 37 represent the elevation and plan respectively of a large cylinder, in which we wish to make a circular opening such that we may be enabled to place within the opening the smaller cylinder represented by

Fig. 38. In this diagram let E F represent the diameter of the smaller cylinder. With the center *g* draw the curve, and divide it, as shown in *a*, *b*, *c*, &c., into any number of parts; then square with the line E F produce the ordinates *e a*, *f b*, &c., and produce the center one, as shown, to O of Fig. 37. Now with any point, as O of the center line, as the center draw the plan of the larger cylinder, as shown in Fig. 36. Divide this, as shown in A, W, X, &c., into any number of equal parts. In Fig. 39 set off A, W, X, &c., equal with the length of the corresponding points of Fig. 36. At the point given in C erect the perpendicular C *g*. Let *g* represent the center of the opening, and through *g* draw E F parallel with A B. Now set off *g*, *f*, *e*, &c., respectively, equal with *c*, *b*, *a*, &c., of Fig. 36. Then parallel with *c g* draw *e a'*, *f b'*, &c., equal with the length of the corresponding ordinates of Fig. 38. The points given in E, *a*, *b'*, &c., are those through which to trace the developed curve of intersection, or the curve of penetration—that is, the curve generated where the smaller cylinder penetrates the larger one. The drawings being made to correspond to the size of cylinders the development may be wrapped around the larger one and a practical illustration obtained of

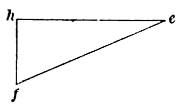


Fig. 35.—Obtaining True Length of Line.

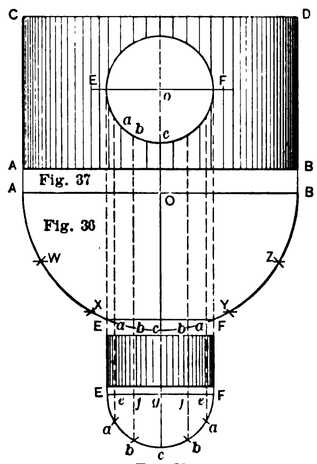
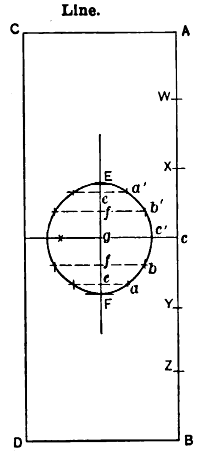


Fig. 38



Figs. 36, 37 and 38.—Illustrating the Development of Curved Surfaces.

Fig. 39.—Developing the Curve of Intersection.

Laying Out Circular Arches in Circular Walls.

the problem. It may be noted that the figure traced in Fig. 39 is one that cannot be drawn with centers, but must at all times be projected by means of ordinates, as above directed.

Attention has already been drawn in the first article to the method by means of which a practical illustration may be had of this problem.

Technical Courses in City Schools for Apprentices.

Reports from Chicago are to the effect that the union carpenters of that city are considering the matter of asking the Board of Education to establish a technical course in some of the city schools for a part of the year, where apprentices to this trade may fit themselves for their future work. As the Board of Education has already gone on record as favorable to such a departure in school work, it is thought it will readily grant the request when the carpenters decide on what shall constitute the special course. Other unions are said to be considering similar action in behalf of their trades, and in this connection it has been suggested that the school year be divided, in the buildings set apart for the technical courses, to accommodate pupils, from the different trades, as follows:

January, February and March—Apprentices to the masons, bricklayers, carpenters and other building trades.

April, May and June—Apprentices to the plumbers and steam fitters.

July, August and September—Vacation.

October, November and December—Apprentices to the machinists.

This scheme of education, where sons of union workmen are trained at the expense of the contractors who employ the fathers, is already in operation at the Dorè School, Harrison and Halsted streets, so far as it affects one union. Here, says the *Tribune*, the pupils are 123 apprentices in the bricklayers' and stonemasons' trades. Nine months of the year these boys work at laying brick and setting stone, and three months they devote to their books, their wages being continued by the contractors.

So interested are the boys in their efforts to fit themselves for work as intelligent craftsmen that one Saturday they requested of the Board of Education that they be granted one hour more each day in the school. Such a request was unprecedented in the history of the board, and it was granted at once by the trustees.

These pupils are apprenticed for four years to contractors who are members of the Masons' and Builders' Association, and the educational feature of the agreement between the employers and union has received the approbation of hundreds of students of the labor problem throughout the country.

Nominal supervision of the 123 young artisans, as of the other pupils in the school, is vested in Principal Joseph A. Bache, but all matters pertaining to the selection of studies and to the discipline of the students is referred for action to the Joint Arbitration Committee of the contractors and unions. All the fines imposed by the Arbitration Board or by the individual organization on any of its members for delinquency in living up to the working agreement are put into a fund for the purchase of text books for the young *protégés*. If a boy should absent himself from school without a valid excuse the fact is reported by the principal to the Arbitration Board and the period of his delinquency is added to the time he must serve as a novice in the trade.

January, February and March, which constitute the slack period of the building trade, are devoted to the school course. The pay of the apprentices is $260 for the first year, $300 for the second, $350 for the third and $400 for the fourth, and there is no deduction for the time spent in school. To obtain a working card at the end of his term of indenture the apprentice must satisfy the Arbitration Board of his ability at manual work, and also of his good behavior and diligence while in school. At the end of his third year he may graduate if he can satisfy his superiors that the fourth year is unnecessary to his development.

Besides the regular branches taught in the public school the education of the apprentice includes the technical subjects allied to his trade. The boys study the common branches in the morning, but in the afternoon they devote their time to engineering, principles of construction, architecture, elementary mechanics and other theoretical principles involved in their trades.

Superintendent Cooley, who has evinced great interest in the apprentices, has provided also that three instructors in technical subjects at the English High and Manual Training School shall deliver lectures before the young bricklayers and masons.

The father of this educational scheme is said to be Andrew Lanquist, a building contractor, who has for many years been a prominent officer in the Masons' and Builders' Association.

We understand that as soon as conditions in the schools of Milwaukee will permit, the same general plan as that in Chicago looking to the instruction of apprentices will be inaugurated.

At a recent meeting of the Massachusetts State Association of Master Builders held at the United States Hotel in Boston, 40 local organizations were represented. The State organizer reported a total membership of 300 and gave it as his opinion that the speedy organization of the master builders in the State was only a question of time.

WHAT BUILDERS ARE DOING.

THE building business in Albany and vicinity promises to be very brisk this season, contracts for a large amount of work for the year having already been awarded. A number of the leading builders have secured considerable out of town work, which will go far toward making business good for them. There are now under way in the city four new bank buildings and a large shop for the New York Central Railroad Company, which latter will require some little time to complete. It is expected that the following new improvements will surely be carried out during the year: New public school, a public bath, a station house for the first precinct, a fire engine house for steamer No. 5, a large barn and storehouse for the John G. Myers Estate, together with a considerable number of private residences.

At the annual meeting of the Carpenter Contractors' Association of Albany, the following officials were chosen for the ensuing year:

J. A. Knuth.................... President.
William G. Sheehan............. Vice-President.
Edward A. Keeler.............. Secretary.
Peter Blake.................... Treasurer.
Henry Kronau.................. Financial Secretary.
Richard Wickham.............. Chairman Trustees.

TRUSTEES.

John A. Ensiline, John J. Maas,
M. Waldbillig, Edmund A. Walsh.

At the annual convention of the New York State Association of Builders, which was held in Albany in January, two members of the Carpenter Contractors' Association were honored by election to office, Edmund Walsh having been selected for president and Peter Keeler for a member of the Executive Committee.

Akron, Ohio.

The members of the Builders' Exchange of Akron, Ohio, celebrated the first anniversary on Tuesday evening, March 3, when upwards of 100 of the leading builders of the Summit City were present at a banquet which was held in honor of the occasion. Speeches were made by Edward A. Roberts, secretary of the Ohio State Association of Builders' Exchanges; Henry A. Taylor, C. L. Briggs, Franklin A. Towson and George Lang of Cleveland, and by members of the local Exchange. The organization now numbers more than 60 of the leading contracting and building firms of Akron and is in a flourishing condition.

Boston, Mass.

The master painters of Boston and Journeymen Painters' and Decorators' Union, No. 17, with more than 3000 members, entered into an agreement on February 24 regulating the rate of wages, hours of labor and establishing working rules for one year from the first Monday in April. Eight hours is to constitute a day's work, and the minimum wages are to be 35 cents per hour for painters and 40 cents per hour for decorators. This agreement, we understand, is the first of its kind in the history of the craft in Boston, although a union rate of wages has generally been paid.

Buffalo, N. Y.

The annual meeting of the Builders' Association Exchange of Buffalo, which was held in January, was a most interesting and enjoyable affair. An elaborate buffet luncheon was served during the day, and among the guests of the Exchange were the various Deputy Commissioners of the Department of Public Works. The attendance was large and the number of votes cast is said to have been the largest at any election in several years. The polls were open from 11 in the morning until 2 in the afternoon, the inspectors of election being H. C. Harrower, John Feist, Otto Carl, Charles Geiger, W. H. Pinck and Charles Mosier. A canvass of the votes cast showed the following to have been elected for the ensuing year:

George W. Maltby.................President.
C. Q. Jameson....................Vice-President.
James S. Stygall, Jr..............Treasurer.

Trustees to serve for three years.—Charles Mosier, Frank C. Kempf and E. P. Smith.

Arbitration Committee.—John Feist, E. M. Hager and Henry Schaefer.

The annual meeting and installation of officers of the Builders' Exchange were held the latter part of January, when the retiring president, B. I. Crooker, rendered a report reviewing the work of the association for the past year. After some routine business and the ceremonies incident to the installation of the officers, H. C. Harrower, on behalf of the members of the Exchange, presented to retiring President Crooker a handsome chest of table silver ware. The gift was accepted by Mr. Crooker with a few well chosen remarks, in which he thanked the members of the association for the loyal support rendered him and the courteous treatment shown while in the discharge of his duties as president of the association. After the business meeting the officers elect invited the members present to partake of a "spread," served in the Exchange room.

Cleveland, Ohio.

A movement was recently started by the Builders' Exchange, the Local Chapter of American Institute of Architects and the Fire Insurance Exchange to have a commission of three experts appointed by the Mayor to revise the building laws of this city. A resolution on this line was adopted by the council Monday evening, the sum of $1000 being set aside for this work. The commissioners will be compensated to the amount of $150 each, the one acting as secretary, however, receiving $400. The balance of the appropriation is for contingent expenses.

There has already been a large amount of correspondence with the leading cities of the country, and copies of the building codes have been obtained for the purpose of comparison. It will be the aim to provide this city with a system of regulations which will be a model for the entire country. Under the new municipal code law enacted by the last Legislature the cities embraced in this State are given free rein in the matter of building laws, and the entire subject will receive most careful consideration.

At the annual meeting of the Mason Contractors' Association of Cleveland, held in the rooms of the Builders' Exchange about the middle of February, steps were taken to enlarge the scope and usefulness of that organization. Although the association has been in existence only about a year, it has accomplished a great deal for the benefit of the trade represented. It is thought that still greater usefulness to its members can be accomplished, and its work will be in the direction of reforms in methods of practice and with a view to eliminating the abuses which now exist.

The officers for the new year are: President, Henry G. Slatmyer; vice-president, Henry Walker; secretary, C. L. Briggs, and treasurer, J. C. Grant.

The Board of Trustees consist of Peter Hamilton, William T. Paul, Henry Terwood, John F. Aring and D. Lindhorst.

Columbus, Ohio.

At the meeting of the Columbus Builders' and Traders' Exchange, held in their rooms in East State street, January 21, the following standing committees for the year were appointed:

Room Committee—S. W. Nichol, J. E. Kuntz and E. J. McNamara.

Arbitration—William Watson, F. H. Nichol, H. Jones, George W. Ochs and F. G. Gould.

Membership—J. D. Evans, F. J. Bush, F. S. Bartlett, A. M. McGrew and B. S. Stevenson.

Entertainment—W. E. W. Cherry, W. H. Fish, J. B. Powell, R. O. Watson and J. R. Rittel.

Legislation—H. O. Taylor, F. C. Kelton and A. S. W. Huffman.

Denver, Colo.

Recent advices from Denver indicate that during the coming season a considerable amount of building in the aggregate will be executed. There is a feeling in some quarters that the high prices of building materials may interfere to some extent with projected enterprises, but architects quite generally throughout the city are busy, and some projects of magnitude are at present on their boards. There is more or less contemplated in the way of dwellings, and some of the residences likely to be erected are of a rather pretentious nature. Conspicuous among these is the new home of Charles Connor, which will cost in the neighborhood of $10,000. The drawings prepared by William Cowe call for an exterior of gray pressed brick with red sandstone trimmings, while the interior will be finished in hard woods. A feature of the house is that all the living rooms will be placed on the south side so as to have the sun the entire day. The same architect has prepared plans for a home for E. W. Post, to cost upward of $8000. Architect G. L. Bettcher is superintending the construction of a $6000 house for a Mr. Condon, and has under way a residence for George H. Hill, which will cost something like $5000, together with one of similar cost for G. L. Magrum.

Detroit, Mich.

The annual meeting of the Builders' and Traders' Exchange was held in their rooms in the Peninsular Bank Building, on Fort street, West, on January 14, just too late to enable the results to be published in our last issue. The election of officers for the year 1903 resulted in the following choice: F. B. Stevens, president; George H. Clippert, vice-president; E. O. Chase, secretary, and W. S. Vivier, treasurer.

These, with E. Austin, C. L. Batchelder, James D. Candler, Edward M. Harrigan and Richard Nelson, constitute the new Board of Directors. We understand that the new board have not yet mapped out any particular policy for the ensuing year, but it is generally understood that special efforts will be made to increase the membership of the exchange and awaken a new interest among the building fraternity.

At the annual meeting of the Michigan Chapter of the American Institute of Architects, held early in January, the following officers were elected for the ensuing year: President, John M. Donaldson; vice-president, W. B. Stratton; secretary, Frank Baldwin, and treasurer, H. J. Maxwell Grylls. The director named was Louis Kamper.

Honolulu, H. I.

The Builders' and Traders' Exchange has now completed the draft of the building laws, which it is proposed to bring before the legislature at its next meeting. The laws are very comprehensive and are believed to be especially adapted for Honolulu. They do not make any great modification of the present system, but arrange for stricter provisions in the matter of construction of large buildings. At a recent meeting of the Exchange a committee consisting of Arthur Harrison, F. J. Amwegg, and J. H. Craig was appointed to call together all the general contractors of the city for the purpose of discussing remedies for certain abuses which have crept into the trade.

At the annual meeting of the Builders' and Traders' Exchange the following officers were elected: President, E. Gartley; first vice-president, J. B. Craig; second vice-president, W. W. Hall, and treasurer, Robert Catton.

Joliet, Ill.

The Joliet Builders' Association have fitted up commodious quarters in the Fargo Building, and the members are looking forward to a good spring business. The association is in a flourishing condition, and the rooms are utilized for conferences, figuring on contracts, and discussing building work in general. The officers are: President, A. G. Watson; vice-president, O. A. Fisher; secretary, A. Lundstrom; treasurer, John A. Boyd.

Los Angeles, Cal.

For February the City Superintendent of Buildings issued 464 permits, the improvements authorized aggregating a value of $780,053. There were 3 three-story brick buildings, costing $21,000; 5 two-story brick buildings, costing $61,250; 11 single story brick buildings, costing $29,800; 2 three-story frame buildings, costing $25,000; 83 two-story frame residences, costing $244,523; 22 story and a half frame residences, costing $1403; 185 single story frame residences, costing $1,723,737; 26 frame and brick flats, costing $149,506; 40 barns, 46 additions, 15 alterations, and 28 removals. In February, 1902, the number of permits issued was 354, the improvements authorized costing $363,233, and in February, 1901, the number was 129, with improvements costing $150,550.

Montclair, N. J.

"The Master Carpenters of Montclair, N. J." (incorporated), have entered upon the second year of their existence with a membership of 51. They have signed an agreement with the journeymen for the ensuing year at the old rates and hours. The following officers have been chosen for 1903: President, B. G. Sims; vice-president, Hugh D. King; treasurer, Abraham Brooks, and secretary, L. Jerome Aimar of Berkeley avenue, Bloomfield, N. J.

Newark, N. J.

The Associated Building Contractors of the city of Newark and vicinity held their monthly meeting on Wednesday evening, March 4, when in recognition of their efficient services the officers of last year were unanimously re-elected. These were: President, J. C. McGuire of the Master Plumbers' Association; first vice-president, A. A. Sippel of the Master Painters; second vice-president, which was a new office created in view of the increased work of the association, H. D. King of the Master Carpenters of Montclair and Bloomfield; secretary, A. J. Crowder of the Master Carpenters of Newark, and treasurer, John L. Earle of the Master Steam Fitters.

Some discussion ensued concerning the introduction of a bill in the Legislature regarding the incorporation of all labor organizations. Although too late to bring the matter before the House this term, it was agreed to have it introduced at the next session, and to use all possible influence to have it adopted.

New York City.

The activity recently prevailing in the real estate market is beginning to be reflected to some extent in the building situation, and although the amount of work thus far projected is less than that for last year, the outlook as the season opens is by no means discouraging. In many directions rentals are improving, and there is a disposition on the part of builders to give more attention to apartment and tenement house construction than has recently been the case. Ever since the passage of the new tenement house law the erection of this class of building has been much restricted, as will be noted from our review of building operations in 1902 presented on another page. At present, however, there are indications that the ensuing year will witness a very marked improvement in the number of this class of buildings and the record for 1903 in this respect at least should show a decided advance over last year. The new tenements will, for the most part, be erected upon the East Side and the apartment houses in the upper West Side of the city. Since the beginning of the year the value of the contemplated improvements in the boroughs of Manhattan and the Bronx is given at $32,400,000, as against $38,900,000 for the corresponding period of last year.

Some of the more conspicuous enterprises projected include a 16-story brick office building, to be erected at the corner of Fulton and William streets, in accordance with plans prepared by Bruce Price, the estimated cost being placed at $300,000; a 13-story office building as an addition to the present structure of the Hanover Fire Insurance Company in Pine street, to cost $175,000, A. B. Jenning being the architect; and an 11-story warehouse from plans by W. H. Birkmire to cost about $675,000, to be erected on the site of the old United States Appraisers' Stores, bounded by West, Hubert, Laight and Washington streets. This building will be of steel skeleton construction, resting upon a pile foundation driven about 40 feet in the earth, and the tops of the piles imbedded in concrete. From cellar to roof the iron stairways and elevator shafts will be inclosed with brick walls. It is expected that the building will be completed by the first of next year, and it will contain 4,000,000 cubic feet of space. There is under way in West Seventy-seventh street, facing the Museum of Natural History, a 12-story fire proof apartment house, and which when finished is expected to be one of the most complete houses of its kind on the west side of the city. The plans were drawn by George Pelham. It is expected that a portion at least of the site occupied by the old Macy store will be improved by a modern structure of brick, limestone and terra cotta, to cost in the neighborhood of $600,000, the plans having been drawn by Cody, Bergh & See. There is also talk of a new 15-story building on the flat iron shaped property at Beaver, Wall and Pearl streets, which is said to have been the site of the old New York house of Captain Kidd.

A very interesting affair early in February was the annual meeting and election of the Building Trades Association, which was held at their rooms in the Townsend Building, 1123 Broadway. The polls were open from 1 to 5 o'clock for the casting of ballots for the various officials. At 6 o'clock about 100 members sat down to the annual banquet held in the spacious dining room of the association, which was handsomely decorated with the national colors. The members and their guests were seated at three long tables running the full length of the room, with President Francis W. Weeks at the head table. During the dinner an orchestra rendered a well selected programme of music. After the well served *menu* had been duly considered, President Weeks in an appropriate address announced the annual meeting and welcomed the members present. The report of the official tellers of election was received showing the following officers to have been unanimously elected for the ensuing year:

Warren A. Conover........President.
Charles L. Eidlitz..........First Vice-President.
Leonard K. Prince........Second Vice-President.
William K. Fertig.........Secretary-Treasurer.

Managers for Three Years: James Curran, Vincent C. King, Henry W. Miller, George S. Holmes and William T. Ritch. Manager for one year, F. B. Tuttle.

Secretary-Treasurer W. K. Fertig presented his report for the past year, showing the association to be in a most flourishing condition, and a vote of thanks was tendered him by the association. The matter of the consolidation of the association with the Builders' and Mechanics' Exchange was referred to a Committee of Three to be appointed by the newly elected president. E. F. Eidlitz, the counsel for the association, gave a brief *résumé* of the work of the Legislative Committee during the past year, and then President Weeks delivered his annual address, in which he referred to the loyal support of the members during his two terms of office.

Remarks were made by the newly elected president, Warren A. Conover, who thanked the members for the honor bestowed upon him, and asked for their hearty support during his administration; by Ronald Taylor, who spoke on behalf of the House Committee; by Secretary Fertig, Vice-President Charles L. Eidlitz, and others.

After the dinner the members were entertained in the billiard room by a well-known specialist in legerdemain. The evening was most enjoyable, and the success of the dinner and entertainment was such as to encourage the hope that it may pave the way for more of the same kind.

Philadelphia, Pa.

A considerable amount of building has been in progress in and about the city during the past month, and the outlook for the spring is most encouraging from the standpoint of architects and builders. A number of projects looking to the improvement of suburban plots are under consideration or in shape to commence active operations as soon as the weather will permit.

In this connection it may be mentioned that G. W. & J. M. Cane are about beginning work on 40 two and three story houses in the Twenty-eighth Ward, which will involve a cost of something like $172,000. A. C. McGill has commenced work on 35 two-story houses and two-story stores and dwelling in the Thirty-fourth Ward, 30 of the houses being 14 x 28 feet each, and James Lilley has under way 18 two-story houses in the Thirty-sixth Ward. Most of these will cover an area 14 x 37 feet each.

An idea of the outlook may be gained from the statement that the figures of the Bureau of Building Inspection for the month of February make a record which excels that of any previous February, and in value is more than double that for the same month of last year. There were 374 permits issued in February this year, covering 733 operations, estimated to cost $1,783,660, as against 286 permits, covering 440 operations, estimated to cost $887,240 for February, 1902. The figures for last month were also larger by more than $500,000 than those of January. Of the total for February over $900,000 was for two and three story dwellings; nearly $300,000 for alterations and additions; $138,000 for miscellaneous structures, and $150,000 for two office buildings.

Portland, Ore.

The building trade here is apparently again face to face with another strike. The carpenters and painters have both made demands for a minimum wage rate of $3.50 per day. This is an advance of 50 cents per day. The Master Builders' Association, which represents probably more than 50 per cent. of the contracting business of the city, has declared that it cannot allow the advances asked, and it is understod that the Master Painters' Association will take the same stand.

Quincy, Mass.

The annual meeting of the Master Builders' and Traders' Association was held Tuesday evening, February 10, when reports of the various committees were presented, showing the organization to be in a prosperous condition. The election of officers for the ensuing year resulted in the following choice:

J. W. Pratt........................ President.
William A. Bradford.............. Vice-President.
Arthur W. Stetson.................. Secretary.
William Westland.................... Treasurer.

DIRECTORS.

Julius Johnson,	John O. Hall,
Edward J. Sandberg,	Charles C. Foster,
William H. Teasdale,	Thomas H. Williams.

The second annual banquet of the association was held in Hancock Hall on the night of February 18 and was a most successful affair. About 125 were present to enjoy the very substantial menu provided by the caterer. President Pratt was toastmaster, and stated that since the first banquet the membership had nearly doubled, and he expected to see it double again in 1903. Thomas A. Watson was introduced as the twentieth century builder of Quincy and James Thompson, chairman of the Board of Assessors, gave a bird's-eye view of the city, showing the progress in all sections. Other speakers were Alexander Fryer, Representative P. T. Fallon, H. L. Kincaide and ex-Senator E. H. Sprague.

San Diego, Cal.

The secretary of the Board of Public Works has just filed his annual report for the year 1902, showing that during the year 127 building permits were issued representing a valuation of $432,140. This is the largest annual total of building permits ever issued with the exception of the year 1896, when the total amount of building permits issued was $506,745. The outlook for the present year is considered exceedingly good. Builders report a large amount of work to be given out during the spring. A building strike has been in progress for several weeks, but will probably be settled very soon.

San Francisco, Cal.

With the strike of the bricklayers and the hodcarriers over and the prospect of no long contention resulting from the demands of the carpenters for an increase in their wages, it is thought that building operations will proceed rapidly. There is a strong demand for business structures, but less for flats than was the case a year ago. Work on the big buildings already under way is progressing satisfactorily. Once the grading is finished no delay is anticipated in the construction of the Fairmount Hotel on the Oelrichs-Vanderbilt property. The demolition of the old Merchants' Exchange building is now progressing rapidly, that the ground may be clear for the excavation and grading for the new structure. Operations on the Pacific Union Club Building, on the northeast corner of Post and Stockton streets, are expected to commence about the middle of May. The five story O'Connor apartment house in course of construction on the north side of Ellis street, between Larkin and Polk streets, is attracting a great deal of attention. It occupies a lot, 92.6 x 120, on the rear street, and will contain 216 rooms or sixty-six apartments of three and four rooms each, with kitchens and tiled bathrooms attached.

Seattle, Wash.

Hotel building seems to have assumed new activity at Seattle of late. The change in the plan of the Lincoln transforming it into the Knickerbocker Commercial Hotel, and the purchase by James A. Moore of the Denny Hotel seem not to have deterred the builders of smaller structures, who see in the lack of hotel facilities in Seattle an opportunity for profitable investment and exploitation. Hamm & Schmitz have begun the work of tearing down the building on their property on Second avenue opposite the Butler, and will immediately begin the erection of their new hotel building, and the contract has been let for the erection of the new stone and brick Hotel Stander, on Fourth and Marion streets. Several larger brick buildings are in contemplation, and a number of them will be commenced within a few weeks. Among those which will soon be in course of construction is the new building at the corner of First and University streets, the other half of the Arcade Block to face on First avenue, the new Ranier Club Building, a new four-story brick on Western avenue and a new business block on Broadway. The buildings are being removed from the new city library site, and matters are now well under way for the commencement of work on that building.

Utica, N. Y.

The Master Mason Builders' Association of Utica, N. Y., held their first annual banquet at Williams' restaurant on the evening of January 13, the affair being a most pronounced success. While there were no formal toasts, J. S. Jones, who acted as master of ceremonies, called upon a number of those present for impromptu addresses, which were greatly enjoyed. Among the speakers were James Scott, B. McDermott, T. H. Williams, George Garratt, William Hughes, T. C. McDermott, Pierce Jones and Pius Kerner.

The banquet was in charge of the officers of the association, of which T. C. McDermott is president; William Maxwell, vice-president; E. C. Richards, secretary, and Pierce Jones, treasurer. The association was formed a year ago and is in flourishing condition, having a membership of 40, composed of the leading master mason builders of the city.

Notes.

A Builders' Exchange was organized at Fresno, Cal., on February 26. The officers are: Frank Rehorn, president; Emory Donahoo, vice-president, and J. A. Bishop, treasurer.

The Manila Building Trades Association has been organized at Manila, P. I., the officers being Henry M. Jones, president, and George W. Cook, secretary. One of the first things that will occupy the attention of the new organization will be the question of sanitary plumbing.

The outlook for building in Kenosha, Wis., is very encouraging, and we understand that wages are better than last year. The Carpenters' Union has advanced the rate per hour from 30 cents to 35 cents, and reduced the working day from nine to eight hours. The leading contractors and builders of the place have lately perfected an organization in order to better promote their mutual interests.

During the past year there has been a great deal of building going on at Zion City, Ill., the operations covering all classes of structures, such as factories, stores, dwellings, hospitals, &c. The indications are that a considerable degree of activity will prevail the present season, and there seems to be a good demand for intelligent, industrious mechanics, at wages ranging from 35 to 50 cents per hour, according to qualifications.

The Builders' Exchange of Warren, Pa., recently sent out invitations to the builders of North Western Pennsylvania and Western New York to attend a convention of master builders to be held in that city on March 18. The headquarters during the convention will be at the New Struthers, and the business sessions will be in Young Men's Christian Association auditorium.

All the mills furnishing building material in and about Raleigh, N. C., have been overrun with work for some time past, and have not yet been able to catch up with their orders. This is a striking indication of the amount of work which is being done in the building line throughout the State. While Raleigh is largely a residential city, there has been a fair amount of building done, and while at the present time the architects are not overburdened with work, everything points to a good season, which will equal, if not exceed, that of 1902, which was an unusually busy period.

Capt. John S. Damrell, for more than a quarter of a century building commissioner for the city of Boston, resigned his position February 28, and has been succeeded by Hugh Montague. The employees of the Building Department, many of whom had been associated with Captain Damrell during his long term of office, presented him with a set of resolutions engrossed on parchment, expressing their very great regret at his retirement from active duty, and their heartfelt wishes for his health, happiness and prosperity.

The master builders of Plainfield, Trenton, New Brunswick, Paterson, Newark, Jersey City and Camden are interested in a movement looking to the organization of a protective league. We understand that this movement has been started by reason of the feeling of unrest which seems to pervade labor circles all over the country, and which it is feared may develop into strikes as soon as the building season opens. The idea of the organization, as we understand it, is to prevent men striking in one city from securing employment in another.

Building Operations in the South.

The higher cost of building materials and labor appears to have operated toward the restriction of building operations in the South during the year 1902. According to statistics obtained by the *Tradesman* of Chattanooga, Tenn., from the leading cities of the South, the construction of new buildings for dwellings, business and manufacturing purposes in the towns and cities of the South whose population is over 5000 showed a stationary, if not a lagging, condition last year, as compared with 1901. That there was a large increase in new industrial enterprises in the Southern States in the same period would lead to the impression that the volume of building should have shown a correspondingly favorable growth; but this does not appear to have been the case. Notwithstanding the prosperity that marked almost every other line of industry, the building business, owing to the causes above outlined, as well as to the hampered facilities for transportation and sundry labor strikes, appears to have been materially checked in the South. The outlook is favorable, however, for more active conditions in building this year in that section of the country.

Portable Houses in South Africa.

It is well known that quite an active demand exists for portable houses in South Africa, owing to the widespread destruction of buildings in that section of country during the recent Boer War. Consular Agent Gordon writing from Johannesburg a short time ago pointed out that American manufacturers of portable houses ought to be able to secure considerable business in this line, as building material is very high there and arrives from the coast very slowly.

In this connection it may be noted that a concern in Norwich, England, has just sent out 150 bungalows, as they are called, to be used as married officers' residences attached to the army of occupation in South Africa. The buildings are 80 feet long by 22 feet wide, and afford the following accommodation: Drawing room, dining room, four bedrooms and bathroom, with a verandah all round. Connected with the main building by a covered way is another building to be used as a kitchen block, with a servant's bedroom and the ordinary offices. This building also has a verandah all round. The whole structure is raised some 2 feet above the ground, and is supported on white ant-proof cast iron bases or standards.

The bungalows are to be landed at Cape Town, Port Elizabeth and Durban, for ultimate delivery at Standerton, Harrismith, Bloemfontein, and other places in the Orange River Colony and the Transvaal.

A New Building Stone.

A new building stone is being introduced into German and English markets which is manufactured in a mold, and while the stones are of a uniform length and hight they vary in thickness. They are made in such a way that one locks into the other, so that in erecting a wall mortar is used only at the points of junction, that is to say, for the last and topmost rows of stones, and where the partition wall joins a neighboring wall. When the wall has been put up it receives a coating of plaster, after which it is said to be ready for the paper hanger or painter. The process of making the stones is such that the latter can be used any number of times for temporary partitions if they be placed on wooden or iron beams provided with grooves.

The raw materials, which consist of gypsum and sawdust, or gypsum and slag, are thoroughly well mixed to a pulp in a large tub and then this mass is poured into the molds. The claim is made that after about 20 minutes the stones are sufficiently hard to be loaded on a truck without breakage or damage. They are, however, piled in the open air and exposed to the wind and sun in such a position that there is a free circulation of air and when the stones are perfectly white it is a sign that they are dry and ready for use.

Acetylene Rendered Harmless.

According to John S. Seymour, former United States Commissioner of Patents, by the use of a recent invention acetylene can be used for public and private illumination without any danger of explosion, even if the gas is subjected to the test of an electric spark. To obtain this result the storage cylinder is packed with asbestos or brick disks—the latter of 80 per cent. porosity—and filled with acetone. The acetylene is then pumped into the cylinder or tank under a pressure of ten atmospheres. It is found that the acetone dissolves or absorbs the acetylene to the extent of 100 fold the mathematical capacity of the cylinder. The gas is now being used on several railroads in this manner for illuminating purposes. William McDevitt of Philadelphia, inspector for the Fire Underwriters, said that the invention constituted the greatest improvement in the safe use of acetylene yet extant. With the gas stored in this manner, he believed that the element of danger of explosion was almost eliminated.

THE subcontract for the carpentry, mill work and lumber for the gymnasium and grandstand on Franklin Field, Philadelphia, has been awarded to Appleton & Burrell, 1204 Chancellor street, that city. The cost of the entire work is placed at $400,000, and the drawings were prepared by Architects Frank Miles Day & Bro., of Philadelphia, Pa.

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DESIGN OF FRAME RESIDENCE AWARDED THE FIRST PRIZE IN THE THIRTY-FIFTH COMPETITION.

JOHN P. KINGSTON, Architect.

SUPPLEMENT CARPENTRY AND BUILDING, APRIL, 1903.

Worcester, Mass.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
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DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS.
232-238 WILLIAM STREET, NEW YORK.

MAY, 1903.

Labor in the Building Trades.

With the approach of May 1 the labor question in the building trades always becomes a subject of interest, and this year is no exception to the rule. While in a number of cities agreements have already been reached with the workmen in the various trades connected with the building industry, there are signs of disquietude in some of the larger centers, particularly in the East. In New York and vicinity the trouble this year is complicated by internal dissensions among the labor unions themselves. A strike of the carpenters and joiners is now in operation, which has tied up a large amount of important building operations, many of which have reached a stage when such interruption of work causes serious embarrassment. The fight now being waged in New York City between the workmen who are members of the United Brotherhood of Carpenters and Joiners and those who belong to the Amalgamated Society of Carpenters and Joiners has resulted in a strike of several thousand members of the first named body, in what appears to be an effort to drive out the rival union or compel its members to join the Brotherhood. Some of the master builders are inclined to favor the Amalgamated Society rather than the Brotherhood, on the ground that, in striking, the members of the latter organization have violated an agreement signed last fall, to the effect that all differences should be submitted to arbitration. It was on this agreement that the Brotherhood carpenters were conceded an advance in wages of 50 cents a day. While this dispute has the effect of tying up a great deal of building for the time being, there are indications that the unions in other branches of the building trades may possibly declare a general strike on May 1 if their demands for increased wages are not complied with. The Board of Building Trades, with which organization most of the building trades unions in New York City are affiliated, is said to represent some 60,000 men engaged in building construction in the city and its vicinity. Should the demands of the men be refused by the employers and a general strike ensue, the building industry would be paralyzed at a time when it should be most active. The position of those interested in the building industry at the present time is a perplexing one, and no one seems inclined to predict what may happen by May 1. Already the item of labor cost is regarded by the builders as excessive, and if they are called upon to pay a considerable increase in wages it would so seriously enhance the cost of building as to inevitably restrict the amount of work to be undertaken this year. It is to be hoped that an agreement will be reached before May 1, and that the expected strike will not materialize. To afford some idea of the magnitude of the interests that would be affected by a building trades strike, it is estimated that at the present time nearly $50,000,000 worth of building is in hand or in contemplation in New York City alone. This sum simply represents the erection of large buildings costing $100,000 and upward, and does not take into account residences and smaller structures, the aggregate of which would materially add to the sum named.

Public Support of Trade Schools.

The opinion has been advanced in some quarters that the true solution of the problem of trade training for the young men of this country would best be found in the establishment of trade schools in connection with the public educational system in our cities. There is little doubt, however, that such a step would meet with the opposition of the labor unions, whose policy is at all times to limit the number of young men entering the trades where special skill is required. Nevertheless, this system is in successful operation in the city of Springfield, Mass., where the trade school conducted by the Springfield Technical Institute was taken over about two years ago by the city authorities and made a branch of the public school system of the city. Although manual training is given in a number of the American cities in connection with the public schools, this is probably the first and so far the only instance in which a trade school, pure and simple, has been grafted onto the public educational system. The result in Springfield has more than justified the wisdom of the step taken by the local Board of Education. We learn in a recent communication from Principal Charles W. Warner that the trade school attached to the Mechanics' Arts High School of Springfield has achieved a marked degree of success, and that it has fully demonstrated its ability to command the sympathy and support of the public. The classes are held in the evening, so as to make them available for youths who are engaged in earning their living during the day, and a full course of instruction is given in mechanical drawing, machine shop practice and tool making, in plumbing, wood turning and pattern making, as well as in mathematics and electricity. Up to the present time the trade school movement in the United States has been greatly hampered by the lack of public support, both financial and moral. The need of these institutions is daily becoming more evident, and it would seem that the experience in Springfield should encourage the authorities of other cities to at least make experiments on similar lines. Many who have made a study of this subject are of the opinion that the public trade school is bound to take its place in the future as one of the educational institutions of the country. However that may be, it is of interest to know that the plan has already been tried for nearly two years in New England with most satisfactory results.

Industrial Education.

It has been truly said that an educational system which develops minds alone, and develops them for nothing but mental activities, fails to render the truest service to the public at large. Such a system serves the ends of but a small part of the community in which the handworkers form the great majority, as is the case in all our cities. In view of this fact, it is encouraging to note that a movement for more and better industrial and technical education is gathering headway in this country. The value of trade training seems to be coming into wider recognition, and while genuine trade schools are still comparatively few in number, manual training, which imparts the first principles of handicrafts, is becoming more deeply imbedded in our public school system year by year. The recent laying of the corner-stone of a Manual Training High School in Brooklyn, N. Y., brings this fact to the front. Only a few years ago the introduction of trade education into the public school system was unheard of. To-day industrial training is a regular part of the public educational system of many cities, and the Board of Education of at least one large community—Springfield, Mass.—maintains a regular public trade school for the benefit of the youth of the city. Industrial schools of various kinds, catering to many branches of skilled labor, are scattered throughout the land, and the list of these institutions is growing to very gratifying proportions. For many years the advocates of industrial training for the American youth were as voices crying in the wilderness. Little heed seemed to be paid by the public or by those in authority to the plea for better systems of mechanical education in the interest of the industrial welfare of the country, as well as for the good of the American boy himself. This indifference is apparently wearing off; and it is well that it is so. A bulky volume on "Trade and Technical Education," recently issued by the United States Commissioner of Labor, contains a vast amount of illuminating information on this subject, and a perusal of its pages furnishes amply sufficient reasons why trade education should be more widely adopted in the United States, if we are to maintain a leading position among the industrial nations. The national benefits derived by the more or less thorough systems of trade and technical education prevailing in Great Britain, Germany, France, Belgium, Switzerland and other European countries are clearly set forth in the report. The net result of a comparison of these foreign schools and ours is that, while a few of our trade and technical schools take rank with their European prototypes, the large majority of them, in respect to the fullness and completeness of their teaching, are inferior to the foreign models, while in comparison to population American schools of this class are much fewer in number than those of the leading European nations. It is this lack which it should be the task of all interested in our industrial welfare to correct. A thorough and generally used system of trade and technical education is to-day one of the most urgent economic needs of the United States.

Some New Metropolitan Hotels.

That section of New York City in the immediate vicinity of Long Acre Square has for some time past been the scene of unusual activity in the building line, and projects are already under way for the erection in that locality of additional examples of attractive architecture in the shape of theaters, hotels, apartment houses, &c. One of the more recent of these is the twin-apartment hotels now in process of erection on a plot 80 x 100 feet, at 141 to 149 West Forty-seventh street, the drawings having been prepared by Architect George F. Pelham. The building is of steel frame construction with encasing masonry of limestone for the first two stories and brick above. The style of architecture will be French Renaissance with ornate entrances two stories in hight. The interior will contain about 75 suites, each ranging from one to four rooms with bath. There will be two high speed electric elevators, as well as other modern improvements, such as mail chutes, private telephones, &c. The cost of the structure will approximate $300,000, and the architect expects to have the hotels ready for occupancy by February 1 next. Another improvement on this street is the stone and brick hotel, which will be put up at Nos. 128 and 130, at a cost estimated at $275,000. The plans have been prepared by Schwartz & Gross, and call for a nine and one-half story structure of limestone and brick. This, we understand, is the sixth hotel on Forty-seventh street for which plans have been filed within a year.

A new 15-story brick hotel is under way in West Thirty-third street, between Fifth and Sixth avenues, which is estimated to cost about $300,000, and will have a frontage of 40 feet to a depth of 90 feet. According to the plans of the architect, Hugh Lamb, the first and second stories will be of limestone and the rest of terra cotta.

Another recent building improvement contemplated is a 12-story brick hotel, 75 x 79½ feet, and estimated to cost $250,000. The structure will be located at the northeast corner of Madison avenue and Forty-ninth street, and will have façades of brick and stone. The plans have been prepared by H. Lucas of this city.

The magnificent apartment hotel, which is now in process of erection on Broadway, between Eighty-fifth and Eighty-sixth streets, New York City, will contain 500 rooms above the first story, of which 44 will be private dining rooms to be connected directly with the kitchen in the basement by means of high speed service elevators. The rooms will be arranged in suites of from one with bath to seven rooms and bath. The structure will be seven stories in hight, and will cover a plot 204 x 214 feet. The building materials for the first two stories will be of Indiana limestone with brick and stone above. The cost of the structure is placed at $1,500,000, and the work is being done in accordance with plans prepared by Architect Harry B. Mulliken. The interior will be lighted by two courts, each 35 x 70 feet, opening to the east and affording unusual lighting facilities. The first floor of the building will be devoted to the main dining room, a breakfast room, a Flemish lounging room and the usual parlors and offices. In the basement will be large power plants for lighting and refrigerating purposes. It is expected that the building will be ready for occupancy the coming August.

A Large Pipe Organ Factory.

In the latter part of March work was begun on the Murray M. Harris Organ Company's pipe organ factory on Alameda and Seventh streets, Los Angeles, Cal., which will cost about $55,000, and, when finished, it will be one of the largest and best equipped organ factories in the United States. It will be a two and three story brick structure, with a front of 110 feet on Alameda and 280 feet on Seventh street. The central portion of the building is 60 x 120 feet, and three stories high, the rest being two stories. In the central portion of the house will be the offices of the company and the "setting up" room. The offices will be finished in oak, with trimmings of dull brass, and glass work of heavy plate and fine art glass. The building will be supplied with modern conveniences, and the finest machinery and equipment that can be had. The machinery will all be run by electricity, and in the dry kiln, which will be provided, a carload of lumber can be steamed and kiln dried without taxing its capacity. It is expected that the building will be ready for occupancy in about 90 days.

Death of Anson O. Kittredge.

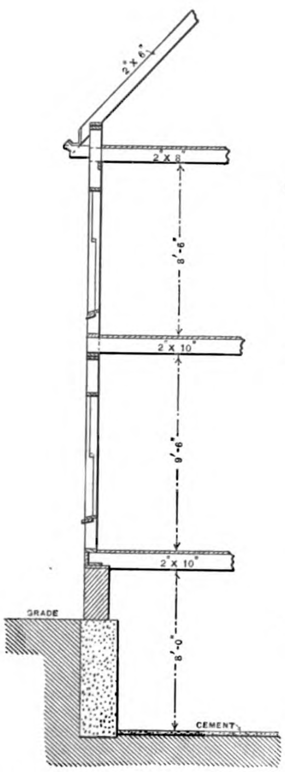
Anson O. Kittredge, who was editor of *Carpentry and Building* from its inception up to 1893, died at Boston on March 24 while on a visit to that city. Mr. Kittredge at the time of his death was president of the Account, Audit & Assurance Company of New York, and Professor of Theoretical and Practical Accounting in the School of Commerce, Accounts and Finance of the University of New York. He was one of the founders of the New York State Society of Certified Public Accountants. Mr. Kittredge was 55 years of age, and is survived by a widow and three children.

THE fire loss of the United States and Canada for the first quarter of this year was materially below the average of the same period in recent years. The records of the New York *Journal of Commerce* place the losses for the three months ended March 31, 1903, at $39,164,800, or $9,000,000 less than in the first quarter of 1902, and $6,500,000 below the corresponding period of 1901. The March fire losses were unusually light, amounting to but $9,907,000.

COMPETITION IN $5000 FRAME HOUSES.

SECOND-PRIZE DESIGN.

WE take pleasure in laying before our readers the set of drawings awarded the second prize in the Competition for $5000 Frame Houses, the author being D. P. Slitor, of 133 South avenue, Penn Yan, N. Y. We give in connection with the elevations, floor plans and miscellaneous constructive details, the specifications in full as submitted by the author, together with his detailed estimate of cost. In awarding this design the second prize, the committee pointed out one or two changes which in their opinion would tend to somewhat improve the internal arrangement, and we mention them at this time for the benefit of those who may be inclined to use the drawings as the basis of building operations. Among these is the location of the kitchen, which is such that in order to reach the front door it is necessary to pass through the dining room. This, however, could be obviated by the rearrangement of the foot of the stairs in such a way as to give direct access to the front hall from the kitchen and still have two doors intervene. The committee express the desirability of having two doors between the kitchen and any other main room on that floor for the sake of keeping the odors of cooking from the other parts of the house.



Section.—Scale, ⅛ Inch to the Foot.

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

Competition in $5000 Frame Houses.—Second-Prize Design.—D. P. Slitor, Architect, Penn Yan, N. Y.

Excavations.

Excavate 1 foot larger all around the building than sizes given on foundation plans, to the depth shown on sectional drawings; excavate for trenches under main wall, graded to 8 inches deep at point where main 5-inch tile leaves cellar.

Excavate for chimney and center partition 1 foot deep; for porch footings, 3 feet deep.

Excavate for all drain pipes so as to give main 5-inch tile proper drainage to sewer, and connect with same. All earth not needed for grading to be removed from premises.

Masons' 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 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 fire place where shown, with arch to support tile hearth. Corbel out over boiler in kitchen to face of partition to form flue for kitchen range. All to be carried up and finished at top as shown; all above roof to be laid with red mortar, ¼-inch beaded joint; all to be plastered inside smooth their entire length; all above roof to be laid in cement.

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 compound 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 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 and 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 wainscoting that comes to outside walls.

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 inches, laid flat on wall and bedded in cement, one 2 x 8 inches set edgewise, and outside even with outer edge of 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 rafter 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-foot 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 material sized. Main partition in cellar to have 2 x 6 inch studding, 12 inches on center, resting on 6 x 6 inch sill bedded in cement on foundation before mentioned. All other partitions shown on cellar plans to have 2 x 4 inch studding, 16 inches on center, all to be covered with ⅞-inch match 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 to each bearing.

Papering.—Cover all sheathing with best grade of water proof 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 8-penny 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 Sides and Gables.

Cover all sides and gables where indicated on plans 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 1 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, cap to window and door frames, and all other work necessary to make a water proof 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 details, 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. Rear porch with one 6 x 6 inch square box column, built around a 4 x 4 inch white oak post to support corner.

Front porch with turned column, 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 North Carolina pine, match 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 shingled breast, molded rail and 1¾ x 1¾ inch turned baluster.

Window and Door Frames.

Cellar frames of 2-inch white pine, with 1⅜-inch sill fitted to stone sill, with 1⅛ x 2½ inch face casings, and 1⅛-inch staff mold. All window frames to be made in the usual manner, with ⅞-inch jambs, 1⅛ x 4½ inch face casings, ⅞-inch sub-sill 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.

Attic and sash frame at side of reception hall as per detail. Front door frame to be made of quartered oak, with 7-inch turned column at sides, and heavy molded head to reach to porch ceiling.

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 balanced with cast weights. Cellar sash hung at top and provided with hook and button.

Interior Finish.

All interior finish shown in parlor and dining room to be of No. 1 whitewood, finished in white enamel. Reception hall, vestibule, toilet room and main stairs in quartered white 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 plans, raised molded outside, with bevel plate glass. Vestibule door to have bevel plate glass, same hight as front door. Cellar and 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 doors 1⅜ inches thick, regular stock pine.

Wainscoting.—Toilet room first floor to be wainscoted 4 feet high with ¾-inch match 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 match and beaded black ash wainscoting, finished with neat cap and ⅝ quarter round at floor.

Bathroom to be wainscoted 4 feet high with match and beaded Gulf cypress, with same base and cap as specified for toilet room.

Stairs.—Build main stairs, as shown, of quartered white oak, with plain white oak treads, molded and paneled newels, 2½ x 3½ inch molded rail, 1⅛ x 1⅛ inch turned balusters set 1½ inches apart on inclosed string. Panel side of first run from string to floor, and soffit of second 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 1⅜-inch treads, ⅞-inch risers, 1¾-inch strings, all pine.

Clothes Chute.—Build clothes chute from bathroom to laundry where shown, lined with ⅝-inch match and beaded white pine; furnish and hang ⅞-inch paneled cypress door in bathroom to finish at top of back slab to washstand, and extend up to line of other doors.

Medicine Closet.—Furnish and set medicine closet where shown in bathroom, with four shelves, door same hight as specified for clothes chute.

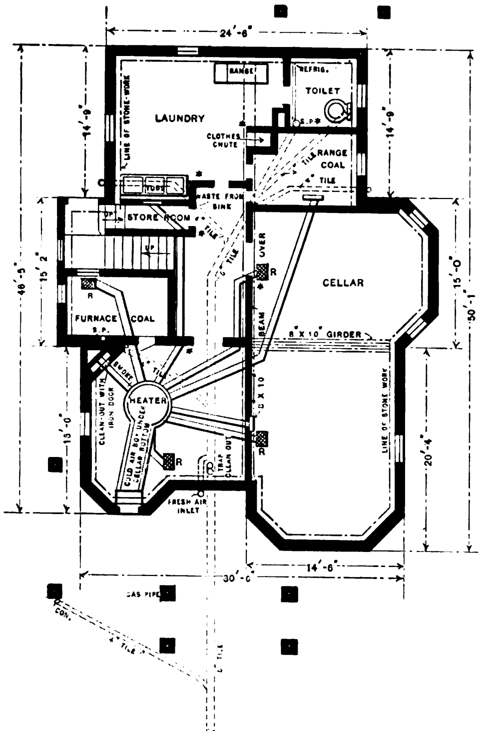
Closets.—Furnish all closets where shown, with two shelves and 3-inch beaded wardrobe strip all around, with steel wire coat and hat hooks spaced 1 foot apart.

cupboard. Extend doors to line with main door, finished at this point with neat cornice, from there to ceiling. Build cupboard inclosed with four short doors 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.

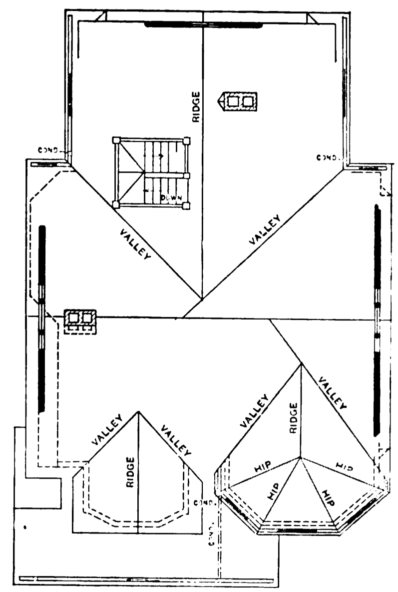
Column Partition.—Build between reception hall and staircase hall a turned column and molded pilaster partition, as shown; all of quartered oak.

Picture Molding.—Put up in each room on first floor and each chamber on second floor a 2-inch picture molding, 18 inches down from ceiling; all of same materials as rooms in which they are placed.

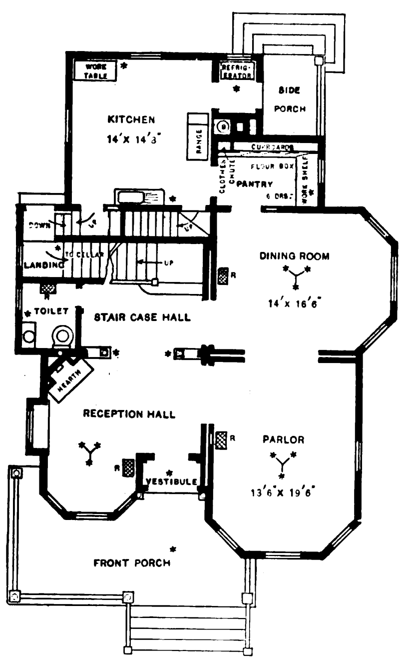
Floors.—After finishing is completed, lay over subfloors in kitchen, pantry and side entrance a ⅞ x 2½ inch No. 1 kiln dried white maple matched floor; in



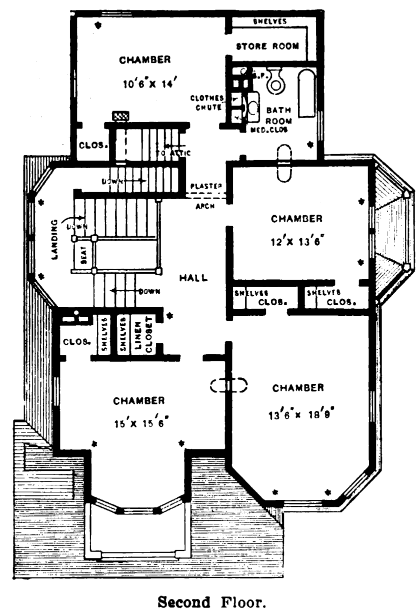
Foundation.



Attic and Roof Plans.



First Floor.



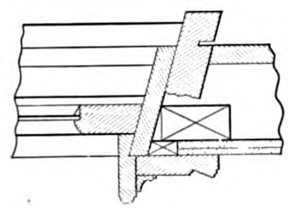
Second Floor.

Competition in $5000 Frame Houses.—Second-Prize Design. Floor Plans.—Scale, 1-16 Inch to the Foot.

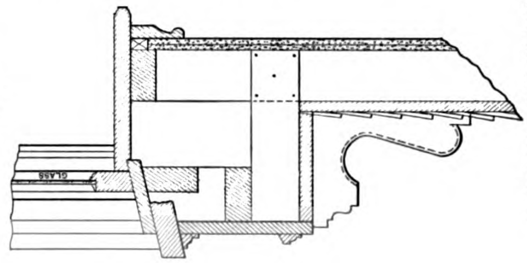
Linen closet, with three drawers under shelf, about 8 inches deep.

Pantry.—Fit up pantry as shown, with all drawers and tilting flour box brought onto 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 three-panel doors; above countershelf build

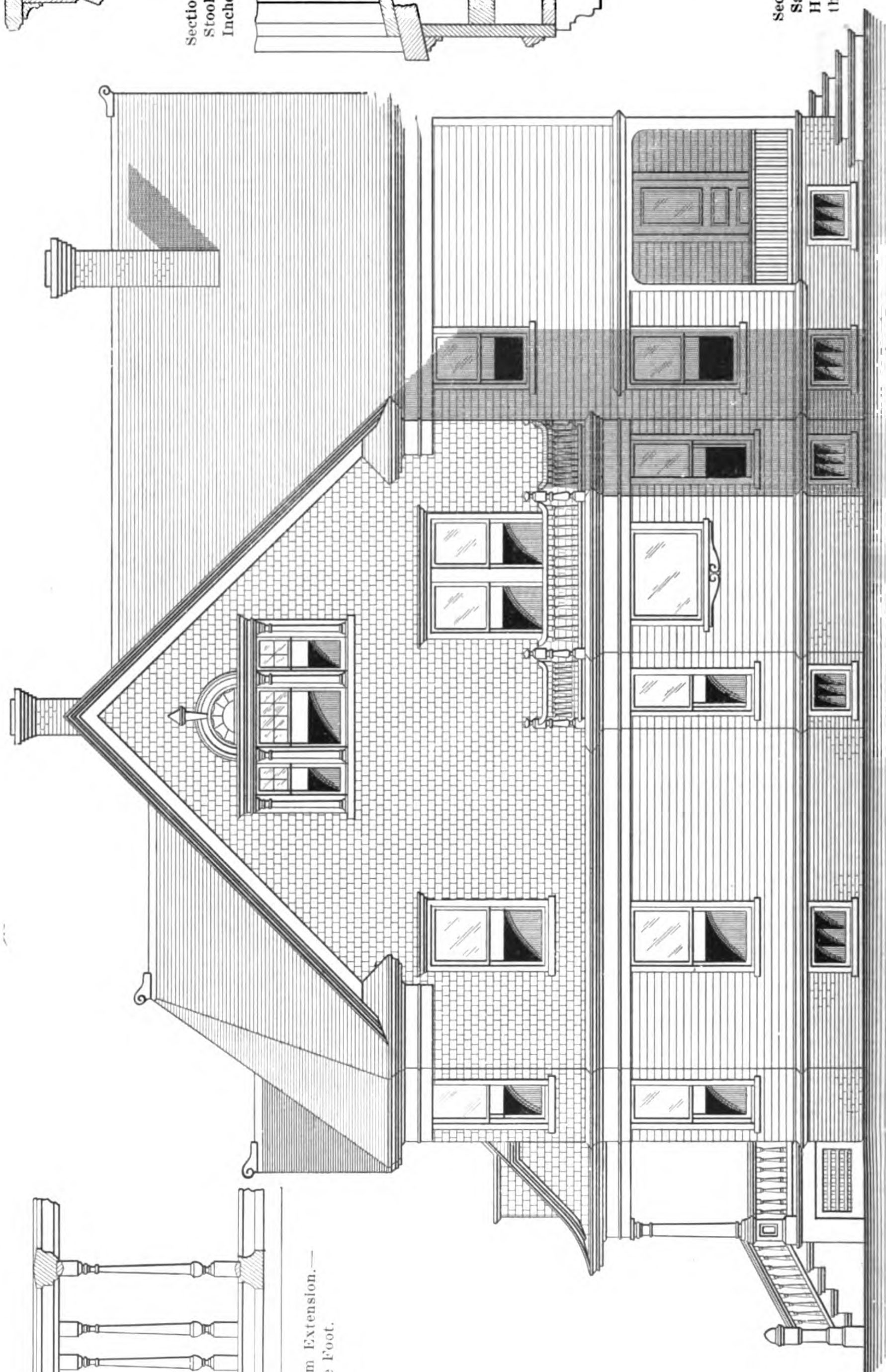
dining room, parlor, reception and staircase hall, bathroom and toilet a ⅞ x 2½ inch No. 1 kiln dried white oak matched floor; and entire second floor to be covered with ⅞ x 3 inch white pine matched floors. All hard wood floors to be thoroughly dressed up true and even and finished with sand paper, leaving perfectly even surface for finishing.



Section through Window Stool and Sill.—Scale, 1½ Inches to the Foot.

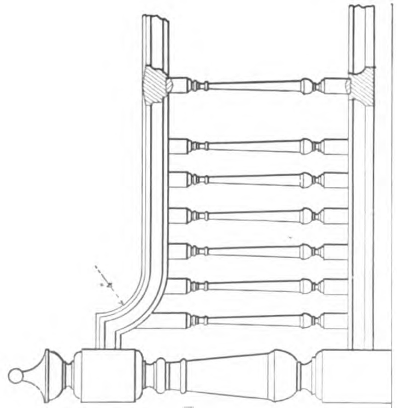


Section through Bottom of Sash Frame in Reception Hall.—Scale, 1 Inch to the Foot.

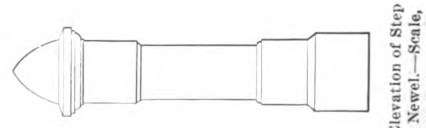


Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

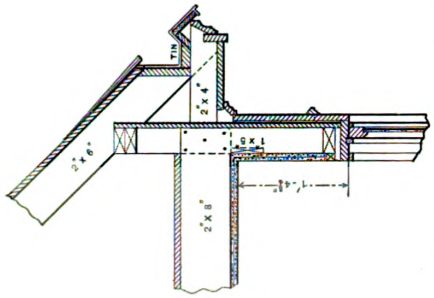
Competition in $5000 Frame Houses.—Second-Prize Design.—Elevation and Miscellaneous Constructive Details.



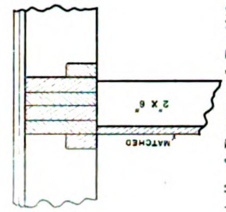
Balustrade Over Dining Room Extension.—Scale, ¾ Inch to the Foot.



Elevation of Step Newel.—Scale, ½ Inch to the Foot.

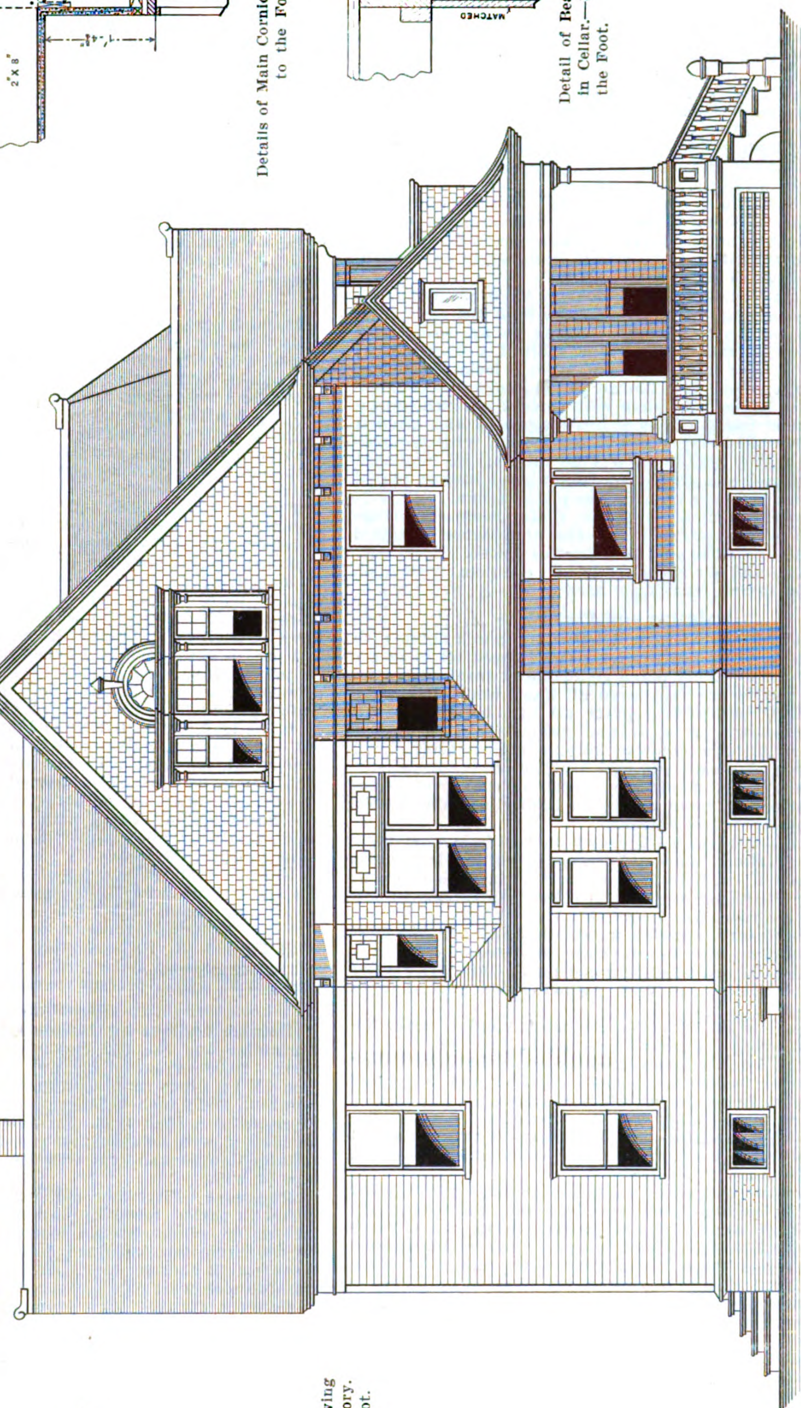


Details of Main Cornice.—Scale, ½ Inch to the Foot.



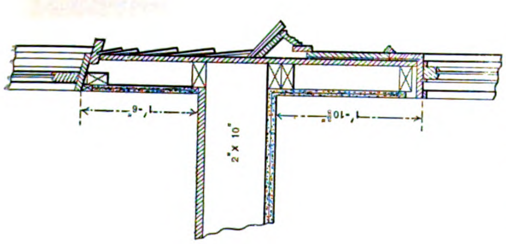
Detail of Beam and Partition in Cellar.—Scale, ½ Inch to the Foot.

Bracket on Left Elevation.—Scale, ¾ Inch to the Foot.

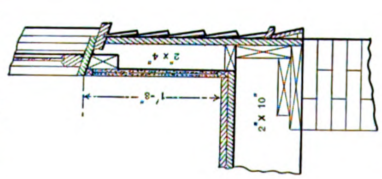


Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

Competition in $5000 Frame Houses.—Second-Prize Design.—Elevation and Miscellaneous Constructive Details.



Detail of Belt Course, Showing Construction at Second Story. —Scale, ½ Inch to the Foot.



Details of Water Table and Sill. — Scale, ½ Inch to the Foot.

All attic surface to be covered with ⅞ x 4 inch matched hemlock, firmly nailed and strained up tight.

Hardware.

Front doors to have Sargent's 5-inch easy spring cylinder locks, with 3 x 10 inch bronze escutcheon and 2¼-inch bronze knobs. Stationary door to have same escutcheon and 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 inch 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 cup 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 two steel bronze plated butts, 4 x 4 inches.

Double swing doors 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.

Cellar and 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 trims.

All windows shown in parlor, dining room and reception hall to have bronze sash locks, and bronze cupboard sash lifts; all others to have bronze plated.

Furnish and set one electric bell compete, with push button to match front door hardware.

Painting and Finishing.

Paint all wood work on exterior and porch floors with three coats of best white lead and linseed oil in colors to suit owner (except porch ceilings and front doors and frame), having first shellaced all knots and pitch spots. After first coat is dry, putty all nail holes. Dip all shingles shown on sides and gables two-thirds 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, hand sandpaper lightly, and finish with two coats best spar varnish.

Finish all wood work shown in vestibule (including outside of front doors and frame), reception hall, main stairs and toilet, including window sash, with one coat of Berry Brothers' paste wood filler, well rubbed in and wiped off clean after thoroughly dry, and putty all nail holes with putty to match wood, and finish 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.

Parlor and dining room, including window sash, finished in white enamel six-coat work.

Pantry, kitchen and side entrance, including window sash, to be finished with one coat filler and two coats 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 wood work in cellar way 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 Bros.' wood filler, rubbed off clean and finished with two coats Berry Bros.' floor finish.

Kitchen floor to have one coat of 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 rules of the local lighting company and of the National Board 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.

Plumbing Specifications.

Sewer.—Furnish and connect with sewer and carry 5-inch vitrified pipe to house, and to a point under bathroom, 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 laundry, where indicated on plans, one set of three soapstone laundry tubs, connected with city water by ½-inch galvanized iron pipe and ½-inch N. P. Fuller patented bibs for hot and cold water, and connected to drain with 1½-inch lead pipe and 1½-inch lead trap.

Place in toilet off laundry one low down siphon 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 toilet, first floor, one low down siphon 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 connect 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 kitchen 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 bibs, and furnish waste with 1½-inch N. P. brass trap, connected to soil pipe. Place one 40-gallon, extra heavy, galvanized boiler, set on ornamented iron stand, supplied with hot and cold water with ½-inch compression stops, connected to range.

Furnish and place in bathroom on second floor one low down siphon closet, with seat and tank same as toilet, first floor, and connect same to soil pipe with lead bend and brass ferrule.

Furnish and set one 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. 4 ½-inch Fuller's 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 foundation 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 toilet, first floor, and 9-inch pipes to risers 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.

Registers.—First-floor registers to be N. P., 10 x 14 inches in parlor, reception hall and dining room; 9 x 12 inches for toilet. Second-floor registers to be 9 x 12 inches, circle top, japanned finish; one in rear chamber to be 9 x 12 floor register. All properly connected with suitable size wall pipes, covered with asbestos.

Connect furnace 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 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.

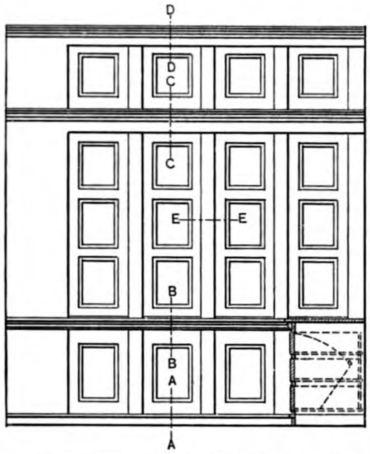
The estimate of cost furnished by the author is as follows:

EXCAVATING.

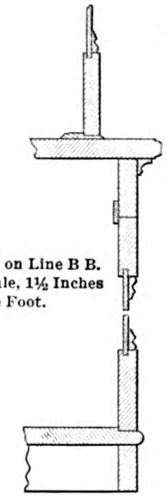
Excavating 322 yards, at 20 cents	$64.40

MASON WORK.

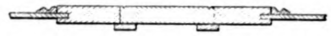
Stone work, 94 perch, at $2, laid and pointed	$188.00
Cement floor, 160 square yards, at 60 cents	96.00
Brick in foundation, 8050, at $16 per M., laid	128.80
Brick in chimneys, 6800, at $16 per M., laid (including furnace foundation)	108.80



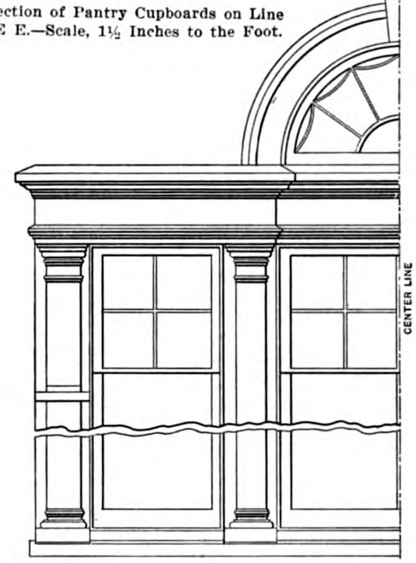
Elevation of Pantry Cupboards.—Scale, ¼ Inch to the Foot.



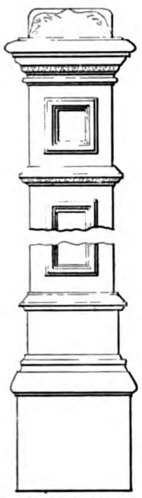
Section on Line B B. —Scale, 1½ Inches to the Foot.



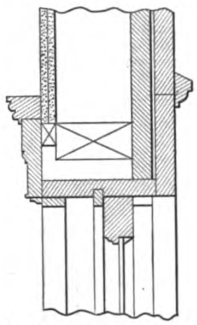
Section of Pantry Cupboards on Line E E.—Scale, 1½ Inches to the Foot.



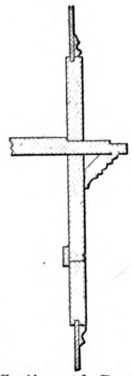
Partial Elevation of Gable Window.—Scale, ½ Inch to the Foot.



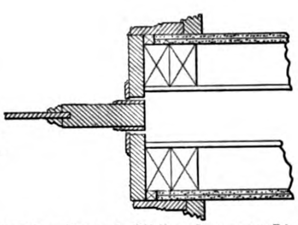
Main Stair Newel.—Scale, 1 Inch to the Foot.



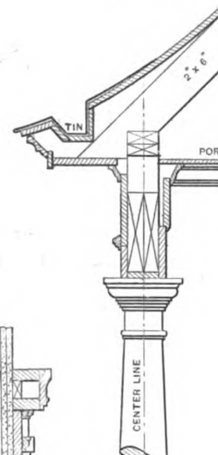
Vertical Section through Head Casing. —Scale, 1½ Inches to the Foot.

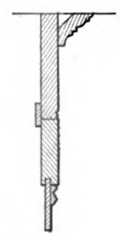


Section of Pantry Cupboards on Line C C.—Scale, 1½ Inches to the Foot.

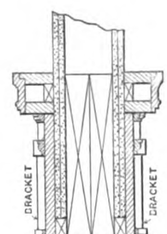


Section through Sliding Doors on Line A B.—Scale, 1 Inch to the Foot.

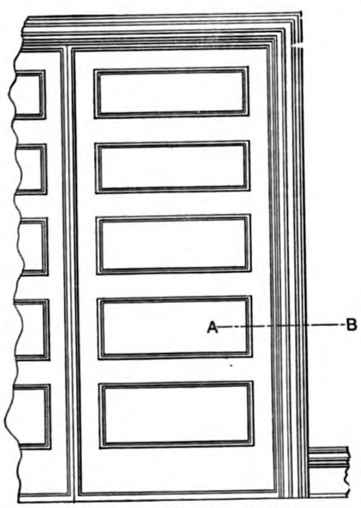




Section of Pantry Cupboards on Line D D.—Scale, 1½ Inches to the Foot.

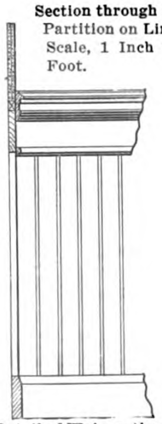


Section through Column Partition on Line A A. Scale, 1 Inch to the Foot.

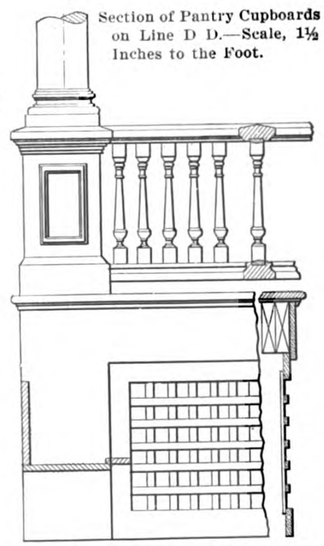


Partial Elevation of Sliding Doors.—Scale, ⅜ Inch to the Foot.

Base.—Scale, 3 Inches to the Foot.



Detail of Wainscoting in Toilet and Bathroom.—Scale, 1½ Inches to the Foot.



Details of Front Porch.—Scale, ½ Inch to the Foot.

Competition in $5000 Frame Houses.—Second-Prize Design.—Miscellaneous Constructive Details.

Lathing and plastering, 1135 yards, including lath, at 28 cents	317.80
35 square feet 2-in. flag stone for cold air flue covering	3.50
Two-inch drain tile, 160 feet, laid	4.10
Ten stone sills for cellar frame	10.00
Filling in trenches and outside of main walls	6.00
Total	$927.40

CARPENTER WORK.

14,598 feet framing materials, at $18	$262.76
5500 feet surfaced and jointed sheathing and sub-floors, at $19	104.50
1900 feet surfaced roof boards, at $18	34.20
2950 feet matched hemlock for cellar partition and attic floor, at $22	64.90
19,000 cedar shingles on roof, at $4.50	85.50
9000 dimension shingles on sides and gables, at $5	45.00
130 pounds best Manila sheathing paper, at $6	7.80
2200 feet No. 1 white pine siding, at $30	66.00
1050 feet white oak match, first noor, at 5 cents	52.50
360 feet white maple match first floor, at 3½ cents	12.60
1800 feet white pine match, second floor, at $28	50.40
Total rough lumber	$786.16

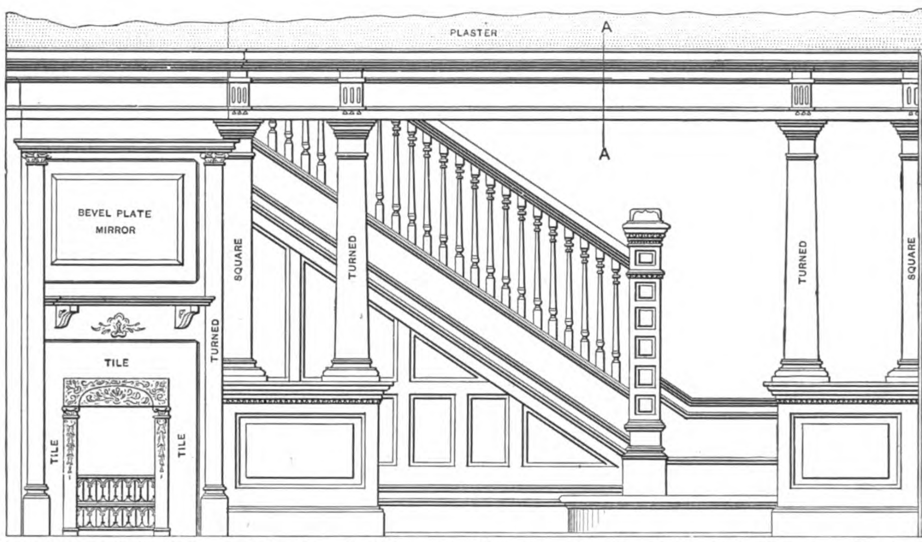
MILL WORK.

125 lineal feet water table complete, at 4½ cents	$5.63
154 lineal feet belt courses, including eave cornice to porches, at 10 cents	15.40
229 lineal feet gable cornice, including return and belts across gable, at 11½ cents	26.34
96 lineal feet main cornice, including forms for gutter, at 15 cents	14.40
44 lineal feet corner boards complete, at 4½ cents	1.98
90 lineal feet ridge boards, with finials complete	6.60
Materials for front porch complete, with step newels and pedestals made up	95.00
Materials for rear porch complete, with columns and cone buckets made up	18.44
Materials for balustrade on front balcony, 7 lineal feet	3.71
Materials for balustrade over dining room extension, 18 lineal feet	13.00
43 windows, 1⅜ inches, C. C., glazed A. D. T	117.04
31 window frames for above, pockets and pulleys, made up complete	49.46
One sash frame for above	1.50
One special sash frame for above on left elevation	5.00
Seven sets white wood trim for above, put together	13.30
Nine sets quartered oak trim for above, put together	19.35
13 sets cypress trim for above, put together	19.00
Four sets black ash trim for above, put together	8.50
11 sheets glass, cellar sash	9.73
Two special frames for gables for above	20.00
Two sash frames for above	2.50
11 cellar frames for above	8.25
All frames made up complete.	
One cellar door, one light, No. 1 pine	7.35
One side door, one light, veneered ash and pine	10.20
One pair front doors, one light, veneered quartered oak	27.20
One vestibule door, one light, veneered quartered oak	15.58
Two sliding doors, col. panel, veneered ash and oak	32.88
One pair sliding doors, col. panel, solid white wood	15.89
Six doors, veneered	39.20
13 doors, solid cypress	51.64
Nine doors, common stock pine, cellar	18.00
One cellar door frame and pine trim, complete	2.00
One side door frame and ash trim, complete	2.00
One front door frame and quartered oak trim, complete	20.00
Ten sets inside door jambs and trim, two sides, complete, first floor, put together	42.75
13 sets inside door jambs and cypress trim, two sides, put together	28.60
100 lineal feet beaded wardrobe strip, cypress	1.50
64 lineal feet ⅞ x 18 inch pine closet shelving	3.00
Drawers in linen closet	5.00
Four cypress and one oak turned corned beads	1.25
Materials for attic stairs complete	9.32
Materials for rear stairs, 12 risers	4.60
Materials for stairs from kitchen to cellar, complete	9.08
Materials for main staircase, quartered oak, including newels and first steps and paneling, made up ready to set, with stringer housed	117.14
Materials for clothes chute, including door in bathroom	6.70
525 lineal feet picture molding	5.25
335 lineal feet 9-inch molded cypress base, three members, at 6 cents	20.10
105 lineal feet 10-inch molded whitewood base, three members, at 6½ cents	6.83
60 lineal feet molded quartered oak base, 10-inch, three members, at 11½ cents	6.90
25 lineal feet 10-inch molded black ash base, three members, at 6½ cents	1.62
21 lineal feet ¾-inch matched and beaded quartered oak wainscoting, 4 feet high, toilet	7.90
21 lineal feet caps and base for above, at 14 cents	2.94
44 lineal feet ¾-inch match and beaded black ash wainscoting for kitchen, 3 feet high	8.25
44 lineal feet cap and quarter round	.88
30 lineal feet ¾-inch match and beaded cypress wainscoting for bathroom, 3 feet high	5.60
30 lineal feet cap and base for above	2.10
Medicine closet made up complete, ready to set	3.00
Materials for pantry complete, with drawers and flour box made	19.90
Materials for quartered oak, turned col., partition in reception hall	34.60
Mantel and grate complete	50.00
Total mill work	$1,120.98

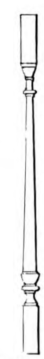
RECAPITULATION.

Mason work	$927.40
Total rough lumber	786.16
Mill work	1,120.98
Tin and iron work	65.70
Rough hardware	56.00
Finished hardware	90.00
Heating	180.00
Plumbing	388.25
Lighting and fixtures complete, including one electric bell	103.00
Painting and finishing	380.00
Carpenter work	901.70
Total	$4,999.19

The builder's certificate was signed by G. B. Stryker of 213 Lawrence street, Penn Yan, N. Y.



Elevation of Main Stairs Looking through Column Partition from Reception Hall.—Scale, ⅜ Inch to the Foot.



Stair Spindle.—Scale, 1 Inch to the Foot.

Competition in $5000 Frame Houses.—Second-Prize Design.—Miscellaneous Constructive Details.

Employer Not Required to Recognize Labor Union.

One of the most important legal decisions ever announced in the State of New York, on the question of the right of a labor union to order a strike, was handed down by the Appellate Division of the Supreme Court on April 9.

It is in effect that a labor union has not the right to order its men to quit work where they are in receipt of the wages demanded by the organization and where there is no attempt to employ non-union workers, but where the only question over which there is any difference is a refusal of the employer to recognize the union or its representative.

A NEW 12-story fire proof office building, which will cost $400,000, is soon to be erected at the cornor of Broadway and Leonard street, New York City, the site having a frontage of 61 feet and a depth of 175 feet. Brick, limestone, terra cotta and granite will be the material used.

NEW COTTAGE HOSPITAL AT ENGLEWOOD, N. J.

[WITH SUPPLEMENTAL PLATE.]

THE half-tone engraving which constitutes our supplemental plate this month represents the remodeled and greatly enlarged cottage hospital which was completed at Englewood, N. J., not long since in accordance with the plans of Architect Arthur G. C. Fletcher of 1133 Broadway, New York City, who gave to the problems which were involved in the transformation a vast amount of careful study and thoughtful consideration. The original structure was a small building with accomodations for eight beds in each ward, and its general outlines included the rear extension and part of both rear wings of the plans which are presented herewith. The rear extension formerly contained the operating and etherizing rooms, the left wing was the female ward, and the right wing the male ward, each wing consisting of but one room.

In the remodeled and enlarged building each of the rear wings has been divided into halls and rooms and an addition put on the outer part, the left one being turned into private rooms, as shown, while the right wing is devoted to hall space, sterilizing room, stores and operating room, the children's ward and bathroom being the new additions. In changing the operating room from the rear extension to the wing a direct north light was obtained from the large windows to the operating table. The present dispensary was the only private room in the old structure, the hall at its side being the old main entrance. All shown by the plans in front of the dispensary is entirely new building.

The motive of the architect as to the arrangement was governed mainly by the conformation of the old wings, and the object in splaying the new wings was to concentrate the halls and communicating spaces and to draw the main ward around so as to face as nearly south as possible, at the same time leaving ample light and air between the front and rear wings. With the present arrangement there is a concentration of the executive and working forces, resulting in a great saving of steps in reaching from a central point the various important rooms. It will be seen from the plans that radiating from the reception hall are the baths, toilets, linen rooms, kitchens, etherizing room and dispensary. There are accommodations in each ward for 12 beds, with ample room for more should necessity require. In the children's ward are eight beds.

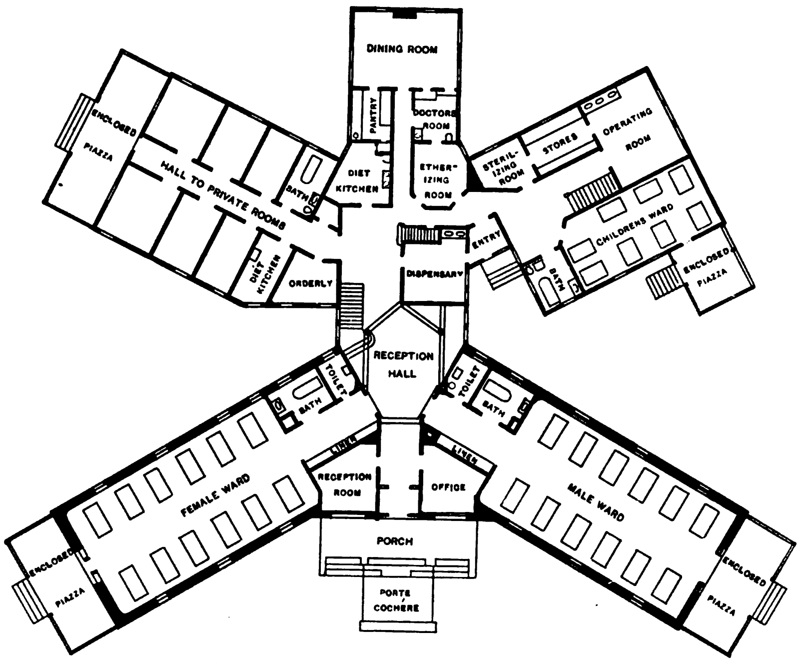
The outer walls of both of the front wings are of brick, 12 inches thick, faced with rain wash brick, while the rear portions of the building are frame to conform to the old structure. The roofs are shingled. At the end of each ward is an inclosed piazza, so constructed that the glazed sash can be removed and replaced at short notice.

The interior walls are painted and enameled, as also are the bath and toilet rooms. The floor and walls of the operating room to a hight of 5 feet are covered with 6-inch tile. Above the tiling the walls and ceiling are in enamel paint.

In the basement under the dining room are the kitchens and pantries; under the operating room and children's ward are the isolating room with sound proof walls and ceiling, the morgue, and laundries. As the ground slopes away at the rear there is a level side entrance opposite the stairs near the operating room. The balance of the basement is utilized only for cellar purposes and for the heating apparatus, the building being heated by a system of direct hot water.

The second floor has no provision for patients, and is devoted entirely to rooms for the nurses and help.

The contract for the construction was executed by Andrew D. Bogert of Englewood, N. J.



Main Floor Plan.—Scale, 1-16 Inch to the Foot.

New Cottage Hospital at Englewood, N. J.—Architect, A. G. C. Fletcher, 1133 Broadway, New York City.

The Master Painters and the Labor Question.

At the nineteenth annual convention of the Master House Painters and Decorators of the United States and Canada, held in Richmond, Va., in February, a great deal of attention was given to the labor question and its bearing upon the particular branch of trade which was represented by the membership of the association. A special committee made a report upon the matter, and appended to it the following proposed "Cures for Labor Troubles:"

1. Fair dealing on the part of the employer: not taking advantage of a man's necessity.

2. Asserting our rights as American citizens and demanding proper protection in the carrying on of our business from the Government, which can be brought about by a consolidation of the reputable employers in the various branches of the business.

3. A united demand that labor unions shall be responsible for their acts or the damage they unjustly inflict on the employer. Their claim for power is found in their organization and the threat of united political action on their part, and the natural cowardice of the men in office, which would be offset by a compact organization on the part of the employers and respectable employees. The lack of union on the part of the employers weakens their case very materially.

4. Putting the stamp of disapproval on the boycott, which is un-American, unjust and would not be tolerated by the intelligent American citizens if they realized it was being enforced.

5. Demanding that a better show should be given to the American youth in their desire to learn a trade. In other words—care for the coming man. As American citizens and employers, recognize our responsibility as educators in enlightening the minds of the conservative element in our employ, opening an avenue for mutual understanding, agreement or arbitration between them and us, impressing on the minds of our customers that we have some rights that should be protected by them if an unjust and unfair demand is made upon us.

Last. Try to conduct our business along the line of the Golden Rule, eliminating selfishness as a controlling power.

The following preamble and resolutions were unanimously adopted by the association as a result of the discussion of the report:

Whereas, The labor unions of our country, under their present management, are not pursuing a course that is advantageous to any clear minded employer, nor any conscientious skilled employee. The endeavor on the part of the leaders to control the management, to curtail the output of the business and place all workmen in the same grade has a tendency to take the spirit and destroy the ambition that should be the animating force, so that the best results could be attained by the employee himself; and also that the line pursued by the leaders to bring about results by intimidation, threats, boycott and other un-American methods that aim directly at the destruction of the freedom of individual choice, and robbing of the individual of his rights granted to him by the Constitution of our county; and,

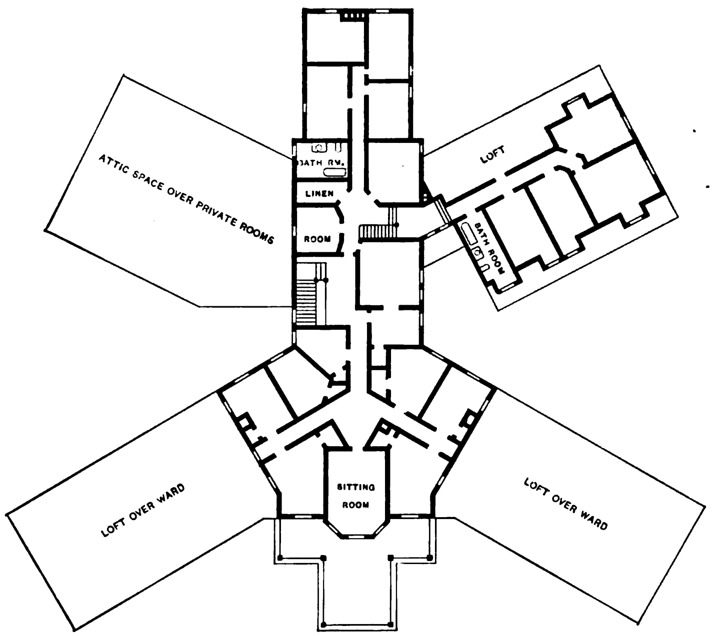
Whereas, The trend of the times is to consolidation, both on the part of capital and labor, we as employers recognize the right of labor to organize, and we believe no fair minded employers have any unkind feelings toward their employees if they exercise the right to lawfully combine, for the purpose of bettering their conditions. And we believe every patriotic American citizen, whether he be employer or employee, recognizes the constitutional right that secures the blessings of liberty to ourselves and posterity which can only come to us by recognizing and respecting, on the part of each individual, the rights of his neighbor, and we feel that in the development of these combinations injustice is done often unintentionally, and we desire, as employers and lawful American citizens, to put ourselves on record and to do all that we can to bring about cordial relations between our employees and ourselves; therefore, be it

Resolved, That we, the National Association of Master Painters and Decorators express our unanimous opinion that the several States should exercise the power conferred by the Constitution in passing such laws as will require labor unions to organize as corporate bodies under the law, in such manner as will make them responsible for any damage, for any wrongful, malicious and unlawful acts committed by them or their agents and representatives, even as the employers are to-day responsible; that the rights of the individual to dispose of his labor should be free, except as far as peaceable and lawful moral suasion is concerned. That the workingman should be protected in his rights to gain his living, even if he refuses to be bound by the laws of the labor unions.

Resolved, That the attitude taken by the labor unions in the matter of curtailing the number of apprentices to be employed by their various trades is damaging to the coming men of the nation, as well as placing us in a state of dependence upon the skilled labor from foreign lands, and that we deem it a wrong to the boys and a menace to the further progress of our nation, and we demand that the powers of the Government be exercised to protect the young men of our country in their endeavors to learn a trade.

Resolved, That we most heartily condemn as un-American and wrong in principle the boycott, and respectfully call the attention of the American citizen to that most dangerous of all weapons which is now used by the labor leaders to accomplish their ends; since under this Government every man should be allowed the privilege of living without the fear or dread which is now put upon him by irresponsible men and irresponsible organizations; and be it further

Resolved, That we recommend to the State and local associations of Master House Painters and Decorators of the United States and Canada that they do all in their power to promulgate the principles as set forth in the foregoing resolutions, believing as we do that there is nothing therein contained that any self respecting citizen can take exception to.



Second Floor.—Scale, 1-16 Inch to the Foot.

New Cottage Hospital at Englewood, N. J.

RATES OF WAGES IN THE BUILDING TRADES.

THE variety and degree of the changes which have occurred in the rates of wages in the leading branches of the building trades during the past few months, together with the demands made to take effect the first day of May, have developed a situation which is of more than usual interest and importance to the building fraternity. With a view to showing the schedule of rates which prevail in many departments of labor connected with the building industry in some of the leading centers of activity, we have obtained from the secretaries of builders' exchanges and other authorities in the several cities named the figures which are presented below and in force at the date of going to press, April 14. A careful study of them cannot fail to impress the reader with the fact that the building mechanic is sharing in large degree in the magnificent prosperity with which the country is at present blessed.

Baltimore, Md.

In the various branches of labor the situation is such as to seriously affect prospective building operations, unless the differences existing are soon settled. The "card" system seems to be the great bugaboo, and the Employers' Association of the United Trades of Baltimore and vicinity have decided to resist the introduction or use of any general card system among their workmen, or any sympathetic strike that may result therefrom. The current schedule of wages is as follows:

	Current rate.	Rate asked May 1.
Carpenters (minimum)	$2.75 for 8 hours.	$3.00
Bricklayers	4.50 for 8 hours.	....
Plasterers	3.50 for 8 hours.	....
Roofers	2.50 for 9 hours.	....
Sheet metal workers	2.50 to $3.00	....
Plumbers	3.00 to $3.50 for 9 hours.	....
Gas fitters	3.00 for 9 hours.	....
Building laborers	1.50	....
Plasterers' laborers (hod carriers)	2.50	....
Architectural iron workers	3.50 for 8 hours.	....
Steam fitters (minimum)	2.50 for 9 hours.	....

Boston, Mass.

A most unusual condition of affairs exists in Boston, and it is somewhat difficult to present figures which are safe to quote. The immediate outlook for the building business is not particularly flattering, as there is more disturbance in the field of labor than has been experienced in this locality for a dozen years. The current rates of wages in the various trades are as follows:

CARPENTERS.—Up to May 1, 35 cents per hour.

From May 1, 1903, to May 1, 1904, wages will be 37½ cents per hour, established under joint agreement recommended by the National Association of Builders.

BRICKLAYERS.—Wages 50 cents per hour.

Unions have just withdrawn from the National Association agreement, which has been in operation successfully and satisfactorily in the city for 12 years. It is impossible to determine with certainty the cause for this action, as apparently the form of agreement has been productive of the best results and there have been no strikes or lockouts and therefore no lost time.

PLUMBERS.—Wages 47 cents per hour.

GAS FITTERS.—Wages 31 cents per hour.

PLASTERERS.—From April 1, 1903, to April 1, 1904, under terms of the National Association agreement, wages will be 50 cents per hour.

STEAM FITTERS.—Forty-seven cents per hour.

STEAM FITTERS' HELPERS.—Twenty-five cents per hour.

ARCHITECTURAL IRON WORKERS.—Wages vary in a marked degree. Minimum may be stated at 35 cents per hour.

GRAVEL ROOFERS.—Thirty-five cents per hour.

SHEET METAL WORKERS.—Thirty-five cents per hour.

BUILDING LABORERS.—Twenty-seven cents per hour.

Under a division of the committee coming under the joint agreement, the question of an increase to 30 cents has gone before the umpire.

PLASTERERS' LABORERS.—Thirty-four cents per hour.

In case of the plumbers, gas and steam fitters, gravel roofers, steam fitters' helpers, architectural iron workers, plasterers' laborers and sheet metal workers, no agreement exists.

Buffalo, N. Y.

There is a feeling that the labor situation and the high prices of building materials are having an appreciable effect upon building operations. Some branches of labor have made a demand for an increased rate of wages, and until the differences between employer and employed have been adjusted the situation will remain very much unsettled. The following are the current rates in the various trades:

	Current rate.
Carpenters	35 cents per hour.
Bricklayers	50 cents per hour.
Plasterers	50 cents per hour.
Roofers (slate)	40 cents per hour.
Painters	$2.50 per day.
Gas fitters	3.25 per day.
Plumbers	3.50 per day.
Architectural iron workers	45 cents per hour.
Sheet metal workers	35 cents per hour.
Steam fitters	35 cents per hour.
Building laborers	17 to 20 cents per hour.
Plasterers' laborers	17 to 20 cents per hour.

The bricklayers have made a demand for 55 cents per hour, to take effect May 1, but the increase has been refused by the Mason Builders' Association. At the hour of writing the painters who went out April 1 have not returned to work, their differences not having been settled.

Chicago, Ill.

The increase which was granted on April 1 to the men in the various branches of the building trades is said to have been the largest in that line which has ever been given and covered a greater number of unions. Three years ago, when the lockout in the building trades was ended, many trade unions made contracts, some at the previous rate, others at a small advance and a few entered into agreements providing for an increase in the last year of its existence. On April 1, however, the increase involved all the unions where the old agreements had ceased to exist, so that the total affected was much greater than would have been the case under other circumstances.

The old and new rates for the various classified trades are as follows:

	Old rate per hour. Cents.	New rate per hour. Cents.
Carpenters	45	60
Bricklayers	55	60
Plumbers	50	56¼
Gas fitters	50	56¼
Plasterers	50	56¼
Steam fitters	50	56¼
Steam fitters' helpers	25	28⅛
Architectural iron workers	42½	50
Gravel roofers	45	50
Sheet metal workers	42½	45
Building laborers	28	30
Plasterers' laborers	35	36½

Cincinnati, Ohio.

The labor situation in and about the city is somewhat uncertain just at present. There is a fair prospect for building operations, and while some expect no important developments May 1 there is nothing certain as to what the changes will be, if any.

The following are the rates for the classified trades:

	Old rate. Cents.	Hours.	Present rate. Cents.
Carpenters	37½	8	37½
Bricklayers	56¼	8	56¼
Plasterers	50	8	56¼
Roofers	25 to 31¼	10	25 to 31¼
Sheet metal workers	25 to 31¼	10	25 to 31¼
Plumbers	35	9	35
Gas fitters	35	9	35
Building laborers	17½	10	17½
Hod carriers	35	8	37½
Architectural iron workers	33½	9	33½
Steam fitters	35	8	35
Stone masons	45	8	50

The increase in wages of the stone masons went into effect on April 1. The rate for the architectural iron workers is now in dispute, they demanding 45 cents per hour. The advance in the plasterers' rates went into effect early in the year.

Cleveland, Ohio.

The building outlook in the city is regarded as very favorable at present, and matters are moving along in a most encouraging way. The ruling rates of wages in the various branches of the trade are as follows:

Carpenters	37½ cents per hour until June 1; then 40 cents per hour.
Bricklayers	50 to 60 cents.
Plasterers	$4 per day of 8 hours.
Plasterers' laborers	$2.25 per day.
Roofers (slate)	37½ cents per hour, but are asking 45 cents.
Sheet metal workers	20 to 35 cents per hour, with 30 cents as the average. They ask for 10 per cent. increase on May 1.
Plumbers	$4 per day.
Gas fitters	$4 per day.
Architectural iron workers	47½ cents per hour.
Steam fitters	$3 per day, but are demanding $3.50.
Building laborers	25 cents per hour and ask for 30 cents after May 1.
Gravel roofers	22 cents, but are asking 25 cents.
Foremen	$18 to $20 per week.

Columbus, Ohio.

The labor situation in and about the city is such that building operations are not being interrupted to any appreciable extent. In fact there is said to be more work than can be done, and in many instances mechanics are receiving more than the union scale of wages working eight hours a day.

The following shows the current rates in the various lines:

	Current rate per hour. Cents.
Carpenters	30 to 35
Bricklayers	55
Plasterers	50
Stone masons	50
Roofers	40
Plumbers } Gas fitters }	45
Building laborers	31¼
Steam fitters	45
Painters	30 to 35
Lathers	35
Cement finishers	35

Evansville, Ind.

The outlook in the building line is not as brilliant as it was 60 days ago on account of the unrest which exists in labor circles, combined with strikes in several trades outside the building line. All this is tending to interfere with the progress of new work and causing more or less uneasiness.

The following schedule shows the current rates of wages per hour, together with the old rate, the changes having taken place at different times since the first of the year:

	Old rate. Cents per hour.	Current rate. Cents per hour.
Carpenters	.....	30
Bricklayers	45	50
Plasterers	40	50
Tin Roofers	25	28 1-3
Sheet Metal Workers	25	28 1-3
Plumbers } Gas Fitters } Steam Fitters }	33 1-3	37½
Building Laborers	15	20
Platerers' Laborers	25	28 1-3

At the time of writing the painters are out on strike for an increase in wages to 35 cents per hour, the old rate being 30 cents.

Lincoln, Neb.

In regard to the labor situation it may be stated that agreements affecting the various trades in the building line for the year ending April 1, 1904, are signed and at present in force. The comparative scales for last year and the present one are as follows:

	1902.		1903.	
	Hours.	Rate. Cents.	Hours.	Rate. Cents.
Carpenters	9	25 to 30	8	32½
Bricklayers	9	50	8	55
Plasterers	9	35 to 40	8	45
Sheet Metal Workers	9	25	9	30
Plumbers } Gas Fitters } Steam Fitters }	8	50	8	50
Building and Plasterers' Laborers	9	15 to 25	8	22½ to 25
Architectural Iron Workers	9	25	9	35 to 40
Painters	9	25 to 30	9	31¼
Electricians	9	25	They ask 8 hours and 37½ cents.	

The plasterers originally agreed on 45 cents per hour, but before the agreement was signed they raised their demand to 50 cents. There seems to be no immediate prospect of settlement, unless it be on the basis of 45 cents per hour, which the contracting plasterers are willing to pay. In the case of the electricians and building laborers the trouble hinges on recognition of the unions exclusively and compulsory employment of union labor by the contractors.

Milwaukee, Wis.

A large amount of building is likely to be done this season if the labor situation does not develop unexpected features.

We give below the current rates in various branches of the trade, together with that demanded for May 1:

	Current rate per hour. Cents.	Rate asked for May 1. Cents.
Carpenters (minimum)	30	35
Bricklayers	50 to 55	..
Plasterers	40 to 45	..
Roofers	35 to 40	..
Sheet Metal Workers	30 to 35	40
Plumbers	47½	..
Gas Fitters	35	..
Building Laborers	25 to 35	..
Plasterers' Laborers	25 to 30	..
Architectural Iron Workers	$2.75 to $3 per day.	
Steam Fitters	37½	..

The architectural iron workers are asking for an increase in wages to take effect May 1 and recognition of the union. The building laborers and steam fitters are also out, the recognition of the union being the main cause.

New York City.

In this city the labor situation is greatly involved by the factional warfare that is in progress between the United Brotherhood of Carpenters and Joiners and the Amalgamated Association of Carpenters and Joiners, and the demands in various branches of the building industry for more money and less hours. Then, too, there are pending many agreements between the employers' and laborers' associations, the signing of which is being deferred awaiting some solution of the iron workers' strike and the trouble between the two carpenters' unions. Many organizations deem it wise not to sign the yearly agreements until these complications have been somewhat relieved. Just what will be the outcome no one seems willing to predict or to know what May 1 will bring forth. An idea of the present rates which prevail in the various branches may be gathered from the scale of wages paid members of the unions controlled by the Board of Building Trades, which are as follows:

Amalgamated Society of Carpenters and Joiners	$4 to $4.50 per day.
Tar, Felt and Waterproof Workers	3.50 per day.
Plumbers and Gas Fitters	4.25 per day.
Plain and Ornamental Plasterers	4.00 per day.
Plasterers' laborers	3.25 per day.
Amalgamated Painters and Decorators	4.00 per day.
Amalgamated Sheet Metal Workers	4.00 per day.
Metal Roofers	4.00 per day.
Bricklayers	60 cents per hour.
Steam and Hot Water Fitters	$4.00 per day.
Steam Fitters' Helpers	2.30 per day.
House Shorers' and Movers' Union	3.50 per day.
Cement Masons' Union	4.50 per day.
Cement and Asphalt Laborers	2.50 per day.
Electrical Workers	4.00 per day.
Marble Cutters	4.50 per day.
Marble Cutters' Helpers	2.65 per day.
Marble Polishers and Rubbers	3.50 per day.
Mosaic Workers' Helpers	2.65 per day.
Tile Layers' Union	5.00 per day.
Tile Layers' Helpers	3.00 per day.
Portable Hoisting Engineers' Union	24.00 per week.
Wood Lathers' Union	4.00 per day.
Metal Lathers' Union	4.00 per day.
Granite Cutters' Union	4.50 per day.
Journeymen Stone Cutters' Association	4.00 to $5 per day.
United Derrickmen, Riggers' and Painters Union	3.00 per day.
Housesmiths' and Bridgemen's Union	4.00 per day.

In order to show some of the differences between the current rates and the new demands it may be stated by way of illustration that the marble cutters demand $5 per day, the marble polishers $4 per day, the marble bed rubbers $4.50 per day, the marble machine hands $5 per day and marble cutters' helpers $3 per day.

From all that can be learned it seems probable that the increase demanded in the various trades to take effect May 1 will approximate an average of about 15 per cent.

Philadelphia, Pa.

While there is a large amount of building under construction and in contemplation, the situation as regards the master builders and the various branches of labor is unsettled. This, with the demands for increased wages to take effect May 1, have retarded operations to some extent and postponed many contemplated improvements. At the moment there is much uncertainty as to the probable outcome of existing conditions, but unless some agreement or compromise is reached between the Council of Allied Building Trades and the Structural Building Trades Alliance, between whom there is a contention, or with the master builders, reference to whose attitude has previously been made in our columns, it is not improbable that several thousand men in and about the city will cease to work on May 1.

The current schedule of wages in various branches of the trade, together with the rate asked by some of them, to take effect May 1, is as follows:

	Current rate. Per hour. Cents.	Rate asked beginning May 1. Per hour. Cents.
Carpenters	40	50
Bricklayers	55	60
Plasterers	45	50
Roofers	35	40
Sheet Metal Workers	35	40
Plumbers	37½	43¾
Gas Fitters	37½	42¾
Building Laborers	15 to 20	*22½
Plasterers' Laborers	35	40
Steam Fitters	32½ to 45	No advance.
Architectural Iron Workers	$2.75 to $3 per day	$3.00*

* Uniform rate asked.

The journeymen plumbers are at present on strike for the increase noted above, with eight hours as a working day, but it may be stated that the master plumbers on April 10 passed a resolution declaring that all master plumbers refuse to grant the demands made by the journeymen.

Pittsburgh, Pa.

The differences existing between employers and employed in many branches of the building trades have created a somewhat unsettled feeling and are having a detrimental effect on building operations, as a number of people who had large buildings in prospect have decided to hold off until the labor situation is clearer.

The current rates of wages in the various branches of the building trades in Pittsburgh and vicinity are as follows:

	Rate.	Hours.
Carpenters	$3.50 to $4.50 per day	8
Bricklayers	$4.80 per day	8
Plasterers	Are now being paid $4 per day of 8 hours but are on strike for $4.50 per day, working the same number of hours.	
Roofers	37½ to 40 7-10 cents per hour.	
Sheet Metal Workers	37½ to 44 cents per hour.	
Plumbers	$4 per day	8
Gas Fitters	$4 per day	8
Building Laborers	$1.50 to $2 per day	8
Plasterers' Laborers	$2.80 per day	8
Architectural Iron Workers	37½ to 44 cents per hour.	
Steam Fitters	$4 per day	8

The painters are at present out on a demand for an increase in wages to $4.50 per day of eight hours, the same as the plasterers. The structural iron workers have been out on strike, not for an increase in wages, but for certain other concessions, and this has tied up a great deal of structural steel work of the American Bridge Company.

St. Paul, Minn.

The building situation in the Northwest is regarded as excellent, the prospects for work being greater than for a long time past. Architects and builders are not looking for any labor disturbances, and if nothing unforeseen occurs the year should prove a very prosperous and satisfactory one to all interested in the building line.

The schedule of wages in St. Paul in the various trades mentioned below for the years 1902 and 1903 are as stated:

	1902. Rate per hour. Cents.	1903. Rate per hour. Cents.
Carpenters	37½	37½
Bricklayers	50 to 60	50 to 60
Plasterers	50	56¼
Roofers	35	35
Sheet Metal Workers	35	ask 40
Plumbers	50	50
Gas Fitters	30	30
Building Laborers	25	25
Architectural Iron Workers	37½	37½
Steam Fitters	37½	37½
Plasterers' Laborers	25	25

The wages for 1903 have been adjusted, with the exception of those of the sheet metal workers, who demand an increase of 5 cents per hour over the rate for last year. The matter is now being arbitrated by the employers and workmen and will doubtless be settled before May 1.

Worcester, Mass.

The labor situation in the city and vicinity is such as to influence to some extent the outlook for business, the increase cost of materials showing its effects in the stoppage of many improvements which were contemplated a short time ago. The general building outlook has been most encouraging and is still hopeful, although the feeling prevails that were it not for the continual advance in prices of materials and the unsettled questions of labor there would be plenty of business for every one at a fair price.

The current rates for labor in the various branches of the building trades in the city and vicinity are as follows, the hours varying from eight to ten:

	Rate.	Hours.
Carpenters	$2.25 to $2.75 per day	Mostly 8
Bricklayers, Plasterers	45 cents per hour	8
Helpers	28 cents per hour	8
Gas Fitters, Steam Fitters	$3 to $3.25 per day	8
Plumbers	$3.50 per day	8
Painters	$2.25 to $2.75 per day	8 to 9
Roofers	$2.50 per day	9
Architectural Iron Workers	$3.50 per day	8
Sheet Metal Workers	$2.50 per day	8

The question of wages and hours is at present in dispute, or likely to be, in almost every branch of the building trade. The increase demanded is such as to leave the outlook in a most uncertain state.

The Missing Cornerstone.

While the workmen were busy in excavating the old Mint site on Chestnut Street, Philadelphia, Pa., preparatory to the erection of a modern building, much curiosity was expressed by the public as to the location of the cornerstone, and the workmen have to answer queries in regard to it every day. That the building had a cornerstone is a fact attested by history, but what the box in it contains or whether there ever was a box placed in it, is one of those things no feller can find out, as Dundreary says. The newspapers of the time throw no light upon the subject. The stone was laid July 4, 1829, and that day fell upon Monday. The printers were too patriotic to work on the Fourth, and as no Sunday papers were printed in Philadelphia in those days, there was no paper between Saturday and Tuesday. And there is no mention of the Mint or the cornerstone laying in any paper published within a month of the time; so that curiosity will remain unsatisfied until the cornerstone is uncovered by the workmen.

THE new Chicago building ordinance requires that a plat of the ground upon which buildings are to be erected, must be submitted with a written application for a permit upon the part of the owner, and that the plans shall be left with the building department for three days, for consideration, before a permit is granted.

CABINET WORK FOR THE CARPENTER.*

BY PAUL D. OTTER

STRENGTH in the wheel is radiated from the hub, so the light from the center table lamp throwing out its cheer over the family circle is remembered in after years as having much to do in strengthening family ties. It is then an article of furniture which assuredly the carpenter and artisan should construct, embodying in its assembling his especial fancy and requirements. The table of to-day is not clothed with a long overhanging skirt or cover, though this may be justified should the table be a temporary makeshift. Beauty of wood and good joinery should never be hidden by an all over cover, and while the craftsman's wife or sweetheart may be an excellent needlewoman, anything of an applied nature should be subservient—used as a narrow overhanging band, scarf, or centerpiece—to show in contrast.

Importance, then, should be particularly directed to selecting the best obtainable stock for the top. When a table is contemplated it is sometimes possible to secure a quartered oak, which has, although rarely, a curly figure in combination, and the table top is just the place to do honor to this whim of nature. The edges of all table tops should be molded with an easy vance in lumber cost necessitates a careful study of the uniting of thin, or, what was in times past, refuse cuttings, into glued up dimensions, and where, by a definite finish of molding, as in the case of the reinforced table top, considerable is saved. The old notion tnat great strength was to be found only in the solid piece is dispelled by modern practice in wood economy.

The illustration, Fig. 1, is sufficiently self explanatory, except we might suggest that the cross rails be cut long enough to have deep set tenons, and also the turned posts be provided with a long square tenon as it enters the foot pieces. The bracket supports are secured to posts and under top by screws sunk and blind plugged.

Our next illustration, Fig. 2, is of a style suitable in a small or large size, and while shown with only the cross strainers, may have substituted a lower shelf for books or magazines. Possibly many have profited from the series of articles on wood carving published in these

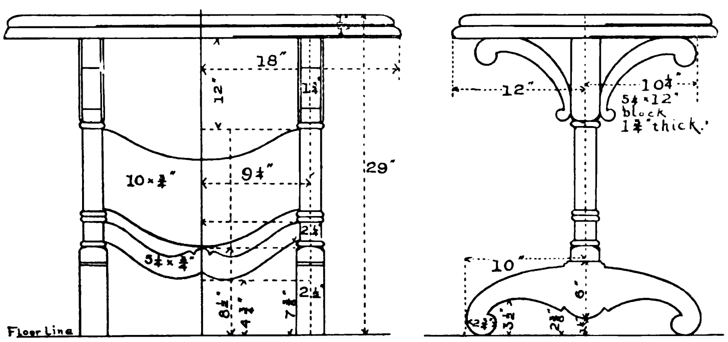


Fig. 1.—Front and End Views of Table.

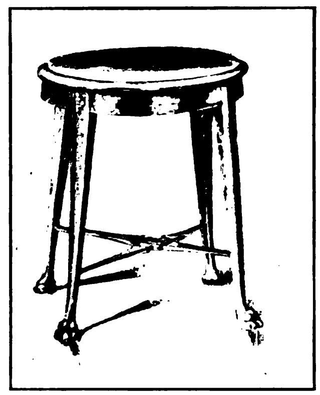


Fig. 2.—View of Round Center Table.

Cabinet Work for the Carpenter.—Center and Side Tables.

round shape on the upper edge, as an accidental indentation is less noticeable and it is more congenial to the touch.

In the case of small side tables, where the top would not be subject to heat or accidental spilling of liquids, as would be the case with a dining table, veneers of marked figure or crotch may be used with great success, permitting of a lower cost material to be used for the solid part. When veneers are thus used the mold selected must be of a profile which cuts a decided edge through the veneered surface—that is to say, a quarter mold, or one rounded still lower, generally presents a destructive edge to the veneer and does not show up well in the finish. It is expected that by the guidance of the measured drawings here given the workman will receive inspiration to lay out his working details, and if fancy dictates, modify as he thinks best. His requirements may be for a larger or smaller table, in which case a hight of 27 to 30 inches is adhered to, and top measurements are generally increased indefinitely by 2-inch additions.

Fig. 1 offers a suggestion for the display of grain and figure in the top, on the rails underneath and on the turned shafts. If made of solid wood the opportunity oı well rounding all edges is particularly offered to enhance the finish of this pattern. The top is apparently heavy, this being produced by false under stock projected and molded in advance of the top, as shown. This false framing is carefully selected as to figure, fitted, glued and afterward molded, when it is then glued and screwed to top. The steady and rapid ad-

* Continued from page 75, March issue.

columns some years ago and later issued in book form by the publishers of *Carpentry and Building.* To them the claw foot will not be difficult to draw and execute. Just this suggestion of rugged cutting in combination with the plain upper structure adds much to the character of any piece of furniture. Should a plain foot be desired, the "bandy leg" is proper for this table, the forming of such a leg being described in the article in the October issue for 1902, page 242. The size given for this leg is 2 x 2 5-16 inches. This, however, is sufficiently heavy that the addition of side blocks will not be necessary to produce a gracefuly formed ankle and foot. The reinforced framing to the top is also used in this table, this being 2¼ inches wide, and to which are screwed the rails, and into which are secured the legs by dowels.

The hight of these tables having been given, the plan in Fig. 3 will facilitate making up a working drawing. In this illustration the top is 23 incnes in diameter by 1 inch thick, and the projected under part 24 inches in diameter by ⅞ inch thick. The rails between legs can be made of 2-inch material glued up to admit of securing a width sufficient to produce the quarter ring shown, which is 1½ inches wide. Secure these rails by glue and three countersunk screws to each quarter.

In Fig. 4 is shown an easily constructed table of a plain character relieved by the carving on side panels. This carving should have a dull finish, with plain surrounding surfaces polished. Fig. 5 shows what can be done by using properly selected stock patterns of moldings under the top, a pattern that will be somewhat in contour with an easy line given to the leg. This leg is diagonally placed under the corner of the top and is secured from stock 2½ inches thick, reduced to shape and taper as shown. The rounding or stock dressing is accomplished by a draw knife, shave and scraper previously described. Fig. 6 affords the basis of many modifications dependent upon the constructional features being kept in evidence. This makes a good serviceable family reading or library table, where one can poke away an unfinished book on the open shelf at ends. Such a pattern finishes most properly with a dull surface, "weathered" or "Antwerp" tone.

(To be continued.)

Some Freak Buildings.

Curious building freaks are to be found the world over and the following particulars regarding a few of them may not be without interest. George Ley, whose luck at cards was proverbial, resolved to build his residence at Combe Martin, North Devon, England, in the form of a pack of cards, split up and erected castlewise. The idea was carried out thoroughly and the edifice equipped with fifty-two windows—one for each card—while its form necessitated a plethora of chimney stacks.

Redcliffe Tower, at Paignton, Devonshire, called Smith's Folly, is erected in the oriental style, like the castle of an Eastern Maharajah, and consists of a massive round tower and two wings.

It is also known as the Bride's Cake, because of its resemblance to one in shape and color—pink with white edges. It has a fine view of Torbay.

Oystershell Hall used to be one of the sights of Newcastle-upon-Tyne. It derived its name from the whole of the building, except the roof, but including the chimney stacks, being covered with oyster shells, the concave side outward. When the sun shone upon them the effect was brilliant.

There is a curious shell house in Goodwood Park, constructed in the early part of last century, which took seven years to complete. The walls and ceiling are entirely covered with sea shells, arranged in elaborate and tasteful designs. This floor is paved with the teeth of race horses cut in half and polished.

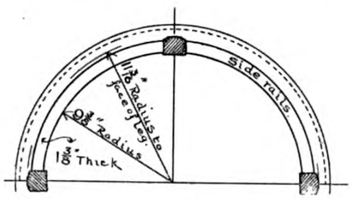


Fig. 3.—Half Plan of Round Table.

Fig. 4.—A Parlor Table.

Fig. 5.—Another Style of Center Table.

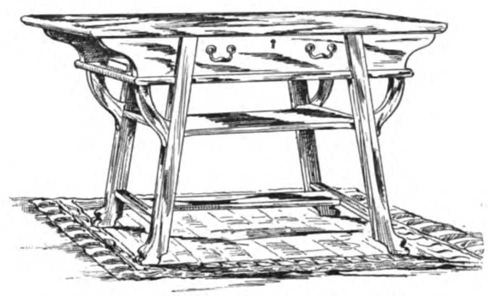


Fig. 6.—Family Reading or Library Table.

Cabinet Work for the Carpenter.—Center and Side Tables.

On Mr. Ley's death the property was acquired by a publican, who named it "The Pack of Cards," by which name it is still known, though a subsequent owner called it "The King's Arms."

Boughton House, near Kettering, Northamptonshire, England, was designed to represent the days, weeks and quarters of the year. It has four wings facing the four quarters of the heavens to represent the four quarters of the year; 365 windows, one for each day; 52 chimneys, one for each week, and seven entrances, to represent the seven days of the week. The house, one of the residences of the Duke of Buccleuch, is noted for its painted ceilings, by Verrio, its fine tapestries and two cartoons by Raphael.

Mr. W. T. S. Barber Starkey's house, Knockshannoch, at Glen Isla, Forfarshire, has no passages. It is circular in form and consists of two portions, the larger measuring 240 feet in circumference and the smaller (servants') 165 feet. The hight of the cupola is 80 feet. In the center of the house is a circular hall, into which the various rooms open, while the upstairs rooms are entered from a circular gallery. On a concert being given, 250 persons can be seated comfortably in the hall and gallery.

A Chinese fisherman at Monterey, Cal., owns a commodious house built of mother-o'-pearl. The effect presented by the exterior when the rays of the sun are flashing upon it is said to be one of the most beautiful imaginable.

Ross's Folly was a building at Stockbridge with a vault beneath, which was the burial place of Ross, the antiquarian. The ceiling was filled in with grotesque figures of musicians—bagpipers, fiddlers, &c.—all highly colored in green, blue and red. When the building was demolished the carved stone figures and moldings were taken to Abbotsford.

Freston tower, Ipswich, is a quadrangular building, six stories high, which has only one fireplace and no chimney. The story is that the owner built the tower as a study for his daughter, who as the day progressed, had to occupy the stories successively, until at its close she was studying the advantages of benevolence by distribution of alms to the poor of the neighborhood, who were allowed to visit the ground floor till a certain hour in the morning. Afterward home duties, needlework and other accomplishments were attained in the various rooms, the top one being devoted to studying astronomy.

Convention of Pennsylvania and Western New York Builders.

THE Builders' Exchange of Warren, Pa., has started a work and stimulated the foundation of organizations the benefits of which will be far reaching in the extreme. The latter part of February the exchange sent letters to all builders and material men of Central and Western Pennsylvania and Western New York, stating that a meeting would be held in Warren, March 18, to consider the advisability of forming an association for the betterment of builders' conditions in the territory mentioned. When the meeting was called to order on March 18 it was found that delegates were present from Pittsburgh, Scranton, Wilkes-Barre, Oil City, Meadville, Corey, Warren, Bradford, Erie, Kane, Ridgway, St. Mary's, Du Bois, Franklin, Titusville, Jamestown, Dunkirk, Olean and Buffalo.

The meeting was held in the Y. M. C. A. assembly room, the first session of the convention being called at 1.30 in the afternoon by C. W. Uhde of Warren, Pa., who stated that the object of the meeting was to formulate plans for an association that would foster the interests of the builders of the State. C. W. Uhde was elected temporary chairman of the meeting, and B. W. Schaefer of Erie temporary secretary.

Chairman Uhde then introduced James M. Carter of Buffalo, secretary of the Buffalo Builders' Exchange, who gave a talk on "Builders' Exchange Organizations, Their Objects and Aims." Among other things he said:

It should not be thought that builders' exchanges have a remedy for all the evils to which the building trade is subjected. They have not and do not pretend to have a sort of "cure all" for the perplexing problems of competition, labor unions, and the like. We do believe, however, that no one man in any community can solve the problems of that community, but the majority of the men of the district can; so we simply get the majority of builders together, under the Builders' Exchange, and tell them to solve the problems that confront them. Now, when men meet together to adjust problems and stick together, sacrificing individual idols for the general good, considering the problems with charity toward all, the problems must be solved, and solved in a manner fair to all. The builders' exchanges must and do solve the problems for the builders of a community.

The opinion sometimes goes forth that builders' exchanges are formed to oppose labor unions and their principles. Such is not the case. The leaders in the exchange movements to-day recognize in the labor unions a factor in the solution of the labor problems. When the labor unions in their dealings are wisely led and controlled by the spirit of honesty and fairness we are satisfied to deal with them; when unions are led by bigoted, narrow, unprincipled leaders—when there is no honesty, justice or fairness in their demands—then it is not unionism we oppose but the leadership and their unprincipled policies. Labor problems of the future will be handled and solved through the medium of labor unions, and it becomes the duty of every employer of labor in this country to then see that labor bodies are established on and controlled by straightforward, honest, fair and wise policies. Employers can and must see to it that this condition prevails.

After Mr. Carter's address considerable informal discussion followed relative to the advisability of forming a Pennsylvania State association of builders. It was finally decided to appoint a committee, to be composed of one member from each city and town represented in the convention, this committee to consider ways and means of forming such State associations as might be deemed wise, the committee to report back to the body their resolution.

A recess was then taken till 7 p.m. The committee appointed met at once, going into executive session.

When the convention reconvened at 7 p.m. the committee rendered a report favoring the formation of two associations, one to be called the Pennsylvania State Association of Builders, and to have as its members all the Builders' exchange associations of the State; the other association to be called the Builders' Association of Northwestern Pennsylvania and New York. The committee's report was adopted. Jno. S. Elliott of Pittsburgh, Edwin S. Williams of Scranton and W. H. Dennis of Bradford were then appointed a committee to draft a constitution for the two associations. The committee's report was accepted. The following officers were elected:

PENNSYLVANIA STATE ASSOCIATION OF BUILDERS.

President, William Hanley, Bradford.
Vice-President, Edwin S. Williams, Scranton.
Second Vice-President, C. W. Uhde, Warren.
Treasurer, W. H. Shepard, Wilkes-Barre.
Secretary, B. W. Schaefer, Erie.

NORTHWESTERN PENNSYLVANIA AND NEW YORK ASSOCIATION OF BUILDERS.

President, C. W. Uhde, Warren.
Vice-President, B. U. Taylor, Olean.
Second Vice-President, C. A. Swanson, Jamestown.
Treasurer, C. A. Constable, Erie.
Secretary, F. H. Guinenger, Warren.

It was decided to hold the next meeting of the Pennsylvania State Association in Scranton, January 13, 1904. A meeting of the Northwestern Pennsylvania and New York Association was called to meet in Bradford, Pa., March 26, 1903.

The business session of the convention then adjourned and the delegates proceeded to the New Struthers Hotel, where a substantial, inviting banquet had been prepared. Barth's Orchestra rendered a number of delightful selections between the courses. A splendid quartette assisted the orchestra in giving a pleasing musical entertainment. Dr. Robertson of Warren and Mr. Sterling of Erie each rendered several vocal selections. Charles D. Crandall of Warren filled the position of toastmaster in a most fascinating manner and introduced most humorously the following speakers: C. W. Uhde of Warren, William Hanley of Bradford, E. S. Williams of Scranton, W. H. Shepard of Wilkes-Barre, James M. Carter of Buffalo and Dr. A. C. McAlpin of Warren.

Meeting of the Northwestern Pennsylvania and New York Association of Builders.

A convention of the Northwestern Pennsylvania and New York Association of Builders was held in Bradford, Pa., on March 26, 1903, in accordance with the suggestion made at the convention held in Warren on March 18. The object in holding a meeting in Bradford so shortly after the Warren gathering was to perfect the organization arrangements of the West Pennsylvania Association. The general objects of the latter association are to bring together the builders of the border cities in close bonds of business fellowship; to consider ways and means of solving problems of common interest; to establish a uniform scale of wages to be paid journeymen workmen in the various cities, and in a general way to do what can be done to advance the general welfare of the building fraternity as represented gy its members.

The convention headquarters was the Holly House, and the business session was held in the hotel parlors. The business meeting was called to order at 1.30 by President C. W. Uhde of Warren, when B. U. Taylor of Olean submitted a revised constitution and set of resolutions, which were enthusiastically received and accepted. Considerable informal discussion relative to the wage scale and prices for estimating work ensued and then the meeting adjourned to reconvene at 7 o'clock.

In the evening a Board of Directors was elected, Colonel Rickards of Meadville being selected for chairman of the committee.

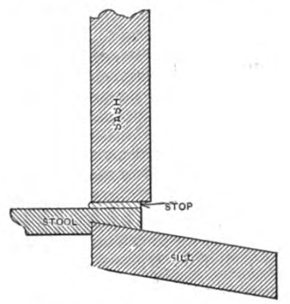
After the business session adjourned the Bradford builders invited the visiting delegates to be their guests at a banquet served in the dining hall of the Holly House. W. H. Dennis of Bradford acted as toastmaster. Good things to eat, music and well worded toasts did much to give all a happy time.

FIVE courses of brick will lay 1 foot in hight on a chimney; eight bricks in a course will make a flue 4 inches wide and 10 inches long.

CORRESPONDENCE.

A Question in Window Sash Construction.

From O. N., *Atkinson, Ill.*—In reply to the correspondent making inquiry, I would say that my method of hanging windows is illustrated in the sketch submitted herewith. The stop is nailed to a stool and the sash swings over it in the same way as a door closes over a threshold. The sash projects beyond the stool when closed and rain drips from the sash to the sill.



Question in Window Sash Construction.—Sketch Accompanying Letter of "O. N."

From J. A. R., *Atlantic City, N. J.*—In regard to the inquiry of "H. M." in the April issue I would say that I have had considerable experience in hanging sash where they swing inside. I find in this part of the country that there is no way to hang the sash where they swing on hinges except to swing them outside.

Elevations and Floor Plans Wanted of Frame Cottage.

From A. S. W., *Shawnee, W. Va.*—I inclose a sketch of the first floor plan of a house that I desire to build and would ask the readers architecturally inclined to give me elevations for a story and a half cottage and to arrange the second story so as to provide two rooms and a bath. The kitchen and pantry portion will be only one story high and the main building 12 feet to the square. I would like to have the readers locate the doors and windows, give a plan of the stairs and make the roof as fancy as circumstances will permit. I would also like to have them tell me how much framing timber is required and the sizes, how much material it will take to finish the exterior, the gables being shingled. The roof should be of 1-3 pitch. It will be seen that in the diagram the full extent of the kitchen is not shown, neither are doors or windows indicated.

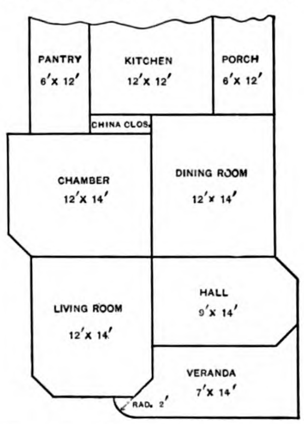


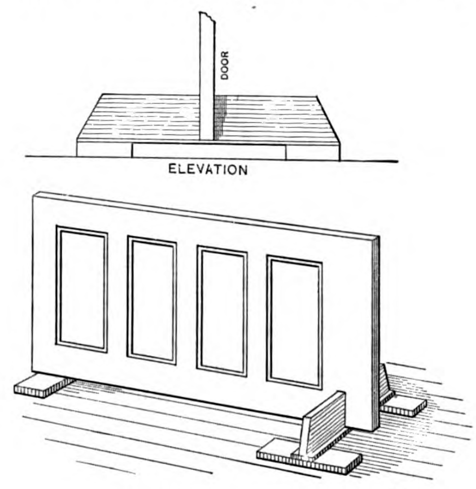
Diagram Accompanying Letter of "A. S. W."

Design Wanted of Small Dry Kiln for Lumber.

From J. S. C., *Michigan.*—I have been a subscriber to *Carpentry and Building* for nearly 20 years and recently have made a search through the back numbers with a view to finding something on dry kilns. I was not, however, successful and I therefore come to the readers with a statement of my requirements. I think it would be of general interest and especially so to me if some of the readers would give their experience in constructing a small dry kiln to hold say from 1000 to 2000 feet of lumber, in connection with a carpenter shop, but to be separated from the main building. At this place we have no little exhaust steam going to waste and it could be used to advantage for dry kiln purposes.

A Convenient Door Clamp.

From G. L. McM., *Tacoma, Washington.*—If the "bragging match" is over, I will make a suggestion in regard to holding doors while jointing them. Having an idle day a while since I happened in where one of our Tacoma crackerjacks was hanging doors and was much interested in the device he used for holding the doors in position while jointing them. It consisted of two blocks of 2 x 4 or 2 x 6, nailed edgewise on a lath or piece of thin board. He said he sometimes used a piece of spring steel instead of the lath, the space between the blocks being just equal to the thickness of the door. A couple of ⅞ x 3 inch pieces about a foot long were nailed transversely across the lath at each end, the bottom side of blocks being on the top side. The device was placed on the floor and the door put between the blocks, when its weight caused the lath to spring down enough to clamp the door so firmly as to prevent its slipping endwise, while the blocks held it upright. I have tried the thing since and find it will hold firmly and securely doors up to 3½ x 7 feet, 2-inch veneered oak. For light doors it might be necessary to drive a nail through each transverse piece to prevent the whole apparatus slipping along the floor under the resistance of the material of the door to the plane. The sketches which I send show a general view of the door in the clamp with an end elevation, all of which I think will render its construction readily understood. If any of the readers have convenient devices likely to interest members of the craft, more especially if they are calculated to facilitate the execution of work, I trust they will let us hear from them.



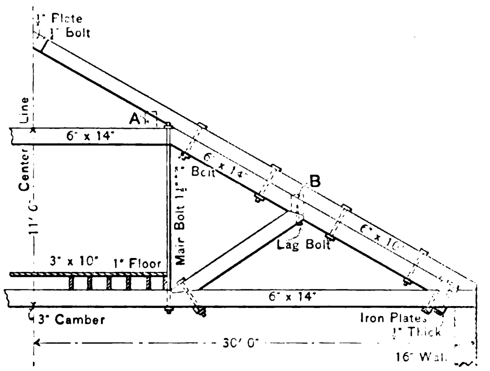
A Convenient Door Clamp.

Hanging a Sash Door.

From S., *Maud, Pa.*—In regard to the question of "E. E. F." in the April number as to the proper way to hang a sash door, I would say that if the door is of suitable thickness, and it should not be less than ¾ inch, I would get the millman to furnish a molding similar to that around the panels and then bed the glass with putty and securely brad it in. If the door is protected by the porch roof I would hang it with the solid molding on the outside. If not protected and it was in a place where rain would beat on it, I would hang it solid molded side in, so that the water would have an opportunity to escape outside. I have heard men argue the question as to which side of a transom and of a cellar window should be hung out. I would like to know what the readers think about it. My contention is that the putty side should always be hung out.

Framing a Truss.

From Frank E. Kidder, *Denver, Col.*—In running over some of the recent issues of the paper I note the fact that the request of "Learner," published in the October



Framing a Truss.

number, has not yet received attention at the hands of the readers and I therefore offer a few suggestions which may not be out of place, even though a trifle tardy. The design of a truss submitted by the correspondent is all right if the sizes of the members are sufficient to resist the loads. As the load to be supported depends upon the spacing of the trusses, or distance between centers; the kind of roofing; purpose for which the floor in the center is to be used and whether or no there is any plastering, none of which data is given, it is impossible for me to say whether or not the truss is sufficiently strong for the purpose. The weakest part of the truss is probably the tie beam, as that is to act both as a girder and as the main tie of the truss. If the floor is very heavily loaded the tie beam will probably be strained beyond the safe limit. It will also require good sized bolts to hold the foot of the rafter.

Instead of doubling the rafter it would be better construction to omit the 6 x 10 and place purlins at A and B, as indicated by the dotted lines in the sketch at these points, the purlins extending from truss to truss, and on these placing 2 x 6-inch rafters running in the same direction as the 6 x 10-inch pieces. The illustration shows the truss resting on a 16-inch wall without reinforcement. I do not consider a 16-inch wall strong enough to support such a truss unless reinforced by 8 x 28-inch pilasters either inside or out.

In order to frame the truss it should be laid out full size on a floor with the tie beam crowned, say, 2 inches and the braces cut to fit. The additional inch called for by the correspondent should be obtained by tightening up on the main rods.

Finishing a Roof Ridge.

From The Montrose Metal Shingle Company, *Camden, N. J.*—We would recommend "F. P. M.," whose inquiry appears in issue for December, to nail strips of board about 2 inches high along the hips and ridge and miter the tiles up close. Then cover with a No. 2 hip cap, such as can be furnished by Merchant & Co. of Philadelphia, who make a specialty of this class of work.

From The Berger Mfg. Company, *Canton, Ohio.*—While not knowing the form of imitation French tile roof referred to by your correspondent, "F. P. M.," we would say that be the form what it may it is customary when using these corrugated sheets, or any form of metal tile roofing, to finish the ridge with a ridging that is made especially for the purpose. By this we mean that the apron of the ridge is of a form to fit the shape of the tile roofing plates. We suppose that the manufacturer of the imitation French tile roofing referred to is prepared to furnish a ridge of this description, and would be able to do so at less expense than could be otherwise produced; because we assume that it is formed by means of dies for the purpose. If a sheet of the tile is sent to us we can at once instruct what it is necessary to do, and what the cost of the ridging to make a proper finish would be.

From The Milwaukee Corrugating Company, *Milwaukee, Wis.*—The only way to finish an imitation French tile roof at the ridge line is with tile ridging especially made for that purpose. The party that furnished the French tile imitation will also furnish the ridging. There is no other good way of finishing the comb of a roof.

Comments on Heating the Ilion Library.

From T. H., *Albany, N. Y.*—I wish to make some criticism on the paper presented by Mr. Switzer to the American Society of Heating and Ventilating Engineers. My comments are based on what I see of the plan and of the paper as presented in *Carpentry and Building* for March. I note on the plan shown what I understand to be two fire places for ventilation, one on the inside and the other on the outside wall. The flues of these fire places are 12x16 inches, having a total area of 384 square inches of ventilating flue. The air escapement is given as having a velocity of 250 feet. This would mean a total escapement of less than 700 cubic feet of air per minute, and as the total number of cubic feet of space in the building is given at 60,000 cubic feet, this would mean a total exchange of air only once in about 85 minutes; in consequence, I doubt greatly, when viewed from a theoretical standpoint, whether any one could be found who would guarantee such a result as is claimed to have been attained from the plan shown and the paper read in explanation. As I see it, it is radically wrong that there shall be an area of only 384 square inches for a discharge and an area of 918 square inches of hot air inlet. Why is this arranged thus? The above conditions, to my mind, explain why it became necessary to double jacket the furnace with asbestos, &c. The air would need to be red hot to perform the work claimed. All such protection I claim to be unnecessary. Any heater or furnace placed to work under proper conditions will not part with any more heat than ordinary cellars need. I do think, however, that such long horizontal heating pipes as shown should have been well covered, and it would seem to me that when papers to be read on such questions are presented, they should be well scrutinized, so that they might be thoroughly considered and corrected before publication.

Laying Out Curved Rafters.

From W. A. Emery, *Waterford, Maine.*—In the June number of the paper for last year I presented a method

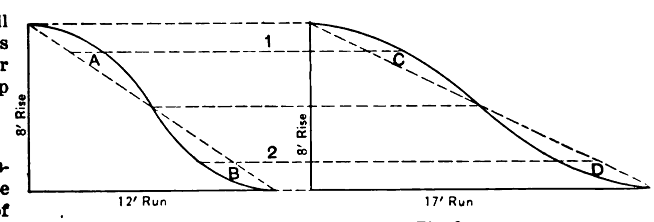


Fig. 1. Fig. 2.

Laying Out Curved Rafters.

for developing a curved hip rafter to correspond with a curved common rafter and desire to now state that "G. L. McM." is correct in claiming that it will not give the proper curve for hip on a large roof, as I have since had a chance to demonstrate on a large scale. I therefore desire to correct my method by means of the inclosed diagrams and state by way of explanation that the swell of the curve for the hip will be found on the lines 1 and 2 by making the lines at C and D of Fig 2 equal to those at A and B of Fig. 1, instead of square from the work line of rafter, as shown at D in the previous description.

Comments on First-Prize Design in $5000 Frame Houses.

From JOHN P. KINGSTON, *Worcester, Mass.*—As the author of the design awarded first prize in the competition for $5000 houses instituted by *Carpentry and Building* and published in the April number, I am of course gratified at the results of my work in this, as well as other competitions conducted by the paper in question. I wish to congratulate each of the other prize winners on the results of their work and also those others whose efforts entitled them to special mention. These must have done well to be so distinguished, and I would say to the authors, "Do not be discouraged, but try again." I, and no doubt many others, will be glad to see each and every such design published in the near future.

In regard to the comments upon my design, I think it well for the committee to bring out what they think are bad points as well as the good ones. In regard to the tower cornice, my opinion is that it is heavy enough for the roof, and the only change I should make would be to carry it up another story, then put on a little heavier cornice. This I have done on two houses of this design but which were a little larger. In the present case it was a matter of economy as much as anything else. As to the sky lines, I would say that having seen the house from all points I feel very well satisfied with the appearance.

As to the matter of reaching the front door, I think this is well provided for when the occupants can do so either of two ways. If the family is assembled in one part the servant or any one else can go through the other. In this section of the country we think it all that is necessary for a house of this size. In a larger house I would have a passage between rooms.

As to a door between rooms on second story, I would say it was the choice of the owner of the house to have none. Ordinarily I always connect some rooms by a door where it is possible, as it is very convenient where there are children or sickness.

I thank the committee very much for the way they have shown up the good points of my design and hope that any of the readers so disposed will feel at perfect liberty to comment on any feature of my design that may appeal to them as calling for criticism.

Number of Shingles in a Bundle.

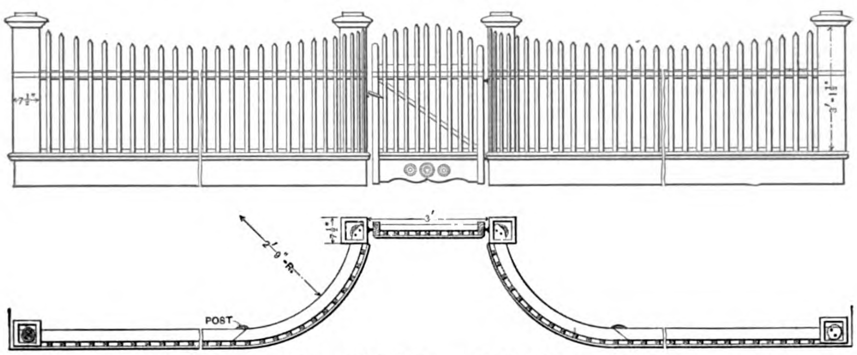
From D. J. MCL., *Sandon, B. C.*—In the March number of the paper a correspondent, "H. R." of Oakland, Cal., states that "there is no shingle mill on the Pacific Coast packing more than 200 shingles per bunch." I have just counted some bundles that are outside and I have found, as I have several times before, that there are 25 double layers of a width of 20 inches, which I figure to be just 250 shingles, four bundles being 1000. Your correspondent's statement does not apply to the established manufacturers of Washington and British Columbia, at least.

Bracing a Barn.

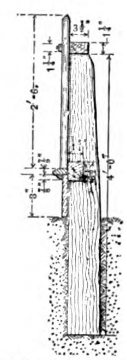
From W. T. M., *Cedar Lake, Mich.*—Will some one tell me the best method of staying a barn, 30 x 50 feet in area, the first story 8 feet high and 5 feet to the plates? The rafters are about one-third pitch and the collar beams have been nailed to the rafters 4 feet from the peak. The building has been used as a warehouse and it is now desired to make a barn of it, putting collar beams or joists near the peak, as stated, and we do not wish to allow the iron rods to remain at the plates. The building has spread already, and we intend putting an iron rod through to bring it back, but wish to remove it afterward.

Design for Picket Fence.

From F. R. *Coalville, Utah.*—I am sending under separate cover by this mail a drawing of a picket fence in reply to "J. F. H.," New Marion, Ind. I have built several fences similar to this one and they seemed to take the people's eye. Every post should be sawed square off at the butt to make it more secure in the ground. I case only the corner posts, the gate posts and the posts where the fence terminates. The intervening posts after being set are smoothed off with a draw knife. The posts may be set leaning on the front side more than plumb, so the gain for the bottom rail need not be very deep. We use native cedar for posts; nothing but good timber and that which will endure longest in the ground should be employed for this purpose. The gate in the sketch is not very elaborate, but seems to have staying qualities which are very necessary. The cost of this style of fence, 3 to 10 rods, with one small gate and two large ones for roadway, including hardware and all material and labor, is about $10 per rod.



Elevation and Plan of Picket Fence.—Scale, ¼ Inch to the Foot.



Vertical Section.—Scale, ⅜ Inch to the Foot.

Design for Picket Fence.—Contributed by "F. R."

What Constitutes an Average Day's Work for a Carpenter.

From DRAFTSMAN, *Brilliant, Ohio.*—The door and shingle question appears to be the problem of the day and leads to the impression that if one does not express his views on the subject he is behind the times. So I will dip my crow quill in the ink and take sail. When I first heard of the 20 door man I went to one of my carpenters and asked him how many doors he could fit in a day. He said about 10. I told him I had found a man who could fit 20. He said, "No man can do that many, and I believe that I can fit as many as any body, but I cannot do as many as that." Now I think this is the chief trouble with the major portion of the writers on the door and shingle question. They take their own efforts as the standard of a day's work and think that no man can do more. It is well, my friends, to remember that we have experts in every trade and profession, and I think that is the kind of a man so many are criticising in the person of the 20 door man. We have some expert finishers over in the East who can put on 20 doors in one day and do it much better than the six-door men, even if the latter only put up one door a day. Of course, he does not fit 20 doors every day, neither do the experts perform their feats every day. If one will take notice, the expert has not said anything since he sent in his first letter. Some take this as an indication that he knows he is beaten, but I think he is enjoying himself reading the various letters in *Carpentry and Building.* I would like to shake hands with him anyway, also with "Wandering Wood Butcher."

In practice on good work six doors or 1500 shingles is the usual estimate for a day's work, but some men would do both and not consider that they had worked hard. If any reader aspires to be an expert I would suggest to him that he make every move count and keep down to business, letting time take care of itself.

From A. P. S., *New Chicago, Mont.*—It has been three or four years since I allowed my subscription to *Carpentry and Building* to run out, and in that time it seems I have missed a lot of life, for upon getting my first copy of this year's volume my attention was immediately drawn to the articles on "What Constitutes a Day's Work for a Carpenter?" I read with the greatest astonishment of the yarns of one man laying 10,000 shingles and another hanging and putting on locks on 20 doors in a day. I had no idea there were so many Baron Munchausens in the trade. I think some of the correspondents would make fine authors of wild cat fiction. It looks to me, as Frank G. Odell says, like a bragging match, in which each successive writer tries to outdo his predecessor and in which, being last, he has all the advantage and so tells the biggest yarn. Now I, like "John Thur" of Philadelphia, have met some of those wonders who lay 4000 and 5000 shingles in a day. I have found almost invariably that I could lay more shingles and do a better job than they. I have been working at the trade about 20 years and over 14 of that time I have been in Montana. The balance was spent in New York and Vermont, I learning my trade in Rutland, that State, and knowing all the carpenters in the city, as well as a good many in different parts of New York State. Since I have been in Montana I have known many more, but I have yet to meet the man who can lay 4000 shingles in a day of 10 hours. Most of these wonders who make such extraordinary speed do it, in my opinion, at the expense of good work. So I say to the young man, "Do not get discouraged when you read the wonderful yarns, for by the time you have worked at the business as long as I have and had charge of as many men you will know they are telling pretty big stories." I do not wonder that "M. L." of Newark holds up his hands and exclaims, "Well, well," for the yarns told by some of those "smart Alecks" would outdo the "Arabian Nights."

Now what is the sense of some Jack-in-the-box hopping up and declaring he has laid or seen laid 10,000 shingles, or even 5000, when every carpenter who has had charge of work and has had to figure on jobs for other men to do knows if he allows more than 2000 shingles for a day's work he is going to get left. What does that mean? It means that there is one carpenter who can lay only 1500 shingles to every one who can lay 3000 for a day's work, and, as I understand it, the average day's work was the objective point in this discussion; so let us stick to that and not to telling big stories.

I have just finished a job which was commenced by one of those fast scrubs and it was enough to make a man hold up his hands in holy horror. The window casings on the outside were ripped out and put up without plane being put on the edges furthest from the openings; the porch floor extended 1½ inches beyond the shingles; the siding did not meet the head casing in some instances by as much as an inch; no water caps were put on the tops of the windows, and there was nothing plumb or square about the entire building. Yet he was working by the day and was told that the people wanted a first-class job. Now that is the way one usually comes out who employs one of these "wonders." Any one who has employed journeymen carpenters knows that some are much faster than others, but when it comes to talking about 5000 to 10,000 shingles as a day's work, and fitting, hanging and locking 15 and 20 doors in a day, well, the only way it is done is by word of mouth in my opinion. Now I hope the jokers will take a back seat and let those who have information to impart be given a chance. My copies of *Carpentry and Building* extend back to 1882, and while I have taken other journals devoted to carpentry and wood working, this one is the best, and I hope the articles on this question of average day's work will lead to what they were intended to accomplish—that is, the diffusion of knowledge.

From M. L., *Newark, N. J.*—Through the good offices and generosity of the editor of *Carpentry and Building* I wish to come in once more. With the March number came more letters on the subject of "What Constitutes an Average Day's Work for a Carpenter," yet with all that has been said few have put forth estimates that to my mind are practical and safe to use as a basis for estimating. In the November number I gave some figures which so far have not been contradicted, and I think it may be taken as granted that they are about right. Of course a great deal depends upon how the work is done. Some may rush the work through regardless of what is coming next, or who must fix it up after them, while others exercise great care in every detail of the work, whether in trimming or framing. I have had it said that it takes me longer to lay the sills on a brick wall than any other man in the business: also, the masons say that they can put up straight and level walls at any time, except when I do the framing, but as a great amount of trouble is avoided in having the sills straight, level and square, they must be so, and so on throughout the entire building. The time it takes to do the work properly and that consumed in rushing it through any old way makes a lot of difference in estimating, or to strike the average day's work for a man in this business. It has been said and truly, too, that no two men can work alike, yet we may by careful study of the different men come to some sort of an understanding as to what would be a fair average. The idea of hanging 16 to 20 doors a day, or laying 7000 to 10,000 shingles is no average. Some men try to see how much they can do, while some try to see how little they can accomplish; therefore, it takes study to determine the average of the two men. I have known men, and good ones at that, who when asked how many doors they could fit and hang, or how many shingles they could lay in a day, could not satisfactorily answer, and for this reason; although doing the work for the last 20 or 30 years, they never thought of timing themselves in order to know just what they could do. From the many communications in the paper I should judge most of them are but quick estimates with no thought of how they would look in print.

The estimates of a day's work which I give below are made from careful study of all grades of men, and such as in the case of shingling, siding, &c., the figures cover the building of all scaffolds and removing same. I trust that the many readers and writers will come down to business and give us practical estimates or criticise others, so that we may profit through their experience, as I trust others may possibly profit by my experience. No man's work is perfect without criticism. Therefore, brother workmen, you may throw all the stones you wish my way and they will be gathered up and given due consideration. The best workmen are not by any means always the fastest, but slow, steady men will cover more ground in a day than one who jumps here and there, as if he were on springs. When a piece of work is put up and it stays up, it may have taken longer to do it than the man who puts up the same work in shorter time, and the foreman comes around and orders it taken down and properly constructed. Which in these cases is the quicker man of the two? The answer I think is obvious.

The figures given below for framing and raising are the complete contents by square feet in floors and exterior walls to the plate and represent an average day's work taken at the rate of $3 per day of eight hours.

Framing and raising, $1.43 per square, 208 square feet per day.

Framing and raising roofs, $2.27 per square, 130 square feet per day.

Sheathing, horizontal, 80 cents per square, 376 square feet per day.

Sheathing, diagonal, 99 cents per square, 305 square feet per day.

Rough floor, 1 x 10, S. L., 88 cents per square, 344 square feet per day, including bridging.

Clapboarding, $1.50 per square, 200 square feet per day.

Lathing roofs, $4.75 per square, 635 square feet of lath per day.

Shingle, sides, $5.53 per 1000, 544 shingles per day.

Shingle, roofs, $4.09 per 1000, 734 shingles per day.

Flooring, 3½ face, 60 cents per square, 506 square feet per day.

Flooring, 2½ face, $1.17 per square, 258 square feet per day.

Piazza steps, 63 cents per step, five steps per day.

Setting piazza columns, no rail, 28 cents each, 11 columns per day.

Setting piazza columns and rail, 30 cents per foot, 10 lineal feet per day.

Cornice with gutter, 34 cents per foot, 9 lineal feet per day, seven members.

Cornice, no gutter, 23 cents per foot, 13 lineal feet per day, four members.

Gable cornice, 11 cents per foot, 30 lineal feet per day, five members.

Dentil blocks and molding, 6 cents, 48 lineal feet per day.

Setting door jambs, pine, 29 cents per set, 12 sets per day.

Setting door jambs, oak, 38 cents per set, eight sets per day.

Trim doors, pine, 17 cents per side, 18 sides per day.

Trim doors, oak, 38 cents per side, eight sides per day.

Fit, hang, lock door complete, pine, 60 cents each, five doors per day.

Fit, hang, lock door complete, oak, 75 cents each, four doors per day.

Fit, hang and weight sash, 22 cents each, 14 pairs per day.

Trim window complete, pine, 43 cents each, seven per day.

Trim window complete, oak, 60 cents each, five per day.

Fit and hang double action door, $1.13 each, three per day, nearly.

Fit, hang and lock front or vestibule door, three, $2.44 each, 6.25 hours each.

Fit and hang double slide doors, $2.07 each, one and a half per day.

Fit and hang single slide doors, $1.50 each, two per day.

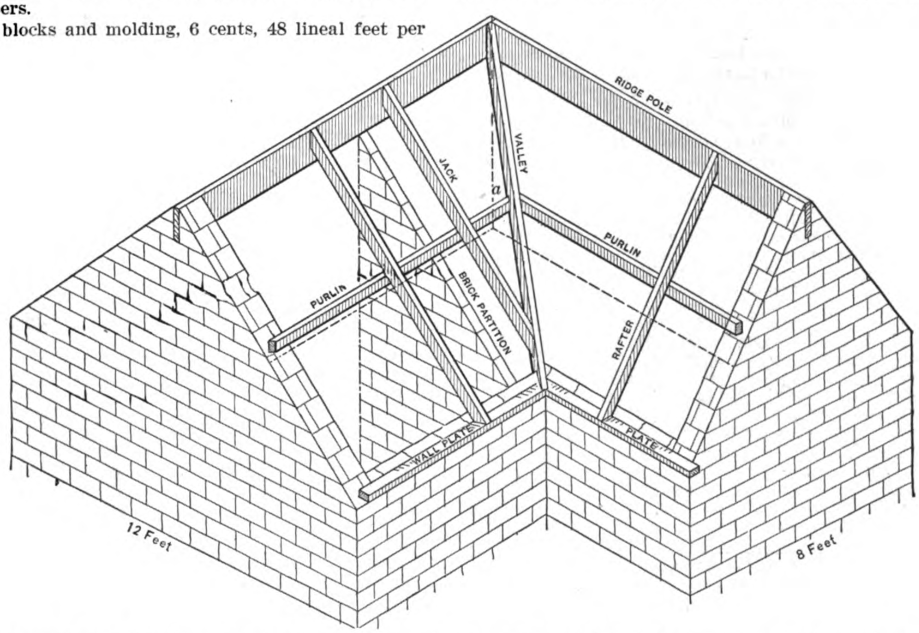
Thanking the editor for the space occupied I shall await what others may have to say, and then I may give figures relating to base, stairs, window and door frames, partitions, laundry work, &c.

Location of Purlins in Roof Construction.

From MORRIS WILLIAMS, *Scranton, Pa.*—In compliance with the request of "W. F. G.," Omaha, Neb., in the March issue, I submit an isometrical drawing showing the intersecting roofs illustrated in my article on "Roofs of Equal and Unequal Pitch" in the February number. In this drawing the purlins are shown in position placed under the rafters and parallel with the wall plates, one end resting on the gable end and the other butting against the valley rafter. The view also shows a brick partition which in brick and stone buildings is often constructed from the foundation up to the roof. The purlin rests on it, as shown, and thus receives an additional support to that given it by its abutment to the valley. If the inside arrangement of the building does not call for a partition and if the length required for the purlin to span from the gable to the valley is such as to call for an additional support, it is the practice to build a truss for the purpose. The arrangement of timbers as shown in this view is a very common one on the other side of the Atlantic, where the majority of buildings are constructed either of brick or stone. The dimensions of the various members are ordinarily as follows: Common rafter, 2 x 3 inches; purlin, 6 x 8 inches; valley rafter, 2 x 12 inches; wall plates, 2 x 6 inches, and ridge boards, 1 x 10 inches. In roofs of very large span calling for a series of trusses it is the practice to lay the purlins on the principal rafters parallel with the eaves, and the common rafters as usual are placed upon them at right angles to the eaves.

The intersection of the purlins at the valley calls for two bevels, one to apply to the top and the other to the side of the valley, as shown at *a* in the drawing. The same bevels will also apply to miter the two purlins in case the arrangement of the roof construction should call for such treatment.

My endeavor in the few articles that appeared in *Carpentry and Building* was to help beginners to an intelligent understanding of the various bevels or cuts that are required in roof construction, and not in any way to treat of the arrangement of timbers. Purlin timber was placed in my Fig. 6 in the February issue merely to afford the opportunity of demonstrating the finding of purlin bevels, thus making the matter of roof bevels complete.



Isometrical View of Figs. 6 and 7 of Article on "Roofs of Equal and Unequal Pitch," Published in the February Issue.

Location of Purlins in Roof Construction.—By Morris Williams.

Constructing Cement Arches.

From E. D. K., *Scranton, Pa.*—I will accept the invitation of the editor in the note to my last letter to write again on cement work, as I am inclined to think that it helps the writer even if it does not instruct the readers. I will try and explain partially, at least, how we built a concrete arch. The arch in question was constructed in a heavy clay fill about 20 feet deep and required wings to keep the fill from encroaching on the creek. A better idea perhaps may be gained from an inspection of the sketches, Figs. 1 and 2. The side walls or abutments were 10 feet high, 5 feet thick at the bottom and 3 feet thick at the top. The arch was 16 inches thick at the crown and running to the full thickness of the side walls at the springing line, indicated by the dotted line, where we left a shallow gutter connected with the soffit by using 3-inch iron pipes, spaced about 5 feet apart, to carry off the dripping from storms, as concrete or mortar of any kind will gradually disintegrate if water is allowed to continually soak through it. Let the reader look at the under side of any old arch where water has a chance to soak through and he will see a white fluoric substance adhering to the stone or concrete. I do not know what this is, but I do know that the mortar is generally rotten back of these places.

Any mechanic knows how to build concrete forms, or at least knows that the inside of the form is to represent the outside or finished concrete after the form is taken away. I will say nothing further about this part of the work, except that the form should be thoroughly braced. The end view, Fig. 2, shows how the arch appeared after it was finished, with the exception of the dotted lines, which were put in to show the thickness and batter of the side walls, skewbacks and extrados of the arch, with the position of the drip pipes.

The concrete used in this work was mixed in the proportions of one of Portland cement, three of sand and five of gravel, mixed quite wet by hand and thrown against the form with a shovel, which caused the larger pieces of gravel to bound back a short distance. After raising 5 or 6 inches this way the rest of the space was filled up and rammed thoroughly. We found that this gave a smooth and a stronger finish than facing with sand and cement.

When leaving off work at night the concrete was left as near level as possible and the trowel run along on the concrete against the front form or where any joints are liable to show. Stones were imbedded in the rest of the work and left protruding to give a binder for the next day's work, as soft concrete will not adhere very well to that which is set up or hard, and the smoother the joints are left where they are liable to show the better the job will appear.

The wings were carried up with the rest of the work, but could not be finished and the slope all put on in one day, so we kept down a foot from the top of the form and stepped it up the same as building a stone wall with a slope, leaving perpendicular joints and putting in plenty of binding stones; then after the rest of the work was done we finished the slope and put on the top coat without any unsightly joints showing.

The concrete in the arch was mixed in the proportions of one of cement, two of sand and four of gravel. It was put on in sections, covering the whole arch center from side to side, and as far lengthwise as could be covered in one day, leaving a perpendicular joint for the next day's work to abut upon.

The extrados was covered with a coat of cement and sand, mixed two to one, troweled smooth and carried down to the gutter and drip pipes. The gravel and sand we used was just as it came from the pit, and we mixed it one to six, or one to eight, as might be the case, but the proportion of sand to gravel is about as I have given. These sketches are not drawn to scale and are not perhaps in all respects accurate, but the readers can obtain from them a general idea of the appearance of the arch and the dimensions.

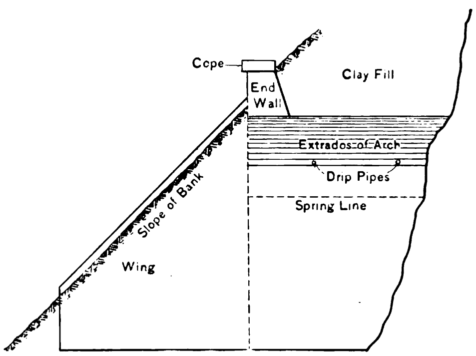


Fig. 1.—Side View.

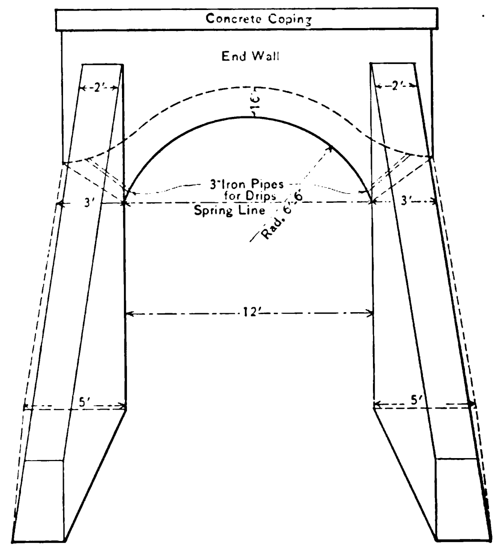


Fig. 2.—End View.

Constructing Cement Arches.—Sketches Accompanying Letter of "E. D. K."

Raising a Frame Building.

From L. H. H., *Glenwood, Ill.*—In the March number of the paper I find a criticism on my January article, "Raising a Frame Building," from "John Thur" of Philadelphia. This article says so little and implies so much that I think a longer letter with illustrations from this author would be very interesting. First, I would like him to explain how he would proceed if working on salary for a company who had only a limited supply of jacks and showed little disposition to get more. Second, as the building in question is only a very large shed, 60 x 126 feet, with posts 28 feet on centers and framed into straining beam roof trusses, he will please illustrate how he would hold up the posts after cutting loose at the top. Third, as the building contained nine passenger coaches in various stages of construction and three tracks which had at all times to be kept clear for the operation of a switch engine, and as the dust from every source had to be avoided on account of the varnishing, the correspondent should explain just how and where his men would work, and how the coach builders, painters, tinners, &c., would fare with a gang of house raisers with blocks, chains, bars, jacks, &c., working over their heads. Perhaps "John Thur" intended to suspend a tight floor from the roof just above the cars and then cut out the posts and set his jacks on this floor, or he may have figured on attaching a lot of captive balloons to the roof and pumping "hot air" into them until the desired altitude was reached. Again, he may have figured on closing all the doors and windows tightly and pumping the "hot air" directly into the building. As "John Thur" seems to have spent considerable time in raising frame buildings, beginning at the top, I think he should go more thoroughly into the matter. There are no doubt many ways of doing this work, but I only tried one and it was successful and cheap. A fully illustrated article from "John Thur" would no doubt be more interesting to some of us old fogies than was ***Harper's Weekly*** during the Great Rebellion.

WHAT BUILDERS ARE DOING.

THE last quarterly meeting of the Builders' Exchange of Baltimore was a most important and interesting affair. Subjects relating to the improvement of the city were discussed by able speakers and resolutions were unanimously adopted urging the Mayor and City Council to take such steps as will relieve the city of the congestion existing in connection with its shipping facilities. The speeches were made after a most enjoyable dinner, the address of the evening being delivered by Major H. M. Putnam, who was followed by Architect J. B. N. Nyatt, William G. Nolting, James H. Smith, City Comptroller, Architect W. W. Emmart, George F. Sloan, Addison Clarke, S. B. Sexton, T. B. Ghequier and President John H. Short.

The building outlook is regarded by architects and builders as of a very promising nature, some in fact holding the opinion that it was never better than it is this spring. Mechanics in all branches of the building business are likely to find ready employment unless they make such unreasonable demands as will prevent their being favorably considered by the contractors.

The Master Builders' Association, with J. Henry Miller, president, and the Employers' Association of the Building Trades of Baltimore and vicinity, with J. J. Walsh, president, have recently been organized and will oppose the introduction of the general card system among their workmen, or any sympathetic strikes that may result therefrom. The object of the last named association is to "promote and combine the intelligence and influence of the entire building industry for the purpose of establishing and maintaining uniform and equitable rules and regulations for the securing and executing of contracts for public and private buildings and for the adoption and maintaining of such other rules and methods for the erection of buildings generally as the combined wisdom of the association may from time to time adopt, so that uniform hours of labor may be observed in each branch of trade and that what is known as the merit system may be observed in the employment of labor, both skilled and unskilled." In their declaration of principles the same association state that on all such questions as hours of labor and the proper compensation therefor they are willing to consider and grant all reasonable requests that the men may make and to establish and maintain any equitable reforms that may seem necessary both for the protection of the workmen and themselves.

The secretary of both the organizations named above is John M. Hering, the well-known secretary of the Builders' Exchange.

Buffalo, N. Y.

The figures of Deputy Building Commissioner Henry Rumrill, Jr., show that the amount of new work projected in the building line was somewhat less for the month of March and for the first quarter of the year than for the corresponding periods of last year. There were 143 permits issued in March, 1903, for building improvements estimated to cost $261,050, as against 165 permits for improvements costing $372,796 in March of last year. Taking the figures for the first quarter of the present year we find that there were 322 permits issued for building improvements estimated to cost $627.828 while for the first quarter of 1902 there were 425 permits issued involving an estimated outlay of $844,414.

Chicago, Ill.

The estimated cost of the building improvements projected during the month of March was in excess of that for any corresponding period in the last nine years. There was, it is true, a slight decrease in the number of permits issued and also in the frontage covered by the operations, while the excess in cost may be due to the high prices prevailing for materials entering into building construction. According to the figures of the Building Department permits were issued for 569 buildings, covering a total frontage of 16,409 feet and costing $4,031,500, while in March of last year permits were taken out for 632 buildings, covering a frontage of 18,152 feet and involving an estimated expenditure of $3,805,200.

On April 1 the differences existing between the leading contractors and their men were amicably adjusted, and the building situation would seem now to be in a fair way to have no serious complications which might interfere with an active season. In some quarters it is felt, however, that the great advance which has taken place in all materials entering into building construction will tend to restrict operations somewhat as compared with last year; yet, on the whole, there is much of encouragement in the outlook.

Cincinnati, Ohio.

The prospects for a good building season are encouraging, although the labor situation is such that new developments would not be surprising May 1. There have been more or less mutterings of discontent in the labor world, but it is hoped that matters will proceed smoothly, as any interference with building operations would be a cause of deep regret. The new work projected in March was not quite up to the record of the same month a year ago, although for the first quarter the showing is much more favorable.

During March there were 350 permits issued for improvements costing $324,645, as compared with 418 permits for improvements costing $333,620 in March of last year. Taking the figures of Inspector of Buildings Charles A. Tooker, we find that for the first quarter of the present year the permits for improvements reached a total of 803, involving an estimated outlay of $897,665, as compared with 876 permits for building improvements costing $846,610 in the first three months of last year.

The strike of the stone masons which has been in progress was settled the latter part of March by an agreement which was reached after several hours' conference at the Hotel Emery. By the terms of the agreement the journeymen are to receive 50 cents an hour and have an eight-hour day. The agreement was made to date from March 1, 1903, and will continue in force until January 1, 1905.

Detroit, Mich.

The outlook in the city and vicinity is regarded by architects and builders as of an encouraging nature, although nothing unusual is expected. The bulk of the new work contemplated consists of dwelling houses, although some improvements will be made in the business section. At present the labor situation is quiet and undisturbed. According to Permit Clerk Charles W. Brand there were 271 permits issued for building improvements in March of the present year, estimated to cost $464,500, which figures compare with 357 permits for improvements, estimated to cost $648,400, in the corresponding month of last year.

The showing for the first quarter of the year is a trifle better relatively than that for the month noted. There were 658 permits issued in the first three months of the present year, involving an estimated outlay of $1,100,400, as against 618 permits for building improvements, estimated to cost $1,237,400 in the first quarter of 1902.

Dunkirk, N. Y.

The leading contractors of Dunkirk and Fredonia have recently perfected the organization of a Builders' Exchange, and the following officers for the ensuing year have been elected: President, J. A. Taylor; vice-president, Peter Meister, Jr.; treasurer, F. L. Kolpien, and secretary, B. F. Aldrich. The Board of Trustees consists of J. A. Taylor, W. S. Sly, John Hilliard, P. J. Higgins and A. G. Sippel.

Regular meetings of the exchange will be held upon the first Thursday in each month. The membership already numbers more than 50, and includes contracting carpenters, masons, painters, plumbers and dealers in building supplies. It is said that the exchange is contemplating the erection of a building of its own, so as to have quarters particularly well adapted for its requirements.

Hartford, Conn.

The outlook for building operations this season in and about the city is considered much brighter than has been the case for some little time past. A number of large building projects are already in process of being carried to completion, and many new residences will be included in the improvements. It is probable also that there will be considerable done in the way of additions in the business quarter of the city. While the labor situation is not all that could be desired, some undertakings being more or less retarded by the failure of the master builders and carpenters to agree upon a wage schedule, it is believed that everything will be satisfactorily adjusted on a basis which will endure for the next two and a half years at least. Such a settlement will give an impetus to building operations and will, it is thought, develop projects which now exist only in an indefinite form.

Kansas City, Mo.

The season is opening most auspiciously as regards the building outlook, and while the position of labor is not all that might be desired, there is a feeling that it will not develop serious aspects, and under favorable conditions the aggregate of building operations should exceed those of last year. The activity is not confined to any one particular line, but is well distributed between private dwellings and structures intended for business purposes.

According to the figures of Superintendent McTernan, the class of building improvements contemplated is of a higher grade than those of a year ago, for during March there were 357 permits issued for buildings, estimated to cost $1,325,240, while in March of last year there were 413 permits issued, which called for an estimated expenditure of only $529,090.

For the first quarter of the year permits were taken out for 774 improvements, involving an estimated outlay of $2,332,625, as against 791 permits for building improvements costing $1,134,635 for the first three months of last year. This, it will be seen, is a notable increase, and if continued at the same rate through the year will make 1903 conspicuous as regards the extent of building operations conducted within the corporate limits of the city.

Lincoln, Neb.

The Contractors' Exchange, comprising a majority of the general building contractors of the city, has signed an agreement with the District Council of Carpenters, the essential provisions of which are as follows:

1. Absolute prohibition of strikes or lockouts.
2. Compulsory arbitration by a joint Board of Arbitration possessing absolute and final jurisdiction in all matters of dispute.
3. Absolute liberty of the individual workman to work for whomsoever he sees fit.
4. Absolute liberty of the individual employer to hire or discharge whomsoever he sees fit.
5. No discrimination against nonunion labor so long as paid the union scale.
6. Mutual preference between contractors and unions in seeking or giving employment.
7. Unions agree not to contract.
8. Piece work barred.
9. An apprentice system.
10. Settlement of differences between the trades represented without the intervention of any other trade.
11. An eight-hour day with a minimum scale of 32½ cents per hour, with half time extra for overtime and double time for Sunday and holiday labor.

This agreement is unique in its recognition of nonunion labor on the same terms as union labor and without discrimination. It is thought that this is probably the only case on record in recent years where a well organized union has voluntarily entered into a binding agreement to work alongside nonunion men for the space of one year, and bound themselves not to discriminate against nonunion labor or to strike for any cause.

The agreement is deemed by those who have examined it critically to be the starting point for possible settlement of the vexed problem of harmonizing these contending factions. The limited time it has been in operation prevents the drawing of any legitimate conclusions as to its effectiveness, but both parties are sanguine of the best results and the most friendly relations prevail. The manner in which this agreement was secured would make a most interesting story which cannot be recounted at this time.

The agreement between the Master Painters' Association and the union painters is similar in its general provisions, except that they are bound to the exclusive employment of union labor. The lines will be drawn very closely in Lincoln this year on the question of the absolute employment of union labor, with a strong public sentiment supporting the conservative position taken by the Contractors' Exchange, and should this position prove tenable in its actual workings it will probably result in the wider spread of the new idea.

The Legislature just adjourned killed the contractors' proposed repeal of the lien law, created the office of State architect and the office of plumbing inspector for cities of 40,000 population or over, which makes a new office for this city with a salary of $1500 per year.

The City Council has appointed a Select Committee to revise the building laws of the city composed of the following persons: The city attorney, engineer and the chief of the fire department, Councilman A. H. Hutton, who is a contractor, Architect A. H. Woods and Frank G. Odell, secretary of the State Builders' Association.

This committee are working on what they hope to make a model set of building laws for a city of 50,000 to 100,000 population. It is probable that some qualified member of the Contractors' Exchange will be appointed building inspector on the passage of the new ordinance, the newly elected administration being fully in sympathy with efficient and practical supervision of building.

Los Angeles, Cal.

During March Julius W. Krause, City Superintendent of Buildings, issued 503 permits for improvements estimated to cost $911,817. They covered one three-story brick building, costing $91,350; two two-story brick buildings, costing $84,700; three single story brick buildings, costing $53,795, and numerous frame flats and dwellings. In March, 1902, the number of permits issued was 341, the improvements authorized costing $591,337. In March, 1901, the number of permits was 236, the improvements authorized costing $286,152.

Builders complain that during the past 18 months the scarcity of skilled mechanics has been such as to retard the completion of many of the largest structures to the extent that hardly any were finished on the time allowance provided for by their contracts and were finally finished under such additional expense as to be almost ruinous to the contractors. The amount of work in contemplation at present is greater than was in prospect at any time during the past four years and builders claim that the present supply of skilled mechanics will not be sufficient to supply the demand.

The leading contractors and builders in the city have recently perfected an organization known as the Master Builders' Association, with a present membeship of about 30. The officers for the ensuing year are J. W. Morrison, president; John T. Long, vice-president; J. School, secretary, and J. F.Hall, treasurer. There is an Advisory Board consisting of four members.

Mankato, Minn.

The leading builders, contractors and dealers in builders' supplies have recently organized a Builders' Exchange with the following officers: President, Hugh McMurtrie; vice-president, J. B. Nelson; treasurer, W. H. Wilcox, and secretary, John Larson. We understand that plans, price-lists, samples of materials, &c., will be on exhibition at the rooms of the exchange, and at all times there will be some person in authority to meet prospective builders and interest them in using Mankato labor and materials.

Milwaukee, Wis.

The building outlook in the city of Milwaukee is regarded by those in a position to know as better than for a long time past. The records for the first three months of the year show the estimated cost of building improvements to exceed those of the corresponding months of 1902 by $323,973, and while the figures ran up to $1,000,000 in April last year, the prospects are that the amount will be doubled in April this year, as the permit for the Terminal Station and office building of the T., M., E., L. & St. R. W. Company, to cost about $1,000,000, will be included. The Chicago, Milwaukee & St. Paul Railroad Company are doubling the capacity of their shops at a cost of $2,500,000, but these are just outside the city limits and do not therefore come under the immediate jurisdiction of the Department of Buildings. These are near enough to be regarded as a portion of the city improvements, as are most of the large factories which are being put up just outside the city limits. There are a considerable number of dwelling houses and flats contemplated, as well as some business blocks and factories. Lumber is about the only material that has advanced to any extent, other building materials being about the same as last year.

According to the figures of Building Inspector Michael Dunn there were 462 permits issued for the first quarter of the present year for building improvements estimated to cost $1,011,315, as against 352 permits for improvements costing $687,342 in the first three months of last year. The figures for the month of March show a very marked increase over last year, there being 270 permits for buildings estimated to cost $615,080, while in March last year there were 197 permits for buildings estimated to cost $377,598.

While the labor situation is not all, perhaps, that might be desired, there are no serious troubles at present in sight in the building trades. The painters went out on April 1, but it was on account of union troubles and not with respect to wages.

New Orleans, La.

The labor situation which has been developing in the various branches of the building trades of the city has resulted in the formation on the part of the leading contractors and builders of the Master Builders' Association, with Joseph Fromherz president and Victor Wogan secretary. It appears that the bricklayers demanded an increase of 12½ cents per hour, the old rate being 50 cents, and the master builders claim that they cannot afford to grant this schedule, as most of the work now under way was contracted under the old rate of 50 cents per hour. The carpenters also asked for an increase in wages to 40 cents per hour with an eight-hour day. As a result of failure to meet these demands the men went out on April 1.

New York City, N. Y.

As we go to press the building situation is greatly complicated by reason of the differences existing between the United Brotherhood of Carpenters and Joiners and the Amalgamated Society of Carpenters and Joiners, which, in conjunction with the iron workers' strike, has resulted in a large amount of work being brought to a standstill. Active efforts are being made to adjust the differences, and it is to be hoped that the troubles will be settled at an early date and work resumed all along the line.

Building operations do not make as favorable a showing thus far as for the corresponding period last year, this being attributed in some measure to the difficulties in negotiating loans on real estate and to the high prices of labor and materials. The figures for the first quarter of the present year show that in the boroughs of Manhattan and the Bronx plans were filed for 429 buildings, estimated to cost $19,425,-235, as against 396 permits for building improvements involving an estimated expenditure of $21,760,644 for the corresponding quarter of last year. In Brooklyn there has been a slight increase, as compared with a year ago, and which is sufficient to offset the slight decrease in the boroughs above named. A noticeable feature has been the falling off in the number and cost of private dwellings projected in Manhattan and the Bronx during the first three months of this year, as compared with a year ago. This year there have been permits issued for only 18, costing $700,000, while in the first quarter of 1902 permits were issued for 35, costing $2,450,000. Much the same condition exists with regard to apartment hotels, for which 12 permits were issued the first three months of this year for buildings, costing $3,300,000, while at the same time last year 15 apartment hotels were projected, involving an estimated outlay of $5,300,000. As intimated in our article last month, the tendency is toward increased construction of tenement houses, and the figures for the first quarter of the present year confirmed this tendency in a most striking degree. There were permits issued for 116 tenements, estimated to cost $6,151,000, while in first quarter of last year permits were issued for only 41 tenements, costing $3,400,000. It is thought in some quarters that if the proposed compromise in relation to seven-story semi-fire proof apartment houses should become a law it will tend to stimulate the erection of this class of building.

In referring in our last issue to the value of the contemplated improvements in the boroughs of Manhattan and the Bronx since the first of the year the types incorrectly stated the figures, which should have read $14,480,000, as against $18,420,000 for the corresponding period of last year.

Oakland, Cal.

Building operations in Oakland are taking on a more important character than heretofore. Several large buildings of the modern type are to be started in the business quarter without further delay. The cost of four of them, not counting the value of the land, will approximate $1,000,000. Two of them will cost in the neighborhood of $300,000 each, and the Realty Syndicate Building, adjoining the Central Bank, will cost upward of $200.000. The new three-story brick structure of Kahn Brothers, on Twelfth and Clay streets, is practically completed and ready for occupancy, while another three-story brick on Ninth, between Washington and Clay, is nearing completion. Work will be commenced on the Union Savings Bank Building and the Bacon Estate Building as soon as the architect returns from New York. Among the industrial enterprises in course of construction are the steel and iron works in East Oakland and the new flouring mill on First street. Activity in residence building continues in the city and in all the suburban districts. At no time in the history of Oakland have so many buildings been in course of construction as at present.

Omaha, Neb.

The Omaha Builders' Exchange has recently filed articles of incorporation with a capital stock of $5000, this being, we understand, a consolidation and reorganization of two similar bodies that have existed for some time in that city.

The officers are: President, John Harte; vice-president, John Reynard, and treasurer, J. E. Merriam.

The directors include A. J. Vierling, A. O. Borchmann, J. Walter Phelps, Albert Foll, Fred. Reumping, Walter Petersen and John H. Tate. We understand that Mr. Tate will act as secretary until his successor is elected.

Philadelphia, Pa.

The total value of contemplated building improvements for which permits were filed during the month of March breaks all records for a single month in the city. It might be mentioned by way of explanation, however, that the heavy total was due to the filing of the permit for the new $5,000,000 department store building for John Wanamaker, at Thirteenth and Chestnut streets. According to the report of the Bureau of Building, there were issued 789 permits, covering 1400 operations, and estimated to cost $9,624,875. These figures compare with 738 permits covering 1559 operations, estimated to cost $5,932,990 in March of last year. Of the total nearly $1,700,000 was for new two, three and four story dwellings. Nearly $600,000 was for new schoolhouses, $500,000 for apartment houses, a little more than $500.000 for manufactories and over $600,000 for new office buildings.

Portland, Ore.

Under the stimulus of fine weather building operations have been rushed ahead, and all sorts of work, more especially that on stone and brick blocks, is more than a month ahead of what is usual at this season. Labor is still scarce in the building trades, says an correspondent under date of April 6. Several of the leading contractors have been unusually active lately, "laying in" a good supply of material, so that operations will not be checked in case of a strike on the part of the teamsters, who expect soon to present a new wage scale to their employers. For the past week, especially teams and teamsters have been in great demand. Laborers have made demands on members of the Master Builders' Association for an increase of from $2.75 to $3 per day for handling brick, and from $3 to $3.50 for handling and mixing mortar. Some opposition to the granting of the demand is anticipated.

Salt Lake. Utah.

Considerable building has been begun in various parts of the city. The work of tearing away the old building on Third South between Main and West Temple streets is under way, and in its place will be erected a modern three-story business block. Especially active is the building of terraces and cottages in the residence parts of the city. The demand for terrace residences is constantly increasing, and apparently investors have decided to supply the demand. Consequently, rentals may assume a more nearly normal condition than has prevailed at times in the city.

The building of the new block on the site of the old Atlas Block will relieve to a certain extent the congested business districts, where offices have been in such demand since the fire. The managers of the Walker Estate have decided upon the plans to be used in the construction of the building. It will have 208 rooms suitable for offices.

Sandusky, Ohio.

The organization of the Builders' and Traders' Exchange recently incorporated was completed at a meeting held about the middle of March in the Odd Fellows' Building. A Board of Directors was elected, and they, in turn, organized by selecting George Feick as president, and George R. Butler as vice-president. A secretary will be appointed by the directors in the near future.

The new organization is modeled to a large extent after that at Columbus, Ohio, the constitution and by-laws as adopted closely following that association. At present the local body has a membership of 57, the leading building contractors being represented as well as painters, plumbers, stone dealers, lime, sand, cement, lumber and hardwaremen, as well as other dealers in building materials.

St. Louis, Mo.

There is a feeling in building circles that operations in St. Louis may be considerably curtailed this year by reason of the great uncertainty of the labor situation and the very high prices prevailing for materials entering into the construction of buildings. According to Commissioner C. F. Longfellow, the work which will be done this year will probably exceed that of 1902, but will be confined principally to office buildings and hotels. The number of dwellings, especially of the smaller sort, will probably be much less this year in proportion, in the aggregate than in former years. The figures of the building commissioner show that the total estimated cost of improvements for March was $2,023,899, as against $1,087,703 for March of last year. Of these totals $1,826,086 was for new brick buildings, as compared with $993,194 for new brick work in March, 1902.

Taking the figures for the three months of the current year, we find that the amount is $3,405,200, which covers new brick and frame buildings, together with additions, repairs and alterations, while for the first quarter of 1902 the estimated outlay was $2,494,667.50. Of these totals $2,979,962 was the estimated cost of new brick structures during the first three months of the present year, while for the corresponding quarter of last year the new brick buildings projected involved an estimated outlay of $2,034,200.

San Francisco, Cal.

There was some improvement in building during the latter part of March as compared with the weeks immediately preceding, but it looks now as though, except for the Merchants' Exchange, there would be less construction this year than in 1902. Owing to the advice of contractors and others a number of builders are holding back until next year, when, they are informed, it is probable there will be a break in both the cost of material and labor. Experts are of the opinion that the expense of construction has reached its limit, and some of them say that by delay in building it is probable owners will effect a saving of as much as 20 per cent. These statements are very alluring to persons who had intended to improve their property without having tenants in view, and several large buildings have been postponed accordingly. Bids have been received for the construction of the new Merchants' Exchange. It is not at all certain that separate contracts will meet with the view of the officers of the corporation, or that any local firm will be found which will undertake to put up the building on one contract. In case, therefore, that it should be decided to let the work in one contract it may be found necessary and also advantageous from the factor of expedition to employ some Eastern concern to do the work. The excavations for the Fairmount Hotel have been completed, and the material for the concrete work is already on hand. Instead of one large store in the Flood Building suitable for department purposes, it has been determined to divide the ground floor into several stores.

Tacoma, Wash.

Building continues brisk and permits for new residences continue to be taken out from the City Building Inspector's office. The largest permits of the month of March were for the Snell Building at the corner of C and South Eleventh streets and for the Provident Life & Trust Company's block on Pacific avenue, between Ninth and Tenth streets. The former will cost upward of $65,000 and the latter between $150,000 and $165,000. The beginning of these two structures runs up the total for March above that of any other month for ten years. The announcement of the proposed building of several other fine dwellings and large flats has also been made, though the plans have not yet been forwarded to the point of taking out a building license. This is unquestionably the busiest spring in building lines Tacoma has seen in many years.

Worcester, Mass.

The journeymen painters of Worcester, Mass., have been granted an increase of 25 cents per day in their minimum wage schedule, the former rate being $2.25. It has been agreed that they cannot take contract work upon their own responsibility and keep their standing in the Painters' Union. It seems that heretofore it has been the habit of many Worcester journeymen painters to take contract work when they were out of a job. They did this on their own responsibility, thus taking just so much work away from the master painters. Under the new agreement there is no desire to stop this practice, but the master painters claim that the men should not do this work and at the same time remain in the Painters' Union, receiving the protection and benefits of organized labor meanwhile. Under the new provision they forfeit their union membership by violating the agreement.

One of the results of the strike of the union shop carpenters in Worcester in May, 1902, is the organization of what is known as the Worcester Co-operative Builders' Finish Company, with a capital stock of $10,000. The company are organized under the laws of the State of Maine and the officers are John E. Mayhew, president, and Joseph F. Aurele, treasurer, both of Worcester. The company expect to start their factory at an early date and will turn out cabinet work of all grades, builders' finish, store fixtures, &c. President Mayhew was formerly foreman in the molding department of the Warren Lumber & Fuel Company and he expects that the business of the new concern will expand to such an extent that the capital will have to be increased very largely within three months. He regards the outlook as unusually bright for the coming summer.

Notes.

The master painters of Dover, N. H., have granted their men a uniform scale of $2.25 per day of nine hours.

The Master Carpenters' Association of Roxbury, Mass., have agreed to a rate of $3 for an eight-hour day.

The Grand Rapids Contractors' and Builders' Association recently perfected their organization at a meeting in the Board of Trade Rooms, Grand Rapids, Mich.

It is intimated that if the present strained conditions in the building trades continue there is a probability that the old Builders' Exchange at Wheeling, W. Va., will be revived.

A Master Builders' Exchange has been formed at Norristown, Pa., the officers being as follows: President, William H. Shoffner; vice-president, William Tod; treasurer, Lawrence Doran; secretary, Samuel W. Lattimore.

At a regular meeting of the Master Builders' Association of Waltham, Newton, Watertown, Weston and vicinity, held the last week in March, it was voted to advance the wages of carpenters to 35 cents an hour, the increase taking effect April 1.

The painters and decorators at Saratoga, N. Y., who went out on strike April 1, returned to work April 9, their differences having been settled by arbitration. The new agreement calls for a wage of $2.37½ per day, instead of the $2.50 demanded, and a nine-hour day, except Saturday, when the men will work eight hours.

The Bar Harbor Builders' Association of Bar Harbor, Maine, have leased rooms in the Rodick Block at the corner of Main and West streets, which they have had fitted up for their occupancy. The association is in a flourishing condition and the officers are A. E. Lawrence, president; H. E. Wakefield, vice-president, and Luther A. Leach, secretary and treasurer.

The strike of bricklayers and plasterers, which was inaugurated September 2 at Brockton, Mass., has been formally declared at an end, the men resuming work on a $4 a day basis. We understand that in the agreement which was signed is a clause calling for the appointment of an Arbitration or Conference Committee to consider in conjunction with the contractors' representatives all grievances or differences that may arise in the future.

Leading firms and individuals employing labor entering into the construction of buildings have recently formed a Westerly branch of the Interstate Builders, Contractors and Dealers' Association. The new organization is composed of members of building firms in Westerly, R. I., and in the adjacent territory in Massachusetts and Connecticut. The statement is made that the purpose of the order is not to antagonize labor, but rather to work in harmony with it.

At present the prospects for a busy spring and summer in the building line in Waltham, Mass., are reported as very good. There is, however, a feeling that if the unions press their demand for an increase in pay from $2.50 to $3 for eight hours' work building operations will receive a decided setback. The contractors have voluntarily agreed to advance the pay to $2.80 for an eight-hour day, but feel that a further increase would be detrimental to the building situation, tending to discourage many who are now arranging to erect buildings for dwelling purposes.

Exhibition of Architectural Drawings at Providence, R. I.

The recent exhibition of architectural drawings by the Rhode Island Chapter of the American Institute of Architects, held in Providence, R. I., was probably the most satisfactory and complete ever conducted by that organization. In collecting the drawings the attempt was made to illustrate as far as possible the progress of a building through the architects' office, and in following out this idea many effective series of drawings were presented. The exhibits were not limited to perspectives, but included as well preliminary sketches, pencil drawings, water colors, pen and ink work, scale details, blue prints and photographs of the finished work. Further variety was added by a few academic drawings by members of the chapter, and the exhibit of photographs of the masterly rendered drawings by Brune and other French draftsmen copied from the collection of the Massachusetts Institute of Technology.

Among the most interesting of the exhibit by Angell & Swift, whose exhibit consisted of 19 photographs and drawings, was the building of the Industrial Trust Company. The collection included competitive drawings for the Central Fire Station at Providence and three school houses. The display by Clarke & Howe was made up of 35 drawings, water colors and photographs, embracing among others the engineering building for Brown University, St. George's School at Newport, a half timbered house at Providence, one at Bristol, and a group of stables and farm buildings for Colonel Goddard at Portsmouth, R. I. The 11 drawings exhibited by Field & Slocum included a State sanitarium, the Tillinghast house on Angell street and a complete set of working drawings for the "Little Blue School" at Farmington, Maine. Hillton & Jackson presented 32 drawings, photographs and pen and ink work, covering a variety of subjects, the collection of photographs of the Henry L. Pierce Building for the Massachusetts Institute of Technology being particularly noticeable. Hoppin & Ely were represented by 33 photographs and drawings, a large percentage of which related to the recently completed entrance gates at Brown University, sketches for the proposed gates for the Butler Hospital and the gates for the Colonel Goddard estate.

Probably the largest space in the exhibition was occupied by the collection of 76 large drawings and photographs from the office of Stone, Carpenter & Willson. Among these were the perspectives of the Providence Public Library and of the Union Trust Building recently erected in Providence. The building for the Providence Institute for Savings was another good example of recent design, and there were drawings of many large houses of Colonial architecture, together with studies for a power house and water tower, a library building, a memorial hall, &c.

Log Cabins in the Adirondack Mountains.

Plans are now being prepared by Newman & Harris of Philadelphia, Pa., for a camp on the shores of Lake Placid in the Adirondack Mountains for A. H. Goudey of Norfolk, Va., which will consist of a main building, 35 x 22 feet in area, and several out structures, all to be constructed of Adirondack spruce slabs from which the bark has not been removed. The main building will be two stories high, the first floor being devoted to a living room, library, dining room, &c., and the second floor to seven sleeping rooms, toilet rooms, &c. Bachelor apartments will be provided in some of the minor buildings, and in addition there will be a boat house, ice house and camp quarters.

THE foundations are now in progress for an improvement at the corner of Fifth avenue and Eleventh street in this city, which will constitute a striking feature of that old residential section. The plans which have been filed with the Bureau of Buildings call for a ten-story brick flat, having a frontage of 51 1-3 feet on the avenue and a depth of 115 feet on Eleventh street. The structure will be of limestone, granite, brick and terra cotta and the cost is placed at $375,000. There will be apartments to accommodate 22 families.

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

By Chas. H. Fox.

We now take up the radiant arch, which we believe to be the most difficult of execution by the stonecutter of any form of arch that may be constructed within circular walls, except it be those arches within the double curved surface of the dome. To the solution of this problem the very best workmen have given more attention than to any other because of its very importance, and it is for the purpose of explaining simple and practical methods by means of which the necessary molds may be developed as required to construct this and other forms of circle on circle arches that these pages have been prepared. By closely following and observing the rules as here given, even the beginner will find little difficulty in working out the construction of the problem.

The projection of the patterns as required in the construction of the three forms of arch more frequently met with by the stonecutter—viz., the radiant, the cylindro-cylindric and the cylindric conic arch—is fully explained.

We have taken, first, the construction, &c., which refer to the radiant arch, orthographical projections of which are shown by means of the accompanying illustrations. In these diagrams Fig. 40 shows the plan. A F a is the representation of the outer or convex surface of the arch, and a f a that of the inside or concave face. A 6 A represents the opening line of the outer face. It is the length, or, as sometimes called, the "width," of this which gives the direction for obtaining the directing curve of the soffit.

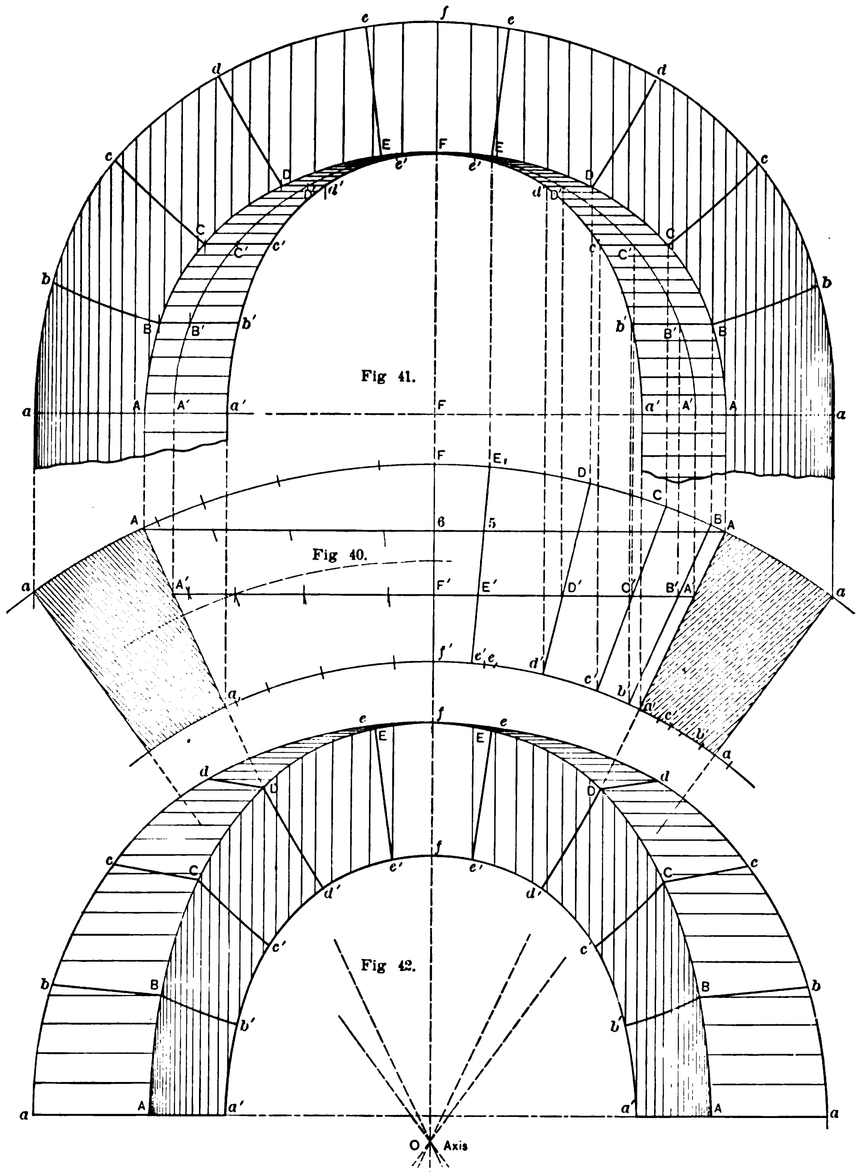


Fig. 40.—Plan of Radiant Arch.
Fig. 41.—Elevation of Arch.
Fig. 42.—Shows Inside of Concave Face, the Exterior Surface, Together with the Inclination of the Joint Turn at Exterior Surface.

Laying Out Circular Arches in Circular Walls.

In the majority of cases the "directing curve of the soffit" is taken as a semicircle, whose diameter is equal to the length given in that corresponding to A 6 A of the opening line of the plan. The "rise" of the arch from the "spring line" to the crown of the soffit will, of course, be equal to one-half that of the length given in the opening as that of 6 A; this is, therefore, the length required of the "radius" with which the "directing curve" may be drawn. This rule only applies to those arches at which the directing curve of the soffit is taken as a semicircle. This construction obtains in the majority of circle on circle arches, both in the radiant and

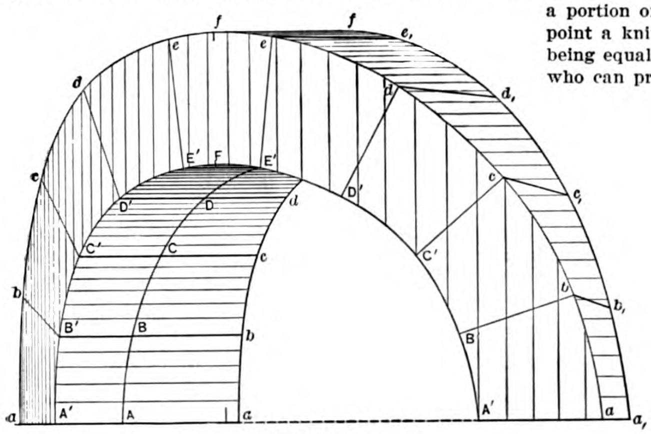


Fig. 43.

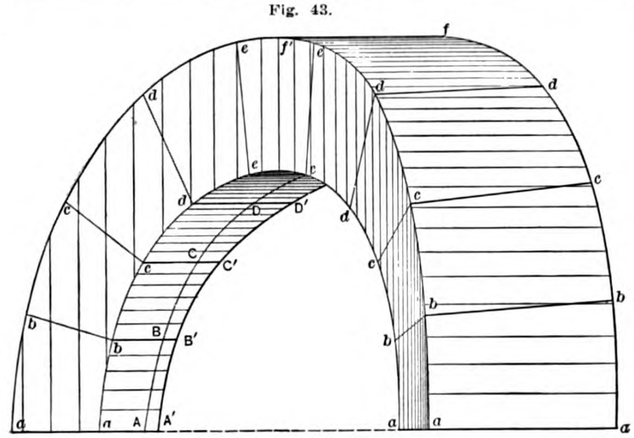


Fig. 44.

Figs. 43-44.—Revolved Position, Giving Side Views of Soffit, Exterior, Convex and Concave Surfaces of the Radiant Arch, Plan of Which Has Been Given in Fig. 40.

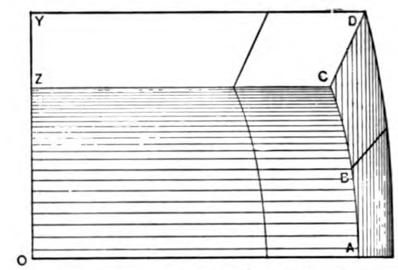


Fig. 45.—Shows Joint Surface with Vertical Arris or Knife Edge at Z Y.—Improper Construction.

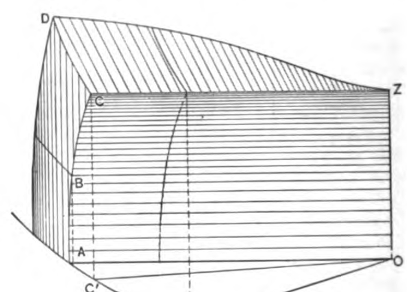


Fig. 46.—Shows Properly Constructed Joint Surface, Which at its Intersection with Axis at Point Z Becomes Level, or at Right Angles with Axis.

Laying Out Circular Arches in Circular Walls.

other forms of arch; yet in practice we occasionally meet with an arch in which the rise of the opening may be considerably less than that of the half width of the opening. Such an arch has been taken as the subject of the projections here made. The directing curve instead of the semicircle above described becomes elliptical, of which ellipse the opening line A 6 A is the major, and the "rise," as F F of Fig. 41, the semiminor axis. In this form of arch the construction of the necessary face molds may be very much simplified by finding, as in A' F' A', the trace of a vertical plane, which, intersecting the conoidal surface of the soffit of the arch, will cut from it the section of a semicircle. The method by means of which this may be done will be fully described in its proper order in the diagrams which follow.

Another very important point which deserves explanation is that of the joint surfaces. In the radiant arch, owing to the soffit lines of the joints, as B *b*, C *c* of Fig. 41, &c., being level, and also radiating toward the axis of the wall, it follows the surface is a "warped" or "twisted" one. In our experience we have noticed the majority of stonecutters are under the erroneous impression that the arrises, as D *d*, B *b*, &c., of Fig. 42, which belong to the exterior surface of the arch should also radiate toward the axis of the wall in the manner the arrises of the joints of the soffit radiate. To show to the readers that such a condition cannot obtain in the properly constructed arch, let us for a moment conceive the surface of the soffit to be extended to the axis of the wall in the manner shown in Fig. 45. Now let the joint surface be projected to the conditions above described. C Z will be the projection of the arris of the soffit, and D Y that of the arris which belongs to the joint at the exterior surface. It may now be clearly seen that the joint surface on meeting the axis becomes in a manner a portion of the axis, and the surface assumes at that point a knife edge wedge shape, the hight of the edge being equal to that given in Y Z. Those of our readers who can properly conceive the shape and position that this surface now assumes can at once see how impracticable it is, if not an impossibility, to attempt to place upon this surface a similar one such as may constitute the joint surface of the adjacent stone. Although the surface at the outer face may be normal to the surface of the soffit, yet as we near the axis it becomes in a manner more obtuse, until at the axis it is a portion of the vertical plane which intercepts the axis. This is the reverse condition to that which should obtain, for notice Fig. 46. Properly projected, the surface of the joint is normal throughout to the surface of the soffit; the inclination of the normals is less obtuse as they near the axis, until at the axis line they are parallel with the horizontal plane. The surface now complies fully with the principle of building construction which regulates the projection of this and similar surfaces. The principle in question is that the surfaces of the joints be normal to the curved surface of the soffit; they thus become "parallel with the thrust or weight" which may be placed upon the exterior surface of the arch. We can hardly wonder at these and similar misconceptions arising in the minds of the workman when we find to-day such methods are being taught by men whom one would think had a thorough knowledge both of building construction and of the geometrical principles which direct the "projection of warped surfaces," for we have before us a work recently published in England in which we find such a misleading method taught and explained for the projection of the molds as required at the radiant arch. From these remarks we hope the readers will see the advisability of working to some well-known geometrical rule, instead of to the "rule of thumb" methods usually employed.

The illustrations given in Figs. 43-44 clearly show in B′ *b*, C′ *c*, &c., of the soffit, the manner in which the joint surfaces intersect the warped surface of the soffit in Level Radial Elements; while in *b b*, *c c*, &c., is shown the inclined line of intersection of the joint surfaces with that of the extrados or exterior surface of the arch.

SETTING WATER CLOSET BOWLS.

In discussing the above subject a writer in a recent issue of *The Metal Worker* offers the following suggestions: The use of closets requiring a good floor joint has forced the trade in some instances into giving this feature of closet installation the earnest attention necessary to durable work. Yet the manufacturers have generally done less worthy work in this than in other lines, and there is often opportunity for the plumber to exercise his individual skill with a view to supplying that which the factory has omitted. The plumber, too, can make better use of the means at hand than he usually does. Conditions are too varied for any certain form of flange to do well without forethought on the part of the plumber. The fact that a factory has sent out a closet is not proof that the means for connecting it are proper or sensible, any more than that the plumber's part of the work is right or in harmony with the closet part. Let the plumber reflect and prove to the satisfaction of his own mind that the job, as he leaves it, will be good and lasting.

The average iron and earthen ware hoppers have base flanges that are entirely too small, especially those used with the seat attached. It may be argued that the days of hoppers are past and that there is no use to waste time in speaking of them. Such, however, is not the case. Jobbers still order the iron Philadelphia hopper by the carload. More than a thousand go in an ordinary car. Short iron hopper and trap closets also have a large sale, to say nothing of the earthen ware goods. We cannot, in plumbing work, wait for the disgusting results of poor installation to drive a poor article out of the market, because health is at stake in the case of cheap plumbing fixtures even more than where the most approved goods are used. It is then best to deal with what is and what we can do, rather than talk altogether of what ought to be.

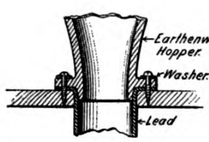


Fig. 1.—Common Floor Joint.

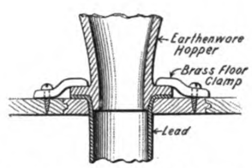


Fig. 2.—Flange Held by Floor Clamps.

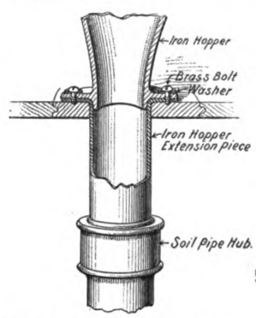


Fig. 3.—New Use for Old Fitting.

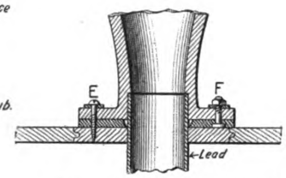


Fig. 6.—Closet Base Recessed for Pipe.

Setting Water Closet Bowls.

In Fig. 1 of the accompanying sketches is shown the floor joint of a round earthen ware hopper. The flange has countersunk screw holes, but it is more likely to crack out if the screws are run down in the holes without washers. Screws of the right length, with sharp thread and large bodies, should be used. Gimlet holes should be made for the screws, small enough for the thread to cut full depth in the wood. The screws should be pointed a little away from the pipe, so that the washer will bear most next to the wall of the hopper. If floor clamps, as shown in Fig. 2, can be had, it is best not to use the holes in the earthen ware at all. The flange is narrow and the holes necessarily close to the edge of the pipe hole. Thus it is easy for the screws to split out, even if the floor fits the pipe well. When clamps are used the screws come further away from the hole and the clamp can be moved so that the screw will not strike into a crack.

Clamps do not look well and a floor flange of brass is better in any case than clamps or screws and washers. The writer uses, where possible, a hopper extension piece, as shown in Fig. 3. These pieces are regular and can be had of different lengths. The use of them does away with the lead connection and permits the use of iron up to the floor line. It is best to use the regular holes to screw the flange down to the floor. Then set the hopper in place, mark the holes and drill and tap for ¼-inch brass bolts. Frost proof hopper outfits are now furnished with a length of flanged iron soil pipe for similar work by the manufacturers. Hopper extension pieces do well on many forms of iron closets and on tall earthen ware hoppers when set in cement floors or in out buildings.

Brass floor flanges are made in two general patterns; one, a ring with the pipe hole concentric with the outside; the other, a brass frame made to conform to the shape of the base of whatever pedestal closet it is intended to be used with, the ring being cast integral to agree with the position of the outlet of the closet. The latter pattern is indicated by Fig. 4. Some flanges have recesses or channels in the bottom at the bolt holes to keep the heads from turning. Some are countersunk in the bottom, for the same purpose, as seen in Fig. 4. Many flanges sold are ridiculously light in every respect, being fit only to fill the letter of specifications, and it is to be regretted that many jobs are let where the architect knows the bidder does not intend to, and will not be asked to, live up to the spirit of the contract. In Fig. 4 A is a flange bolt with loose head; B, a bolt hole; C, a wood screw to hold the flange down; D, the beveled surface at the pipe hole to which to solder the pipe. Bolts at A and B hold the closet down; the screw holes C may be of any number thought necessary and placed at any point, according to the shape of the flange, and whether it screws to marble or wood. The plumber can drill these holes at will, but there are slots in stock flanges that usually serve the purpose. The holes at B in flanges made for particular closets are usually two short slots joining at right angles to aid in adjusting the bolts to suit the holes in the closet flange. Stock flanges have a number of concentric arc slots, radial slots, &c., so as to make them suitable for different closets. The solder surface D is about the same in all flanges. It should be tinned with the copper before the pipe is in place, and the pipe soldered to it by floating the groove full, instead of by flanging out, as is often done before soldering. When screws are put through a flange into marble, the marble should be drilled the same as for a basin clamp, as far away from the edge of the hole for the pipe as possible. It is easier to drill out the lead with a gimlet than to locate the screw by pouring the lead around it. Fig. 5 indicates the position of the flange under a pedestal closet.

Fig. 6 represents the base of a closet having a pipe recess in the bottom at the outlet instead of the usual projecting nipple. The pipe is brought 1 inch above the level of the floor flange and soldered to it as usual. The square end of the pipe, together with the putty, is supposed to exactly fill the recess; but it takes very careful fitting to make a good job. When the pipe is of the right length and diameter putty is likely to swell over into the bore of the pipe and there is no way to remove it on trapped closets.

Floor screws with gimlet point, slotted upper end and loose head must be screwed down to the proper hight by the head; the slot in the end is worthless for screw driver use. They have only one redeeming feature—the hold on the floor or slab is not disturbed by removing the closet. It is sometimes very convenient to screw through both floor and closet flange into the slab or floor, as shown at E in Fig. 6. The regular bolt with loose head, as at F, is better, however.

When other arrangements are properly made it matters little on ordinary closets what kind of putty or cement is used. The point is to hold the closet firm and in place. The factories use the commonest of glaziers' putty in putting on flush rims, and a little dryer added to putty, or dryer and white lead, or boiled oil and ocher, or a combination of any of them with putty, oil and dryer, will make a good joint on a plunger closet bowl if it is not to be used for a few days. Common putty makes a good joint when the closet is set over a wood floor, because the floor hardens the putty by absorbing the oil. Hydraulic cement is often used on closets set over tile or cement floors. For ordinary work, where slabs are used, putty will answer if one does not mind the oil stain, which will show distinctly around the base of the closet, especially if the marble is white. For floor joints that must be air tight, if over tile, or marble, a hard setting cement that will not stain is best. This is nearest obtained by making a paste of either clay, red lead or litharge with shellac varnish. The writer has had trouble with poor material of this kind. Let the plumber buy from a reliable place and state that the goods must be genuine. If he wants to be certain of the result it is best to buy grain alcohol and gum lac and dissolve as much of the gum as the alcohol will easily hold and mix with the lead. This mixture sets hard and very quick. Everything must be in perfect readiness before the lead and varnish are mixed, and the closet should be pushed down to its final resting place promptly and the screws run down comfortably tight as quickly as possible. This cement cannot be forced; when the screws are tight no more can be done, except to break the flange or strip a thread. Enough cement must be put into every crevice to make a perfect joint at the beginning, as it will not squeeze into place so readily as common putty. The only trouble with hard setting cements is the danger of breaking the closet flange when removing it for repairs and the difficulty of cleaning the flange for resetting. The cost is greater than for common putty.

In plunger closets, such as that shown in Fig. 7, the bowls sometimes get broken, and as they are often promptly in use when installed, a hard, quick setting cement that will stand water immediately is needed. The shellac varnish and red lead, or litharge, as described above, answer the purpose perfectly. In setting such bowls the iron parts must be cleaned thoroughly. If the brace is attached by bolts it is a good plan to bolt it up tight, dry, iron to iron. Then place the bowl to see how the outlet comes. If necessary lay in some little blocks of wood at each end of the brace (not in the channel) so as to raise the bowl nearly even with the outlet and high enough to meet the arm pipe from the plunger chamber. These pieces should be stuck in place with a little cement mixed for the purpose. When the bowl rests right, except being a little low, mix the cement and smear the flange of the bowl and the face of the iron opening with varnish only. Then fill the channel, which forms the lower half of the joints, with cement; put a good daub over the wood blocks and paste the end of the bowl and settle it into place by firm pressure. Make sure that the flange joint is filled all around. Next, fill around the upper half of the flange and bolt the keeper on very carefully. This should all be done, if possible, before the first cement hardens. Smooth the inside of the joint with fresh cement, very soft, and fill around the bowl anchor which projects through the brace. The bulk of the filling between the bowl and brace, between the blocks, and at the end, can be done with common putty after the bowl is set. In some forms of bowl pipes it is better to put the connecting pipe into the bowl before setting the bowl in cement.

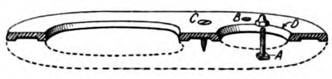


Fig. 4.—Floor Flange for Pedestal Closet.

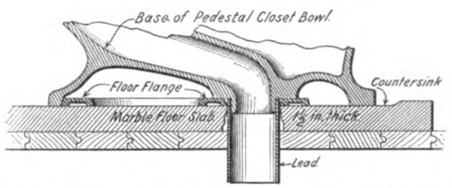


Fig. 5.—Floor Flange in Place Under Pedestal Closet.

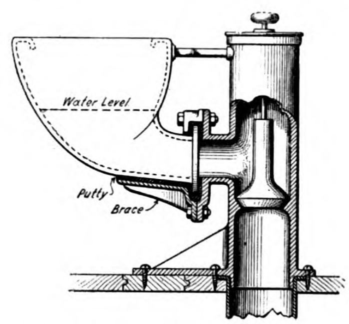


Fig. 7.—Plunger Closet Bowl Joint.

Setting Water Closet Bowls.

Cement Wash for the Exterior of Masonry Concrete Walls.

In reply to a correspondent who asked what material should be used as a binder for Portland cement that is to be employed as a size in paint form on walls of brick, concrete or stone, a recent issue of *Headquarters* has the following: The cement is mixed with water, to which is added a portion of lime water and salt. The proper proportions are: One pint of lime water to 7 pints of soft water and 2 ounces of salt. Enough cement is stirred in to make a paint of such consistency that it may be spread conveniently with a wall brush. If coloring is desired, add hematite red in powdered form for red, hematite brown for brown, yellow ochre for buff and whiting for gray or slate color. Very good for new or damp walls.

New Publications.

Common Sense Hand Railing. By Fred. T. Hodgson. 118 pages. Size, 5½ x 7¾ inches. Illustrated with over 120 drawings and diagrams. Bound in board covers. Published by Frederick J. Drake & Co. Price, $1.

This new volume contains three distinct treatises on the subject indicated with complete instructions for laying out and working hand rails suitable for any kind of a stair—straight, circular or elliptical—or for stairs with landing and cylinders. These systems or treatises are compiled, revised and edited in a most careful manner, and are adapted from the works and actual examples of well-known hand railers. It is a well-known fact that the building of stairs is very often one of the most puzzling problems which the carpenter and builder has to solve, and in the book under review the author has given such instructions as will with careful study and thought enable the workman to produce a satisfactory job. There are 11 distinct styles of stairs shown, but it must be borne in mind that the same principle that governs the making of the simplest rail governs also the construction of the most difficult, so that once having mastered the simple problems the workman is in a position to make rapid progress in the art.

Letters and Lettering. By Frank C. Brown. 214 pages. Size, 6 x 9 inches. Illustrated by means of 200 examples. Bound in board covers. Published by Bates & Guild. Price, $2.

This work has been brought out to meet a well defined demand on the part of those who have felt the need of a varied collection of alphabets of standard forms arranged for convenient use. The alphabets illustrated, while primarily intended to exhibit the letter shapes, have in most cases been so arranged as to show also how the letters compose into words, except in those instances where they are intended to be used only as initials. The application of classic and medieval letters to modern usages has so far as possible been suggested by showing modern designs in which similar forms are employed. The matter has been compiled with a great deal of care, and it will be found of especial interest and value to architects, draftsmen, artists and others. The arrangement is in five chapters, the first being devoted to Roman Capitals, the second to Modern Roman Letters, the third to Gothic Letters and the Fourth to Italic and Script. The last chapter is addressed more particularly to the beginner, and tells of the tools and materials requisite in order to do good work in the line indicated.

The Art of Illumination. By Louis Bell. 346 pages. Size, 6 x 9¾ inches. 127 illustrations. Bound in cloth. Published by the McGraw Publishing Company. Price, $2.50.

This work covers a subject which is of more or less direct interest to architects and builders, dealing as it does with the utilization of artificial light. The matter is embraced in 14 chapters, the first three of which are devoted to a discussion of the physical and physiological principles which form the basis of the art of artificial lighting. Then in succession are taken up the properties of practical illuminants and their bearing upon the development of modern lighting. There are chapters upon electric incandescent lamps and arc lights, as well as on shades and reflectors. The lighting of the house, as well as of large buildings and of streets, is treated in successive chapters, and concrete cases illustrative of the principles laid down are worked out in detail. A separate short chapter is devoted to the basic principles of decorative illumination for special purposes, and the volume closes with a clear statement of the methods and apparatus employed in modern photometry.

Wall Papers and Wall Coverings. By Arthur S. Jennings. 162 pages. Size, 7 x 11 inches. Numerous illustrations, some of which are in colors. Bound in board covers. Published by William T. Comstock. Price, $2, postpaid.

This work by an author more or less well known to our older readers is a practical hand book for architects, builders, decorators, paper hangers and house owners generally. Some years ago the author brought out a work on "Practical Paper Hanging," and in taking up the matter again it was found that so many changes had taken place and so many improvements made, both in design and manufacture, during the last decade that it was advisable to entirely rewrite the work and to issue it under the new title of "Wall Papers and Wall Coverings." The author has endeavored to include characteristic designs in vogue at the present day, and to give reliable information as to the choice of wall papers, as well as to describe the practical methods of applying them. The illustrations are somewhat elaborate, many half-tones in colors being used, showing the latest designs of a large number of manufacturers in England and France, as well as in this country. Practical questions, as well as the tools used, are given extended treatment, with illustrations of the latest devices. The matter is arranged in 12 chapters, and is presented in a way to be of more than ordinary interest and value to the mechanic and designer.

Commencement Exercises, New York Trade School.

An audience of considerably more then 500 people congregated in the auditorium of the New York Trade School at 1260 First Avenue, New York City, on Wednesday evening, April 8, to attend the twenty-second annual commencement exercises of the school. The auditorium was decorated with much taste, flags being the principal feature. Mothers and sisters of the pupils formed no small proportion of the audience, and the trustees and their ladies, with other friends, occupied the platform.

The classes in carpentry, plastering, bricklaying, drawing, plumbing, electrical work, house, fresco and sign painting, cornice work, printing, blacksmithing, steam fitting and pattern making, and the attendants at the lectures for steam engineers and electrical workmen for the year showed a total enrollment of 924, including 472 pupils in the evening classes, 275 in the day classes and 177 attending the journeymen's lectures. These pupils, who came from 27 States, were present in large numbers, and during the evening occupied the centre of the auditorium.

The exercises were opened by President R. Fulton Cutting, who in a brief address referred to the successful year which had elapsed, both as regards the attendance and the degree of proficiency in the various trades. Among other things he pointed out that the reputation of the student is his best capital and that he could recompense the school for what it had done for him by making the fact known that the trade-school-man is always worthy of implicit confidence.

At the close of the president's remarks he introduced John Mitchell, ex-president of the National Association of Plumbers, who in his address presented much food for thought on the part of the young men who were about starting out to follow their chosen vocations. He referred to the excellence of the exhibition work and expressed gratification at the knowledge that so large a number of the students were so well qualified to go out and take up the struggle of life. He pointed out that such young men were needed in the world and urged conservatism in their future course.

Your influence in the labor organizations to which you will eventually belong, he said, must be honest and intelligent, and you will aid my namesake in the great work which is being done for the education of labor, which is now spoken of as the labor question. You can best do this by doing your whole duty by whoever employs you. There should be no conflict between capital and labor. Each is essential to the other. By helping to intelligently dispose of the questions which arise between them in a fair and honest manner, you will make good citizens, and by the fruits of your labor make this country the peer of any on the globe. You have enjoyed a great advantage in being assisted to that superiority in your instruction in this institution which was provided for you by the late Colonel Auchmuty, who founded this school. In addition to being a monument to his breadth and sagacity, it is also invaluable to this whole country; and, through you, its benefits will be carried to every part of it. I have taken pleasure in a critical examination of your work, and am familiar with that of the best journeymen plumbers of to-day, and the superiority of your work should shame the men who are trying to restrict the opportunities of the American boy to learn a trade and to boycott those who endeavor to assist him. I stand here to-night opposed, as I always have been, to those organizations which are un-American in their attempts to curtail the freedom and liberty to which all are entitled, and which, if their will should prevail, would prevent young men from being useful, and by these restrictions would fit them instead for the rum shop and for idlers. You represent many different trades, and I wish each and every one of you success. May you be as safely conservative and as generous as the man who founded this school. To the boy who has worked all day and then comes here in the evening to improve himself, I say: All honor. I congratulate you on the evidence that the labors of Mr. Delahanty in your behalf have been appreciated, as shown in your work, and also that Mr. Brill is able to make such excellent reports in reference to what the New York Trade School has been able to show through your efforts this year.

Certificates to the graduates were then presented by John Noll and E. Van Houten, while the certificates to those pupils who had won distinction were presented by A. K. Mackay.

The prize for the pupils in the day carpentry class, donated by the Industrial Education Company, resulted in a tie between Cæsar Leonard and Albert J. Wood, and in consequence, through the generosity of the publishers, each will receive a set of books.

The medal for the day painting class, which is awarded annually by the *Painters' Magazine*, was presented by J. Burton Allen, who said that fifteen years ago he had sat in front of the platform as one of the pupils, and that there had been a medal presented that year, but that he did not win any medal. He had sympathy for medal winners, and congratulated the present winner, John Burke.

The medal contributed annually by the Association of Master Steam Fitters of New York City for the most proficient scholar in the day class in steam fitting was awarded to William Arthur O'Neil, of Warren, Indiana. It was announced that William K. Kingston and Thomas E. Griffiths were entitled to honorable mention.

President Cutting then introduced the Rev. W. S. Rainsford, D.D., who assured the young men that there was plenty of room at the top and that there never was a time when the hard working, industrious man had a better chance to get to the top than to-day. His remarks were followed with the closest attention on the part of the young men present, who seemed to be greatly impressed with the many suggestions which were made regarding their future course of life. At the close of Dr. Rainsford's remarks the various instructors were presented with gifts by the students in the respective classes.

The number graduating was 14 in the day carpentry class ; 11 in the class in bricklaying ; 17 in the house. sign and fresco painting classes ; 1 in the class in plastering ; 87 in the plumbing class ; 15 in the steam fitting class ; 4 in the class in cornice work and 32 in the electrical class.

Use of Cement Piles for Building Foundations.

An interesting occurrence in this city recently witnessed by a number of architects and engineers was the driving of the first concrete pile for the foundation work at Pearl and Park streets, where the enlargement of the Hallenbeck Building is in progress. The pile used was 28 feet long and 12 inches square, and was composed of a mixture in the proportions of 1 part cement, 2 parts sand and 4 parts of broken stones, which would readily pass through a ¾-inch ring. Along the outer edge of the pile, running its entire length, were four 2½-inch wrought iron rods, bound with steel wire bands at intervals of 8 inches. About 2 feet from the bottom the pile narrowed to a point. The building will occupy a plot 20 x 97 feet, and will be ten stories in hight. In the foundations for it 64 of these piles will be used. The architect for the building is H. C. Pittman, and the contractors in charge of the work are Walter Reid & Co. It is stated that three weeks' time was required for the cement of which the piles are composed to "set."

Cement piles have been used for some time past in England, France and Germany, principally in connection with the building of docks, and their introduction into this country is said to be with a view to overcoming the difficulties experienced with wooden piles because of the constantly changing underground water level and the consequent decay of the wooden piles when the water level comes below their tops.

Homes of the Washingtons.

Countless Americans have journeyed to the beautiful estate of Mount Vernon on the Potomac, where the great Washington passed his last days; but not every one is aware that scattered in Virginia and West Virginia are numerous other homes of the Washingtons, each of which is an architectural achievement of note, and replete with historic associations. In the May *Delineator* Waldon Fawcett describes four of these fine old edifices, Kenmore, Harewood, Claymount and Audley. They represent the highest type of Colonial architecture, and are characterized by a degree of elaboration seldom attained in that period. The original furnishings are preserved. Excellent illustrations give additional interest to the paper.

IN connection with a brief description of the Farmers' Bank Building of Pittsburgh, Pa., which we presented in these columns a few months since, mention was made of the fact that the architects who prepared the drawings were Alden & Harlow of that city. We now learn that the firm have taken offices in the new building and have had the quarters especially fitted up to meet the requirements of their extensive architectural business.

CONTENTS.

NEW COTTAGE HOSPITAL AT ENGLEWOOD, NEW JERSEY.

ARTHUR G. C. FLETCHER, Architect

SUPPLEMENT CARPENTRY AND BUILDING, MAY, 1903.

[FOR PLANS AND DESCRIPTIVE ARTICLE SEE PAGES 119-120.]

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

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

JUNE, 1903.

The Local Building Situation.

The overshadowing feature of the local situation is the practical deadlock which exists in the building business, whereby active operations on all important work have been brought to a standstill. When the trouble between the two rival carpenters' and joiners' associations developed about May 1 it was thought that it would not prove of long duration, and probably this would have been the case had the situation not been further complicated by the attempts of outside team drivers and handlers to unionize the yards of the dealers in masons' building materials, lumber, &c., with the result that the employers assumed the aggressive, and through their associations declared a lockout by closing their yards. As a consequence of this step no building materials of any account are being delivered within the boroughs of Manhattan and the Bronx, and work has practically ceased on every important building contract in the city. Meetings have been held by the employers directly concerned, and the Building Material Dealers' Association with the Lumbers Dealers' Association have decided to act together in the matter, while representatives of the Brick Manufacturers' Association are understood to have agreed to co-operate in any plan which will tend to bring order out of the chaos created by the demands of the unions. The Mason Builders' Association, which counts among its members the leading general contracting firms in the city, has also decided to stand with the first named associations against the striking material drivers and truckmen. The opinion seems to prevail that if the lumbermen and material dealers' associations yield and allow their yards to be unionized, it will place the entire building business at the mercy of the Board of Building Trades, and might cause the paralysis of the building industry at any time one of the affiliated unions of the board made demands. Notwithstanding the various agreements which went into effect on May 1, the men in several lines have made demands for increased wages and differences exists in many branches of the trade. The general situation has assumed such shape that meetings of representatives of the various associations of employers in the building trades have recently been held to consider plans for bringing about normal conditions in the industry to the end that the present epidemic of strikes, which seems to be sweeping over this part of the country, may not cause an abrupt termination of the building season. A call has been issued by officials of the Building Trades' Association for a general meeting of all the associations of employers in the building trades in Manhattan and the Bronx, to take place Friday evening, May 15, for the purpose of considering "what steps shall be taken to remedy the existing intolerable conditions." It is thought that one of the first steps in dealing with the situation will be the formation of a powerful organization of employers, and somewhat similar action is expected to be taken by the employers in the building trades in Brooklyn. It is the general feeling of the employers that the present labor situation calls for unusual and determined action on their part. This is probably the first time in the history of local labor disputes that the employers have recognized the necessity of organizing to resist the encroachment of the labor unions. Should both sides remain obstinate in their positions and refuse to make concessions, a bitter and prolonged struggle may ensue which would seriously affect the business and public interests of New York City and vicinity. This is the time when the building trades should be specially active, and the present season gave every promise a short time ago of being an unusually prosperous one. A great deal of building construction is under way, and much is in prospect, ready to be pushed to completion provided the labor outlook is satisfactory. It is certainly to be hoped that some method of arriving at a mutual understanding will be adopted whereby the building situation may be clarified and a prolonged tie up of operations averted.

Employers' Protective Associations.

Apropos of the movement looking to the protection of the interests of the employing builders, it is rather significant of the present tendency of the times that so thoroughly has the desirability of organization impressed itself upon business interests that scarcely a branch of productive industry can now be found in which some kind of an association does not exist. Many of these are of a purely social and educational character, having for their primary object the interchange of ideas for mutual improvement. Others are commercial in their nature, while a few have for their special object the management of the labor question. Organizations of the class last named are of a comparatively recent origin. In fact, it may be stated that the labor question was so long considered such a dangerous matter to touch upon that organizations of employers deemed it wise to expressly disclaim any intention of handling it when forming an association, but very much against their inclination this course has been forced upon them by the developments of the last few years, and it now appears not only necessary to maintain organizations for the express purpose of dealing with labor problems, but also to include the labor question as one of the subjects to be given consideration by all associations of employers except those of a strictly technical character. The fact is becoming impressed upon careful observers that the general attitude of organized labor is not altogether conducive to the best interests of the country. Too often leaders display unceasing activity in endeavoring to break down the control of labor by employers and to curtail the liberty of citizens generally. If strikes prove a failure, they apply to the law making bodies of the States, or the nation, and bring to bear the power of the great body of voters to secure the enactment of laws giving them what they want. If judges issue injunctions restraining riotous strikers from interfering with the peaceful conduct of business operations, the representatives of the strikers ask Congress to pass a law forbidding injunctions in labor troubles. If employers successfully oppose an attempt to force upon them a shorter day, the labor leaders appeal to Congress for an act which will prove the entering wedge in the establishment of a general eight-hour day. The statute books of many of the States are now burdened with enactments passed at the instance of organized labor, and unless strong efforts are made by employers it is not too much to assume that ere long the United States statutes will be considerably expanded by legislation of this character. The effect of such a movement, if long continued, cannot fail to be serious in the extreme. One of its worst features is that it subverts discipline, which is so essential to success in any undertaking involving the employment of a number of hands. In resolutely opposing retrogressive forces employers have a duty to perform which is not altogether selfish. While their investments are imperiled, other considerations should also influence them in taking an aggressively defensive stand against the schemes of labor leaders to secure control of the business interests of the country. Selfishness would perhaps lead to compromises for temporary individual advantage. Some employers have reaped considerable profit by yielding to the demands of labor during a strike in which their competitors, by refusing to surrender, were unable to transact any business for a long time. Action of this character in the past may not have been specially serious, but we now seem to have arrived at a critical period in handling the labor question, and a new policy appears to be required. It would seem to be the part of wisdom that employers stand together and waive temporary considerations for the permanent benefit not only of themselves but of the community at large.

American vs. English Basement Houses.

In late years there have been erected in this city a great many private dwellings which have been designated as "American" basement houses as distinct from the old time "English" basement houses, and no little discussion has been created among architects and builders as to the real difference between the two types of houses. The English kind is familiar in Boston, Philadelphia and Baltimore, and is, with unimportant modifications, the typical city house throughout England. The "American" basement house is peculiar to New York City, and nearly 95 per cent. of the new dwelling houses built in this city in recent years by speculative builders are of this type. There is not a floor in this type which can be thrown open entirely for entertainment. The dining room, foyer and salon are on the same floor, but the library is above the salon, and on the floor with the sleeping rooms. The kitchen and laundry are on the entrance floor, thus occupying one of the most important parts of the house.

In the "English" basement house the basement is exclusively occupied by the kitchen, laundry and servants' hall. The first story is raised three or four steps above the curb, and is occupied by the reception room and dining room. Above this floor are the salon, staircase hall and library, while the third floor contains the master's apartments. This arrangement, it will readily be seen, lends itself more advantageously to entertainments and affords likewise more privacy.

A well-known New York architect recently expressed the following views to a representative of the *Tribune:*

"The American basement dwelling house was evolved from the old fashioned high stoop house, and is the only successful economical alteration of this type of house without changing the level of the floors. Builders took their cue from such alterations, and, because of the economy in excavating, adopted and popularized the so-called American basement house. The American basement first became popular on the upper West Side, where the people do not entertain much, and where economy in running the house from the point of view of heating, servants, &c., is to be considered. In the American basement the kitchen is placed on the entrance floor, occupying space which in any intelligently planned house of 25 feet or more in width should be given to the dining room. The place for the kitchen, servants' hall and laundry is in the basement, and not on the first floor. There is one excuse for the American basement house, and that is where the lot is very narrow, say 17 feet, and it is desired to get a large room in the front of the house. In that event the entrance must be underneath this room, but even then the more attractive house would be the English basement, omitting the reception room from the first floor and receiving in the salon, on the second floor, as is the custom in many English houses. The American basement has one less room than the English basement house, and so, of course, is a more economical house to build and a more economical house to maintain. The successful builders of the upper West Side, having exhausted the available land, turned their attention to the east side of the Park, and brought with them the type of house which they had sold on the West Side.

"It is a curious fact that, aside from altered houses, no one who has built his own house on the East Side, 25 feet or more in width, has built an American basement house. With the exception of the Farley houses, builders have not built anything except American basement houses. There are two or three blocks of houses, built some time ago, which are of the English type. They stand out as an old advance guard. One of these blocks is composed of some of the most attractive houses in the city; it is between Fifty-seventh and Fifty-eighth streets, on the east side of Fifth avenue. Another block of English basement houses is between Eighty-fourth and Eighty-fifth streets, on the east side of Fifth avenue."

Death of Henry Van Brunt.

In the death of Henry Van Brunt, which occurred at Milton, Mass., early in April, the architectural profession lost a most honored member. For 20 years he practiced in Boston, where he achieved a reputation as a designer of buildings for Harvard University, churches, public libraries, &c., throughout the United States. In 1887 he removed to Kansas City, where he joined his old partner, F. M. Howe, who had preceded him two years before. In 1890 he returned to this country from a year's trip abroad, and was selected as one of the ten architects for the designing of the Columbian Exposition, his particular work being the Electricity Building. As an architectural critic Mr. Van Brunt stood very high among the practicing members of his profession. He was a somewhat voluminous contributor to architectural journals and literary magazine, and he also translated Viollet-Leduc's "Discourses on Architecture."

Some New Department Stores.

The new department store which is being erected upon a portion of the site of the old Macy store at Sixth avenue, Thirteenth and Fourteenth streets, New York City, will be a ten-story structure, with basement and sub-basement. The work of demolishing the old building is making rapid progress, and it is expected to have the new store ready for occupancy by the opening of the new year. According to the plans of the architects, Cady, Berg & See, the new store will on the Fourteenth street side include the modern nine-story arcade entrance building, formerly a part of Macy's store, and only recently erected. There will be more than 40,000 feet of floor space, insuring broad aisles, capacious entrances, easy stairways and moving platforms. In the new building will be a handsome art gallery, a modern, fully equipped "rest room," a writing room and a large restaurant, together with 22 elevators for passenger and freight service.

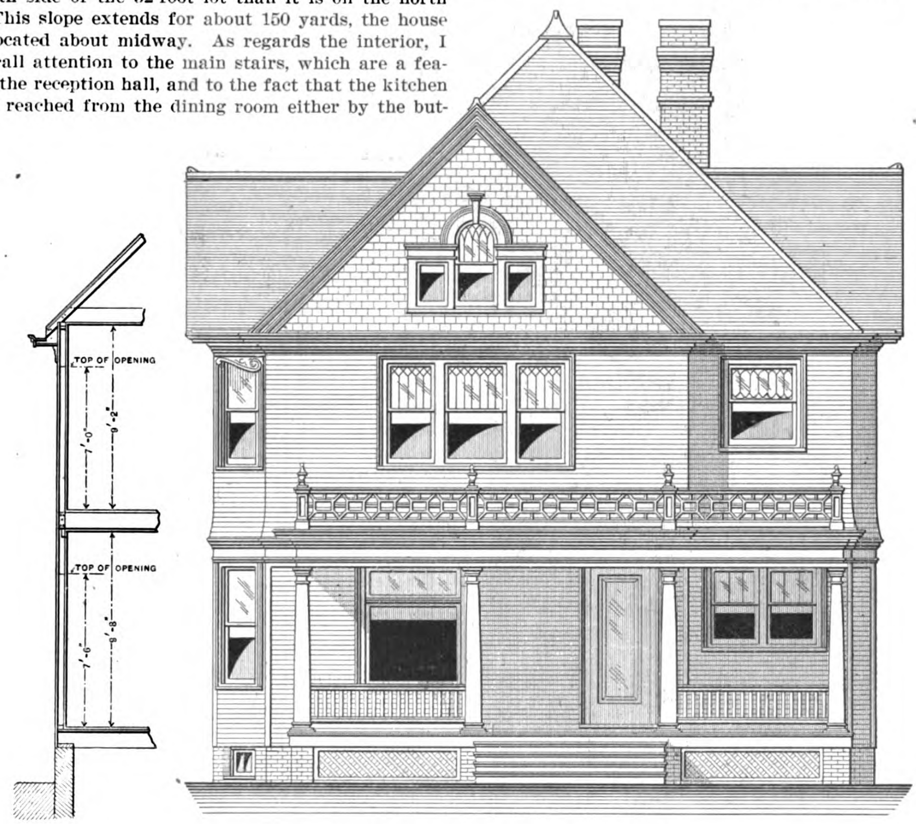
Another important building in this line is the store to be erected for John Wanamaker on the block bounded by Broadway, Ninth street, Fourth avenue and Eighth street, New York City. It will be 13 stories, with basement and sub-basement, in hight and will cost between $3,500,000 and $4,000,000. The plans have been prepared by D. H. Burnham & Co. of Chicago, who also prepared the drawings for the new Wanamaker store to be erected in Philadelphia. The New York building will be of steel construction, fire proof throughout, with exterior walls of granite, limestone and terra cotta. In the center of the building will be a grand stair, extending to the eighth floor. The delivery department and wagon concourse will be at the corner of Fourth avenue and Eighth street. The interior wood work of the structure will be of San Domingo mahogany and quartered oak. It is estimated that about 15,000 tons of structural steel will be required for the building.

COMPETITION IN $5000 FRAME HOUSES.

THIRD-PRIZE DESIGN.

We take pleasure in laying before our readers the design awarded the third prize in the competition in $5000 frame houses, the author being Mark H. Whitmeyer of 15 North Vermillion street, Danville, Ill. Since the time the drawings were forwarded the house has been completed, and our half-tone supplemental plate, reproduced direct from a photograph, shows the appearance of the finished dwelling. In referring to the design the author presents some comments, from which we quote as follows:

"The house is designed for an east front and is built on a slope, the sidewalk being about 10 inches lower at the south side of the 52-foot lot than it is on the north side. This slope extends for about 150 yards, the house being located about midway. As regards the interior, I would call attention to the main stairs, which are a feature of the reception hall, and to the fact that the kitchen may be reached from the dining room either by the butler's pantry or through the passage at the head of the basement stairs, and that the door from the kitchen contains chipped glass. This would more effectually shut off the objectionable portion of this passage. In the present instance the owner raised an objection on account of the number of doors. The large alcove on the second floor might with a few slight changes be made into a sewing room. It might possibly be thought best to move the hall a little to the north, making the servants' room and the closet of bedroom No. 3 a little smaller, thus increasing the size of the rooms on the south of the hall. This, of course, is a matter of choice on the part of the owner.



Section and Front Elevation.—Scale, 1/8 Inch to the Foot.

Competition in $5000 Frame Houses.—Third-Prize Design.—Mark H. Whitmeyer, Architect, Danville, Ill.

"The house is now being built at Danville, Ill., from these plans, except for the extras which I shall mention. The contract was let at $3447, the next highest bid being $3453, and the average of the seven bids received being $3629. The contract includes just what is put under that heading in the estimate, the other articles being listed separately. The plumbing contractors will not figure as subcontractors in the State, hence the necessity of figuring separately. The heating and electrical wiring were reserved for special reasons. The estimate appended is based upon the actual construction of the work, the actual bills of material being used where obtainable. The work at this writing is ready for the finishing wood work (interior), hence is so nearly completed that there is little room for error in these bills. In connection with the estimate it may be well to state that as the work is being done in winter the contractor has made a reduction, as is customary here, in order to keep the men employed. The plastering contractor personally informed me that he made a reduction of $20 in the plastering. It must also be considered that we have here one of the largest common brick factories in the country and can get the best of good hard burned shale brick, laid down at the work, for $7.50 per 1000. The furnace used in the heating is also a product of our city and was put in by the manufacturers; hence the freight, or the transportation at least, was saved."

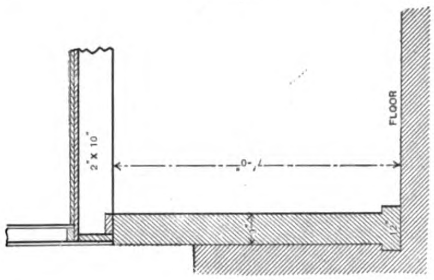
The following is a description of the method of construction of the building, together with that of the materials used:

Specifications.

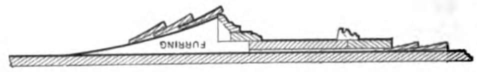
Excavation extends under the entire building. Cellar floor is 7 feet clear under the joists. Dirt from excavations used in grading, all being used.

Brick Work.—Walls and cross walls, with footing, piers, &c., of hard shale brick in lime-cement mortar. Flues tile lined. Large ash pit under hearth. Large concrete footings under the chimneys.

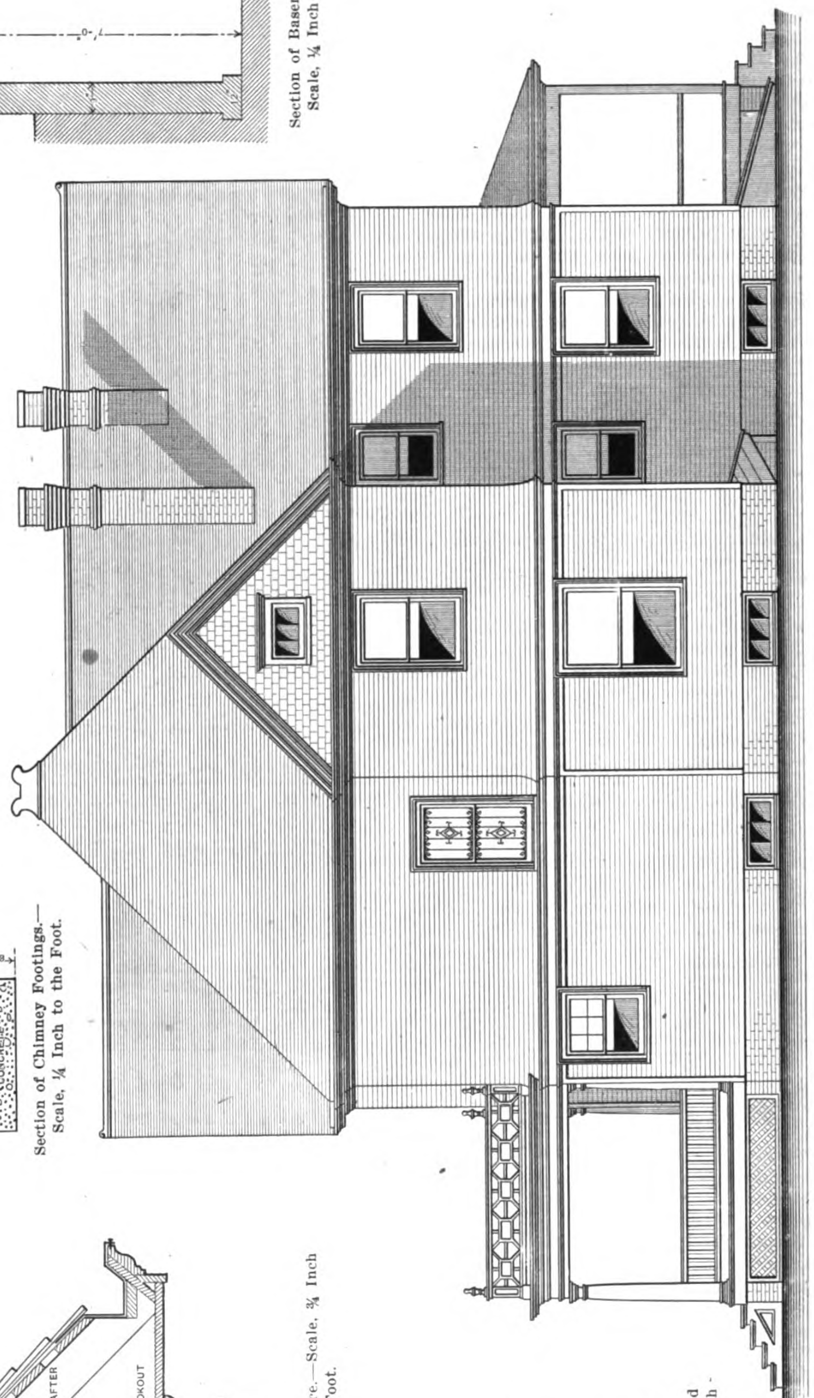
Drains.—No drains are built except vitrified tile, 4 inches, from all leaders to the cistern. As the cistern was previously built on the lot it is not included in this work. Tile to cistern are well laid and set in cement.



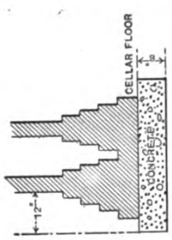
Section of Basement Wall.—Scale, ¼ Inch to the Foot.



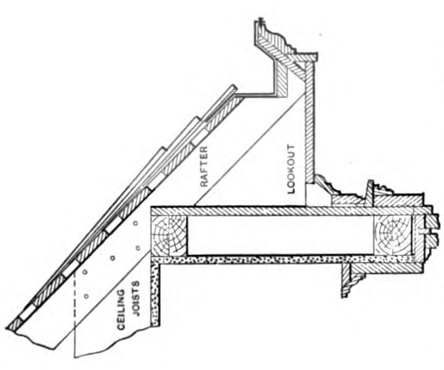
Detail of Belt Course.—Scale, ¾ Inch to the Foot.



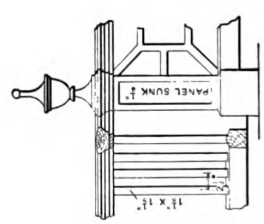
Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.



Section of Chimney Footings.—Scale, ¼ Inch to the Foot.



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



Details of Porch Railing and Balustrade.—Scale, ¾ Inch to the Foot.

Competition in $5000 Frame Houses.—Third-Prize Design.—Side Elevation and Miscellaneous Constructive Details.

Carpenter Work.

Framing Timbers.—Yellow pine, to be sound, well seasoned and free from defects, shakes, and any large loose or black knots, or other defects materially impairing its durability or strength.

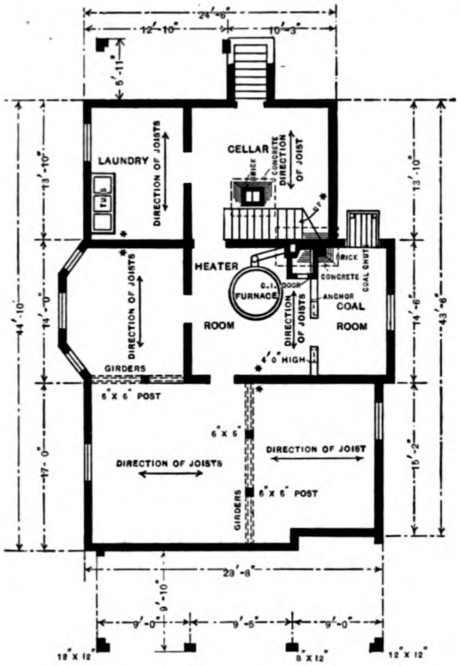
Sills and Joists.—Balloon sill made as shown on plans. Joists 2 x 10 inches, 16 inches on centers, notched over wall plate. Doubled joists under all partitions running same way. Joists lapped and spiked on girders. Joists under hard wood floors in second story notched out ⅞ inch for double floor. Headers and trimmers made with doubled joists. Joists bridged with one row 2 x 2 inch cross bridging in spans over 10 feet, and if span is 16 feet or over two rows.

Walls and Partitions.—Studs 2 x 4 inches, set 16 inches on centers. Studs set on 2 x 4 inch plate. Where possible studs to be continuous throughout the hight. Trussed over all openings over 4 feet in span. Corners formed by three studs, spiked together to arrange corners for lathing. Top plates are doubled. Sliding door pockets lined with ⅝-inch stuff, matched. Studs doubled around all openings.

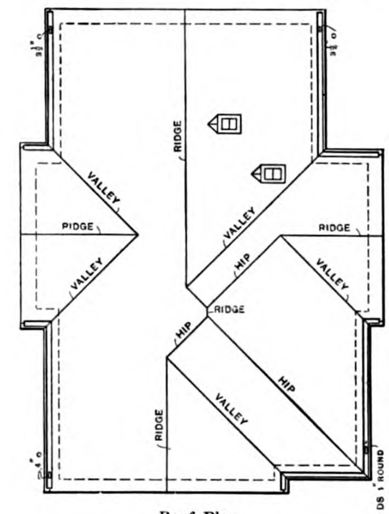
Lining and Paper.—Lining is No. 2 8-inch flooring, put on diagonally and nailed to every bearing with three 8d. nails. Paper is red rosin sized, grade A, laid with a 2-inch lap.

Roofs.—Rafters under 14 feet are 2 x 4 inches, 14 feet and over are 2 x 6 inches, placed 20 inches on centers. Valleys, 2 x 10 inches; hips, 2 x 8 inches. Roof sheathing is No. 2 pine, 1 x 4 inches, laid 2 inches apart and nailed to every bearing with two 8d. nails. Shingles are best clear red cedar, 5 to 2, laid 4½ inches to the weather, narrow open valleys and Boston hips. No shingles less than 3 inches wide. At least two nails to each shingle and all shingle nails cut nails. Shingles dipped 11 inches in stain by the painter before laying. No. 26 G. I. finials and ridge roll. Flashing, Scott's, Taylor's or Hamilton's best old style IC.

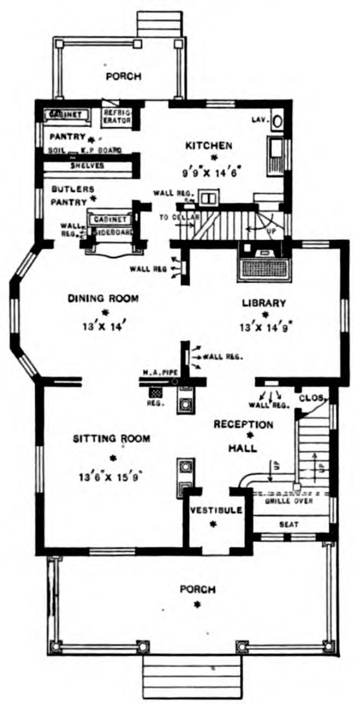
Siding.—Best clear yellow poplar siding, "no bastard poplar admitted." 4 inches wide, laid 2¾ inches to the



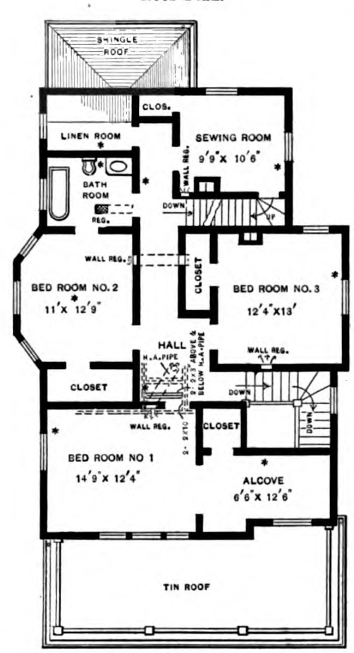
Foundation.



Roof Plan.



First Floor.



Second Floor.

Competition in $5000 Frame Houses.—Third-Prize Design.—Floor Plans.—Scale, 1-16 Inch to the Foot.

weather, nailed to every bearing with 6d. nails set in for puttying. Corner boards in first story and lap mitered in second story. Gable shingles selected from roof shingles and dipped 11 inches in stain. Laid 4½ inches to the weather.

Outside Finish.

Material is well seasoned white pine or poplar, free from sap, shakes and large or black knots, or other imperfections materially impairing its durability or appearance. Primed as put up. Cornice has brackets or lookouts to each rafter. Raking cornice same as horizontal. Corner boards 1⅛ x 3 inches. Belt course as detailed. Window frames all molded, except those on rear, which frames have crown mold and drip. Outside casings are 1⅛ x 4½ inches.

Porches.—Floor of ⅞ x 3 inch clear white pine or fir, laid over 2 x 8 inch joists. Steps 1⅛-inch tread and ⅞-inch risers, edges of steps and treads formed into nosing and scotia put under. Ceilings are level, of ⅝-inch beaded yellow pine, and are to be finished natural. Lattice is ⅝ x 1⅜ inch frames under front porch.

Columns are 10-inch built up, bases and caps turned, pilasters 4 x 10 inches at base. Railing is built up top rail and solid 2½ x 3½ inch bottom rail.

Top and bottom rail of balcony are same as those below, with baluster pattern built up of 1⅜ x 1⅛ inch stuff. Posts solid, panels run in and with wood turning on top. Tin carried under posts, then a flashing turned into saw kerf in posts and soldered down to roof.

Rear porch has plain 5 x 5 inch columns and post, plain 2 x 4 inch beveled top rail, the frieze box smaller and no scotia under nosing. Otherwise it is the same as the front porch.

Composition Work.—The two large composition brackets are No. 1955 from the Architectural Decorating Company's catalogue, are 32 inches long, 11 inches face and 13 inches drop.

Cellar Hatchway.—Top frame of 2-inch stuff, bolted down to the brick work; two batten doors at top with battens screwed on, fitted with strong wrought iron hinges, hasp and suitable lifts. One wide batten door at the bottom, fitted with bronze bolt rim lock, hung on wrought hinges. Steps of 2-inch mill dressed plank on horses, steps 1 inch clear of the brick work.

Window Frames.—Jambs and heads 1⅛ inches thick, steel pin pulleys, iron weights. Regular cellar frames in basement, hinged to swing in and fitted with hooks, buttons, &c.

Door Frames are blocked solid for hinges and locks. Frames for masonry have 2-inch jambs and anchors. Birch inside door frames 1⅛ inches thick, yellow pine ⅞-inch. Outside door frames 1¾ inches, rebated for doors; front frame of birch for natural finish.

Temporary Inclosing.—House to be temporarily inclosed for the plastering. Sash in inferior rooms may be put in before plastering.

Grounds are set ¾ inch thick for all base, casings, &c.

Floors.—An under flooring of 8-inch No. 2 pine flooring is laid diagonally over the first-floor joists before the plates are set. This floor is well nailed to each bearing with 8d nails; nailers cut in where required and come flush with the outer edge of the sill. Over this floor is a layer of red rosin paper, grade A. The same sort of a floor is put under the hard wood floors upstairs.

The hard wood floors are ⅞ x 2½ inch clear comb grained yellow pine. They are laid throughout the first story and throughout the hall and bathroom of the second story. They are of strictly clear material, are blind nailed, &c., planed, scraped, sandpapered and left in first-class condition for finishing. Color to be selected uniform in each room. All other floors are No. 1 ⅞ x 4 inch fencing flooring; attic floored throughout with 8-inch No. 2 flooring, all matched.

Sash are all regular pattern, weather lipped meeting rail. Sash for glass over 26 inches wide have 1½-inch meeting rail. Attic and cellar sash, 1¼ inches thick; sash for plate and art glass, 1¾ inches thick; all other sash, 1⅜ inches, primed with oil inside. Plate glass fastened in with stops.

Glazing.—Plate glass is best American plate. Art windows on stairway lightly tinted glass. Owner buys one art transom. All other glass AA and A, D. S. All glass is well bedded, tacked and puttied.

Doors are 7 feet 6 inches downstairs, except in minor rooms, and 7 feet upstairs. Principal doors downstairs 1¾ inches thick; all others 1⅜ inches. Birch doors, six cross flat panels, bead and cove sticking, veneered. Front and vestibule doors have 6-inch stiles and top rail; bottom rail 12 inches; are molded with egg and dart molding, and have plate glass with 1½-inch bevel. Doors for yellow pine trim are white pine stiles and rails and yellow pine panels. These are five flat cross panels and are AAA machine smoothed for oil finishing. A machine smothed doors are admissable in kitchen and pantries. All doors are blind tenoned.

Trim and Base.—All strictly clear; no window or door trim to be spliced. Casing, 4¼ inches wide; head, 8 inches wide; 3-inch crown mold at top. Birch base is 8-inch wide, with a mold on top. Yellow pine base, stock pattern, 8 inches. All is well smoothed and sanded. All principal rooms have picture mold of natural wood.

Stairs.

The main stairs are entirely of birch, strictly clear. Risers, ⅞ inch, and treads, 1⅛ inches, tongued and grooved together, and both housed into the wall strings with wedges glued in. Treads having nosing on the edge and end, with a scotia under. The wall strings and front strings are ⅞ inch, molded to correspond to the birch base. Rail is as detailed. Balusters, 1⅜ inches, turned, three to the tread. Main or starting newel is 7 inches, and landing newels 5 inches. Rail is well bolted together and to posts, &c.

The rear and attic stairs are of yellow pine, with wall strings to match the yellow pine base, and treads and risers not tongued and grooved or housed. Otherwise the same construction. Cellar stairs of 2-inch treads and ⅞-inch risers. All stairs are well supported on horses and well secured in position.

Colonnade.—The colonnade from the reception hall to the sitting room is of birch, to match the other finish and built as detailed. Columns are 8 inches in diameter built up, turned, with turned bases and composition caps as shown.

Seat.—The seat on the landing is of birch, to match the rest of the trim, with panels at back and end up to the windows and panels in front.

Pantries.—The butler's pantry has a cabinet, 4 feet 6 inches long, with shelves 12 inches wide above the base shelf and 16 inches wide below it, with doors 1⅛ inches thick. Also shelves along entire opposite side with a tier of drawers under one end. The kitchen pantry has also one dresser of similar design.

Closets.—Each closet has a row of hooks entirely around the wall space, and has at least one shelf.

Plasterer's Specification.

Lath.—The ceilings, walls, stair rakes, &c., of the two main stories and the ceilings of the furnace room and the laundry are lathed with best pine lath, properly spaced, nailed at every bearing, joints broken every tenth lath, and with no lath put on horizontally of run from one room into another.

Plastering.—Basement ceilings have scratch coat only. All other walls and ceilings have scratch and brown laid on or drawn work. These coats are carried behind all trim and base. Lime is screened through one-quarter mesh screen, plenty of good, long hair mortar stacked before using. All ceilings to be perfectly level, and walls straight, true and plumb, and all angles sharp and true.

All plaster of the first and second stories is to be finished with a finish of lime putty, white sand or marble dust and plaster of paris, finished and troweled to a smooth even surface and free from defects or brush marks.

Hardware.

The hardware used was selected from the Reading Hardware Company's catalogue, and the numbers are given as well as a short description.

Front door lock, 1400½, easy spring, night latch attachment, bronze bolt and strike.

Inside doors and rear door, 01199½, easy spring, bronze bolts and strike. Vestibule door hung on double swing spring hinges with no lock, but with two wrought bronze plain 3 x 12 inch push plates, and two 6 x 24 inch kick plates, finished to match the other hardware.

Inside door locks, No. 01199½.

Sliding door lock No. 01288¾.

The trim is Creston wrought bronze for the birch finished rooms, the kitchen, pantries, &c., bronze plated on iron (plain), and the second story has Reole design bronze plated on iron. The plain hardware is old copper polished, and all other is sand blast brass finish.

Butts are 3½ x 3½, finished to match the other hardware, cast steel; the spring hinges, Chicago, finished same as the other hardware.

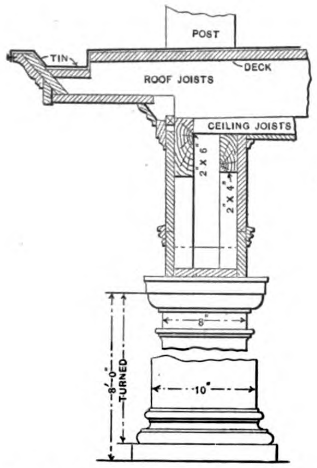
Sliding door hanger is Wilcox trolley. All doors have rubber tipped door stops.

Painter's Specification.

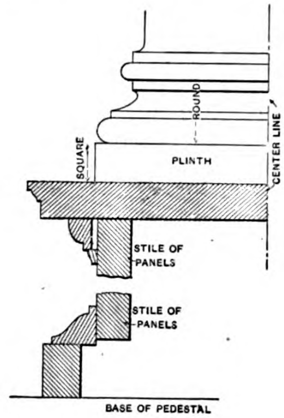
Exterior.—All sap, knots and defects in wood work which is to be painted are to be covered with strong shellac before priming; nail holes, cracks, &c., puttied after priming. All exterior wood work except as below mentioned is to receive three coats of paint composed of one part best zinc white and five parts best white lead, thoroughly mixed and thinned to proper consistency, the last coat containing no turps. Trimmed in colors as designated by the owner.

Shingle Stain.—Shingles are dipped in stain 11. Cabot's 144 for the roof and 303 for the gables.

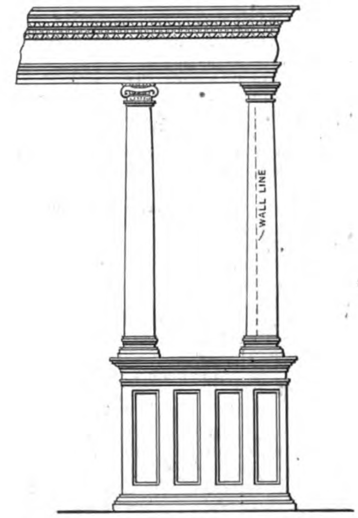
Natural Wood Finish.—Wood thoroughly cleaned. Puttied after first coat to match the wood work. Outside, front door and both porch ceilings finished with



Details of Porch Column and Cornice.—Scale, ¾ Inch to the Foot.



Details of Column, Base and Pedestal Cap of Colonnade.—Scale, 3 Inches to the Foot.

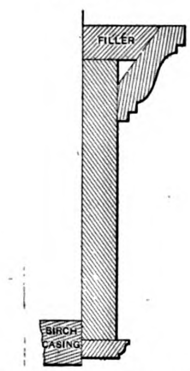


Partial Elevation of Colonnade Between Reception Hall and Sitting Room.—Scale, ⅜ Inch to the Foot.

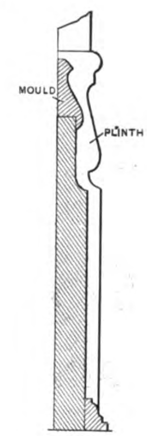
Section of Yellow Pine Casing.

Section of Birch Casing.

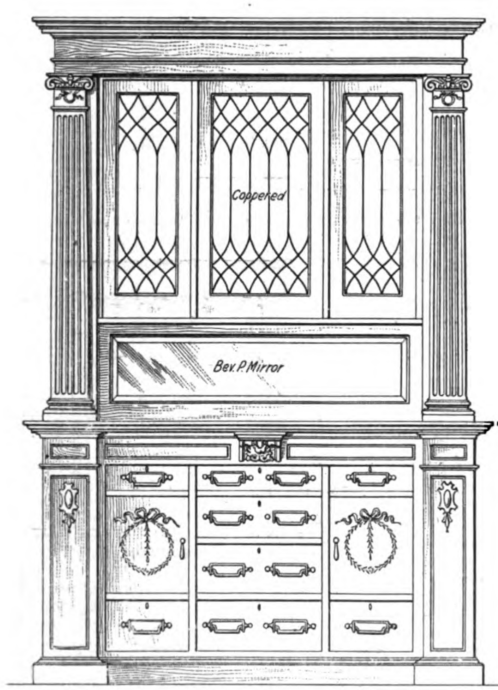
Scale, 3 Inches to the Foot.



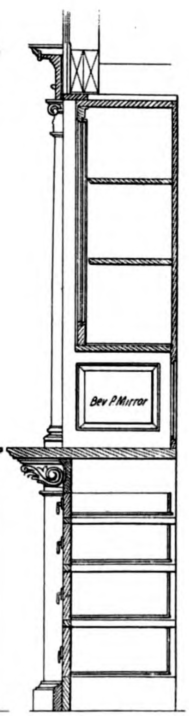
Section through Birch Cap.



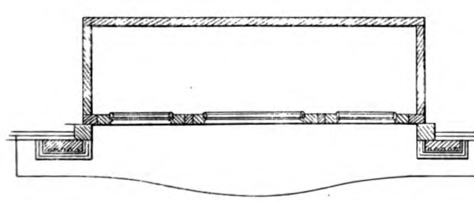
Base.



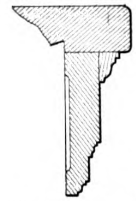
Front Elevation of Sideboard and China Cabinet.



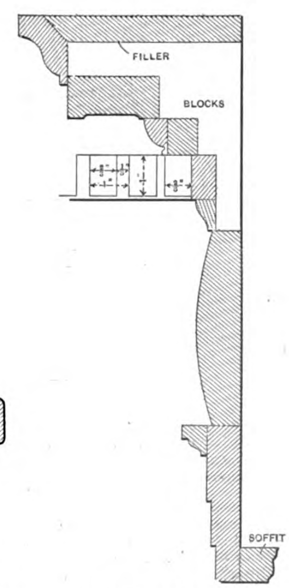
Section.



Plan of Sideboard and China Cabinet.
Scale, ½ Inch to the Foot.



Window Stool and Apron.



Details of Entablature of Colonnade.

Scale, 3 Inches to the Foot.

Competition in $5000 Frame Houses.—Third-Prize Design.—Miscellaneous Constructive Details.

a coat of surfacer and two coats of Rosenberg's Elastica No. 1. Interior, same except Elastica No. 2. Window stools same as exterior. All floors and stair treads have three coats of Gutta Percha floor finish. All this work is sandpapered after the first coat and rubbed with hair cloth after the second coat.

Metal Work is painted two coats by the painter. All metal showing from below to be painted to match the body and trim. All other to receive two coats of red lead and oil.

Tinner's Specification.

Material for the tin work is to be Scott's, Taylor's or Hamilton's best old style roofing tin, IC thickness, painted on underside before laying and on the top immediately after laying. Solder, half tin half lead; resin as flux. Galvanized iron is No. 26.

Roof.—The roof is laid in 20 x 28 inch sheets, with 12 nails to the sheet, no nail heads left exposed; tin is turned up under the siding 6 inches. Valleys are 14 inches wide. Leaders are five in number, rectangular, corrugated G. I.

Furnace.

The furnace is a No. 34 modern all steel furnace, closely riveted with heavy rivets and calked joints, all heating surface curved, the feed necks and pipe collars protected by heavy backing flanges on the inside of the dome, which entirely prevents the steel from springing away. The fire pot is constructed of the best sectional fire clay brick 3 inches thick, which, being set in a circle, are self supporting. Sections can be replaced from the door without disturbing the setting of the furnace. The fire pot is as large at the bottom as at the top, giving large grate surface. The grate is a flat sliding and dumping grate, which, in case of breakage, can be removed through the ash pit door. Casings are made double, galvanized outside, and the inside casing of tin lined with asbestos paper. Has chain regulator in library. Rating, 50,000 cubic feet.

There are japanned wall registers in every room except the sitting room and bath, which have floor registers. The linen room and pantry have no registers. These wall registers are patent adjustable registers known as the "Ideal." There is a 30 x 30 inch electric bronzed return air register under the front stairs. All wall stacks are doubled or safety pipe, as required by our city ordinances. Basement pipes are wrapped with heavy asbestos.

Plumbing.

The pipes for the plumbing are all standard, as are the gas pipes. Soil pipe extends through roof with a proper lead flashing. Bathroom traps vented, others not vented. All exposed piping in bathroom is nickel plated. Hot and cold water system connected to kitchen range. Thirty-gallon galvanized boiler. About 150 feet of 4-inch vitrified sewer set in cement. An outside grease trap laid up in brick and cemented inside, as required by the building ordinances.

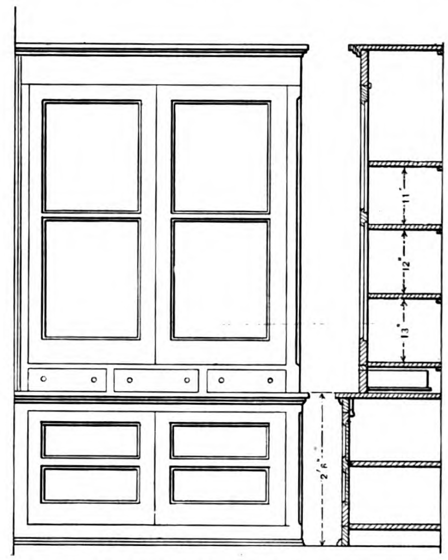
Fixtures.—One 20 x 30 inch kitchen sink, enameled inside, with enameled iron drip and 15-inch high back enameled, all white enamel.

In the kitchen is also one small corner lavatory, roll rim and 15-inch high back on two sides, all in one piece.

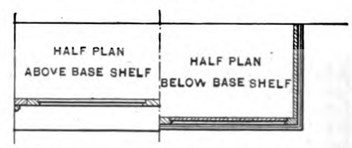
In the bathroom is one lavatory of similar pattern except larger.

The water closet is a high tank closet, porcelain bowl, siphon jet. The tank is plain antique quartered oak finished copper lined.

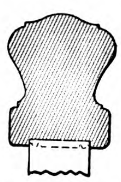
The bathtub is not included in the present contract, as the owner had in his possession a tub suitable for use.



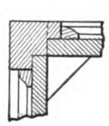
Elevation and Vertical Section of Pantry Cabinets.—Scale, ⅜ Inch to the Foot.



Half Plans of Cabinets.—Scale, ⅜ Inch to the Foot.

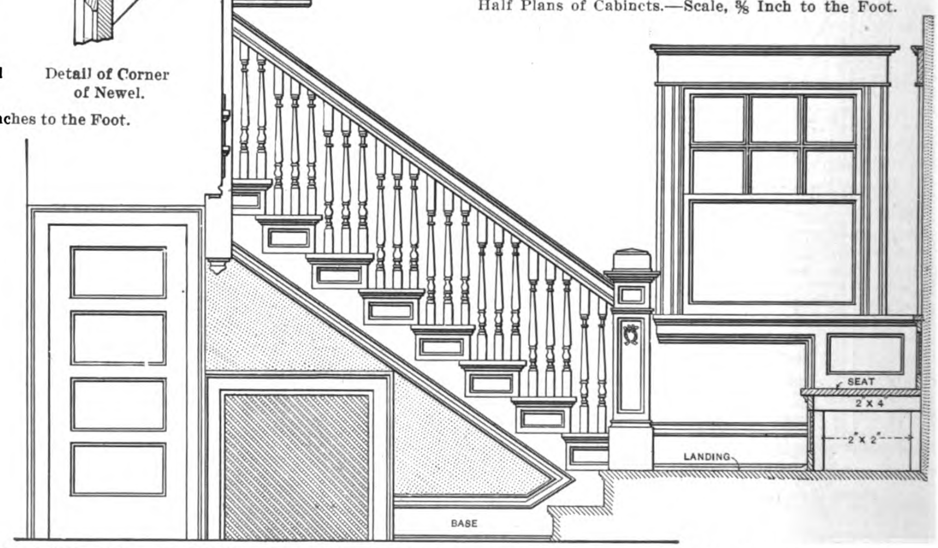


Section of Hand Rail.



Detail of Corner of Newel.

Scale, 3 Inches to the Foot.



Elevation of North Side of Reception Hall as Viewed from the Sitting Room, Showing Window and Seat at First Stair Landing, also Door to Closet Under Stairs and Large Bronzed Air Register.—Scale, ⅜ Inch to the Foot.

Competition in $5000 Frame Houses.—Third-Prize Design.—Miscellaneous Constructive Details.

Laundry Tubs.—Set of three porcelain enameled roll rim, painted outside.

The city water was in the lot and had been attached to a previous building, hence this part of the supply system is not included in this work.

Wiring.

The house was wired for city service. The fuse box is located in the rear hall upstairs. The switches are all three-way flush switches.

Estimate of Cost in Detail.

We present herewith the author's estimate of the cost in detail, together with his comments. "In the items will be found the estimate for a 3-inch concrete floor for the basement throughout and the addition of a sideboard. These two items are added separately to the general contract and the contractor has made his certificate to cover them. The owner is to furnish the mantel, one art glass transom, the grille over the stairs and the work in connection with the sidewalk. As he is also to furnish the bathtub, I have allowed for it. These items are not covered by certificate, but the work of connection or putting them in, with the exception of the sidewalk, is covered by the certificates, and as the total is considerably under the limit and the estimates covering the same is ample it is hardly necessary to have them so included.

"I wish to state that while the item of carpenter work and incidentals looks small in this estimate, the lumber bill is $51.20 higher than the lumber bill used on the house. I could not obtain from the lumber yard the detailed bill as I did from the planing mill. I therefore had to take the bill of lumber given me by the contractors as the material which went into the building and make the estimate at current prices for the same, which came out $698.20, while the same lumber was furnished on the work for $647. The estimate for the mill work is an exact copy from the books of the mill."

MILL WORK.

9 cellar sash and frames	$18.00
1 coal chute	4.00
2 cellar doors and frames	5.00
1 front door and frame, 6 ft. 6 in. x 3 ft. x 1¾ in.	25.00
1 rear door and frame, 2 ft. 10 in. x 7 ft. 6 in. x 1¾ in.	9.00
1 front window and frame for sitting room	20.00
1 double window and frame, 24 x 20 x 1⅜ in.	11.00
1 window and frame, 32 x 20 x 1⅜ in.	6.50
3 windows and frames, 44 x 32 x 1⅜ in., at $9	27.00
1 window and frame, 30 x 30 x 1⅜ in., coppered	25.00
3 windows and frames, 32 x 32 x 1⅜ in., at $8	24.00
1 window and frame, triple front, 2 24 x 28 in., 1 32 x 28 in., fancy top sash	22.50
1 window and frame, 36 x 28 in., upper sash leaded, D. S.	10.00
1 fancy front gable window and frame, top sash leaded	13.00
1 window and frame, 34 x 28 x 1⅜ in.	7.00
2 windows and frames, 24 x 30 x 1⅜ in.	10.00
3 windows and frames, 28 x 28 x 1⅜ in., at $6.50	19.50
2 windows and frames, 9 x 14 in., three lights, gable	5.00
2 windows and frames, 32 x 24 in., two lights, at $6	12.00
1 window and frame, 24 x 22 in., double	7.50
2 windows and frames, 30 x 18 in., at $5	10.00
2 windows and frames, 22 x 18 in., at $4.50	9.00
2 windows and frames, 32 x 28 in., at $6.50	13.00
2 windows and frames, 36 x 28 in., at $7	14.00
1 ice door	15.00
1 inside door and frame, 3 ft. x 7 ft. 6 in. x 1¾ in., veneered birch	22.50
1 colonnade complete	90.00
1 arched opening complete	20.00
1 pair inside sliding doors, 5 ft. 4 in. x 7 ft. 6 in. x 1¾ in., and frame	17.50
1 cased opening, 6 ft. x 7 ft. 6 in., birch	5.00
2 inside doors and frames, 2 ft. 8 in. x 7 ft. 6 in. x 2⅜ in., birch	18.00
2 inside doors and frames, 2 ft. 8 in. x 6 ft. 6 in. x 1⅜ in.	12.00
2 inside door and frame, 2 ft. 6 in. x 6 ft. 6 in. x 1⅜ in.	5.50
1 inside door and frame, 2 ft. 6 in. x 7 ft. x 1⅜ in.	6.00
1 set birch stairs complete	140.00
1 birch seat and platform	12.00
175 ft. birch base mold and strip	14.00
175 ft. birch picture mold	2.62
400 ft. Y. P. base and strip	13.00
2 Y. P. pantry cabinets, at $20	40.00
1 set pantry shelves and drawers	15.00
1 drip board	1.00
1 set cellar stairs	10.00
1 set rear stairs	30.00
5 inside doors and frames, 2 ft. 8 in. x 7 ft. x 1⅜ in., at $6	30.00
6 inside doors and frames, 2 ft. 6 in. x 7 ft. x 1⅜ in., at $6	36.00
1 inside door and frame, 2 x 6 ft.	5.00
200 ft. Y. P. picture mold	2.00
32 ft. closet shelves, at 3 cents	.96
100 ft. hook strips, at 1½ cents	1.50
Linen room strips	5.00
8 corner rolls	1.60
4 porch columns, turned, 10 x 10 in., 8 ft. long, at $5	20.00
2 porch pilasters, at $3.50	7.00
52 ft. box beam cornice, at 40 cents	20.80
40 ft. rail and balusters, at 35 cents	14.00
4 deck posts, at $2	8.00
2 ½ posts, at $1.25	2.50
50 ft. rail and balusters, at 75 cents	37.50
1 pair front steps complete	12.50
1 pair rear steps complete	5.00
1000 ft. lattice	5.00
180 ft. lattice framing stuff	1.80
2 porch columns, 5 x 5 in., 8 ft. long	2.00
1 porch post	.50
2 ½ columns	1.00
20 ft. plain rail	1.00
22 ft. beam and cornice, at 15 cents	3.30
60 ft. porch base and mold, at 4 cents	2.40
90 ft. ¼ round	.45
130 ft. belt course, at 20 cents	26.00
300 ft. main cornice, at 20 cents	60.00
2 large composition brackets	15.00
	$1,148.93

LUMBER.

13,600 ft. framing lumber, at $18	$244.80
7000 ft. 8-in. flooring, at $18	126.00
3500 ft. 4-in. clear siding, at $25	87.50
2000 ft. 4-in. sheathing, at $15	30.00
24,000 shingles, at $3.65	87.60
1600 ft. Y. P. flooring, at $32.50	52.00
1100 ft. pine flooring, at $33.50	36.85
500 ft. porch flooring, at $3.50	1.75
500 ft. porch ceiling, at $2.30	1.15
	$667.65

BRICK WORK.

29,000 brick, at $10 in the wall	$290.00
Chimneys, including mantel setting	110.00
	$400.00

RECAPITULATION OF GENERAL CONTRACT.

Mill work	$1,148.93	
Lumber	667.65	
Brick work	400.00	
Tin and galvanized iron work	87.00	
Painting	260.00	
Hardware complete, including all nails, &c.	185.00	
Excavating (there was an old stone walled cellar to be torn out and the old stone removed)	58.00	
Plastering	260.00	
Carpenter work and incidentals	400.77	
		$3,412.35
Add: For sideboard as shown		120.00
For concrete in basement, 2½ in. grout and ½ in. finish, 1230 ft. at 10 cents per ft.		123.00
Total for general contract		$3,655.35

GENERAL RECAPITULATION.

General contract	$3,655.35
Plumbing and fixtures	450.00
Heating	200.00
Electric wiring	48.00
Mantel	60.00
Grille over stairs	15.00
Art glass transom	15.00
Bathtub	40.00
Concrete sidewalks	125.00
Total	$4,608.35

The builder's certificate, not including the heating, plumbing or electric wiring, was signed by Frank Quint; the certificate for the plumbing and gas fitting by Fred. Greiser & Co.; the certificate for the electric wiring by N. R. Eader, and the certificate for the heating apparatus by W. U. Koons, all of Danville, Ill.

Quarrying by Means of Fire.

The quarrying of granite by means of wood fires has been brought to such perfection in Southern India, says an English journal, that an average of 30 pounds of stone can be quarried with 1 pound of wood. The method is as follows: A narrow line of fire, 7 feet in length, is gradually elongated and at the same time moved forward over the surface of the solid rock. The burning lasts eight hours, and the line of fire advances nearly 6 feet per hour. The area passed over by the line of fire is actually 460 square feet, but as the crack extends about 3 feet on either side, the area of the entire slab which is set free measures about 740 square feet.

STEEL-CONCRETE CONSTRUCTION.

A VALUABLE and timely article on steel-concrete construction has been contributed to the *Railroad Gazette* by A. L. Johnson:

So much is being written nowadays about steel-concrete construction, and so many apparently different theories of design are being offered by the specialists that the practicing engineer, having little time for winnowing, often prefers to stick to old standards rather than run the risk of getting chaff, especially as the doctors themselves do not agree.

But the disagreement is more apparent than real. Some of the theories are good, some bad. But, after all, there are so many tests available, to some of which at least, in all cases, the theories have been made to conform by the insertion of proper empirical coefficients, that it may be said that all theories have more or less common ground. It is not to be denied that there is a good deal of chaff, but at the same time there are certain main facts which cannot be gotten away from, and in locating a road it is well once in a while to climb a tree and take a look around.

An examination of the topography of the field of steel-concrete construction will reveal certain prominent features, some of which are stated below:

1. It is a masonry construction having at least as much strength in tension as in compression.

2. It will not crack, hence is not injured by frost; is not disintegrated by the carbonic acid of the air, but is, in fact, hardened thereby, and hence is everlasting.

3. It is cheap and easily molded to suit any case with ordinary and available labor.

4. It can be nearly everywhere obtained of fairly uniform quality, getting the bulk material at, or near, the site.

5. Careful workmanship is of much less importance than with any other kind of engineering structure; a proper design and wet concrete will insure good results.

Now let us consider what the results would have been if for the last 2000 years we had had a material with as much strength in tension as in compression. Would our designs be what they are to-day. Manifestly not. Instead of small arches we would have beams, except where artistic effect was desired. Our large arches would probably be twice their present length. Many structures would look like the present ones reversed or turned upside down. For example, retaining walls would be thin, shaped like an L with the toe turned into the bank; sewers and culverts would usually have an arched bottom with a flat top. Masonry plate girder bridges of 100-foot span might now be in use. No doubt a successful permanent road bed would have been developed years ago. The present tinder box style of residence construction would probably never have originated. Masonry dams would be much like those we now have, but many disastrous failures would no doubt have been averted. These things we can readily imagine, but as to what marvels of construction the ancients would have wrought with such a material we can only wonder. And now comes the twentieth century bringing with it just such a material. Necessarily its advent marks a new era in structural art. Standing apart and taking a broad, common sense view of the situation, it takes no prophet to forsee that a complete revolution in our methods of construction is inevitable. When this condition is realized by the engineers at large they will very soon familiarize themselves with the few details necessary to enable them to separate grain from chaff and obtain such a material as above described.

Two things there are that are essential: First, a perfect and permanent bond must be provided between the concrete and the metal. Second, the metal must be distributed in small areas throughout the distorting concrete. The whole science and art of steel-concrete construction depend upon these conditions being met.

Those who have done much in this line of construction are satisfied that plain bars cannot be relied upon to meet the first condition and, as a result, various styles of reinforcing material have been devised to overcome the difficulty. Without drawing any invidious comparisons between these materials, but simply assuming that the adhesion does not exist, we see at once that theoretically the reinforcing material should be provided with surfaces nearly at right angles to the direction of stress, varying therefrom by an amount not exceeding the angle of friction between concrete and metal. This is not theory alone, but common sense as well. To meet the second condition is very simple; in fact, it is cheaper and easier to lay the material in small areas close together than in heavy sections at widely distributed points. As a general proposition the metal areas should not be more than 12 inches apart.

Continuous Concrete Walls Without Expansion Joints.

Another matter that perhaps may be properly spoken of here, it not having been discussed in any literature so far published, relates to the practicability of building continuous concrete walls without expansion joints and without any danger of cracks.

The writer's company have built continuous walls 300 feet in length, 8 inches thick, and exposed on both sides to the weather, which are now about one year old and in perfect condition. He is satisfied that a wall a mile long could just as readily and successfully be constructed.

But it usually takes more than an optical demonstration to convince an engineer. He will not believe it when he sees it, unless he can understand why it is so. For this reason the following theoretical explanation is appended:

Continuous walls will crack vertically in lengths such that the weight of the section multiplied by the coefficient of friction on the soil is equal to the tensile strength of the wall. The temperature required to crack the wall in these lengths is that temperature requiring a shrinkage in excess of the ability of the wall to stretch. Now plain concrete can stretch very little before cracking. But concrete thoroughly reinforced with metal can take a proportionate elongation of .0018 before cracks will be developed.

The maximum shrinkage that would be required could not be due to a fall in temperature of more than 125 degrees. The coefficient of expansion of concrete is .0000055, which for 125 degrees becomes .0007 per unit of length, or less than one-half the ability of the reinforced concrete to stretch. No crack, therefore, could be produced with a fall in temperature of less than 250 degrees, which, of course, would be impossible to realize in practice.

The quantity of metal used should be enough to equal the tensile strength of the concrete at the elastic limit of the metal. Calling the tensile strength of stone concrete 200 pounds per square inch, and the elastic limit of the steel 55,000 pounds per square inch, the number of square inches of steel required would be 1-275 of the number of square inches in the wall section.

Prospective Building in Washington.

Architects and builders are looking forward to a period of marked activity in the way of building construction in Washington, D. C., within the next few years, as something like $20,000,000 is to be expended in the erection of public buildings alone. Among the improvements to be made are a new union railroad station, to cost $5,000,000; a new municipal building, to cost $1,-500,000; an office building for the use of the members of the House of Representatives, to cover an entire square and to cost $3,000,000; an addition to the Department of Agriculture, with probably several millions more to be expended later; a new National Museum, to cost $3,500,-000; a Hall of Records, to cost $2,000,000, and a number of minor structures, such as the new Freedmen's Hospital and additions to the Providence, the Garfield and the Homeopathic hospitals, costing in the aggregate about $1,000,000.

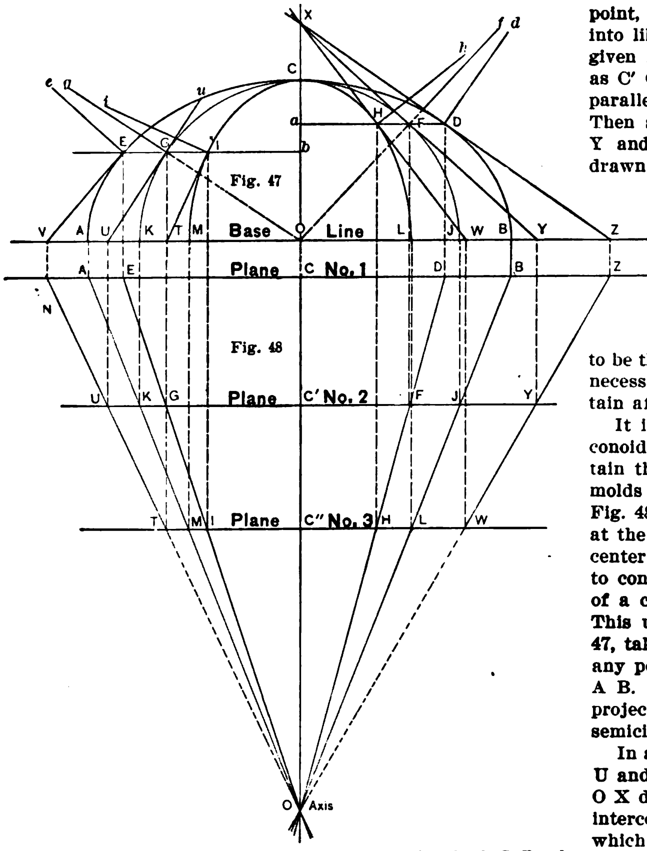
In addition to these expenditures it is probable that the erection of a Department of Commerce building and other Federal buildings along the Mall, all in accordance with the plans of the Park Commission, will be authorized by the Fifty-eighth Congress and will provide for the disbursement of many millions more from the United States Treasury.

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

BY CHAS. H. FOX.

BEFORE proceeding further we will explain the manner in which the soffit of the radiant arch may be generated. We shall for the benefit of the student make use of the proper designations, &c., so that he may become familiar with the proper terms of reference which apply to the several constructions of which use will be made. If the reader wishes to be master of the subject he will do well to carefully note the meaning and intention of each line, for the drawing here presented is of such importance that to pass over it lightly or without thought is to make the drawings which follow of little or no avail.

Let A E C D B, Fig. 47, be a semiellipse situated in



Figs. 47 and 48.—Diagram Showing Manner in Which Soffit of Radiant Arch May Be Generated.

Laying Out Circular Arches in Circular Walls.

a vertical plane of which A B of Fig. 48 is the horizontal trace. Let O, Fig. 48, be the horizontal projection of a vertical line through O, the elevation of which is given in O X of Fig. 47. Now let the semiellipse and the vertical at O be taken as the directrices of a surface, generated by moving a right line parallel with the horizontal plane, and in each movement touching the curve of the ellipse and the vertical line at O. The surface thus generated is that which forms the soffit of the radiant arch. This is a warped surface called a right conoid, owing to its directrices being perpendicular to the horizontal plane. The ellipse is called its curved directrix; the horizontal plane its plane director; and the vertical at O its right line directrix, and the right line the generatrix of the surface. In circle on circle the axis of the circular wall in which the arch may be situated will in each case be taken as the right line directrix, therefore we may designate the vertical at O as the axis line.

If now the conoid be cut by any vertical plane parallel with the vertical plane of the ellipse, the section there obtained will also be an ellipse. Another valuable property of the conoid is this: If a tangent line be drawn to the directing curve at any point, as that projected in D of Fig. 47, it will meet the horizontal plane in a point Z, which if this be joined with O will give in Y W of Fig. 48 points at which tangents erected to the points as F H of other sections at a hight above the horizontal plane as that of point D, also meets the horizontal plane.

We will now prove this by construction: First draw any line, as O X, then square with this draw A B of both diagrams; the latter we may designate the base line. Now construct the semiellipse A C B, and at any point, as D, erect the tangent X Z. Now project D Z into like points of Fig. 48, and together with the points given in A B, join them with O. Through any points, as C' C'', square with O X draw U Y and T W. Now parallel with O X draw Y Y, W W, H H and F F. Then square with O X draw D *a*. Now join X with Y and W. If the drawing is correct the lines just drawn will pass through the intersections already given in F H of Fig. 48. Project the points J L of Fig. 47 into like points of the base line of Fig. 48, and with O C and O L and O J, respectively, as the axes, construct the curves of the ellipse. The reader will find the curves if correct to pass through the points H, F. Now by construction, Fig. 25, we will prove the tangents X Y, X W. The reader will find the lines already drawn to be the correct ones, showing conclusively that it is not necessary to first construct the curves in order to obtain afterward the tangents.

It is by making use of the known properties of the conoid that we are in practice enabled to so readily obtain the projections of the joint lines, &c., of the face molds of the circle on circle arch. For making C' J of Fig. 48 equal to O C of the directing curve, the section at the plane C' J must of necessity be drawn with the center O, and we know from experience it is far easier to construct a tangent to a point on the circumference of a circle than to a point at the curve of an ellipse. This understood, at the left side of the diagram, Fig. 47, take K G C as a quadrant of a circle, and through any point, as G, draw *b* E, parallel with the base line A B. Then square with O G draw the tangent U *u*; project U into U of the plane No. 2 of the section of the semicircle.

In a similar manner project G into G of No. 2; through U and G draw O U V and O G E. Now parallel with O X draw I I, E E, &c., and it may be found these will intercept the curves already drawn in the points I E, which proves the constructions. The normals may readily be obtained by drawing E *e*, G *g*, &c., square with the respective tangent.

We will in a later issue explain the method by means of which a cardboard representation of the problem may be obtained, for we are convinced it is only by this means of constructing models that the truth and accuracy of many intricate drawings may be tested. There the student will not only be able to test the accuracy of the constructions just made, but will also be enabled to obtain a practical illustration of the manner in which the surface of the soffit of the radiant arch may be generated. This will, we know, repay him for the little trouble he may take in cutting the representation of the problem.

Having explained the manner in which the soffit of the radiant arch may be generated, it may be stated that the surface in question being a warped or twisted one, it follows that if the joint surface is made normal throughout to the surface of the soffit it will be also a warped surface. We will now show the manner in which the winding surface of the joint may be projected, and at the same time will explain a simple method by means of which a plane surface joint may be constructed instead of the other. This method has been adopted in order to avoid the inconvenience of constructing and cutting the twisted surface, for, as stonecutters know, it is far easier and quicker to cut a plane surface than a twisted one of the same area as that of the other. The plane surface joints are so taken that they are normal to the curve of the soffit at the center point of the right line element which belongs to the joint. In a manner a portion is taken from one face line and placed at the other, so that the joint surface is perpendicular to the curve of the soffit at the center point only.

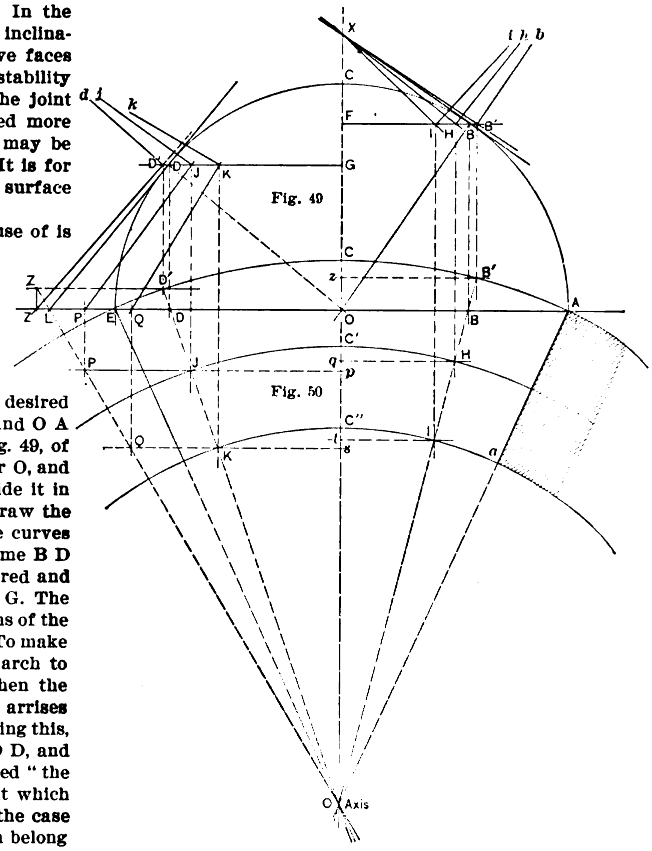
One of the conditions, we may say the principal one, required in the construction of arches, vaults, &c., is in the position of the joints. The condition required is that they be perpendicular to each other and to the curved surface which forms the soffit of the arch. Any material deviation from this principle destroys not only the general symmetry of the structure, but also diminishes the firmness and durability of the arch. In the radiant arch we do not in altering the angle of inclination of the joint lines of the convex and concave faces from the "normal" diminish in any way the stability of the structure; the arch is not weakened. The joint lines may be projected and the surfaces formed more expeditiously than the winding surfaces which may be normal throughout to the surface of the soffit. It is for these reasons that we have adopted the plane surface joint.

In Figs. 47 and 48 the directing curve made use of is an ellipse. Here we have taken it as a semicircle, shown in A C E of Fig. 49. We may assume the points B, D to represent those at which joints are desired. First, to draw the plan, take O as center, and with O A as the radius of the outer face curve draw the arc A C E of Fig 50. Then draw the center line O X of the drawing. Now square with O X draw E A equal to the desired width of the opening, and with O as the center and O A as the radius draw the directing curve A C E, Fig. 49, of the soffit. Then join A and E with the plan center O, and set off C C″ equal to the depth of the soffit, divide it in C′ into equal lengths, and with O as the center draw the curves respectively of the center and inside face curves of the plan, as shown in the drawing. Now assume B D at pleasure as the points at which joints are desired and parallel with the base line E A draw B F and D G. The lines just drawn are termed "the vertical projections of the elements at the soffit which belong to the joints." To make this point clear, let us suppose the soffit of the arch to be produced to the axis line O X of the plan, then the horizontals B F, D G are the elevations of the arrises which belong to the joints in question. Understanding this, parallel with the center line O X draw B B and D D, and join D B with O. The lines just drawn are termed "the horizontal projections of the elements at the soffit which belong to the joints." They are, when applied to the case above stated, "the plans of the soffit arrises which belong to the joints" of which the lines B F and D G are the elevations. Now draw B X and D L tangent with the curve at the points B, D. As may be noted, one of these meets the axis line in X, the other the base line in L.

To obtain the projections at the upper point B proceed as follows: Parallel with the center line O X draw B′ B′, H H and I I. Now join B H I with the point X of the axis line. These are the tangents to the points respectively given in B H I of the soffit. Drawing B′ *b*, H *h* and I *i* at right angles with the respective tangents, the normals to the points in question may be obtained. These lines in their practical application to our subject are the vertical projections of the inclinations of the joint lines, which may be transferred to the face molds in order to give the direction at which to form the surface of the joint. That is, B′ *b* gives the inclination as required at the outer face mold, and I *i* that at the inside face mold, when a winding surface joint may be desired. If the plane surface joint be that required then the inclination of H *h* is that to be transferred to the molds developed to apply at the outer and to those developed for the same purpose at the inside face of the arch stones. This may easily be explained by noting that the point H is the center point of the arris of the joint in question.

Now take the lower point, D. First join L with O, then parallel with the opening line draw D′ Z, J P and K Q. The object of the projections just made may readily be seen, by noting that we have at the lower point to not only find the projections which belong to the element of the joint, but to also ascertain from projections to be made at the plan the proper direction at which to project the tangent to the points at the element in question. To do this we proved as follows: Parallel with the center line O X draw Z Z, P P and Q Q of Fig. 50, then join Z D′, P J and Q K, which gives the tangents. Square with these draw the normals D′ *d*, &c. D′ *d* and K *k* are the projections of the inclinations of the joint lines as required to form the twisted surface joint, and J *j* is that required to form the plane surface joint.

Now in applying the problem to our subject we may



Figs. 49 and 50.—Showing the Manner in Which the Winding Surface of the Joint May Be Projected.

Laying Out Circular Arches in Circular Walls.

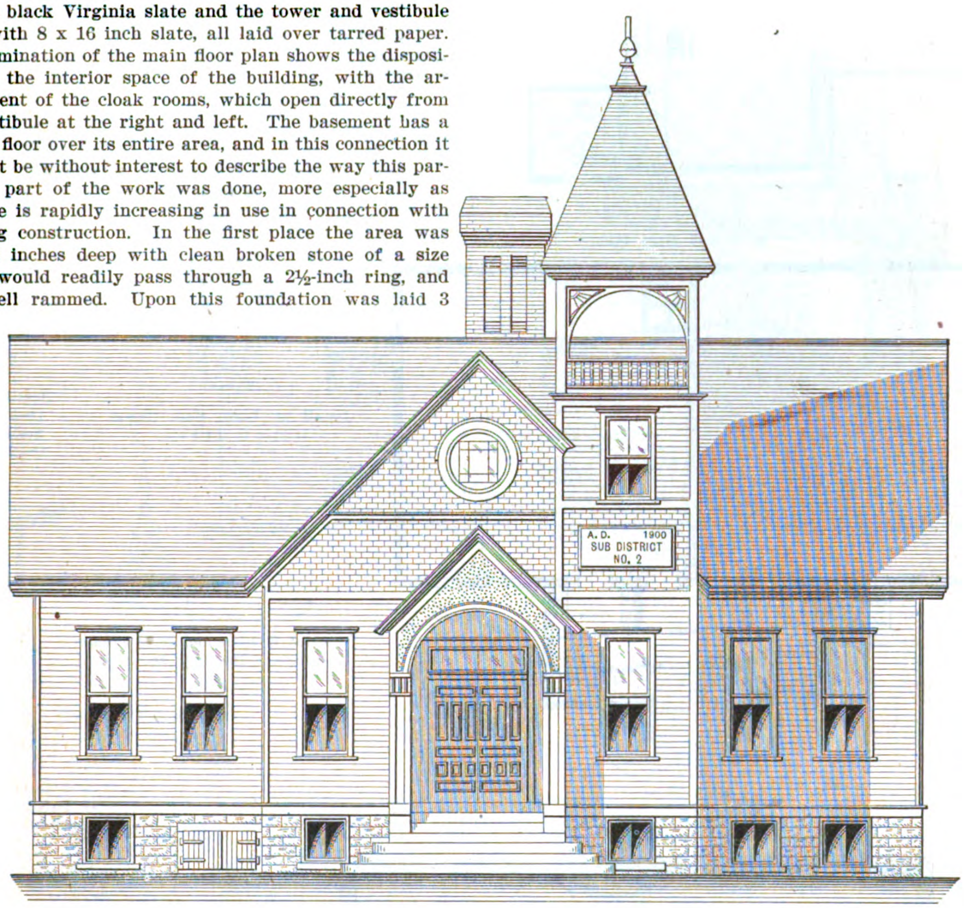
suppose that the points B, D are the projections or representations in which the joint line of the soffit of the arch stone meets the outer or convex face of the arch, that the points I, K are in like manner the similar representations in which the line meets the inside or concave face of the arch, and that H J are the representations of the center points at the soffit in question. It is to the curve found at the center point of the joint line that the surfaces of the joints are made normal in the plane surface joint. It is to make this point perfectly understood by our readers that we would advise them to work out and form the cardboard representation which we will now explain.

FIFTY FEET of boards will build 1 rod of fence five boards high, first board being 10 inches wide, second 8 inches, third 7 inches, fourth 6 inches and fifth 5 inches.

DESIGN FOR A TWO-ROOM SCHOOL HOUSE.

WE show upon this and the pages which immediately follow elevations, floor plans and a varied assortment of constructive details of a school house particularly adapted for country and suburban sites where ground space is plentiful. It is a two-room affair, one story in hight, and was erected not long since in Sub-District No. 2, Colerain Township, Hamilton County, Ohio. It has a blue limestone underpinning at the front and on two sides, with joints pointed with black Portland cement, while the rear wall is of cobblestones. The first story of the frame is covered with 6-inch white pine lap siding and the gables with Washington cedar shingles, which were painted before being laid. The main roof is covered with 10 x 20 inch black Virginia slate and the tower and vestibule roofs with 8 x 16 inch slate, all laid over tarred paper. An examination of the main floor plan shows the disposition of the interior space of the building, with the arrangement of the cloak rooms, which open directly from the vestibule at the right and left. The basement has a cement floor over its entire area, and in this connection it may not be without interest to describe the way this particular part of the work was done, more especially as concrete is rapidly increasing in use in connection with building construction. In the first place the area was filled 2 inches deep with clean broken stone of a size which would readily pass through a 2½-inch ring, and was well rammed. Upon this foundation was laid 3 inches of concrete, composed of one part cement, two parts clean, sharp and medium coarse sand, and four parts gravel, measuring from ½ to 1½ inches in diameter. The cement and sand were well mixed when dry, then made into a mortar and thoroughly incorporated with the gravel by means of shovels and hoes. Upon the 3 inches of concrete was laid a finishing coat 1 inch thick, composed of one part cement and two parts clean, sharp sand run through a No. 5 screen. The finishing coat was applied before the underbed of cement was thoroughly dry, and was troweled to a smooth finish. The steps leading to the vestibule are also of concrete, with 1-inch finish of cement similar to that of the cellar floor.

Under the school room floor is a 6 x 8 inch girder, resting on 6 x 6 inch posts, and under the wall between the vestibule and the school room is an 8 x 10 girder, resting on 8 x 8 posts. The girder under the tower wall is 6 x 10 inches, with 6 x 6 inch posts. The sills are 4 x 6 inches, halved at the corners and securely spiked together. The floor joist of the school rooms is 2 x 12 inches, and of the vestibule and cloak rooms 2 x 10 inches, placed 16 inches on centers. The ceiling or attic joist are 2 x 8 inches, and have a 2 x 6 inch stay lath securely spiked on top across the centers of each section, the outer ends being securely anchored in the wall. The bell deck joist are 2 x 14 inches, having a camber of about 2 inches, and are placed 16 inches on centers. The studding are 2 x 6 inches in all 8-inch walls, and 2 x 4 inches in the 6-inch walls, all being placed 16 inches on centers, doubled at the corners and up to the lintels at all doors. The subsills are 2 x 6 inches and 2 x 4 inches, the lintels being doubled and spiked together. The joist plates and rafter plates are 2 x 6 inches, placed 2 feet on centers. The trusses, the chords of which are to be in one length, have 6 x 6 inch posts for bearings, with 4 x 6 inch T-heads on them between the studs. The rods and bolts are of wrought steel and fitted with plates and washers.

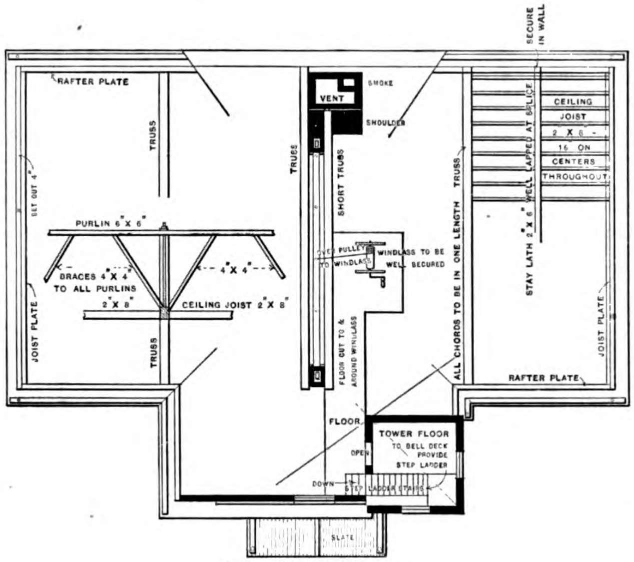


Front Elevation.—Scale 3-32 Inch to the Foot.

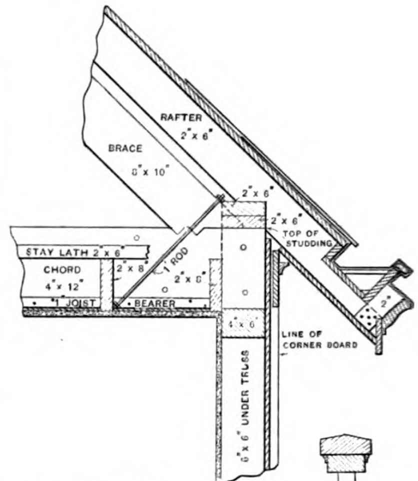
Design for a Two-Room School House.—N. M. Williams, Architect, Cincinnati.—George M. Barnes, Contractor, Mt. Healthy, Ohio.

The floors are of yellow pine, secret nailed, and the walls are wainscoted to a hight on a line with window sills. Blackboard panels extend around the walls, between openings, as indicated on the sectional elevation. The plastering is three-coat work, the space above the blackboards having a hard float finish and blocked off to imitate cut stone work. The cloak rooms, vestibule and entrance are blocked and finished in the same way.

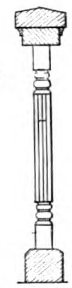
A feature of the building is the partition which divides the two school rooms, this being so constructed that it may be raised, throwing the entire area into one room.

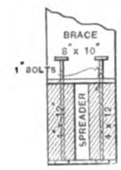


Attic and Roof Plan.

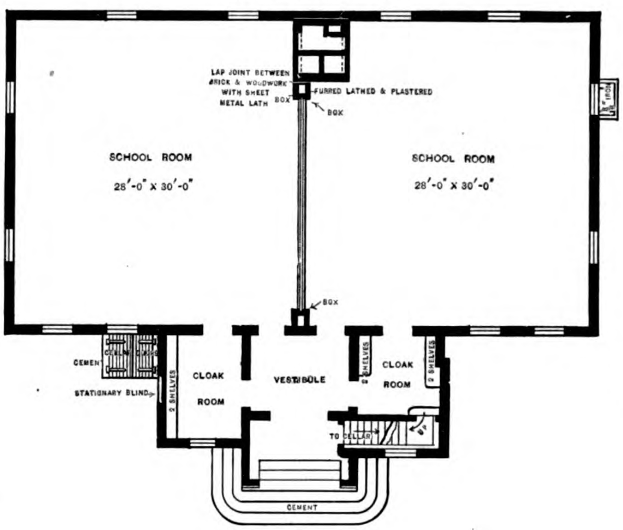


Details of Truss, Cornice, &c.—Scale, ½ Inch to the Foot.


Detail of Bell Deck Baluster. Scale, ¾ Inch to the Foot.

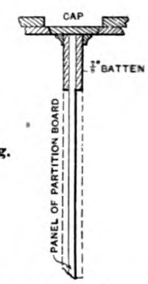


Detail of Truss End.—Scale, ½ Inch to the Foot.

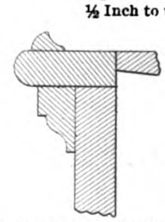


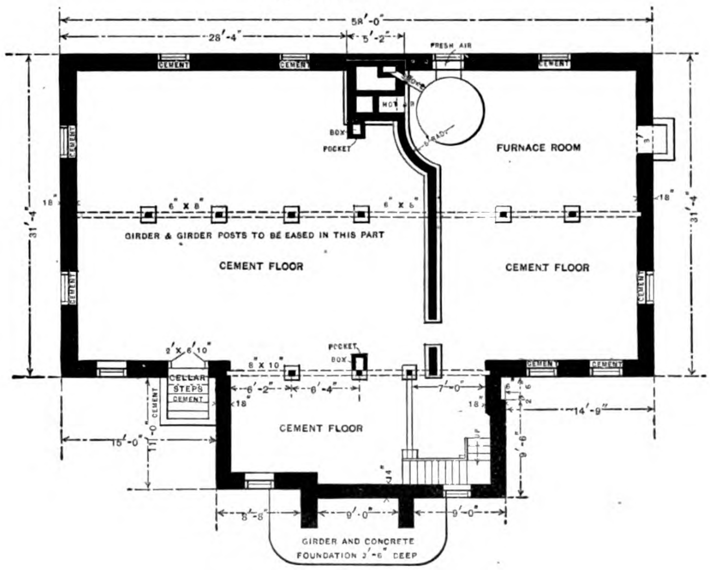
Main Floor.


Interior Window and Door Casing. —Scale, 3 Inches to the Foot.

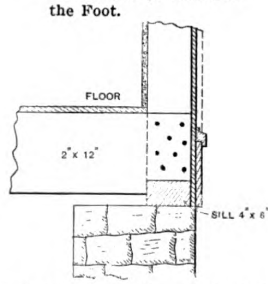


Section through Hoisting Partition.—Scale, ½ Inch to the Foot.


Wainscot Cap and Window Stool.—Scale, 3 Inches to the Foot.

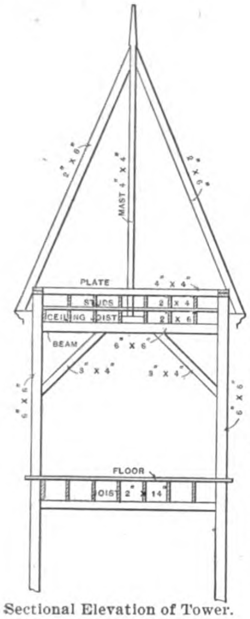


Foundation or Basement. Scale, 1-16 Inch to the Foot.

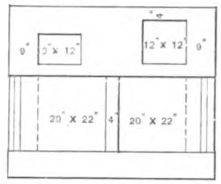


Detail of Water Table.—Scale, ½ Inch to the Foot.

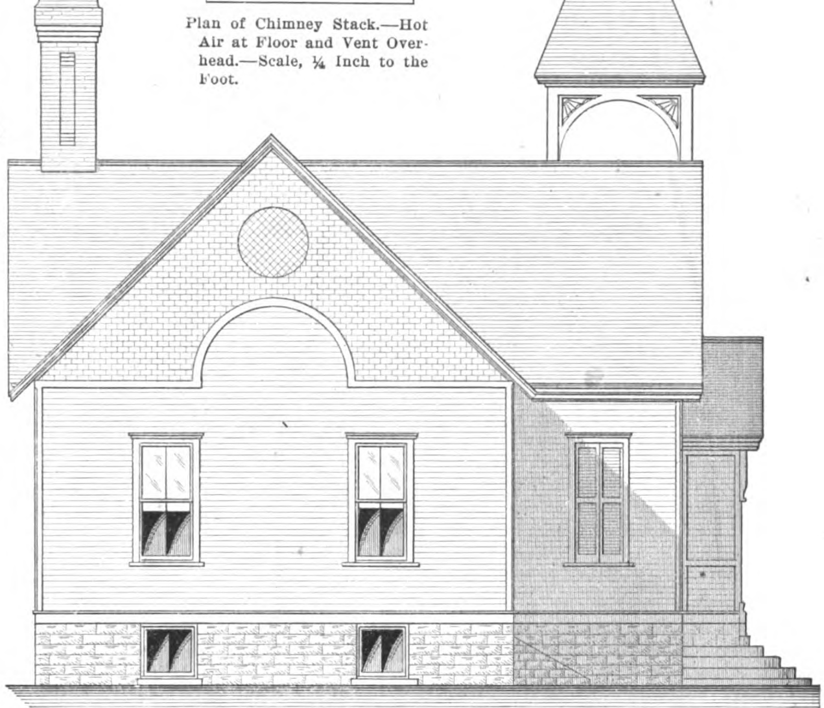
Miscellaneous Constructive Details of a Two-Room School House.



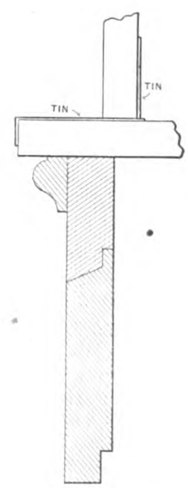
Sectional Elevation of Tower. —Scale, ⅛ Inch to the Foot.



Plan of Chimney Stack.—Hot Air at Floor and Vent Overhead.—Scale, ¼ Inch to the Foot.



Side (Left) Elevation.—Scale, 3-32 Inch to the Foot.



Section at Bell Deck Floor and Tower Belt Course. —Scale, 3 Inches to the Foot.

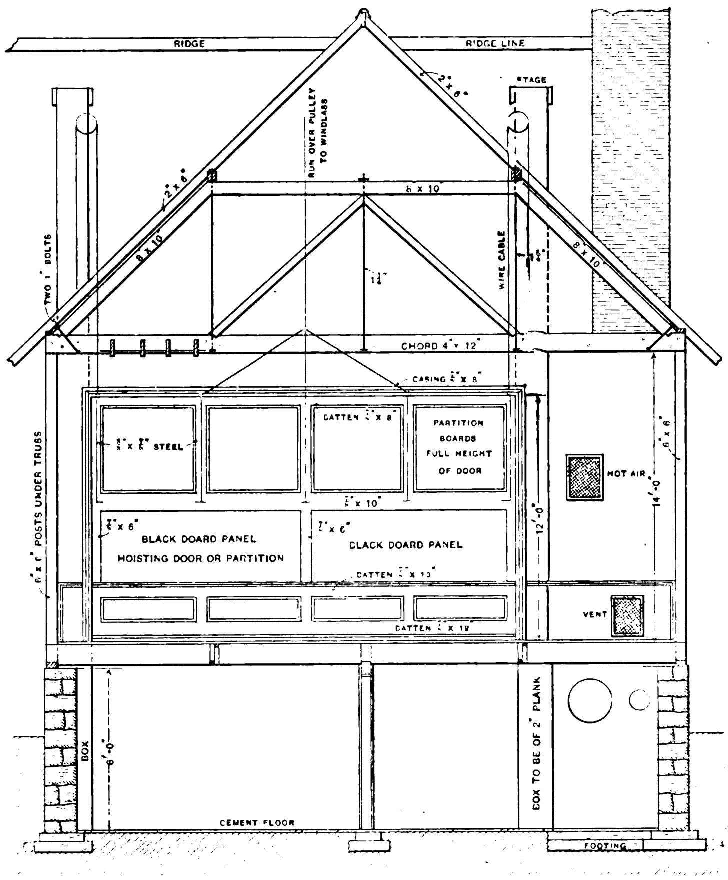
Side (Right) Elevation.—Scale, 3-32 Inch to the Foot.

Design for a Two-Room School House.—Elevations and Details.

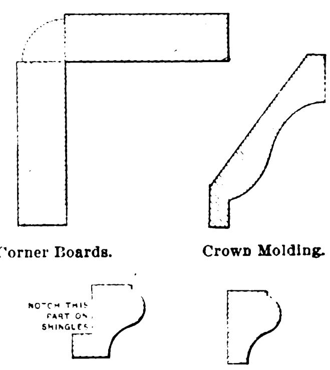
This partition is made of ⅞-inch boards, with battens on both sides, these being placed with dovetail joints, glued and thoroughly dried. The battens extend across the entire partition and are secured with screws. The partition is hung to iron weights with wire cable, which has a strength double the load it is required to sustain. A cable from the center of the partition runs up over a pulley to a windlass in the attic, as shown on that plan, this windlass being intended to raise the partition when it is desired to throw the two rooms into one. The boxes for the iron weights are made of 2-inch plank, tongued, grooved and spiked together. The partition slides in grooves from the floor up to the pulleys.

The exterior woodwork has three coats of linseed oil and lead paint finished in colors. All tinwork has two coats of Princess brown, and the tower ceiling has three coats of flowing varnish. The front and vestibule doors are finished in the natural wood. All interior woodwork in the school rooms, vestibule, cloak rooms, &c., has one coat of filler and two coats of best inside varnish. All sash throughout the building is glazed with double strength Pittsburgh glass.

The contract for the school house here shown was executed by George M. Barnes of Mount Healthy, Ohio, in accordance with plans prepared by architect N. M. Williams of 3270 Montana avenue, Cincinnati, Ohio. We understand that the contract price was in the neighborhood of $3350, but the work was done something like two years ago, which fact must be taken into account in considering the design at this time.



Sectional Elevation Taken on Line of Hoisting Partition and Showing Construction of Truss, &c.—Scale, ⅛ Inch to the Foot.



Corner Boards. Crown Molding.

Bed Molding for Shingles. Bed Mold for Level Surface.

Scale, 3 Inches to the Foot.

Design for a Two-Room School House.—Sectional Elevation and Details.

THERE are 20 common bricks to a cubic foot when laid and 15 common bricks to a foot of 8-inch wall when laid.

A Palatial Log Cabin.

There is at present in process of construction at Lamoine, on Frenchman's Bay, opposite Bar Harbor, on the coast of Maine, a summer home which, when completed, will be in many ways remarkable. The house will be of logs of rough exterior, the walls being of pine and fir, just as they come from the forest, but the interior will be richly fitted and furnished. The house is being erected by William F. Des Isle, a direct descendent of Louis Duparre Des Isle, as a memorial to his ancestors, and is to be a reproduction of the famous "Fountain La Val," a wonderful palace of logs, erected in 1791, upon the same spot by Madame La Val, who, with 30 followers, fled from the terrors of the French Revolution after her husband had fallen under the guillotine. This log mansion, which she called "Fountain La Val," was 60 x 100 feet in size, two stories high, very rough without, but within furnished magnificently with such of her household effects as she had brought from France, and in addition had purchased in New York and Philadelphia.

In the course of time Madame La Val became Madame Bartte, wife of the Governor of one of the West Indies, where she went to make her home. Upon her departure she conveyed to Louis Duparre Des Isle all her lands and other property, and until recently the great estate, extending 5 miles along the bay, remained in the hands of the Des Isle family. Upon the share that has descended to him, including the site of Fountain La Val, William F. Des Isle is now erecting a log palace of exactly the same size and design as the original mansion.

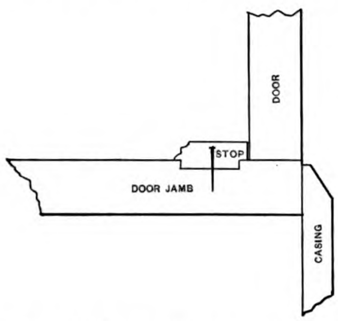
On the first floor of the new building will be a reception room, 16 x 20 feet, with a fire place in brick. From this room will arise the main stairway, its railing and newel post of logs in their natural state, except for elaborate carvings in places. Four other rooms on the first floor will be entered from the reception room through decorated arches, and in these rooms, as well as in those above, will be displayed a wealth of rich furniture and hangings with numerous relics of the Colonial days. There will be bathrooms and other modern comforts, but in no other respect will the house resemble any other on the coast, with the possible exception of the log palace of a Philadelphia family on an island in Penobscot Bay.

CORRESPONDENCE.

Nailing Stops on Door Jambs.

From LAZARUS, *Cliff, N. M.*—In answer to the query of Frank Rippon, Coalville, Utah, I would state the practice of nailing on stops to form a rabbet in door frames is not good practice unless the stop is glued as well as nailed. Some architects will not permit either method, but have the stop worked with a tongue and fitted into a groove in the door frame, which makes a very substantial job.

From "DOWN SOUTH," *North Carolina.*—I notice in the April issue that Frank Rippon asks if it is a first-class job to nail stops on a door frame instead of rabbeting. My experience is that extra good work usually calls



Nailing Stops on Door Jambs.—Sketch Submitted by "Lazarus."

for rabbeted jambs, but they have one disadvantage—if the door is warped, and many of them are, it will strike at one corner first, which makes an unsightly and disagreeable piece of work, whereas if stops are used they can be adjusted to the warp of the door, making it shut solid and close. It will doubtless be admitted that putting in the common ogee stops 1½ to 2 inches wide does not make so good looking a finish, and I would suggest cutting the stops just wide enough to show the same rabbet on both sides of the jamb, leaving the edges of the stop square. If properly put in this will make a first-class job.

From D. P. B., *Redford, N. Y.*—In the April issue Frank Rippon asks if it is a first-class job to nail stops on door jambs to form a rabbet. In my opinion it is no job at all and barbarous practice.

Cement for Making Glass Tank Water Tight.

From C. C. H., *Brookville, Pa.*—Will some reader tell me the kind of cement to use in order to render a glass tank water tight? For example, I want to take four pieces of glass and set them together so as to make the sides and ends of a box or tank, and then another large piece for the bottom. I want to use the glass box for gold fish, and desire to cement the pieces so that the receptacle will hold water.

Answer.—A good cement for glass, and one which is said to completely resist the solvent action of water may, according to Professor Schwartz, be prepared by the following process. From 5 to 10 parts of pure, dry gelatin are dissolved in 100 parts of water. To the solution is added about 10 per cent. of a concentrated solution of bichromate of potash, and the liquid is kept in the dark. When pieces of glass joined by this cement are exposed to the light the gelatin film is acted upon by the chemical rays, the chromate being partially reduced, and the film of cement becomes tough and durable.

Another formula consists of soaking in water until well swollen 2 parts of isinglass. The water is then poured off and the isinglass is dissolved in alcohol by the aid of heat. One part of mastic is then dissolved in 3 parts of alcohol and added to the above solution; then 1 part of gum ammoniacum. The solution is well shaken and evaporated to the consistency of strong glue, when it solidifies on cooling. When using the cement the parts to which it is applied should be warmed.

For making a transparent cement for glass it is recommended to dissolve 1 part of India rubber in 64 parts of chloroform, then add gum mastic in powder 14 to 24 parts and digest for two days with frequent shaking. Apply the cement with a camel's hair brush.

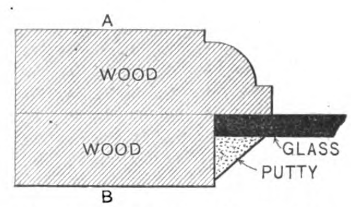
A recipe which is recommended by the *Pharmacist* reads as follows: "Take 1 ounce of Russian isinglass, cut it in small pieces and bruise well, in order to separate the fibers; then add 6 ounces of warm water and leave it in a warm place that the isinglass may dissolve, which will require from 34 to 48 hours. Evaporate this to about 3 ounces. Next dissolve ¼ ounce mastic in 4 ounces of alcohol, and when this is ready transfer the isinglass from the evaporating dish to a tin can (an empty ether can will be found convenient), heat both solutions and add the mastic solution to the isinglass in small quantities at a time, shaking the can violently after each addition. While still hot strain the liquid through muslin cloth and put in bottles."

What is the Best Method of Painting a Shingle Roof?

From J. F. H., *New Marion, Ind.*—Will some of the readers give me their views as to which is the better way to treat a shingle roof? Should the shingles be first dipped in oil or stain and then nailed on, or should they be painted after they are on the roof? I would also like some of my brother chips to tell me the best and quickest way to scaffold for shingling.

A Question in Transom Construction.

From J. C. A., *Oshkosh, Wis.*—Here is an easy one for some of the boys to solve. If you should order a transom to go over an outside door to be constructed of hard wood, the inside quartered white oak and the outside plain red oak, and submitted the accompanying sketch without mentioning which side you were to use as the outside, upon which side would you expect to find the red oak when the transom was delivered? The transom



Question in Transom Construction.

is to be made without beads, for glass and the latter is to be sprigged and puttied in place. In answering this question, will the readers kindly designate by the letters A or B the side on which they would expect to find the red oak and upon which side the quartered white oak, and give their reasons for such decision?

Laying Slag Roofing.

From C. D., *Philadelphia, Pa.*—Will you kindly give me some information regarding the proper method of putting on a four-ply slag roof? How much tar and slag are required for 100 square feet of roofing—that is, where a man would guarantee it for ten years?

Note.—With no desire to anticipate the suggestions which our practical readers may offer regarding the question of our correspondent, we would suggest that common practice among those giving attention to slag roofing is about as follows: Run five thicknesses of No. 1 tar roofing felt along the lowest point of the roof, turn back and mop between with a thin coating of any approved brand of roofing cement, then lap each successive layer at least three-fourths of the width over the preceding layer, turning each course back and mopping back as far as the next layer with a thin coating of the same cement. Over this surface mop a thin coating of cement and sweep crushed slag free from dirt and dust and perfectly dry, and with cement hot enough to hold slag, but not hot enough to burn the fiber of the felt. For work of this kind at least 70 pounds of felt and not less than 10 gallons of cement are required to each 100 square feet.

What Constitutes an Average Day's Work for a Carpenter?

From H. M. B., *Roxbury, Conn.*—I have been very much interested in the various communications dealing with the above subject which have appeared during the last few months. The comments of "Slow One" from Long Island are timely and offer food for reflection by those who claim to be able to lay 10,000 shingles in ten hours. I would like to ask how the 3000, 4000 and even 10,000 shingles were laid. I call 1500 to 2000 shingles, well laid, a good day's work. Our shingles are more or less tapering, some nearly 1 inch wider at the butts than at the points, but this is what our fast men want apparently. They spread the tips and nail them on with the butts tight. This is like laying an open gutter smallest at the bottom and is all rubbish. This method of laying shingles will also keep them moist and cause them to rot. The slow man has to trim the shingles in order to do his work well, and does not have to travel around from town to town looking for a job. I have had experience at almost all kinds of work, except farming, for a period of over 25 years. I have just concluded a school house, which was dedicated in January. I took the contract at a low figure, doing all the work above the foundation, painting and finishing the interior, but did not slight it in the least. It will bear inspection and will help to get another job. If I could lay the number of shingles and hang the number of doors and do all other work in proportion, as some of our brother chips say they can do, I probably could have put $200 or $300 in the bank. As it is, I will get enough out of it to pay my men and running expenses.

From HEE H. SEE, *Montreal, Canada.*—In regard to the above subject, I would like to say that if any one has a good, quick method of hanging doors, laying shingles, setting studding, or anything of the kind, let him trot it out and perhaps we will all be benefited thereby, but this other business of telling how many shingles have been laid by some one, or the number of doors we have heard about being hung in a day, is simply a waste of good space and printers' ink. I would like to know what use this kind of thing is to any of us, for I am sure no one would estimate by it, even if it were correct, for the average day's work by the average carpenter has little or nothing to do with the cost of the building. This depends almost entirely upon the man who is looking after the job—upon the foreman, who gets on the job half an hour before anybody else in the morning, and who goes around at night picking up lumber, locking up doors, storing away nails, &c.; the man who sorts out his men so as to work them to the best advantage; who takes the 20 doors a day man and sets him to building coal bins in the cellar, where his work will not be noticed; who knows where every man on the building is working, how soon he will be done and has another job ready for him when he is finished; the man who keeps everybody's time on the job, checks off all the windows, doors, &c.; measures up all the lumber as it comes from the mill; who is generally expected to do all of the most particular work on the building; who when things go wrong gets all the blame, and when they go right stands back and wipes the sweat from his brow while some one else takes the credit; the man who for all this generally gets about 2 cents an hour more than the other men and thinks himself well paid. This is the man, I say, upon whom more than anybody else depends the cost of the job. I know, for I have been there. This being my opinion, it may be asked why I am helping to swell the tide. I may perhaps be forgiven for saying a few more words upon the subject that is already pretty full, as I seem to have been singled out by "A. E. C." of Vancouver, in the March issue, for some comments. Right here I want to say to "A. E. C." that he has not scored the record yet, for I met a man the other day who told me that he and his brother in Jersey City some years ago hung 64 doors, large and small, in ten hours. I told him, however, that he could not stagger me for I had been reading *Carpentry and Building*, and that he might as well make it an even 100, as it was just as easy to swallow the one as the other while I had my mouth open. I had been looking for these 15, 16 and 20 doors a day men and had at last come to the conclusion that there must be some secret in the process, and that they only do it when there is no one around to see it. But "A. E. C." lets the secret out on page 65 of the March issue when he says: "In the first place, joint the hinge side of the door straight and have it square at the hinge bed, then put the door up and it will be found that it will just joint. . . . Use a sharp pencil or penknife, but before marking for the hinge see that the top fits with 1-16 inch play all around the door, except at the bottom, where it should be 3/8 or 1/2 inch." Now this makes everything as clear as mud, and after I have had 25 to 30 years' practice in door hanging and have learned how to fit the top all around the door and how to "set the hinge square with the door and flush on top," I have no doubt that I will be able to fit and hang 16 doors in a day. No, sir, not in the slightest, because, counting 16 doors to a day and 300 working days to a year, it makes a nice little total for the 30 years of 144,000 doors. If anybody has a million and a half doors to hang I wish he would send me word, as I would like to get the job over as soon as possible. A little further on "A. E. C." says it is harder to hang the door to a solid rabbet frame than to a stop frame. Well, "differences of opinion make horse races." Around here we generally cut in the stops before fitting the doors and do not nail them. The man who hangs the door nails the stops up to it. This at the lowest calculation takes five minutes more than for the solid rabbet.

Then, again, on the lock question we differ. I find it much easier to fit a lock with a long escutcheon, because it generally has only two screws, while the others have at least five, of which two are at the keyhole and three at the knob. Again, with the long ones the screws are a good way from the keyhole, and there is a chance to put them into wood instead of vacancy. After a 3/4-inch hole has been bored in a 1 3/8-inch door there is not much left to hold the screw, is there? Here we wouldn't call a lock put on in good shape if the keyhole were bored with a 1/2-inch bit. We do not believe in making the hole in the door any larger than the one in the escutcheon; then the key will go into the lock without ten minutes' dodging, and when a man takes the key out he won't be so liable to knock the escutcheon off with it. In reference to the question of "A. E. C." about the hight of the lock, I would rather put the lock a couple of inches one way or the other than cut the tenon out of the lock rail. The hight of the lock within certain bounds is not half as important as the stability of the door. In conclusion I wish to say that I think "A. E. C." is right when he says "Some are natural born carpenters and some natural born plowmen." Looking over the columns of *Carpentry and Building*, we might go further and say some are natural born liars, but we won't. We will say, however, that if it takes a man 10 or 12 years to learn to be a carpenter he can make up his mind he is not a "natural born" one.

From N. O. T., *Cuyahoga Falls, Ohio.*—I do not come to the editor very often, but it not because I lack great interest in *Carpentry and Building*, for I have bought every number since 1896 from the local newsdealer. I think no carpenter can afford to do without the paper if he wishes to keep abreast of the times. In regard to the discussion of the average day's work for a carpenter, I think a great many correspondents are giving us samples of what might be done under the most favorable circumstances—not at all an average. I consider a man is doing a good day's work when he fits, hangs and trims six or seven 1 3/8 inch by 2 foot 8 inch by 7 foot pine doors in nine hours, or double nails four squares of 6-inch drop siding in the same length of time. I think for the benefit of the trade in general some of these skilled workmen should make known the methods by which they accomplish so much work in the time stated. I for one would like to see the average brought to a higher standard than it is at present. We have hundreds of so-called carpenters through this part of the country who want from 30 to 32½ cents per hour and who cannot hang four doors in a day of nine hours and make a first-class job of it. If the foreman has his back turned for half an hour he finds something has been done wrong, but still the men expect the best wages. I feel sorry for these so-called mechanics and also for the man who has to pay them. There should be some way to educate the mechanic in order that he may give better results to the man who employs him, better his own condition, and when he has locked his tool box for the last time people might say of him, "The community has lost a good mechanic that has been a credit to himself, and the labor he performed will remain a lasting monument to his memory."

From J. F. H., *New Marion, Ind.*—It seems to me that most of the mechanics who are discussing this subject do not view it from the proper standpoint. What we are trying to accomplish is to ascertain what amount of work the average carpenter should be able to do in a day. Some writers tell us they can nail on 10,000 shingles in nine hours, fit and hang 20 doors in a day of the same length, &c. We have some of these wonders here, but how many nails do they put in a shingle. Sometime two, but mostly one. I was recently told of a new roof which a carpenter had had put on only five years ago, and that a year ago the shingles were blown off that roof and they didn't have a nail hole in them. He said the men who put on the roof were good workmen and understood their business, he thought, but evidently they didn't use as many nails as they were ordered. No, they got in a hurry and slighted their work in order to do a big day's job. Why is it that some of our workmen exert themselves so in that way of doing things? We as a class ought to take more pride in our work and encourage a higher standard of skill, do a neat job, make good joints, have the buildings which we put up plumb and square, and then the boss will have confidence in his men an. pay them good wages.

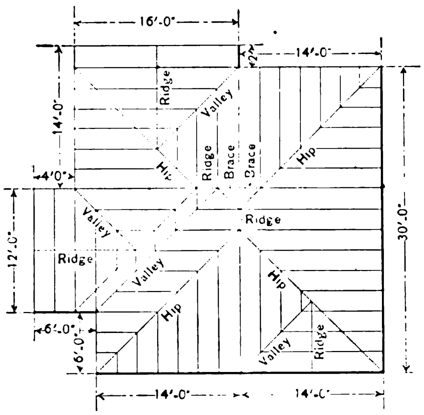


Fig. 1.—Framing Plan of Roof Submitted by "W. C. H."

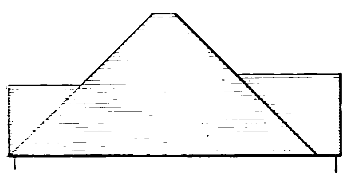


Fig. 2.—Right (Side) Elevation.

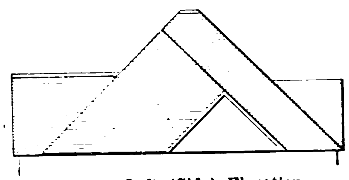


Fig. 3.—Left (Side) Elevation.

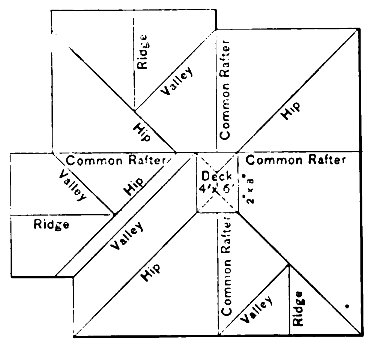


Fig. 6.—Plan Submitted by "H. L. F."

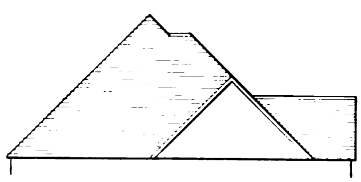


Fig. 4.—Rear Elevation.

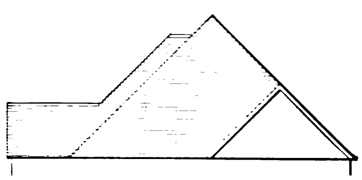


Fig. 5.—Front Elevation.

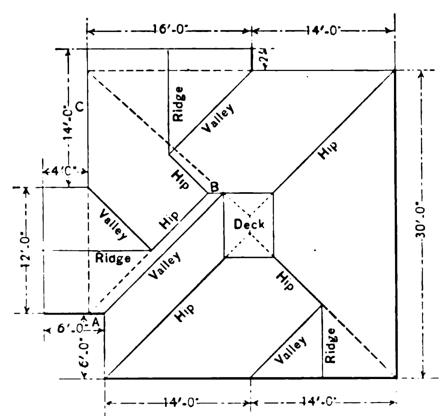


Fig. 7.—Outline of Roof as Suggested by "R. H. A."

Constructing a Half Pitch Roof—**Scale, 1-16 *Inch to the Foot*.**

Constructing a Half Pitch Roof.

From W. C. H., *Donaldsonville, La.*—In answer to the request of "H. M." of St. Louis, Mo., in the February issue, I inclose plans and elevations showing what I consider the best method for carrying a half pitch roof over his partial plan. Fig. 1 represents the framing plan, while Figs. 2 to 5 inclusive show the various elevations.

From H. L. F., *Dana, Ind.*—In answer to "H. M." of St. Louis, Mo., and for the benefit of "O. N.," Atkinson, Ill., as well as other interested readers, I submit a plan, Fig. 6, of a roof which is supported entirely by the outside plate of the building. I would suggest that in framing this roof he first construct the deck as indicated of 2 x 8 inch timber, extending the rear side of the deck timber 2 feet to the left, forming a ridge, to which to place the common rafter as indicated. After the deck is in place and supported by the common rafters the hips and valleys can be placed in their proper position and the spaces filled in with jacks and cripples. If "H. N." does not want a deck on his roof, he may place the rafters on top of the deck, bringing it to a ridge at the top, as shown. I have been a reader of *Carpentry and Building* for several years and have gained valuable information from its columns.

From R. H. ANDERSON, *Route No. 4, Portland, Maine.*—Although not a constant reader of the paper, I wish to submit the accompanying plan, Fig. 7, which answers the inquiry of "H. M." of St. Louis, in one or two ways. The projection A makes a valley necessary, as the projection is really an ell. The dotted lines show the plates and hips as if there were no gables. The short ridge B is equal in length to the projection A. Framed in this way, it will be seen that all the gable roofs make but one valley each, the other side of their roofs being simply a continuation of the faces of the main roof. Another way and obviously cheaper would be to carry the main plate at A out on a line with C, which would give a paneled soffit supported by a bracket at the corner. This would make the plate line 30 feet square and will do away with the upper part of the valley A and the ridge B, making the labor of framing much simpler. If "H. M." should build the roof according to my suggestion, I should very much like to have him send me a photograph of the building when finished and I will gladly pay the expense.

Note.—We also have a reply to this inquiry from "J. C." of Riverside, Cal., the roof plan being the same as that of "O. N.," published in the March issue.

Hanging Glass Doors.

From LAZARUS, *Cliff, N. M.*—Responding to the inquiry of "E. E. F.," Wenatchee, Wash., I would say always hang glass doors with the putty or bead on the inside, and this applies to transoms as well. This method throwns the strain on the wood or frame instead of on the putty.

From D. P. B., *Redford, N. Y.*—Replying to the inquiry of "E. E. F.," at the bottom of page 97 in the April issue, I would say put the putty side of glass doors out. No well puttied glass will stir, as the glass vibrates and therefore takes up the shake.

Design for Picket Fence.

From J. F. H., *New Marion, Ind.*—I notice from recent issues of the paper that there is quite a difference of opinion as regards the construction of picket fences. The writer signing himself "D. P. B.," Redford, N. Y., says to set the posts 5 feet deep, while "Down South" in the April issue says the depth to which posts should be set depends on the nature of the soil, which I believe is true. He also says that he prefers to cut the lower rail in between the posts, which, I think, makes a good job and less work than it is to cut gains, but the people here seem to think that if you do not cut gains in the posts the fence is no good. Time, however, will tell which form of construction is the most durable. I would be glad if some of the readers of the journal would further discuss the subject, as I think there are many points which can be brought out that will be of benefit to many of us.

Importance of Explicit Builders' Contracts.

From F. K. W., *Lake Providence, La.*—I agree with F. G. Odell that it is difficult to estimate high enough as the thousand and one things which occur in connection with every building, and which cannot be foreseen by the wisest of us is what divides the profits. I much prefer to build under a good architect if he be one who knows his business and is reasonable. One reason is, the owner will more likely listen to him than to the contractor, thinking that the latter is looking out too much for himself. Of one fact I am quite sure, very few written contracts are sufficiently full and explicit, and the proviso should always be there that other work not specified must be paid for. I want to say to our friends, look out for the man who wants the cheapest thing he can get, for he will have the best and lots of it before he is done with you. Any old thing will answer until he gets you securely started with several hundred dollars of your money spent, and then he wants cement used instead of lime, then the shingles are not clear heart when he wanted cheap ones, the flooring is not "A" quality, and the glass in the windows is not bedded in putty, the hardware generally is very low grade, the locks are worthless, &c. Yet he asks you for the cheapest of all these, and when it comes time to settle he will offer you $25 less than is due you, with the alternative of a law suit. His name is legion, but he shies at a good, full and explicit contract.

Figuring Tank Capacity.

From A. A. M., *New Roads, La.*—Please inform me how I can figure to determine the size to make a circular tank to hold any given number of gallons.

Answer.—This can be done in two ways. First, by calculating the number of cubic inches in the number of gallons for which the tank is to be made. Divide this total by the hight that the tank is to be. This will give the area of the circle, which should be divided by the decimal fraction 0.7854, and the square root extracted from the quotient. Another way is to multiply the number of gallons by the decimal fraction 0.0034, divide the product by the hight that the tank is to be and extract the square root of the quotient. For example, to explain this operation: If the tank is desired to hold 25 gallons multiplying 25 by 0.0034 will give something above 7200 cubic inches. Then, if the tank is to be 18 inches deep it is only necessary to divide the 7200 by 18 to find that the area at the bottom of the tank will be something over 400 inches. To extract the square root of 400 would show that the tank ought to be a fraction more than 20 inches in diameter. To take exact figures and find the number of gallons that a tank of a given size would hold would mean to multiply the diameter, 20 inches, by 20, when the product would be 400. Multiplying this by 18 would give 7200 cubic inches, which multiplied by the decimal fraction 0.0034 would show that a tank of these dimensions would hold 24.48 gallons. We think that, with this explanation, our correspondent can readily arrive at a method of determining the size of any tank to hold any number of gallons.

A Convenient Door Clamp.

From J. L. C., *Howard, W. Va.*—I notice in the April issue the letter of the correspondent describing a clamp for holding doors in position while being fitted. My feeling is that the device requires too much time in taking care of it and is somewhat clumsy in handling. The plan which I have is to get a piece of board, 1 x 4 inches, and cut it off ¼ inch longer than the door opening is wide so that it will fit tight between the jambs. Cut a notch out of the center to receive the door, and the result is a clamp that beats anything I have ever seen. The door is right where you want it, and there is nothing in the way.

Coloring Copper Cornices.

From J. H., *Lowell, Mass.*—I have recently put up some copper cornices and have been asked if I could treat them with acid to give them an antique appearance, or if I knew how to accomplish this by means of oil, and my reply was in the negative. Will some one inform me how to accomplish this result?

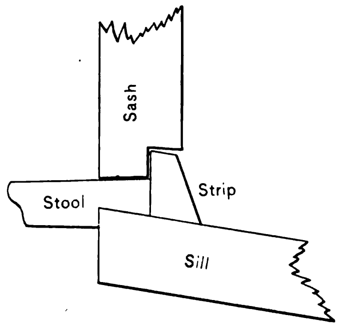
Answer.—One method most generally used for turning copper green is the application of a solution of sal ammoniac and water. Add about 1 pound of powdered sal ammoniac to 5 gallons of water, dissolve it thoroughly, and let it stand 24 hours at least before putting on the copper. Apply to the copper with a brush, just as paint would be applied, being sure to cover every place. Let it stand for one day at least and sprinkle it with water, using a brush, splashing it on lightly. If water is put on too freely it will run the color and streak it. After standing over night the color in the morning will be all that could be desired. The same effect can be produced by using vinegar and salt instead of sal ammoniac, using ½ pound of salt to 2 gallons of vinegar.

Supporting Roof of Lumber Shed.

From D. P. B., *Redford, N. Y.*—Referring to the question of "J. A. E.," whose communication and sketch appeared in the April issue, I would say that if the vertical section between B and C of his diagram is a wall, the best plan of the correspondent would be to support his roof by a line of light trusses.

Hanging Swinging Sash.

From YOUNG READER, *Takoma, D. C.*—I send herewith sketch showing my way of hanging rim sash. Plow the sash and nail a strip on the sill, as shown. The strip



Hanging Swinging Sash.

serves as a stop and also as a drip. I sometimes cover the strip and the sill with tin. The above may be of some service to "H. M.," who inquires in the April issue of the paper.

Water Pressure in a Tank.

From PLUMB, *Republic, Wash.*—I would like to ask some of the readers who are given to pondering mathematical problems what is the whole pressure on the sides, ends and bottom of a rectangular tank filled with water, the inside dimensions of the tank being: Length, 80 feet, width, 20 feet, and depth, 12 feet. Such a tank was built out here a year ago, and there was much argument among civil engineers, as well as some who have no handle to their names, as to the question above. While it is a little outside of the province of the Correspondence columns, yet it is something about which it might be well for carpenters to know, and I therefore submit it for their consideration.

Defective House Drainage.

From F. H. S., *San Francisco, Cal.*—I would like to get some information in reference to the arrangement of house drainage pipes, and submit herewith a sketch. I have shown two 3-inch cast iron stacks for slop hopper work with no water closets or other fixtures connected with them. One stack has three 2-inch traps and the other three 3-inch traps. If any of the upper traps on these risers are operated will not the flushing have a tendency to siphon the traps below the one that is operated, if they are not vented? If they will not siphon in this particular case, please explain why, and if there is any advantage in the 3-inch trap over the 2-inch trap. A great many such jobs are to be found in this city and are sanctioned by the plumbing inspectors. A 2-inch waste stack and a 4-inch soil stack are to be vented according to law—why not such a job as shown?

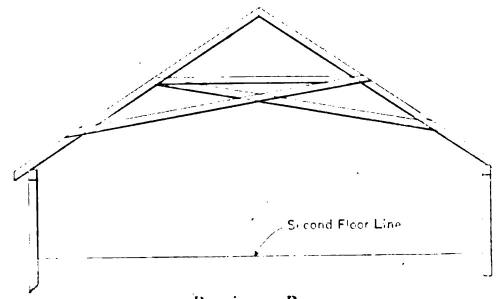
Answer.—Our correspondent submits a sketch showing two waste risers which run open through the roof, and in each case three slop hoppers are connected with the stacks with no other fixtures, the only difference being that one set of fixtures has 3-inch traps and the other 2-inch traps. This description we have deemed sufficient to thoroughly explain the conditions, and the sketch sent has not been reproduced for this reason. According to the regulations in many cities each one of the traps should be vented to protect the trap against siphonage and to permit of a circulation of air through the piping system. Without the vent pipe it is assumed that the flushing of the upper trap would cause a pressure of the air in the stack by the water falling down and forcing the air before it. This would cause the air on the sewer side of the lower trap to press heavily on the trap seal, and even if not sufficient to break the seal would start a motion of the water in the trap by which some would be lost, and if the operation was repeated it would be quite possible to break the seal in this trap. If there was a back air pipe connected with the sewer side of the trap the excess of air pressure could be relieved by the air passing up through the back air pipe without affecting the trap seal. On the other hand, if the lower trap was flushed, air to fill the space in the pipe that had been displaced by being forced ahead of the water would have to be replaced, and would be drawn with equal force through the pipe which extends through the roof and the pipe connected with the trap. This might also set up the oscillating movement of the water in the trap and eventually lead to the trap seal being destroyed. If the law requires fixtures connected with 2-inch waste stacks and 4-inch soil stacks to be vented, we see no good reason why the fixtures connected with 3-inch stacks as described should not also be vented.

Trouble With a Chimney.

From T. S. P., *Anna, Ohio.*—Will some reader of the paper inform me of the kind of a flue top to use on a chimney on a one-story addition built to the south of a two-story building? The dwelling faces north and the chimney has a back draft when the wind is from the south. I have tried a swing top with a 7-foot extension and this failed. I now have a flue top on the chimney 14 feet high without a swing top, and this does not prevent its smoking when the wind is from the south. I can correct the difficulty by carrying the top still higher, but would like to know if there is not some other form of flue top that will do so, and thus I shall not be compelled to run the top up so high.

Bracing a Barn.

From T. A. D., *Philadelphia, Pa.*—In answer to "W. T. M." of Cedar Lake, Mich., I inclose a rough sketch showing how I braced a roof six years ago, the building being 22 feet wide. I used 1 x 6 inch oak for braces, well spiked to the rafters, and I braced at each intermediate post, these being 10 feet apart. I would advise



Bracing a Barn.

"W. T. M.," as his building is wider, to use braces a little thicker, say 1½ inches. Before I put the braces on the barn to which I have referred I drew the plates in a little beyond their place at the center of the building, and two years ago it had scarcely gotten back to its original position.

Paint for Tin Roof.

From A. M. H., *Floyd, Va.*—I should like to know what is the best paint to put on a tin roof.

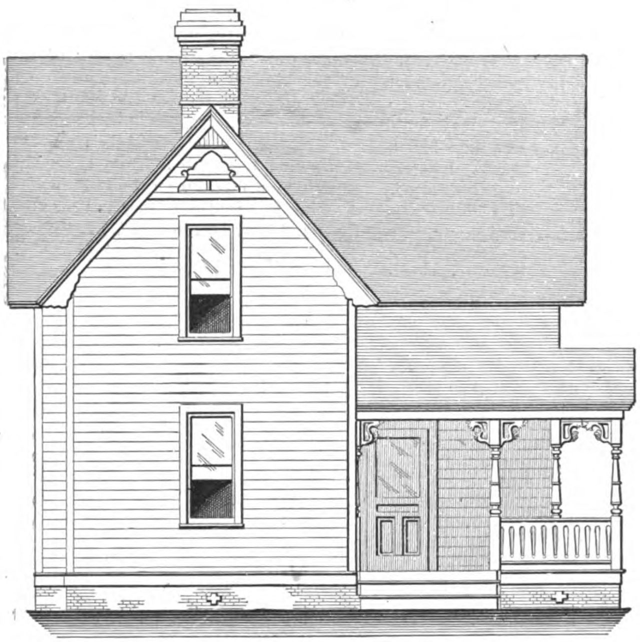
Answer.—In the opinion of experienced men any mineral paint, mixed not too thin with linseed oil and applied in two or three coats, makes as good a paint for tin roofing as can be desired. A correspondent some time ago wrote that he had seen Venetian red adhere so firmly to a tin roof that it could hardly be scraped off; it seemed as if coated with a layer of stone.

DESIGN FOR A LOW COST COTTAGE.

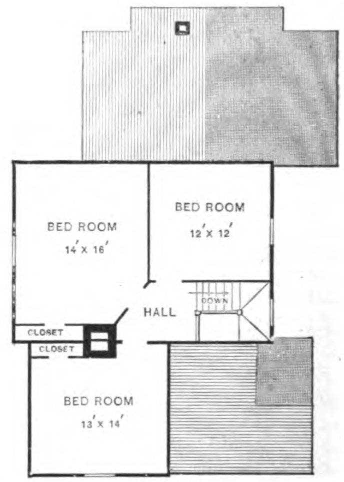
We present herewith illustrations covering elevations, floor plans and a few constructive details of a low cost cottage erected not long since in Sylva, N. C., in accordance with drawings prepared by C. M. Wells of that place. We also give a small half-tone reproduction from a photograph which affords an excellent idea of the appearance of the completed structure. An inspection of the plans shows the interior to be divided into parlor, family room, dining room and kitchen on the first floor and three bed rooms on the second floor.

The frame of the building is inclosed with sheathing boards, over which at the first and second stories and gables is laid weather boarding or siding, as indicated on the elevations. The upper part of the gables is finished with ceiling strips, all as shown. The roof is shingled and was treated with two coats of Cabot's shingle stain.

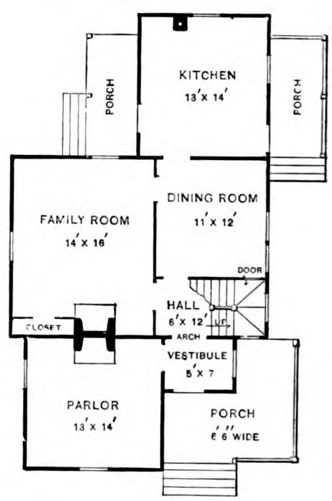
The architect states that the interior is finished throughout in North Carolina pine. In some of the rooms the wood work is treated with three coats of hard oil, while the remaining portions are finished with three coats of paint. The mantels in the house were made at the building of pine and ash. We understand from the architect that the total cost of the structure was in the neighborhood of $800, but the cost will vary somewhat with the locality and style of finish.



Front Elevation.—Scale, 1/8 Inch to the Foot.



Second Floor.



First Floor.
Scale, 1-16 Inch to the Foot.

Design for a Low Cost Cottage.—C. M. Wells, Architect, Sylva, N. C.

New Engineering Building for the University of Pennsylvania.

The new Engineering Building which is about to be erected at the University of Pennsylvania, and plans for which have just been completed by Cope & Stewardson of the city named, will occupy a site at the corner of Thirty-third and Locust streets, Philadelphia, Pa. The building will be 300 feet long by 160 feet deep, with a wing 50 feet wide on the north end extending 40 feet further to Chancellor street in the rear. It will be three stories in hight, with a basement covering about one-third of the area. The construction will be fire proof throughout, the exterior being of dark brick with sandstone trimmings and the finish in strict keeping with the more recently constructed university buildings. The total floor space available will be approximately 128,000 square feet, of which 15,600 will be in the basement, 47,000 on the first floor, 32,600 on the second floor and the same on the third floor.

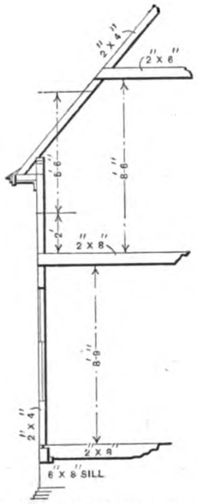
There will be two principal entrances leading to the main hallway, which will extend over the entire length of the building to staircases at both extremities. The interior will be lighted by two light wells about 80 x 50 feet, terminating in skylights over the first story. The basement will be occupied largely by locker rooms and lavatories, and by the necessary engines and machinery equipment for heating and ventilating purposes. There will also be laboratories for hydraulic and physical testing, and also a small one for testing brick.

On the first floor will be located the offices of the heads of the departments, also spacious laboratories for the testing of cements, mortars and concrete. This room will contain testing machines of various types for tensile, compressive and bending tests, a briquette making machine, immersion tanks, damp closets and a number of individual work tables, each completely equipped with an outfit of minor apparatus. It is intended to make special provision for investigating the effect of freezing on mortar and concrete by the installation of refrigerating apparatus. On this floor will also be located the main physical testing and hydraulic laboratories, the former containing universal testing machines of various types ranging in capacity from 30,000 to 200,000 pounds, machines for torsion, bending and impact tests, besides a complete outfit of extensometers, deflectometers, cathetometers, micrometers, &c. The hydraulic laboratory will contain apparatus for experiments on the discharge through orifices and tubes, the tanks being provided with partially removable ends in order to permit also of observations of flow over submerged weirs and dams. Various pipe circuits will be provided and from numerous connections along these pipe lines water will be supplied to different forms of apparatus. There will be an instrument testing room, and mechanical and electrical laboratories. The central space under the skylights will be utilized entirely for work shops. The wood working and the pattern shop will extend to the middle of the building and divide it into two parts, one for beginners and the other for students engaged on pattern work. A foundry will be another feature, and various forms of lathes, planers, &c., will be installed, besides a number of electrically driven tools. In the mechanical laboratory will be steam and gas engines and condensing apparatus, and there will be special testing rooms for refrigerating work, &c.

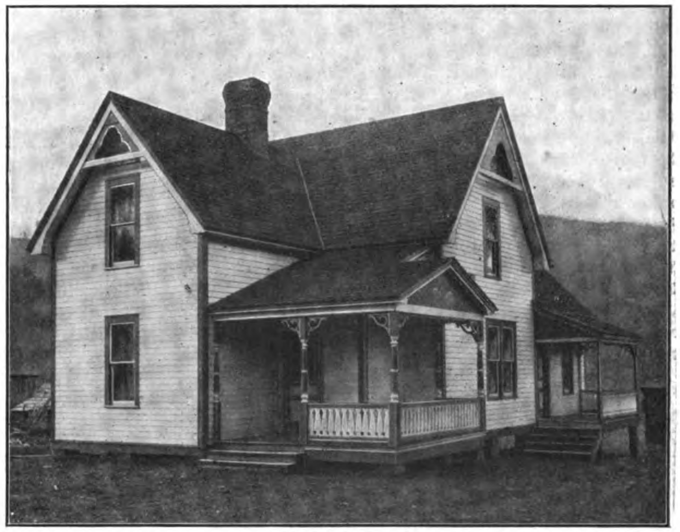
The second floor will be occupied by a reference library and reading room, the library having a capacity of about 20,000 volumes. Between the light well at the center of the building will be a students' assembly room, and along the south side will be numerous instructors' rooms. The rear portion of this floor will be devoted to drawing rooms, a separate room being allotted to each class and an individual desk to each student, so that he may have free access to it at all hours.

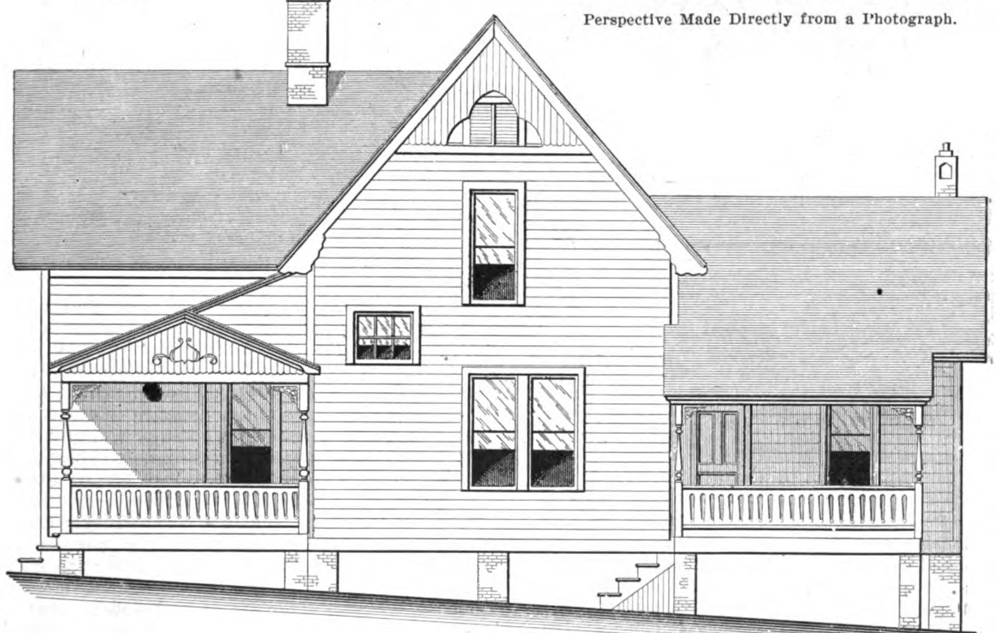
The third floor is intended for the use of the engineering societies, a general supply store, class rooms, instructors' rooms, &c. In the east and west wings spacious rooms will be set aside for engineering museums. The rear of this floor will be devoted entirely to drawing rooms, which like those on the second floor will have the full advantage of north light.

The structure will be heated by direct steam, the ventilation being provided for by electrically driven fans, supplying tempered air to the various rooms. The lighting throughout will be by electricity. It is expected to have the building completed and ready for occupancy by the fall of 1904.



Section.—Scale, ⅛ Inch to the Foot.


Perspective Made Directly from a Photograph.


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

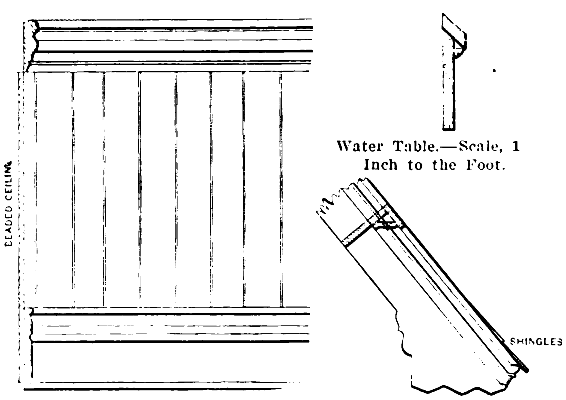
Design for a Low Cost Cottage.

A Concrete-Steel Chimney.

A very interesting example of concrete-steel construction is found in the chimney recently completed in St. Louis, Mo., for a concern manufacturing fire brick. The chimney is 130 feet in hight, with an inside diameter of 5 feet, and was designed and built by Carl Weber of the city named, using the T-bar reinforcement patented by him. The work of building the chimney is described by Mr. Weber as follows:

The materials used in the construction of the chimney were river sand and Portland cement reinforced with steel T-bars 1¼ x 1¼ x ½ inches. Up to a hight of 65 feet from the base this stack consists of two shells, the outside shell being 6 inches thick, and the inside shell 4 inches thick, with an intervening air space of 3 inches. In the concrete mass of the outer shell are 20 steel T-bars, 2 feet apart, vertically imbedded, running from the foot of foundation to the top of the chimney, while ten steel bars 1 foot by 1 inch by ⅛ inch are in the same manner used for strengthening the inner shell. Every 2½ feet a horizontal ring of the same material encircles the vertical bars, being connected to them by steel clamps. The chimney is self supporting and monolithic—a single piece from base to top.

The concrete-steel base, on which the stack rests, 20 feet below ground level, is 5 feet deep and 16 feet square, and is built on solid rock. Above the hight of 65 feet



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

Water Table.—Scale, 1 Inch to the Foot.

Detail of Barge Board.—Scale, ½ Inch to the Foot.

Miscellaneous Details of Design for a Low Cost Cottage.

there is only a single shell, the thickness of which tapers off in proper intervals to 5 inches, 4 inches and finally 3 inches.

The air space, directly above the grade, is connected by four square openings with the outside atmosphere, allowing the air to enter, which at the upper terminal point of the inner shell will force itself through specially provided inclined pipes into the shaft of the chimney proper. One of the functions of the air space is to allow the inner shell freely to expand and contract, being protected by the outer shell against harm from sudden cooling, while in return the outer shell is shielded by the inner shell against the direct effect of the heat. By this arrangement it is made possible for these stacks to withstand heat up to 2000 degrees F.

The forms used in building this stack are made of wood, forming rings of 2½ feet in hight, and being divided into six sections, which are held together by iron hooks. In operation two such rings are in use for the outside and two for the inside of the chimney, while properly curved 3-inch molds provide for forming the intervening air space.

The method of procedure is as follows: After one form is completely filled with concrete, properly tamped around the vertical bars, the second form is placed on top of the first, and likewise filled in with concrete. The hooks connecting the several sections of the lower forms are then opened, the single parts, which are previously secured with ropes pulled up, and again placed on top of the last form, which remains adhering, and so on, *vice-versa*, till the top of the chimney is reached, two rings a day being easily completed.

A very light frame staging is provided on the inside of the chimney for attaching the ladders and supporting a pulley beam, used to hoist material by hand.

The weight of the whole chimney is about 120 tons, without footing. Its outside surface will ultimately be coated with a cement wash, to secure a uniform color.

Day's Work for a Building Mechanic.

The discussion which has been in progress for some little time past in our columns relative to the amount of work of various kinds the average carpenter of ability and intelligence should be expected to perform in a day of a given number of hours, seems to have attracted widespread interest and attention. In a recent issue of one of our exchanges we find a statement regarding what constitutes a fair day's work for an industrious and competent workman in a day of eight hours, and we present it herewith for the benefit of those interested in the discussion now in progress. Under the head of "Carpenters," it says:

Cut and lay 500 feet of sheathing boards.
Cut and lay 250 feet of siding or clapboards.
Cut and lay 2000 shingles.
Place in position 750 feet of joists.
Place in position 500 feet of studding.
Place in position 400 feet of 4-inch finished flooring and 300 feet of 2-inch finished flooring.
Fit 150 lineal feet of baseboard—one member.
Fit 125 lineal feet of baseboard—two member.
Fit 100 lineal feet of baseboard—three member.
Case 12 doors and windows—one member casing.
Case eight doors and windows—two member casing.
Fit and hang eight doors.
Fit locks on 12 doors.
Fit and hang ten two-sash windows.

MASONS.

Lay 100 cubic feet of marble stone masonry.
Lay 1200 to 1800 common brick per day or 300 to 500 pressed brick per day.

LATHERS.

Put on 85 yards of laths per day.

PLASTERERS.

Put on 175 yards of brown coat mortar per day.
Put on 100 yards of finish or putty coat per day.

PAINTERS.

Give one coat to 18 doors, with casings complete, both sides, per day.
Give one coat to 125 yards of interior work (plain surface) per day.

The Fire Proofing of Wood.

After an exhaustive series of experiments, extending over several years, with a wide range of compounds, it is stated in an exchange that Joseph L. Ferrell has found in sulphate of aluminum a compound that appears to answer all the practical requirements. It has the additional feature, of no slight importance in its bearing upon the fire proofing effect, that when strongly heated it leaves an infusible and nonconducting residue to cover and protect the cellular structure throughout the wood. It absolutely prevents the propagation not only of flame throughout the wood, but even of a glow because of its nonconducting and unalterable character. Sulphate of aluminum, in concentrated solution, is far more efficient than an alum solution; as if the alkaline sulphate of the alum simply detracted from the power of the aluminum sulphate in the matter of making wood fire resistant.

Sulphate or phosphate of ammonia acts to make wood fire resistant by rapidly liberating ammonia gas, which has the effect of checking the flames on the surface of the wood. The fiercer the flame which plays against such wood the more rapid the liberation and exhaustion of the protecting vapor. There is no residual protective substance remaining in the wood, and the carbonization of the fiber proceeds apace. On the other hand, so soon as the sulphate of aluminum of the superficial layer of the wood impregnated with this chemical is decomposed by the heat of a flame, a deposit of aluminum is formed, the nonconducting properties of which make it a barrier against the propagation of the carbonizing effect and protect the interior in a very notable degree.

Cooling an Auditorium by the Use of Ice.

One of the very interesting and timely papers read at the semiannual meeting of the American Society of Heating and Ventilating Engineers at Atlantic City last summer was descriptive of the method pursued by John J. Harris, the author, in cooling an auditorium by the use of ice. At the annual meeting held in New York early in the present year Mr. Harris read another paper on the same subject, but involving addition data and illustrations which are of such a nature as to prove of more than usual interest at this time, and we present them herewith.

Two days previous to the commencement exercises in the Scranton High School, June, 1901, the writer was requested by the Board of Directors to devise some means by which the auditorium could be kept at a comfortable temperature during the exercises and not become overheated. Time being short, the only resource left was by the use of ice.

A rack, Fig. 1, was constructed in the fresh air inlet large enough to hold about 8 tons of ice, with several shelves having slatted bottoms, Fig. 2, the frame being made from 2 x 6 inch hemlock studs. At 6 o'clock in the evening the ice was placed in the rack and staggered in such a way that the air was compelled to pass around and between the cakes of ice until discharged by the fan through the flues into the auditorium above, to mingle with the sultry atmosphere, tempering, diffusing and maintaining a temperature that was most invigorating. The bottom or floor of the rack was made from matched pine lumber and lined with No. 28 galvanized iron, and drained by a 2-inch gas pipe. Two fans of the disk type are employed to ventilate this building, one 11 feet diameter, and an 8-foot diameter exhaust fan, located in the attic, the air being forced into the auditorium through a vertical flue at each side of the stage and from above the dressing rooms, foul air making its exit through the registers in the floor, and which are located in the aisles. The construction of this system admits of by-passing all the air intended for the building through the auditorium.

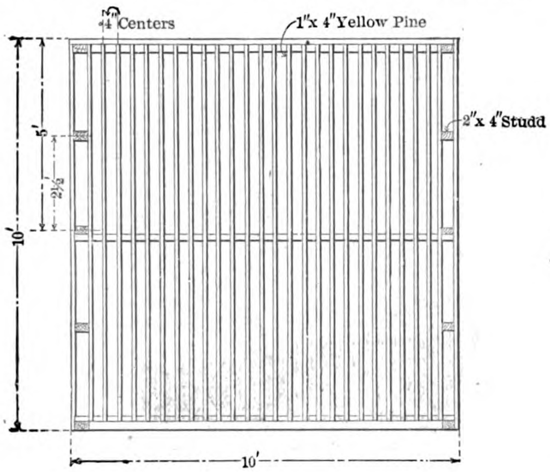


Fig. 1.—Plan of Rack.

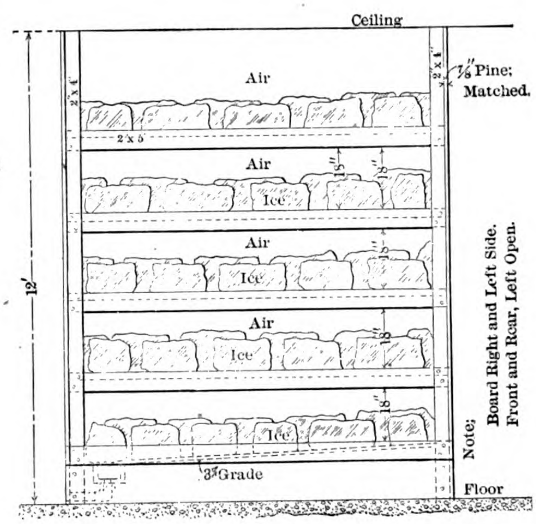


Fig. 2.—Front Elevation of Refrigerator for High School.

Cooling an Auditorium by the Use of Ice.

That such an arrangement is necessary can readily be seen from the fact that the seating capacity of this room is 900, but on occasions of this kind about 1400 persons gain admittance, filling every available space to overflowing. The outside temperature was 90 degrees F., while the inside temperature was maintained at 76 degrees F. The humidity was normal, and at no time reached a point of saturation. That it proved satisfactory can best be demonstrated by the fact that the directors were so well pleased that they desired the method to be used for the exercises in June, 1902.

The size of the auditorium is 80 by 80 feet by 20 feet high. The amount of ice melted was, on June 11, 13,600 pounds; June 12, 11,800 pounds; June 13, 13,000 pounds, making a total of 38,400 pounds melted during the three nights. The fans were designed to deliver 3,000,000 cubic feet of air per hour under the friction of the ducts; the speed of the plenum fan was 100 revolutions per minute and that of the exhaust fan 120 revolutions per minute. By the use of calcium chloride an absolute control of the moisture was maintained. In the case of rooms cooled by means of ice, or by direct ammonia expansion, or by any refrigerating plant, calcium chloride permits of an easy regulation of the percentage of moisture, as it has a capacity to absorb three times its own weight in moisture before becoming fully dissolved. The method of applying calcium chloride for this purpose is to dispose the same in shallow pans with perforated false bottoms, so as to allow the accumulated moisture to drain off and deposit in the bottom of the pans, and they should be placed in the ducts where the rapid currents of air pass over the surface of the calcium. The commercial calcium chloride should be practically chemically pure, containing no chloride of sodium or chloride of magnesium, which, with the above purpose in view, are absolutely useless, having comparatively little affinity for moisture.

New Pennsylvania Railroad Station in New York City.

We referred in these columns a short time ago to the fact that McKim, Mead & White had been selected as the architects for the mammoth railroad station, which is to be erected in New York City on the site bounded by Seventh and Ninth avenues and Thirty-first and Thirty-third streets. According to the architects, the main portion of the building will be 60 feet in hight, one story, with a frontage on the four thoroughfares of 2500 feet. The structure will be of steel skeleton frame filled in with warm granite highly polished. The architecture will be of plain Doric order, and for the purpose of giving more importance to the exterior, as well as for the better accommodation of the public, the structure will set back 20 feet from the Thirty-first and Thirty-third street lines and 50 feet back from Seventh avenue, thus making the streets wider and giving to the building a more pleasing effect. At various points along the fronts there are to be colonnades of columns of the Doric order, and between them pilasters are to be used for the preservation of the same order.

The waiting room will be in the center of the block, measuring 100 feet wide, 300 feet long and 140 feet high. It will be vault-like, and lighted by semicircular windows 75 feet in diameter. The main entrance for foot passengers will be on Seventh avenue. Passing through an arcade lined with shops and stores, passengers will descend by stairs or elevators to the floor of the waiting room about 20 feet below the street level. Leaving the waiting room passengers will go down a short incline to the concourse, the full width of the building from Thirty-first to Thirty-third streets. Indicators will designate the trains and passengers may go to the one desired by descending 20 feet in an elevator, the tracks and side platforms being 20 feet below the concourse and 40 feet below the street level. Entrance may also be had to the concourse direct from the side streets by means of stairs or elevators. At the street level on Seventh avenue side will be a restaurant and lunch room, and below them will be the baggage rooms and above the kitchens.

From Eigth avenue to Ninth avenue will be the train shed, which Mr. Mead declares will be more beautiful than the noted train shed of the railroad station in Dresden. The roof is to be curved and supported by pillars, some of which will be nearly 100 feet in hight. The top of the shed is not to extend above the top of the 60-foot building, which will form the main part of the station. There will be a driveway from Seventh avenue at Thirty-first street for carriages along the side of building and leading to the waiting room or to the concourse, the grade being about 6 per cent. On the Thirty-third street side there will be a similar driveway for the carriages of passengers leaving the concourse.

While the plans which have been prepared for the station are preliminary, it is understood that if they are departed from it will be only in the matter of unimportant detail. The architects intimate that the station, when completed, will be the most perfect and much the largest railroad passenger station in the world.

Cleaning Marble.

A writer in one of our exchanges gives the following method for cleaning marble: Mix two parts by weight of sal soda, one part pulverized chalk or fine bolted whiting, and one part powdered pumice stone with enough water to make a thin batter, and by means of a scrubbing brush apply it to the spots, then wash off with soap and water.

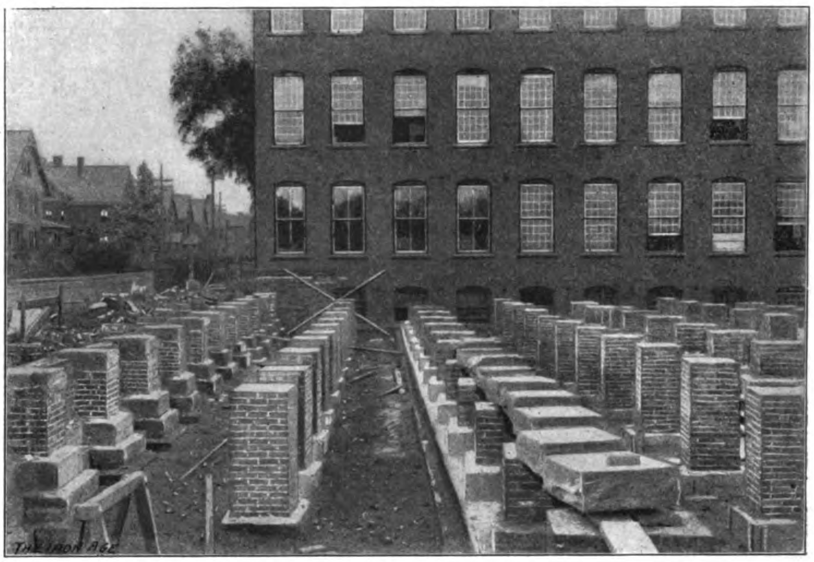
To remove grease spots from marble, moisten fine whiting or fuller's earth with benzine, apply it in a thick layer to the spots and let it remain for some time, then remove the now dry material and wash the spot with soap and water.

To extract oil stains from marble, make a paste by mixing two parts fuller's earth, one part soft soap and one part potash with boiling water. Apply this paste to the spots and let it remain three or four hours.

A Shop Foundation on Made Ground.

The large extension of skeleton construction, 80 x 120 feet and four stories in hight, which has just been added to their small tool department by the Pratt & Whitney Company of Hartford, Conn., involves some rather interesting features. In the frame yellow pine timbers are used, while the walls are of brick.

The peculiar feature of the structure is the foundation, which rests upon ground which was filled in many years ago. Cellar space was not required, as the present building provides all that is needed. Under these circumstances it would have been extravagant to have sunk piles. In order to secure a firm foundation, free from all danger of settling, the following method was pursued: The excavation was made over the entire plot to a depth of only 4 or 5 feet below the street level. Upon this were built concrete piers, topped with brick, for the walls and columns. Extending across the space are three concrete footings, which are stepped, as shown in the engraving. These extend the entire length of the building, and each forms one single block of concrete 6 feet wide at the bottom by 120 feet long. This distributes the load over an extremely wide area. On these footings are built brick piers which carry the floor beams. As additional supports for the first floor, which will be used as a storeroom for finished tools, there are rows of brick piers on concrete blocks. It will be seen that this method of construction furnishes a very great foundation area as compared with that of the entire building.



A Shop Foundation on Made Ground.

A Large Loft Building.

What is intended to be the largest loft building in New York City is now in course of erection on Nineteenth street, just west of Fifth avenue and extending through to Twentieth street. According to the plans of Architect Robert Maynicke, the structure, which will be 11 stories in hight, will cover an area of 20,700 square feet and will cost in the neighborhood of $800,000. There will be seven elevators in the building, three for passenger and four for freight service. There will also be a passageway in the middle of the building, extending through from street to street. The foundations are now being put in and the architect expects to have the building ready for occupancy by the first of the new year. The front will be of granite, limestone, brick and terra cotta. The building is being put up for Henry Corn, and, as showing the demand for accommodations which it will furnish in a business way, it may be stated that it is already fully rented.

WHAT BUILDERS ARE DOING.

THE first of May did not witness any serious disturbance in the building trades of Albany, N. Y., although the question of rates of wages of the carpenters is in a rather uncertain state, with the chances favoring an increase of 10 per cent. provided they waive certain demands which are decidedly objectionable to the contractors. If the advance is granted it will make the carpenters' wages 31¼ cents, 34½ cents and 36 cents per hour. The labor situation is also somewhat complicated by the agitation of the "card system," attempts to inaugurate which are being made but are meeting with opposition by the builders of the city.

Rates of wages in the leading branches of the building trades have been settled for the ensuing year on the following basis:

Bricklayers, Stone masons, Plasterers	.50 cents per hour.
Roofers	.43¾ cents per hour.
Plumbers	.40 cents per hour.
Painters and decorators	.31¼ cents per hour.
Plasterers' laborers	.25 cents per hour.
Sheet metal workers	.43¾ cents per hour.
Building laborers	.25 cents per hour.
Gas fitters	$3.00 per day.
Common building laborers	1.50 per day.
Steam fitters	3.50 per day.
Steam fitters' helpers	2.00 per day.

Buffalo, N. Y.

Building is not particularly active in and about the city just at the present time and does not compare favorably with this season last year. Proably the most favorable feature of the situation is the lack of labor trouble of any kind to distress the building contractors. The bricklayers and stone masons are working without a contract, based on the same scale as last year—that is, 50 cents per hour. They made a demand for 55 cents per hour, to go into effect on the first of May, but the contractors did not see their way clear to meet these figures, and while it was at one time thought that the men would go out on strike, they evidently thought better of it, for all are at work at the scale stated.

Chicago, Ill.

Building operations projected during the month of April make a very fair showing, although the figures are not up to the same month of last year. This, however, is not altogether surprising, as a year ago the total for April was abnormally large, that time operations being in full swing, with both wages and materials lower than at present. The number of permits taken out in April this year was 542, covering improvements having a frontage of 14,355 feet, and involving an estimated outlay of $2,386,985. These figures compare with 666 permits for building improvements, having a frontage of 18,275 feet and estimated to cost $3,406,010, for April of last year. The totals for the four months of the present year are, with one exception, the largest for the corresponding period the last seven years.

Cleveland, Ohio.

The eleventh annual banquet of the Builders' Exchange was held in the auditorium of the Chamber of Commerce on the evening of Tuesday, April 28, the occasion being a notable one in the history of the organization. Among the guests were Congressman J. G. Cannon of Illinois, who delivered an address peculiarly suited to the occasion; Mayor T. L. Johnson, General Joseph Wheeler, Congressman T. E. Burton, Architect W. S. Watterson and President J. J. Sullivan of the Chamber of Commerce.

Prior to the banquet a formal reception was tendered Congressman Cannon, and at this time he shook hands with about 400 ladies and gentlemen. The *menu* cards for the dinner, at which covers were laid for 400, were presented in rather novel form. Printed on the heaviest enameled cardboard, they represented first of all the proposed Government building and the proposed court house as the ideal of the builders' art. They further illustrated what nature's builders can do by indicating the spider and his web, the beaver and his dam and the bird and its nest. The floral decorations consisted of palms, roses and carnations. After the *menu* had been duly considered and the speeches made, there was a season of dancing in which a large number of those present participated. The Committee on Reception comprised J. W. Conger, C. C. Dewstoe, Parker Shackleton, F. H. Glidden, B. F. Powers, J. H. Fuller, K. F. Gill, Henry G. Slatmyer, E. H. Towson, F. G. Hogan, E. W. Reaugh, L. N. Weber, J. W. S. Wood, Arthur Bradley, George Lang, John A. Kling and E. W. Fisher.

The arrangements for the banquet were conducted by the Entertainment Committee of the exchange, comprising W. B. McAllister, chairman; Harry Gill, F. A. Edmunds, Andrew Brymer and A. H. Rudolph. This committee was reenforced by the Entertainment Committee of last year, now designated as the Committee on Acquaintance, comprising Frank A. Towson, chairman; W. M. Pattison, Spencer M. Duty, J. H. Caunter, W. H. Waterbury and R. R. Wills.

The Committee on Dancing comprised E. H. Bohm, J. C. Callaghan, E. E. Teare, J. C. Norton and Ira Farley.

Duluth, Minn.

The members of the Builders' Exchange recently held their annual election, when the following directors for the ensuing year were chosen: H. A. Hall, E. C. Wallimer, W. J. McMartin, J. F. Schluens, H. M. Todd, Otto Johnson, J. A. Watterworth, S. E. Matter and Robert Freeman.

The board organized by electing C. E. Evans, president; E. G. Wallinder and J. F. Schluens, vice-presidents; W. W. Blackshaw, secretary, and George H. Lounsberry, treasurer.

Erie, Pa.

The building business in Erie and vicinity is not developing the activity expected in the early spring, especially when taking into consideration the fact that there has been no labor difficulty aside from the strike of the painters, which is in progress at the hour of going to press. The main reason assigned for the quiet condition of things is the high prices of all materials entering into building construction. During the past three months, however, the secretary of the Builders' Exchange has given information on 178 contracts awarded, over 80 per cent, of which work was done by members of that body.

The Erie Builders' Exchange is in a very flourishing condition, having during the past three months added 27 members to the roll, which now brings the total up to 128. This increase in membership and the amount of work which is being done in and through the exchange has rendered the old quarters in the Penn Building much too small and the management has had to seek new offices. These have been found in the Leibel Building, at the corner of State and Ninth streets, where the exchange now occupies the entire third floor, comprising 4200 square feet of space. The greater part of this is devoted to desk room and exhibition purposes, the balance being so divided as to give two rooms for private consultation or meeting rooms for subsidiary organizations, a plan room, 10 x 22 feet, with all modern conveniences, a secretary and directors' room and a lavatory.

Honolulu, H. I.

The chaotic condition of the building ordinances and the discontent arising therefrom have crystallized in a bill which has been formulated by the Builders' and Traders' Exchange for submission to the Territorial Legislature. The most important general provision of the new law is that all buildings 75 feet or over in hight shall be of fire proof construction, with walls of brick, stone or terra cotta, in which wooden lintels shall not be placed. The provision is also made that all foundations shall be of stone, concrete or brick, laid on solid earth, sand or rock. The outer walls of two-story buildings, or similar structures, shall be 12 inches thick for the first and 8 inches thick for the second story. In all buildings other than dwellings a graduated scale is provided for the thickness of walls, ranging from 24 to 12 inches.

Kansas City, Mo.

The report of the Building Bureau for the fiscal year of the city, which ended April 20, shows a heavy increase in the building operations as compared with the previous 12 months. The record for the year was notable in many respects, particularly in that about 70 per cent. of the capital invested was for dwellings. For the year ending April 20 there were 3492 permits issued, of which 405 were for brick structures, 1188 for frame and 2359 for miscellaneous, all estimated to cost $8,054,248. For the previous year there were 4216 permits issued, of which 390 were for brick buildings, 1419 for frame structures and 2407 for miscellaneous, involving an estimated outlay of $6,135,158. An encouraging fact connected with the figures is that the record shows a heavy increase in operations toward the close of the fiscal year, the operations for March having been the largest on record.

Los Angeles, Cal.

Although the city has been troubled more or less with building strikes during the last few weeks, the amount of building undertaken during the month of April was greater, both as regards the number of permits and the estimated cost of the improvements, than that of the corresponding month in either of the two preceding years. There were 449 permits issued in April for improvements, estimated to cost $732,468, as compared with 337 permits for buildings costing $731,410 in April, 1902, and 249 permits for buildings costing $438,709 in April of 1901. The major portion of the permits issued in April of the present year were for private dwellings, flat houses, &c.

The most important building operation at present under way is that of the hotel to be erected at the corner of South Broadway and Seventh streets by J. B. Lankership.

He has decided to put up a nine-story rather than a seven-story structure as originally intended, and the cost will approximate $300,000, exclusive of the site. The exterior will be of red sand stone for the first two stories and pressed brick for the upper ones. There will be four hydraulic elevators and a large service elevator, steam heat, electric lights, ice plant, hot water system, &c. The ladies' parlor and dining rooms will be finished in polished hard wood, while the other rooms in the same story will have tiled floors and marble wainscoting. The ceilings will be beamed, finished with plaster panels and frescoed. The second floor will have two private dining rooms, a banquet room and parlor, the remaining portion of that story and the seven above being devoted to 408 rooms, each suite having a bath. In the bathrooms and hallways the floors will be of vitrified tile and the wainscoting of glazed tile. It is expected that the hotel when finished will be one of the finest in Southern California.

Lowell, Mass.

The annual banquet of the Builders' Exchange was held at the St. Charles Hotel in Lowell on the evening of April 15, just too late for us to get an account of the affair into the May issue. The annual meeting of the exchange was held in the afternoon at the headquarters, 14 Appleton street, when annual reports were read and officers for the ensuing year were elected. The result was as follows:

President, Royal S. Ripley.
Vice-President, C. H. Nelson.
Treasurer, J. B. Varnum.
Secretary, H. R. White.

BOARD OF DIRECTORS.

In addition to the above named officials the Board of Directors for the ensuing year will consist of L. Clark, P. O'Hearn, D. Moody Prescott, G. P. Green and O. M. Pratt.

After the election the members repaired to the St. Charles Hotel, where a banquet was served, interspersed with eloquent speeches and inspiring music. The newly elected president acted as toastmaster, and spoke briefly of his appreciation of the honor which the members had conferred upon him by electing him president. He then introduced John C. Burke, who discussed various topics in a clever style, being followed by Robert J. Thomas, Superintendent of the Lowell Water Board; C. A. Nelson, the newly elected vice-president; Frank T. Weaver and Albert Burnham. The committee in charge of the entertainment were Frank T. Weaver, chairman; Charles F. Varnum and James Whittett.

New York City.

Since our last issue went to press the local building situation has been greatly complicated by the demands made upon the dealers in masons' building materials and lumber, resulting in the closing of the yards and the tying up of important building operations. Several thousand men were directly affected by the lockout, with the probability that the number will be largely increased should the struggle be prolonged. There have also been demands made in other lines of trade, so that the various employing associations have decided to hold a meeting with a view, if possible, of bringing order out of the present chaos, and it is thought that one of the first steps in this direction will be the formation of a compact organization of employers to deal with the demands of the unions. This meeting will be held Friday evening, May 15, the call being signed by the president and secretary of the Building Trades' Association.

In many branches May 1 brought a change in the rates of wages, the new scales going into effect and for which agreements were made being, according to the secretary of the Board of Building Trades, as follows, all the organizations named having the eight-hour work day:

	Rate per day.
Amalgamated Painters and Decorators	$4.00 and $4.50
Brotherhood of Painters and Decorators	4.00 and 4.50
Cement Masons' Union No. 1	4.55
Cement and Ashphalt Laborers	2.64
Electrical Workers' Union No. 3	4.00
Elevator Constructors	4.25
Granite Cutters	4.50
Housesmiths and Bridgemen	4.50
Journeymen Stonecutters' Association	$4.00 to 5.50
Marble Cutters	5.00 to 5.50
Marble Polishers and Rubbers	4.00 to 4.50
Marble Cutters' Helpers	3.00
Marble and Enamel Mosaic Workers	3.75
Mosaic Helpers	2.60
Mosaic and Encaustic Tile Layers' Union	5.50
Plumbers' and Gas Fitters, Local No. 2	4.00
Portable Hoisting Engineers	5.00
Slate, Tile and Metal Roofers	4.00
Steam and Hot Water Fitters' Helpers	2.50
Second-Hand Building Material Handlers	3.00
Tar, Felt and Waterproof Workers	$2.75 to 3.50
Tile Layers' Helpers	3.00
United Derrick Men, Riggers and Pointers' Union	4.25
Blue Stone Cutters	4.50

A comparison of the above figures with those which we published in our last issue will show the extent to which wages have in many instances been advanced.

Philadelphia, Pa.

While no records were broken in April, the amount of new building improvements projected was up to the average, and the figures of the Bureau of Building Inspection indicate a healthy growth. Permits were issued for 816 building improvements, covering 1175 operations, and involving an estimated outlay of $3,732,810. These figures compare with 885 permits, covering 1359 operations, estimated to cost $2,676,960 for April of last year. It will recall that March of this year was somewhat abnormal in that a single permit, that for Wanamaker's new department store, provided for an expenditure of $5,000,000, and single operations involving more than $1,000,000 are exceedingly rare in the city. Of the total involved in the April permits, private dwellings call for over $800,000, manufactories nearly $500,000, municipal buildings $700,000 and alterations and additions over $600,000.

Henry Reeves has been elected treasurer of the Master Builders' Exchange, to succeed Charles H. Reeves, who has resigned on account of ill-health.

Pittsburgh, Pa.

With a view to regulating matters in the building trades of the city there has recently been formed in Pittsburgh what is known as the Builders' League, the object of which as announced in the by-laws is "to protect members in their rights to manage their respective business in such lawful manner as they may deem wise without the interference from organized labor, and the adoption of a uniform and legitimate system whereby members may ascertain who is and who is not worthy of their employment." Another matter, which we understand the League will take up for consideration, is a uniform date when contracts with the unions in the building trades will be signed. At the present time the scales of the unions expire all through the year, and there is more or less friction, but we understand the League hopes to arrange matters so that all scales shall begin on January 1. In this way contractors would know what the rate of wages would be throughout the year, and could base their estimates accordingly. Architects usually prepare their plans for large building operations the first of the year and contracts are ready to be let as a rule by April 1. With all scales signed contractors would know just what they would have to pay, and would be able to figure intelligently on all work submitted to them.

We also understand that the League will encourage the formation of associations among employers in the various building trades, each association to be represented in the League by two delegates. It is said that 20 associations are already represented by delegates. The officials of the Builders' League are: President, H. R. Rose of the firm of Rose & Fisher, general contractors, and secretary, E. J. Detrick of E. J. Detrick & Co. The headquarters of the League are in the Lewis Block.

Portland, Ore.

Building is at a low ebb in the city, owing to the disastrous effects of the building strike, combined with the scarcity of lumber and the departure of building mechanics to other cities. Some efforts have been made to settle the strike by arbitration, but without important results. All work upon the buildings and other improvements for the Lewis & Clark Exposition, to be held in Portland in 1905, has been suspended on account of the disagreement of the directors of the exposition and the union workmen.

San Francisco, Cal.

A fair degree of activity characterizes the building situation in and about the city, the major portion of the work being confined to inexpensive rather than costly structures, such as flat houses, private residences, &c. The largest contracts awarded during the month of April were for the construction of the Merchants' Exchange Building, these aggregating $887,803. Some of the work contemplated for the summer, but contracts for which have not yet been awarded, includes a three-story fire proof warehouse with pressed brick front, to cost $125,000; a seven-story hotel at Third street and Sherwood place, to cost $50,000; two three-story flat houses, to cost $26,000; 12 flat houses on Polk street and Ivy avenue, to cost $25,000; a three-story brick store and office building at the corner of Hayes and Larkin streets, to cost $26,500, and a three-story structure at the corner of Valencia and Sixteenth streets, to cost $26,000.

Tacoma, Wash.

The most noticeable feature of building operations this season in Tacoma is the number of medium priced residences which are in progress. Architects report numerous plans on the boards for buildings of this sort, and it is expected that a large number of residences, varying in cost, will be commenced during the next few weeks, notwithstanding the high prices of labor and materials. In addition to these improvements a rotel and a number of business buildings will be constructed, ranging in cost from $6000 to $30,000, the latter being a three-story brick building, 61 x 155 feet, to occupy a site at the corner of St. Helen's avenue and D street.

Youngstown, Ohio.

The third anniversary of the Youngstown Builders' Exchange was celebrated by a banquet on the evening of Tuesday, April 21, the affair occurring at the Elks' Club. The programme was arranged in two parts, so that some of the addresses were delivered in the assembly room of the club prior to the banquet. The gathering was in all respects a representative one, there being present as guests lawyers, politicians and business men, as well as visitors from Cleveland, Columbus, Akron and other cities.

The first session was called to order by President George S. Hess of the Youngstown Builders' Exchange, who in a short address stated the purpose for which the gathering was held, and then introduced C. W. McCormick of Cleveland who discussed the question of "The Builders' Exchange from a Business Standpoint." He was followed by Arthur Bradley, also of Cleveland, who spoke on "The Builders' Exchange from a Social Standpoint." The next speaker was the genial secretary of the Cleveland Builders' Exchange, Edward A. Roberts, who responded to the toast, "The Secretary and His Duties." He referred to what was expected of a secretary, and how much of success depended on the work allotted to that official in a builders' organization. The ideal secretary, in his opinion, was a good servant, willing and able to do anything to advance the interests of the members. The secretary, he intimated, was in the employ of any one in the exchange who pays his dues, and at the same time the secretary must also be a promoter and thinker. The first session concluded with some remarks by Fred. Weldon, Building Inspector of Columbus, who responded to the toast, "Building and Plumbing Inspectors."

At the conclusion of Mr. Weldon's remarks the members were conducted to the dining room, which was beautifully decorated for the occasion, and where a substantial *menu* was enjoyed. After full justice had been done to the good things set before them Stephen S. Conroy was introduced as toastmaster. In a few well chosen words he took up the duties of the evening and introduced F. L. Baldwin, who replied to the toast, "The Benefits of Fraternity." He was followed by Hon. R. W. Tayler, Mayor Elect W. T. Gibson and Louis Heller of the firm of Heller Brothers, who made some very witty remarks in reply to the topic asigned him, "Our Guests."

The success of the banquet was due to the untiring efforts of the members of the Social Committee having the matter in charge—viz., W. Campbell, M. J. Hornberger, W. F. Wake and John Squires.

Zanesville, Ohio.

The outlook is good for considerable business this season in the building line, although the high prices of building material are having some little effect. The current rates of wages in the principal trades in the building line are as follows:

	Hours.	Rate per hour. Cents.
Carpenters	9	30
Bricklayers	8	50
Plasterers	9	30
Painters	..	30
Sheet metal workers	9	30
Plumbers	9	30
Steam fitters	9	30
Building laborers	9	17

The painters demanded an increase from 27 2-3 cents an hour to 30 cents per hour, and carfare, to take effect April 1, and the demand was granted by the master painters.

Notes.

The Master Builders' Association of Waterbury, Conn., recently filed a certificate of incorporation, the incorporators being John W. Gaffney, J. K. Smith, William F. Chatfield and Henry S. Peck.

The Builders' Exchange at Memphis, Tenn., have recently removed to new quarters in the Planters Insurance Building, where they have accommodations better adapted to the requirements of thir increasing organization.

The formal opening of the rooms of the Boston Builders' Exchange occurred late in April, when brief addresses were made by the president and others, and refreshments were served. The new quarters are at 17 Roxbury street, Roxbury, Mass., and were inspected by a large number of business men and citizens of the district.

The differences existing between the master builders and carpenters of Cheyenne, Wyom., have been settled, and the men will hereafter receive 45 cents an hour instead of 50 cents per hour as demanded. We understand that the sliding scale, which the builders sought to have adopted, will not be enforced.

The master carpenters and builders of Malden, Everett, Melrose, Medford, Woburn and adjoining places in Massachusetts have recently organized a Master Builders' Association, with headquarters at Malden, that State. The officers elected are: President, R. C. Guptill of Malden; vice-president, Everett Mann of Evertt; scretary, E. G. Freman of Malden, and treasurer, J. Smith of Woburn.

As a result of a recent agreement between the Master Builders' Association and Building Laborers' Union No. 3 of Paterson, N. J., eight hours will constitute a day's work, and from May 1, 1903, to May 1, 1904, the rate of wages will be 30 cents per hour. Overtime will be paid for at double the regular rate. All questions in dispute must be referred to the foreman on the job, and in case it cannot be adjusted it shall be referred to the Joint Board of Arbitration, consisting of three members of the Mason Builders' Association and three members of the local union.

The Builders' Exchange at St. Paul, Minn., have just issued a directory of their organization, which is issued in a size and style which will readily permit of its being carried in the pocket. The matter is arranged in such a way as to be of ready reference, there being given a list of the officers and members of the various standing committees, while the membership of the exchange is presented not only in alphabetical order, but also classified according to the branches of business in which the members are engaged. In the alphabetical list, following the name of each member, is the street address, after which are the telephone calls. There is also a list of architects of St. Paul, which is of interest in this connection. The entire make up gives evidence of careful compilation and reflects much credit upon the secretary, A. V. Williams of the exchange.

LAW IN THE BUILDING TRADE.

MEANING OF "IMMEDIATELY" AS APPLIED TO COMMENCEMENT OF WORK.

Where a contract provides that the work shall commence "immediately on the signing of this agreement," the word immediately must be construed as such convenient time as is reasonably requisite to do the thing.—Water Co. *vs.* Borough, 20 Pa. Supr. Ct., 149.

LIABILITY OF OWNER FOR EXTRAS ON ORAL DIRECTIONS.

Where an owner orally directed alterations in buildings under process of construction, which directions were accepted by the contractor, the owner thus waived the provisions of the contract requiring written evidence of any alterations in order to render the owner liable for same; and oral evidence was admissible to show that such directions were given and their reasonable value, in an action by the owner on the bond of such contractor.—Crowley *vs.* U. S. Fidelity & G. Co., 69 Pac. Rep., 784.

WHEN CERTIFICATE OF ARCHITECT IS A CONDITION PRECEDENT.

A provision in a building contract that the architect shall certify that the work is completed to his satisfaction is a condition precedent to the contractor's becoming entitled to final payment. A guaranty in such a contract of the roof of the building for five years against ordinary wear and tear does not dispense with the necessity of the contractor's completing the roof according to contract, or put the roof in any condition different from the rest of the work as to the necessity, under another provision of the contract, for the certificate of the architect that it is completed to his satisfaction.—Davison *vs.* Martin, 14 Man. Rep., 141.

PARTY WALLS.

Where a visible party wall encroaches on the land of an adjoining owner, such owner's failure to ascertain such fact by a survey will not prevent the other owner from obtaining an easement—or right to maintain same—by prescription, as it stands.—Browning *vs.* Goldenberg, 76 N. Y. S. Rep., 1010.

LIABILITY ON CONTRACTOR'S BOND.

A bond given by a building contractor and conditioned to hold the owner harmless from any mechanics' liens which might be filed, covered payments which the owner had to make in order to prevent the filing of liens, a contention that it was only against those actually filed being without merit.—Chapman *vs.* Eneberg, 68 S. W. Rep., 974.

CONTRACTOR ENTITLED TO PROFIT ON EXTRAS.

A contractor who has been required to furnish materials and do extra work, both within his contract, is entitled to recover, in addition to the actual cost of the labor and materials, a reasonable sum of profit.—Venable Const. Co. *vs.* U. S., 114 Fed. Rep., 763.

LIABILITY OF OWNER ON AGREEMENT WITH MATERIAL MAN.

Where one stated he would furnish materials for a building if assured that the contractor would pay him for same, and the owner agreed with the consent of such contractor to retain possession of a sufficient amount to protect the material man, the latter was not obliged to await a completion of the contract before suing on the agreement.—Roussel *vs.* Mathews, 63 N. E. Rep., 1122.

SOME HINTS ON KITCHEN SINK PLUMBING.

GREAT advances have been made during the last decade regarding the appearance and utility of the fixtures used in domestic plumbing, says M. L. Kaiser in a recent issue of *The Metal Worker*. The kitchen sink has not been neglected in the general shake up. From a dirty wood or zinc lined receptacle for slops, located in a dark corner, it has been brought out into the light, and given a beauty and value which is only limited by the amount of money which the house owner is willing to put into it. Made of almost any size desired, of iron or steel, plain or painted, galvanized or enameled white, blue or gray, slate, solid porcelain, or vitreous china, with flat or roll rim, with waste and overflow, with plug and chain, or with standing concealed waste and overflow, or with unobstructed waste and no overflow.

One of the first fixtures whose setting is intrusted to the young plumber is the kitchen sink. While the actual work connected with the setting of this fixture is simple, there are several points to be observed which are sometimes neglected by the experienced plumber. There is small likelihood that the setting of the better classes of sinks, which are furnished with all fittings complete, will be poorly done. To prove that the more common kinds are often woefully slighted needs only the evidence of sight, although the evidence of the sense of smell is often unwillingly added.

It often occurs that the opinion of the plumber is solicited regarding the location of the sink, and it may be well to first describe as nearly as possible the ideal location for this fixture. To be sure it is not always possible to locate the sink in the best position for it, on account of the interference with other—and perhaps more important—fixtures or furniture. In the first place it should be so located as to receive plenty of light; not necessarily directly in front, but quite close to the sink. This requirement also presupposes good ventilation, by moving one or both of the window sashes through which the light passes. The next requirement, although not so important, is that it shall be so located in relation to the range, the pantry and the dining room door as to necessitate the fewest steps possible to the worker in the kitchen. Attention to this feature will also lead to the consideration of the location of the drip board ; whether it shall be placed at either or both ends, and if at both ends, which shall be the larger. The next item is the distance from the range boiler, as the nearer it is and the more direct the piping the less time and water need be wasted in drawing hot water at the faucet. This requirement and the one relating to its position in reference to the range should rever result in locating the sink so that the worker shall be uncomfortably near a hot fire or warm range boiler. As hinted before, in many kitchens it is only possible to strike a medium which shall least conflict with other interests.

There are many styles of sinks, from the roll rim porcelain sink provided with patent overflow and with a screw spud cemented in place, ready for connection with nickeled trap and pipe, down to the common cast iron sink, provided with strainer and collar for lead pipe connection. The last mentioned is first considered, as it is this style the learner is first "up against." Whether the sink is plain, painted, galvanized or enameled, the work of setting may be considered the same, so long as they are all of one style of connection. As it is considered unsanitary to inclose any sink, or, indeed, any plumbing fixture, in wood work, the sink with plain flat flanges must have bolt holes at both ends to receive the bolts which fasten it to the brackets. These holes are usually cored in at the foundry, and it is only necessary to make sure that the holes are clear and large enough to receive the bolts. In the long side, which is to be placed next the wall, two additional holes should be drilled, to allow for the fastening of the flange of the sink on the back ledge in such a way that it cannot pull out from the walls. It is often necessary, in the absence of the carpenter, that the plumber shall nail this ledge in position, and Fig. 1 shows the method of fixing it so that the top casing of wood may be placed with the least trouble. It will be noticed that the outer ledge is placed about ¼ inch lower than the strip through which the supply pipes pass. The same method may be used on the front edge as well, when the setting may have its plainness relieved or hidden by the wood apron, as shown in Fig. 2. The apron may be cut at the proper pitch to receive the drip boards. The drip boards should have no nails driven in the lower end unless it is intended to cover them with copper or zinc. The method of clamping the drip board shown in Fig. 3 stiffens it across the grain and prevents it from warping. A slight modification of the clamping strip makes it equally suitable for the drip boards on sinks with roll rims where special drip boards to match the sink are not used. The brackets supporting the sink may be placed under the bottom of the sink or under the wood strips which support the end flanges.

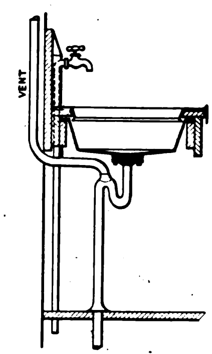


Fig. 1.—Arrangement of Wooden Supports.

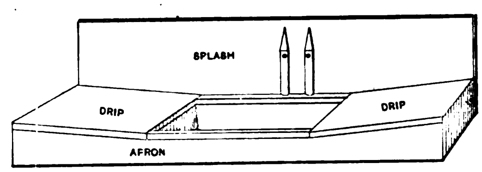


Fig. 2.—Sink Finished with Splash and Drip Boards and Aprons.

Some Hints on Kitchen Sink Plumbing.

The common yoke clamp and screw bolts form a simple and easy connection to make properly, and it is almost as easily made improperly. Rubber gaskets for making this connection are now furnished the trade, although, perhaps, the great majority of these connections are still made with putty. The former method is certainly the best, but an excellent joint may be made with putty. The sink bolts should be provided with tight fitting washers between the bottom of the sink and the first set of nuts, to guard against water following down around the thread and dropping off the end of the bolt. The putty should be carefully placed, so that there shall be a reasonable amount between the bell shaped end of the lead connection and the cast iron of the sink spud. Metal washers between the yoke and the second set of nuts permit of turning the nuts with ease. The nuts should be drawn up evenly and with easy tension, to guard against splitting the strainer or the yoke. This caution is especially necessary with enameled cast or steel sinks, as too great a tension of the bolts is apt to flake the enamel from the strainer.

The sink faucets should be no higher than necessary to accommodate the largest utensil likely to be used at the sink. Fifteen inches above the bottom of the sink will be found to meet the requirements in most cases. If placed much higher the water is apt to spatter too freely. The faucets should be spaced about 6 inches apart, so that both faucets may discharge into an ordinary vessel simultaneously. Although a location at the center of the long side of the sink presents a symmetrical appearance, the writer favors a location about one-third the distance from the end opposite the strainer, as shown in Fig. 2. One reason is that the entire length may be more easily flushed out, and when so located a dish pan may be shifted along in the sink far enough to allow of filling another utensil without lifting the full pan from the sink. For the same reason the sink should be wide enough on the bottom to accommodate the largest pan in use in the household and of a proportionate length. Too great a length is not advisable, as the space thus lost may be more valuable when used on the drip boards.

It is often desirable that the drip boards, front strip and splash board be covered with metal, preferably copper or zinc. This thoroughly protects the wood from the action of water and prevents the lodgment of grease and dirt. Even though the plumbing part of the work is well done, unless the finish of the covering is neatly done also it gives the whole job a "sloppy" appearance. As far as possible the seams should be soldered on the under side, especially when the covering material is copper. Such seams as must be soldered on the outside after the material is in position should be carefully done. A strip of paper may be pasted on each holes in the boards at these points will allow the nails to pass freely into and through the board, where they may be clinched on the under side. In the case of zinc covering the nails may be wire nails with the heads tinned for the purpose, although stiff nails must be clinched with great care, to guard against the marring of the covering metal by reason of straining of the nails in clinching.

For fastening the edges of the covering material to the wood work 1 or 1¼ inch brass nails with rounded heads, known as escutcheon pins, make a neat finish. These nails should be spaced with dividers to present a neat appearance.

It may seem that the method above outlined is too elaborate, and that overmuch care is used for such a common fixture as a kitchen sink. It must be remembered that in the ordinary household the lady of the house often sees the sink; and that servants are more likely to keep clean and properly care for a fixture which, by its appearance, suggests neatness.

The common cast iron sink is sometimes furnished with ornamental cast backs, with bib pipes and rosettes cast in place. Solid porcelain and enameled cast iron sinks are also provided with backs which completely hide the supply pipes. To all such fixtures the above description of covering the bib pipes does not apply, nor does the method of covering the drip boards apply to such sinks as are furnished with drip boards of metal

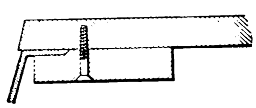


Fig. 3.—Clamping Drip Board to Stiffen.

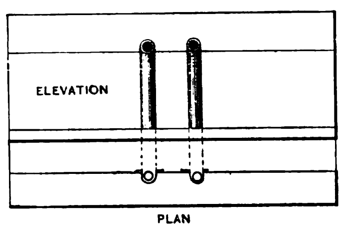


Fig. 4.—Plan and Elevation, Showing Finish of Metal Covering.

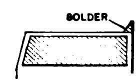


Fig. 5.—Edge Finish of Metal Covering.

Some Hints on Kitchen Sink Plumbing.

side of the seam, leaving only about 3-16 inch for the solder. This not only confines the solder to the space thus formed for it, but prevents the corrosive steam which arises when the soldering copper comes in contact with the acid from discoloring the work. The acid swab should be small, so that the paper is not soaked off before the seam is soldered. Where the pipes pass upward behind the sink there is need for special care in order to provide a good finish. Some tinners form a channel or gutter of the same size as the pipe in the piece of metal which covers the splash, carrying it up to the hight of the shoulders of the bib elbows, as shown in plan and elevation in Fig. 4. A better way is to make the channel large enough to easily accommodate the outside diameter of the bib elbows and run the channel a short distance above the elbow, finishing with a long cone at the top. A hole is cut through the face of the channel at the proper hight and of the proper diameter to fit snugly against the sides of the elbow. This method of construction permits of extending the splash board covering to any desired hight and obviates the trouble experienced in making a finish at the bib elbows which is proof against the lodgment of dirt and impervious to water.

A raised bead, as shown in Fig. 5, should extend around the front edges of the drip boards and sink and around the end edges of the drip boards also if they do not abut against a wall. This edge, to look neat, should not be more than 3-16 inch or at most ¼ inch in hight. This raised bead may be formed in the same piece as the drip board covering, and should be filled with solder to make it rigid enough to stand the battering of pans and kettles. If the drip board surface is large the metal may be protected from bulging by soldering the heads of 1¼-inch copper nails to the under side at the proper distance apart. The metal may then be laid on the wood work and pressed down so that each nail point make a mark on the board. Gimlet or soapstone, or other outfits which are furnished complete and ready to set up.

Advantages of a Small Kitchen.

In regard to the size of the kitchen in a house, a Boston writer suggests that a small one has many advantages over a large one, and says: "A large kitchen with a cellar door at one side, a table at another, and the sink at still another, requires too much walking. Time is consumed in going from one place to another rather than with actual work. Have the range placed in a light, convenient part of the kitchen. In front have a good sized table, containing drawers and spaces underneath for keeping utensils, one portion of the top covered with zinc and the other half left plain. Have underneath the top a baking board which can be easily pulled out. The sink should be near at hand. The pantry may be on the other side of the kitchen and be sufficiently large to hold a barrel of flour, a small pastry table, and a convenient arrangement of shelves.

"The floor may be of hard wood or it may be covered with linoleum or oil cloth, or the ordinary rubber coverings. A tile floor is exceedingly handsome, but rather hard on the feet, making small rugs or bits of carpet a necessity if comfort is to be considered."

THE Bureau of Forestry, Washington, D. C., is about distributing "Bulletin No. 38," relating to Redwood, the matter being compiled by R. T. Fisher. The first part contains an account of the distribution of the tree and discussions of its age, power of reproduction, resistance to fire and the effect on it of soil, soil moisture and fogs. Part II gives a brief account of Redwood lumber operations and a discussion of the timber and its use, while the third part is devoted to a discussion of cut-over lands, the possibilities of second growth, the markets for the lumber, together with tables showing the stand and rate of growth of second growth redwood in California.

Natural Woods and How to Finish Them.

Under the above title Berry Brothers, of Detroit, Mich., have issued the second edition, revised and enlarged, of a most interesting little work on wood finishing. The matter is presented in brief yet practical form and gives such facts and data as experience has shown to be useful to the architect and the wood finisher. There is nothing experimental in the methods presented for the various styles and schemes of wood finishing, but all are based upon actual experience, and it is stated may be relied upon as correct. The point is made that whatever of value may be found in the hints and directions presented within the covers of this little work is in no way impaired because of the suggested use of Berry Brothers' finishes. The staining, shellacking, filling, &c., as the case may be, are the necessary preludes to a successful finish, whatever varnishes may be employed to complete the work, and the mode of applying and manipulating all interior varnishes is specifically the same.

The early pages are given up to the consideration of materials usually employed in producing various styles of finish, following which directions are given for finishing all the usual woods employed in interior work, and also how to treat any particular wood in order to produce a specific style of finish. The concluding pages are given up to some general comments, which will be found especially useful in this connection.

The matter is contained in 78 pages, bound in stiff board covers with gilt side title, and is intended to serve as a useful reference book for the architect in writing his specifications, and is also of interest to decorators and wood finishers. We understand that a copy of the little work will be sent free to architects, finishers, &c., who may make application for it.

A Summer School for Artisans.

Announcement is made that the summer school for artisans which is held under the direction of the College of Mechanics and Engineering of the University of Wisconsin at Madison, Wis., will open July 6 next for its third annual session of six weeks. At the first session 44 students were in attendance, and this number was increased to 70 at the second session. The school has passed the experimental stage and is recognized as a practical and valuable institution. The departments of work include courses in heat, steam, gas and other heat engines ; applied electricity ; machine design ; materials of construction, fuels and lubricants ; shop work, including bench and machine wook in wood and iron ; foundry work, forging, tool making and machine construction and pattern work, and drawing.

The school is designed for the benefit of machinists, carpenters or sheet metal workers, engineers, superintendents and foremen of shops, water works, power stations, electric light plants, factories, &c., and for young men who wish to qualify for such positions. Theoretical and practical instruction is furnished in the trades named, and the pupils have the advantage of the use of the finely equipped shops and laboratories of the College of Engineering. All inquiries regarding the summer school should be addressed to F. E. Turneaure, acting Dean of the College of Engineering, Madison, Wis.

The new law regulating the hight of buildings on residence streets in the city of Washington will probably make many changes in plans for future improvements. Hereafter no building on such streets can be more than 80 feet in hight, but the new law allows buildings facing Government parks and triangles to be as high as the widest street at the intersection is wide. It is said that there were a number of apartment houses for which permits were withheld awaiting the action of Congress, and many of these will have to be reduced in hight in order to conform to the provisions of the new law.

Architect Titus de Bobula has just removed his offices to the Farmer's Bank Building, corner Fifth avenue and Wood street, Pittsburgh, Pa., which has the name of being the tallest skyscraper in that city.

New York's Latest Style Dwelling House.

This is the way a writer in one of the daily papers comments upon a certain style of dwelling which is now to be found in the fashionable quarter of the city :

New York at last has a *nouveau art* house. It is a dwelling far up in Fifth Avenue, opposite Central Park, and although not yet completed is the object of more attention than any other nearby.

It is four stories and narrow, done in red and black brick with colored tiles let in at apparently any point that the imagination of the architect suggested, but the colors are subdued in tone as if the designer had not quite dared to go as far as he might in a city as yet unsupplied with any large number of *nouveau art* homes. The balconies are ornamented with iron scroll work in the general style of the building and the whole is an agreeable variation in the monotony of the other residences. What an entire *nouveau art* block would look like is another matter.

In Germany and Austria and to a smaller extent in Belgium, this style of architecture has become very common. That seems scarcely likely to happen in this city. But there is a certain comfort about having at least one house of the kind. It shows that we are not without knowledge of the style. Whether we happen to care about it or not is different.

CONTENTS.

DESIGN OF FRAME RESIDENCE AWARDED THE THIRD PRIZE IN THE THIRTY-FIFTH COMPETITION.

MARK H. WHITMEYER, ARCHITECT.

DANVILLE, ILLINOIS.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

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

JUNE, 1903.

The Local Building Situation.

The overshadowing feature of the local situation is the practical deadlock which exists in the building business, whereby active operations on all important work have been brought to a standstill. When the trouble between the two rival carpenters' and joiners' associations developed about May 1 it was thought that it would not prove of long duration, and probably this would have been the case had the situation not been further complicated by the attempts of outside team drivers and handlers to unionize the yards of the dealers in masons' building materials, lumber, &c., with the result that the employers assumed the aggressive, and through their associations declared a lockout by closing their yards. As a consequence of this step no building materials of any account are being delivered within the boroughs of Manhattan and the Bronx, and work has practically ceased on every important building contract in the city. Meetings have been held by the employers directly concerned, and the Building Material Dealers' Association with the Lumbers Dealers' Association have decided to act together in the matter, while representatives of the Brick Manufacturers' Association are understood to have agreed to co-operate in any plan which will tend to bring order out of the chaos created by the demands of the unions. The Mason Builders' Association, which counts among its members the leading general contracting firms in the city, has also decided to stand with the first named associations against the striking material drivers and truckmen. The opinion seems to prevail that if the lumbermen and material dealers' associations yield and allow their yards to be unionized, it will place the entire building business at the mercy of the Board of Building Trades, and might cause the paralysis of the building industry at any time one of the affiliated unions of the board made demands. Notwithstanding the various agreements which went into effect on May 1, the men in several lines have made demands for increased wages and differences exists in many branches of the trade. The general situation has assumed such shape that meetings of representatives of the various associations of employers in the building trades have recently been held to consider plans for bringing about normal conditions in the industry to the end that the present epidemic of strikes, which seems to be sweeping over this part of the country, may not cause an abrupt termination of the building season. A call has been issued by officials of the Building Trades' Association for a general meeting of all the associations of employers in the building trades in Manhattan and the Bronx, to take place Friday evening, May 15, for the purpose of considering "what steps shall be taken to remedy the existing intolerable conditions." It is thought that one of the first steps in dealing with the situation will be the formation of a powerful organization of employers, and somewhat similar action is expected to be taken by the employers in the building trades in Brooklyn. It is the general feeling of the employers that the present labor situation calls for unusual and determined action on their part. This is probably the first time in the history of local labor disputes that the employers have recognized the necessity of organizing to resist the encroachment of the labor unions. Should both sides remain obstinate in their positions and refuse to make concessions, a bitter and prolonged struggle may ensue which would seriously affect the business and public interests of New York City and vicinity. This is the time when the building trades should be specially active, and the present season gave every promise a short time ago of being an unusually prosperous one. A great deal of building construction is under way, and much is in prospect, ready to be pushed to completion provided the labor outlook is satisfactory. It is certainly to be hoped that some method of arriving at a mutual understanding will be adopted whereby the building situation may be clarified and a prolonged tie up of operations averted.

Employers' Protective Associations.

Apropos of the movement looking to the protection of the interests of the employing builders, it is rather significant of the present tendency of the times that so thoroughly has the desirability of organization impressed itself upon business interests that scarcely a branch of productive industry can now be found in which some kind of an association does not exist. Many of these are of a purely social and educational character, having for their primary object the interchange of ideas for mutual improvement. Others are commercial in their nature, while a few have for their special object the management of the labor question. Organizations of the class last named are of a comparatively recent origin. In fact, it may be stated that the labor question was so long considered such a dangerous matter to touch upon that organizations of employers deemed it wise to expressly disclaim any intention of handling it when forming an association, but very much against their inclination this course has been forced upon them by the developments of the last few years, and it now appears not only necessary to maintain organizations for the express purpose of dealing with labor problems, but also to include the labor question as one of the subjects to be given consideration by all associations of employers except those of a strictly technical character. The fact is becoming impressed upon careful observers that the general attitude of organized labor is not altogether conducive to the best interests of the country. Too often leaders display unceasing activity in endeavoring to break down the control of labor by employers and to curtail the liberty of citizens generally. If strikes prove a failure, they apply to the law making bodies of the States, or the nation, and bring to bear the power of the great body of voters to secure the enactment of laws giving them what they want. If judges issue injunctions restraining riotous strikers from interfering with the peaceful conduct of business operations, the representatives of the strikers ask Congress to pass a law forbidding injunctions in labor troubles. If employers successfully oppose an attempt to force upon them a shorter day, the labor leaders appeal to Congress for an act which will prove the entering wedge in the establishment of a general eight-hour day. The statute books of many of the States are now burdened with enactments passed at the instance of organized labor, and unless strong efforts are made by employers it is not too much to assume that ere long the United States statutes will be considerably expanded by legislation of this character. The effect of such a movement, if long continued, cannot fail to be serious in the extreme. One of its worst features is that it subverts discipline, which is so essential to success in any undertaking involving the employment of a number of hands. In resolutely opposing retrogressive forces employers have a duty to perform which is not altogether selfish. While their investments are imperiled, other considerations should also influence them in taking an aggressively defensive stand against the schemes of labor leaders to secure control of the business interests of the country. Selfishness would perhaps lead to compromises for temporary individual advantage. Some employers have reaped considerable profit by yielding to the demands of labor during a strike in which their competitors, by refusing to surrender, were unable to transact any business for a long time. Action of this character in the past may not have been specially serious, but we now seem to have arrived at a critical period in handling the labor question, and a new policy appears to be required. It would seem to be the part of wisdom that employers stand together and waive temporary considerations for the permanent benefit not only of themselves but of the community at large.

American vs. English Basement Houses.

In late years there have been erected in this city a great many private dwellings which have been designated as "American" basement houses as distinct from the old time "English" basement houses, and no little discussion has been created among architects and builders as to the real difference between the two types of houses. The English kind is familiar in Boston, Philadelphia and Baltimore, and is, with unimportant modifications, the typical city house throughout England. The "American" basement house is peculiar to New York City, and nearly 95 per cent. of the new dwelling houses built in this city in recent years by speculative builders are of this type. There is not a floor in this type which can be thrown open entirely for entertainment. The dining room, foyer and salon are on the same floor, but the library is above the salon, and on the floor with the sleeping rooms. The kitchen and laundry are on the entrance floor, thus occupying one of the most important parts of the house.

In the "English" basement house the basement is exclusively occupied by the kitchen, laundry and servants' hall. The first story is raised three or four steps above the curb, and is occupied by the reception room and dining room. Above this floor are the salon, staircase hall and library, while the third floor contains the master's apartments. This arrangement, it will readily be seen, lends itself more advantageously to entertainments and affords likewise more privacy.

A well-known New York architect recently expressed the following views to a representative of the *Tribune:*

"The American basement dwelling house was evolved from the old fashioned high stoop house, and is the only successful economical alteration of this type of house without changing the level of the floors. Builders took their cue from such alterations, and, because of the economy in excavating, adopted and popularized the so-called American basement house. The American basement first became popular on the upper West Side, where the people do not entertain much, and where economy in running the house from the point of view of heating, servants, &c., is to be considered. In the American basement the kitchen is placed on the entrance floor, occupying space which in any intelligently planned house of 25 feet or more in width should be given to the dining room. The place for the kitchen, servants' hall and laundry is in the basement, and not on the first floor. There is one excuse for the American basement house, and that is where the lot is very narrow, say 17 feet, and it is desired to get a large room in the front of the house. In that event the entrance must be underneath this room, but even then the more attractive house would be the English basement, omitting the reception room from the first floor and receiving in the salon, on the second floor, as is the custom in many English houses. The American basement has one less room than the English basement house, and so, of course, is a more economical house to build and a more economical house to maintain. The successful builders of the upper West Side, having exhausted the available land, turned their attention to the east side of the Park, and brought with them the type of house which they had sold on the West Side.

"It is a curious fact that, aside from altered houses, no one who has built his own house on the East Side, 25 feet or more in width, has built an American basement house. With the exception of the Farley houses, builders have not built anything except American basement houses. There are two or three blocks of houses, built some time ago, which are of the English type. They stand out as an old advance guard. One of these blocks is composed of some of the most attractive houses in the city; it is between Fifty-seventh and Fifty-eighth streets, on the east side of Fifth avenue. Another block of English basement houses is between Eighty-fourth and Eighty-fifth streets, on the east side of Fifth avenue."

Death of Henry Van Brunt.

In the death of Henry Van Brunt, which occurred at Milton, Mass., early in April, the architectural profession lost a most honored member. For 20 years he practiced in Boston, where he achieved a reputation as a designer of buildings for Harvard University, churches, public libraries, &c., throughout the United States. In 1887 he removed to Kansas City, where he joined his old partner, F. M. Howe, who had preceded him two years before. In 1890 he returned to this country from a year's trip abroad, and was selected as one of the ten architects for the designing of the Columbian Exposition, his particular work being the Electricity Building. As an architectural critic Mr. Van Brunt stood very high among the practicing members of his profession. He was a somewhat voluminous contributor to architectural journals and literary magazine, and he also translated Viollet-Leduc's "Discourses on Architecture."

Some New Department Stores.

The new department store which is being erected upon a portion of the site of the old Macy store at Sixth avenue, Thirteenth and Fourteenth streets, New York City, will be a ten-story structure, with basement and subbasement. The work of demolishing the old building is making rapid progress, and it is expected to have the new store ready for occupancy by the opening of the new year. According to the plans of the architects, Cady, Berg & See, the new store will on the Fourteenth street side include the modern nine-story arcade entrance building, formerly a part of Macy's store, and only recently erected. There will be more than 40,000 feet of floor space, insuring broad aisles, capacious entrances, easy stairways and moving platforms. In the new building will be a handsome art gallery, a modern, fully equipped "rest room," a writing room and a large restaurant, together with 22 elevators for passenger and freight service.

Another important building in this line is the store to be erected for John Wanamaker on the block bounded by Broadway, Ninth street, Fourth avenue and Eighth street, New York City. It will be 13 stories, with basement and sub-basement, in hight and will cost between $3,500,000 and $4,000,000. The plans have been prepared by D. H. Burnham & Co. of Chicago, who also prepared the drawings for the new Wanamaker store to be erected in Philadelphia. The New York building will be of steel construction, fire proof throughout, with exterior walls of granite, limestone and terra cotta. In the center of the building will be a grand stair, extending to the eighth floor. The delivery department and wagon concourse will be at the corner of Fourth avenue and Eighth street. The interior wood work of the structure will be of San Domingo mahogany and quartered oak. It is estimated that about 15,000 tons of structural steel will be required for the building.

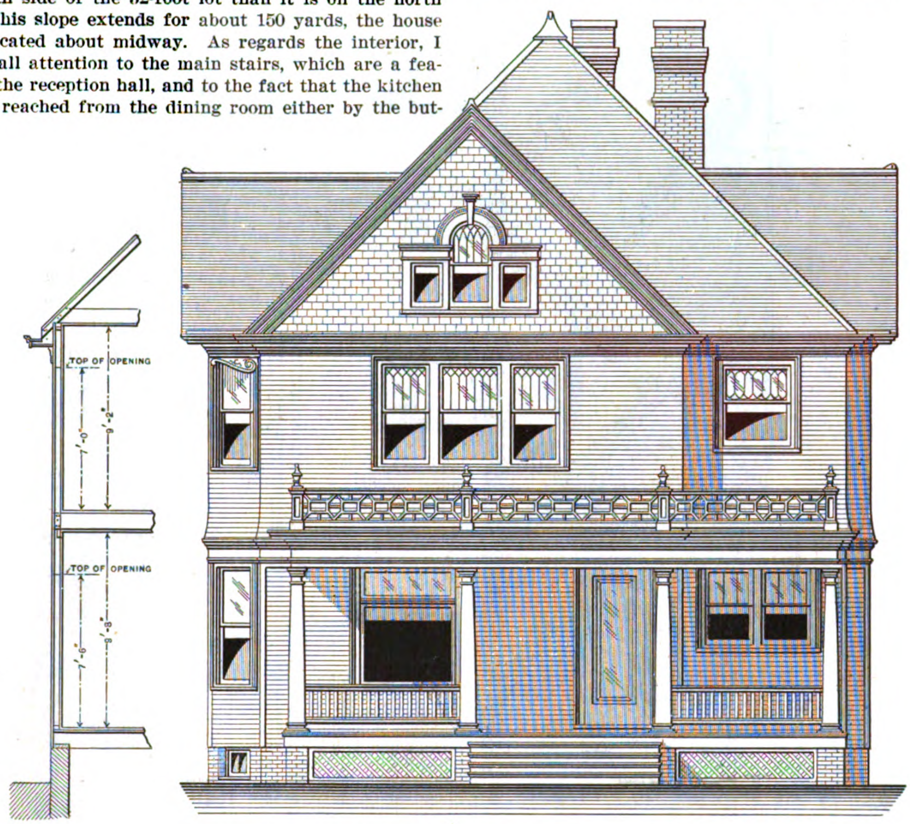
COMPETITION IN $5000 FRAME HOUSES.

THIRD-PRIZE DESIGN.

WE take pleasure in laying before our readers the design awarded the third prize in the competition in $5000 frame houses, the author being Mark H. Whitmeyer of 15 North Vermilion street, Danville, Ill. Since the time the drawings were forwarded the house has been completed, and our half-tone supplemental plate, reproduced direct from a photograph, shows the appearance of the finished dwelling. In referring to the design the author presents some comments, from which we quote as follows:

"The house is designed for an east front and is built on a slope, the sidewalk being about 10 inches lower at the south side of the 52-foot lot than it is on the north side. This slope extends for about 150 yards, the house being located about midway. As regards the interior, I would call attention to the main stairs, which are a feature of the reception hall, and to the fact that the kitchen may be reached from the dining room either by the butler's pantry or through the passage at the head of the basement stairs, and that the door from the kitchen contains chipped glass. This would more effectually shut off the objectionable portion of this passage. In the present instance the owner raised an objection on account of the number of doors. The large alcove on the second floor might with a few slight changes be made into a sewing room. It might possibly be thought best to move the hall a little to the north, making the servants' room and the closet of bedroom No. 3 a little smaller, thus increasing the size of the rooms on the south of the hall. This, of course, is a matter of choice on the part of the owner.

"The house is now being built at Danville, Ill., from these plans, except for the extras which I shall mention. The contract was let at $3447, the next highest bid being $3453, and the average of the seven bids received being $3629. The contract includes just what is put under that heading in the estimate, the other articles being listed separately. The plumbing contractors will not figure as subcontractors in the State, hence the necessity of figuring separately. The heating and electrical wiring were reserved for special reasons. The estimate appended is based upon the actual construction of the work, the actual bills of material being used where obtainable. The work at this writing is ready for the finishing wood work (interior), hence is so nearly completed that there is little room for error in these bills. In connection with the estimate it may be well to state that as the work is being done in winter the contractor has made a reduction, as is customary here, in order to keep the men employed. The plastering contractor personally informed me that he made a reduction of $20 in the plastering. It must also be considered that we have here one of the largest common brick factories in the country and can get the best of good hard burned shale brick, laid down at the work, for $7.50 per 1000. The furnace used in the heating is also a product of our city and was put in by the manufacturers; hence the freight, or the transportation at least, was saved."



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

Competition in $5000 Frame Houses.—Third-Prize Design.—Mark H. Whitmeyer, Architect, Danville, Ill.

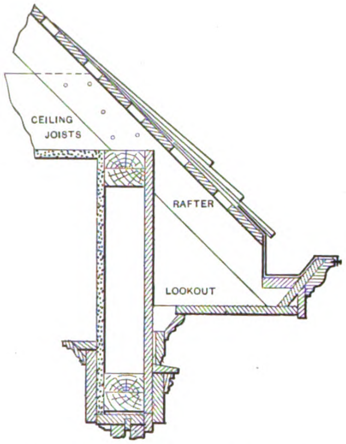
The following is a description of the method of construction of the building, together with that of the materials used:

Specifications.

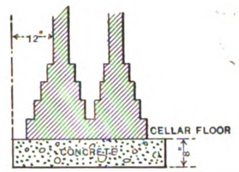
Excavation extends under the entire building. Cellar floor is 7 feet clear under the joists. Dirt from excavations used in grading, all being used.

Brick Work.—Walls and cross walls, with footing, piers, &c., of hard shale brick in lime-cement mortar. Flues tile lined. Large ash pit under hearth. Large concrete footings under the chimneys.

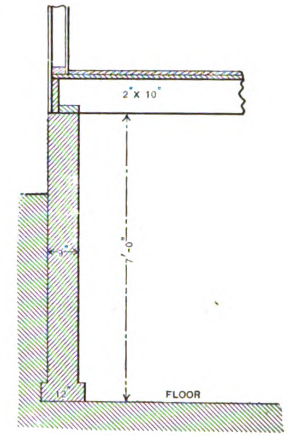
Drains.—No drains are built except vitrified tile, 4 inches, from all leaders to the cistern. As the cistern was previously built on the lot it is not included in this work. Tile to cistern are well laid and set in cement.



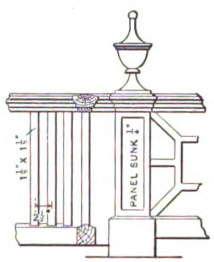
Details of Main Cornice.—Scale, ¾ Inch to the Foot.



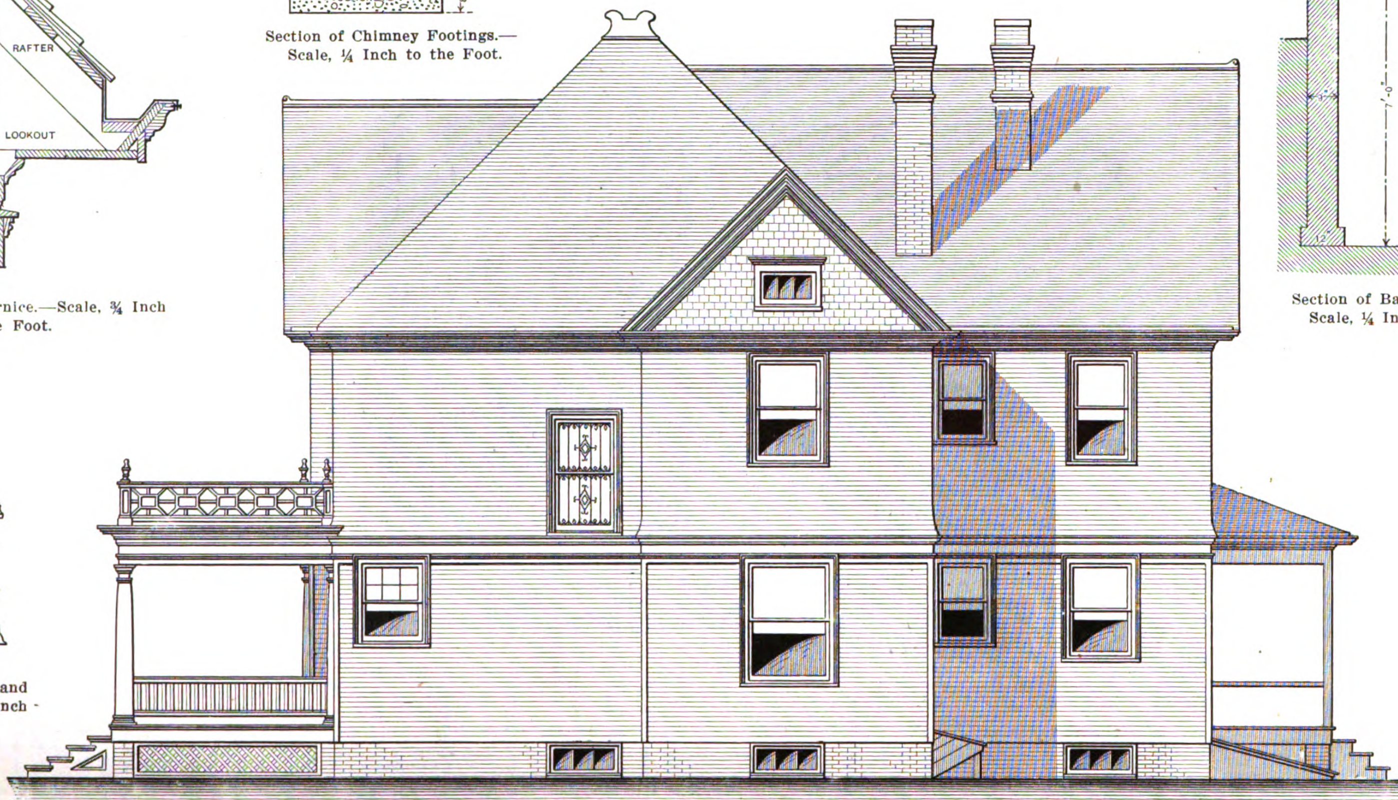
Section of Chimney Footings.—Scale, ¼ Inch to the Foot.



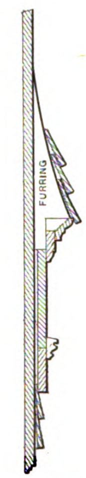
Section of Basement Wall.—Scale, ¼ Inch to the Foot.



Details of Porch Railing and Balustrade.—Scale, ⅜ Inch to the Foot.



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



Detail of Belt Course.—Scale, ¾ Inch to the Foot.

Competition in $5000 Frame Houses.—Third-Prize Design.—Side Elevation and Miscellaneous Constructive Details.

Carpenter Work.

Framing Timbers.—Yellow pine, to be sound, well seasoned and free from defects, shakes, and any large loose or black knots, or other defects materially impairing its durability or strength.

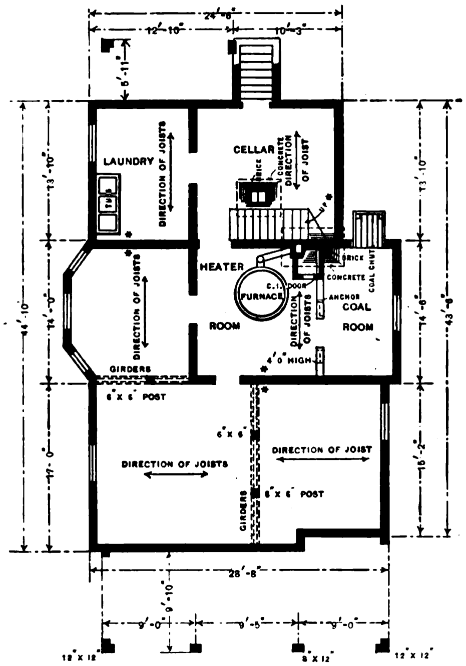
Sills and Joists.—Balloon sill made as shown on plans. Joists 2 x 10 inches, 16 inches on centers, notched over wall plate. Doubled joists under all partitions running same way. Joists lapped and spiked on girders. Joists under hard wood floors in second story notched out ⅞ inch for double floor. Headers and trimmers made with doubled joists. Joists bridged with one row 2 x 2 inch cross bridging in spans over 10 feet, and if span is 16 feet or over two rows.

Walls and Partitions.—Studs 2 x 4 inches, set 16 inches on centers. Studs set on 2 x 4 inch plate. Where possible studs to be continuous throughout the hight. Trussed over all openings over 4 feet in span. Corners formed by three studs, spiked together to arrange corners for lathing. Top plates are doubled. Sliding door pockets lined with ⅝-inch stuff, matched. Studs doubled around all openings.

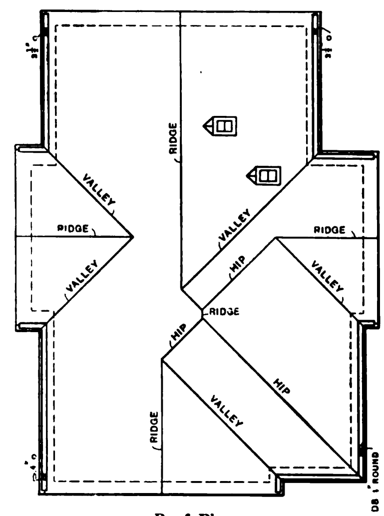
Lining and Paper.—Lining is No. 2 8-inch flooring, put on diagonally and nailed to every bearing with three 8d. nails. Paper is red rosin sized, grade A, laid with a 2-inch lap.

Roofs.—Rafters under 14 feet are 2 x 4 inches, 14 feet and over are 2 x 6 inches, placed 20 inches on centers. Valleys, 2 x 10 inches; hips, 2 x 8 inches. Roof sheathing is No. 2 pine, 1 x 4 inches, laid 2 inches apart and nailed to every bearing with two 8d. nails. Shingles are best clear red cedar, 5 to 2, laid 4½ inches to the weather, narrow open valleys and Boston hips. No shingles less than 3 inches wide. At least two nails to each shingle and all shingle nails cut nails. Shingles dipped 11 inches in stain by the painter before laying. No. 26 G. I. finials and ridge roll. Flashing, Scott's, Taylor's or Hamilton's best old style IC.

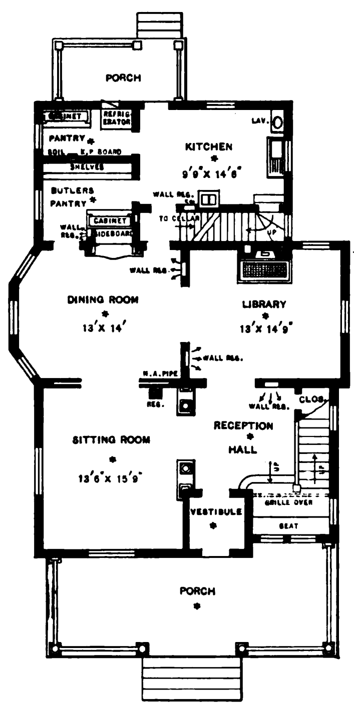
Siding.—Best clear yellow poplar siding, "no bastard poplar admitted," 4 inches wide, laid 2¾ inches to the



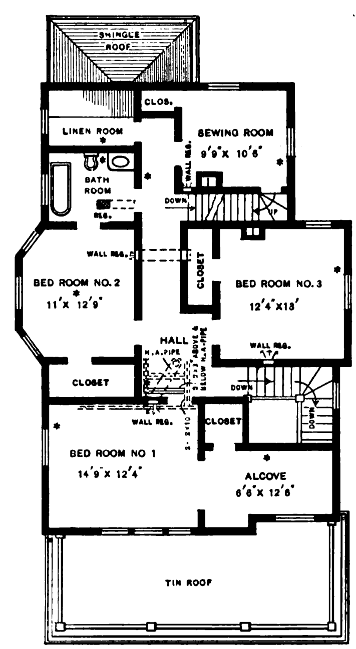
Foundation.



Roof Plan.



First Floor.



Second Floor.

Competition in $5000 Frame Houses.—Third-Prize Design.—Floor Plans.—Scale, 1-16 Inch to the Foot.

weather, nailed to every bearing with 6d. nails set in for puttying. Corner boards in first story and lap mitered in second story. Gable shingles selected from roof shingles and dipped 11 inches in stain. Laid 4½ inches to the weather.

Outside Finish.

Material is well seasoned white pine or poplar, free from sap, shakes and large or black knots, or other imperfections materially impairing its durability or appearance. Primed as put up. Cornice has brackets or lookouts to each rafter. Raking cornice same as horizontal. Corner boards 1⅛ x 3 inches. Belt course as detailed. Window frames all molded, except those on rear, which frames have crown mold and drip. Outside casings are 1⅛ x 4½ inches.

Porches.—Floor of ⅞ x 3 inch clear white pine or fir, laid over 2 x 8 inch joists. Steps 1⅛-inch tread and ⅞-inch risers, edges of steps and treads formed into nosing and scotia put under. Ceilings are level, of ⅝-inch beaded yellow pine, and are to be finished natural. Lattice is ⅜ x 1⅝ inch frames under front porch.

Columns are 10-inch built up, bases and caps turned, pilasters 4 x 10 inches at base. Railing is built up top rail and solid 2½ x 3½ inch bottom rail.

Top and bottom rail of balcony are same as those below, with baluster pattern built up of 1⅝ x 1⅛ inch stuff. Posts solid, panels run in and with wood turning on top. Tin carried under posts, then a flashing turned into saw kerf in posts and soldered down to roof.

Rear porch has plain 5 x 5 inch columns and post, plain 2 x 4 inch beveled top rail, the frieze box smaller and no scotia under nosing. Otherwise it is the same as the front porch.

Composition Work.—The two large composition brackets are No. 1955 from the Architectural Decorating Company's catalogue, are 32 inches long, 11 inches face and 13 inches drop.

Cellar Hatchway.—Top frame of 2-inch stuff, bolted down to the brick work; two batten doors at top with battens screwed on, fitted with strong wrought iron hinges, hasp and suitable lifts. One wide batten door at the bottom, fitted with bronze bolt rim lock, hung on wrought hinges. Steps of 2-inch mill dressed plank on horses, steps 1 inch clear of the brick work.

Window Frames.—Jambs and heads 1⅛ inches thick, steel pin pulleys, iron weights. Regular cellar frames in basement, hinged to swing in and fitted with hooks, buttons, &c.

Door Frames are blocked solid for hinges and locks. Frames for masonry have 2-inch jambs and anchors. Birch inside door frames 1⅛ inches thick, yellow pine ⅞-inch. Outside door frames 1¾ inches, rebated for doors; front frame of birch for natural finish.

Temporary Inclosing.—House to be temporarily inclosed for the plastering. Sash in inferior rooms may be put in before plastering.

Grounds are set ¾ inch thick for all base, casings, &c.

Floors.—An under flooring of 8-inch No. 2 pine flooring is laid diagonally over the first-floor joists before the plates are set. This floor is well nailed to each bearing with 8d nails; nailers cut in where required and come flush with the outer edge of the sill. Over this floor is a layer of red rosin paper, grade A. The same sort of a floor is put under the hard wood floors upstairs.

The hard wood floors are ⅞ x 2½ inch clear comb grained yellow pine. They are laid throughout the first story and throughout the hall and bathroom of the second story. They are of strictly clear material, are blind nailed, &c., planed, scraped, sandpapered and left in first-class condition for finishing. Color to be selected uniform in each room. All other floors are No. 1 ⅞ x 4 inch fencing flooring; attic floored throughout with 8-inch No. 2 flooring, all matched.

Sash are all regular pattern, weather lipped meeting rail. Sash for glass over 26 inches wide have 1½-inch meeting rail. Attic and cellar sash, 1⅛ inches thick; sash for plate and art glass, 1¾ inches thick; all other sash, 1⅜ inches, primed with oil inside. Plate glass fastened in with stops.

Glazing.—Plate glass is best American plate. Art windows on stairway lightly tinted glass. Owner buys one art transom. All other glass AA and A, D. S. All glass is well bedded, tacked and puttied.

Doors are 7 feet 6 inches downstairs, except in minor rooms, and 7 feet upstairs. Principal doors downstairs 1¾ inches thick; all others 1⅜ inches. Birch doors, six cross flat panels, bead and cove sticking, veneered. Front and vestibule doors have 6-inch stiles and top rail; bottom rail 12 inches; are molded with egg and dart molding, and have plate glass with 1½-inch bevel. Doors for yellow pine trim are white pine stiles and rails and yellow pine panels. These are five flat cross panels and are AAA machine smoothed for oil finishing. A machine smothed doors are admissable in kitchen and pantries. All doors are blind tenoned.

Trim and Base.—All strictly clear; no window or door trim to be spliced. Casing, 4¼ inches wide; head, 8 inches wide; 3-inch crown mold at top. Birch base is 8-inch wide, with a mold on top. Yellow pine base, stock pattern, 8 inches. All is well smoothed and sanded. All principal rooms have picture mold of natural wood.

Stairs.

The main stairs are entirely of birch, strictly clear. Risers, ⅞ inch, and treads, 1⅛ inches, tongued and grooved together, and both housed into the wall strings with wedges glued in. Treads having nosing on the edge and end, with a scotia under. The wall strings and front strings are ⅞ inch, molded to correspond to the birch base. Rail is as detailed. Balusters, 1⅜ inches, turned, three to the tread. Main or starting newel is 7 inches, and landing newels 5 inches. Rail is well bolted together and to posts, &c.

The rear and attic stairs are of yellow pine, with wall strings to match the yellow pine base, and treads and risers not tongued and grooved or housed. Otherwise the same construction. Cellar stairs of 2-inch treads and ⅞-inch risers. All stairs are well supported on horses and well secured in position.

Colonnade.—The colonnade from the reception hall to the sitting room is of birch, to match the other finish and built as detailed. Columns are 8 inches in diameter built up, turned, with turned bases and composition caps as shown.

Seat.—The seat on the landing is of birch, to match the rest of the trim, with panels at back and end up to the windows and panels in front.

Pantries.—The butler's pantry has a cabinet, 4 feet 6 inches long, with shelves 12 inches wide above the base shelf and 16 inches wide below it, with doors 1⅛ inches thick. Also shelves along entire opposite side with a tier of drawers under one end. The kitchen pantry has also one dresser of similar design.

Closets.—Each closet has a row of hooks entirely around the wall space, and has at least one shelf.

Plasterer's Specification.

Lath.—The ceilings, walls, stair rakes, &c., of the two main stories and the ceilings of the furnace room and the laundry are lathed with best pine lath, properly spaced, nailed at every bearing, joints broken every tenth lath, and with no lath put on horizontally of run from one room into another.

Plastering.—Basement ceilings have scratch coat only. All other walls and ceilings have scratch and brown laid on or drawn work. These coats are carried behind all trim and base. Lime is screened through one-quarter mesh screen, plenty of good, long hair mortar stacked before using. All ceilings to be perfectly level, and walls straight, true and plumb, and all angles sharp and true.

All plaster of the first and second stories is to be finished with a finish of lime putty, white sand or marble dust and plaster of paris, finished and troweled to a smooth even surface and free from defects or brush marks.

Hardware.

The hardware used was selected from the Reading Hardware Company's catalogue, and the numbers are given as well as a short description.

Front door lock, 1400½, easy spring, night latch attachment, bronze bolt and strike.

Inside doors and rear door, 01199½, easy spring, bronze bolts and strike. Vestibule door hung on double swing spring hinges with no lock, but with two wrought bronze plain 3 x 12 inch push plates, and two 6 x 24 inch kick plates, finished to match the other hardware.

Inside door locks, No. 01199½.

Sliding door lock No. 01288¾.

The trim is Creston wrought bronze for the birch finished rooms, the kitchen, pantries, &c., bronze plated on iron (plain), and the second story has Reole design bronze plated on iron. The plain hardware is old copper polished, and all other is sand blast brass finish.

Butts are 3½ x 3½, finished to match the other hardware, cast steel; the spring hinges, Chicago, finished same as the other hardware.

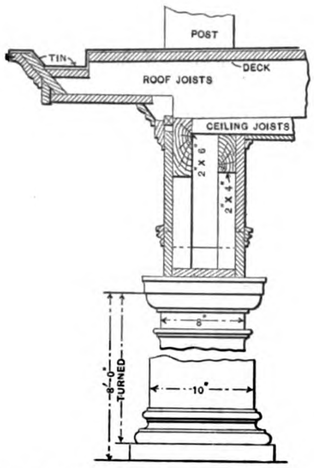
Sliding door hanger is Wilcox trolley. All doors have rubber tipped door stops.

Painter's Specification.

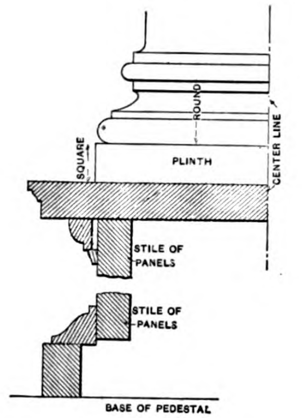
Exterior.—All sap, knots and defects in wood work which is to be painted are to be covered with strong shellac before priming; nail holes, cracks, &c., puttied after priming. All exterior wood work except as below mentioned is to receive three coats of paint composed of one part best zinc white and five parts best white lead, thoroughly mixed and thinned to proper consistency, the last coat containing no turps. Trimmed in colors as designated by the owner.

Shingle Stain.—Shingles are dipped in stain 11. Cabot's 144 for the roof and 303 for the gables.

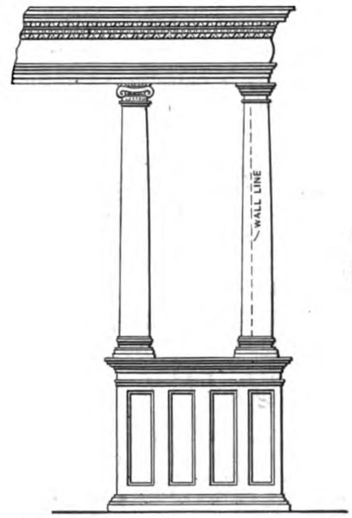
Natural Wood Finish.—Wood thoroughly cleaned. Puttied after first coat to match the wood work. Outside, front door and both porch ceilings finished with



Details of Porch Column and Cornice.—Scale, ¾ Inch to the Foot.



Details of Column, Base and Pedestal Cap of Colonnade.—Scale, 3 Inches to the Foot.

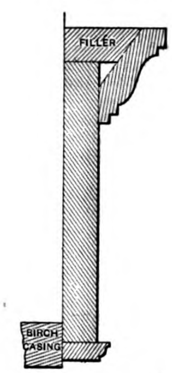


Partial Elevation of Colonnade Between Reception Hall and Sitting Room.—Scale, ⅜ Inch to the Foot.

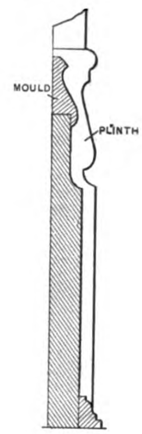
Section of Yellow Pine Casing.

Section of Birch Casing.

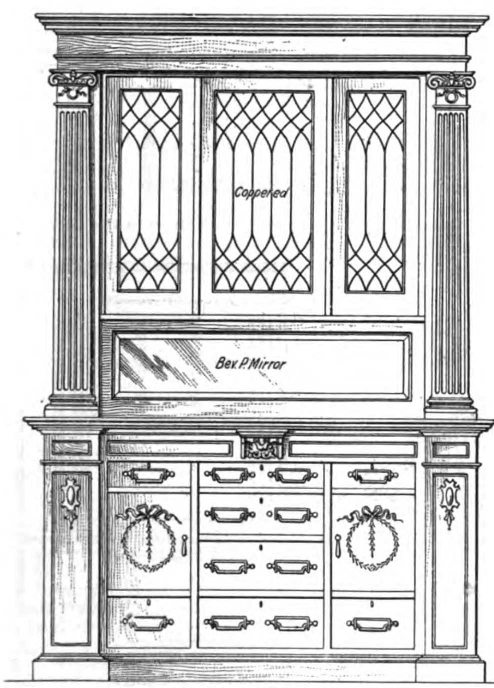
Scale, 3 Inches to the Foot.



Section through Birch Cap.

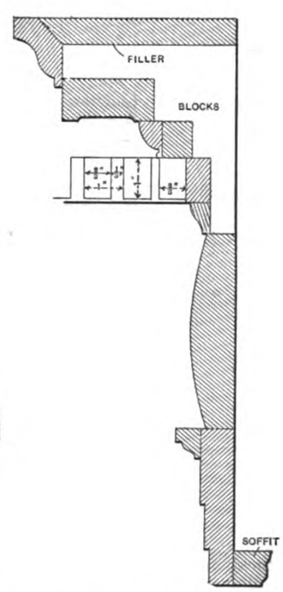


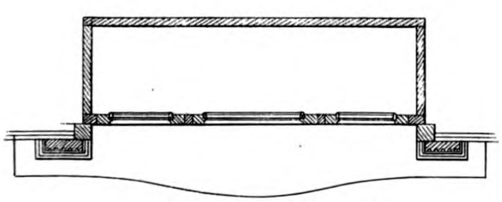
Base.



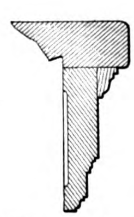
Front Elevation of Sideboard and China Cabinet.

Section.





Plan of Sideboard and China Cabinet. Scale, ½ Inch to the Foot.



Window Stool and Apron.

Details of Entablature of Colonnade.

Scale, 3 Inches to the Foot.

Competition in $5000 Frame Houses.—Third-Prize Design.—Miscellaneous Constructive Details.

a coat of surfacer and two coats of Rosenberg's Elastica No. 1. Interior, same except Elastica No. 2. Window stools same as exterior. All floors and stair treads have three coats of Gutta Percha floor finish. All this work is sandpapered after the first coat and rubbed with hair cloth after the second coat.

Metal Work is painted two coats by the painter. All metal showing from below to be painted to match the body and trim. All other to receive two coats of red lead and oil.

Tinner's Specification.

Material for the tin work is to be Scott's, Taylor's or Hamilton's best old style roofing tin, IC thickness, painted on underside before laying and on the top immediately after laying. Solder, half tin half lead; resin as flux. Galvanized iron is No. 26.

Roof.—The roof is laid in 20 x 28 inch sheets, with 12 nails to the sheet, no nail heads left exposed; tin is turned up under the siding 6 inches. Valleys are 14 inches wide. Leaders are five in number, rectangular, corrugated G. I.

Furnace.

The furnace is a No. 34 modern all steel furnace, closely riveted with heavy rivets and calked joints, all heating surface curved, the feed necks and pipe collars protected by heavy backing flanges on the inside of the dome, which entirely prevents the steel from springing away. The fire pot is constructed of the best sectional fire clay brick 3 inches thick, which, being set in a circle, are self supporting. Sections can be replaced from the door without disturbing the setting of the furnace. The fire pot is as large at the bottom as at the top, giving large grate surface. The grate is a flat sliding and dumping grate, which, in case of breakage, can be removed through the ash pit door. Casings are made double, galvanized outside, and the inside casing of tin lined with asbestos paper. Has chain regulator in library. Rating, 50,000 cubic feet.

There are japanned wall registers in every room except the sitting room and bath, which have floor registers. The linen room and pantry have no registers. These wall registers are patent adjustable registers known as the "Ideal." There is a 30 x 30 inch electric bronzed return air register under the front stairs. All wall stacks are doubled or safety pipe, as required by our city ordinances. Basement pipes are wrapped with heavy asbestos.

Plumbing.

The pipes for the plumbing are all standard, as are the gas pipes. Soil pipe extends through roof with a proper lead flashing. Bathroom traps vented, others not vented. All exposed piping in bathroom is nickel plated. Hot and cold water system connected to kitchen range. Thirty-gallon galvanized boiler. About 150 feet of 4-inch vitrified sewer set in cement. An outside grease trap laid up in brick and cemented inside, as required by the building ordinances.

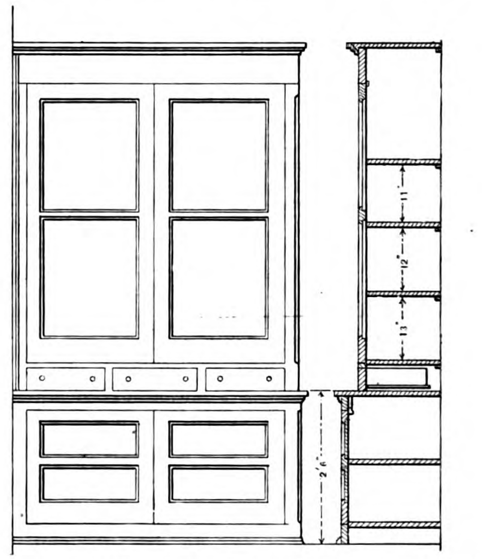
Fixtures.—One 20 x 30 inch kitchen sink, enameled inside, with enameled iron drip and 15-inch high back enameled, all white enamel.

In the kitchen is also one small corner lavatory, roll rim and 15-inch high back on two sides, all in one piece.

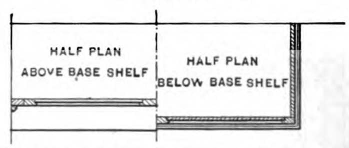
In the bathroom is one lavatory of similar pattern except larger.

The water closet is a high tank closet, porcelain bowl, siphon jet. The tank is plain antique quartered oak finished copper lined.

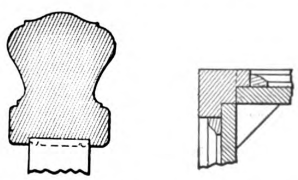
The bathtub is not included in the present contract, as the owner had in his possession a tub suitable for use.



Elevation and Vertical Section of Pantry Cabinets.—Scale, ⅜ Inch to the Foot.



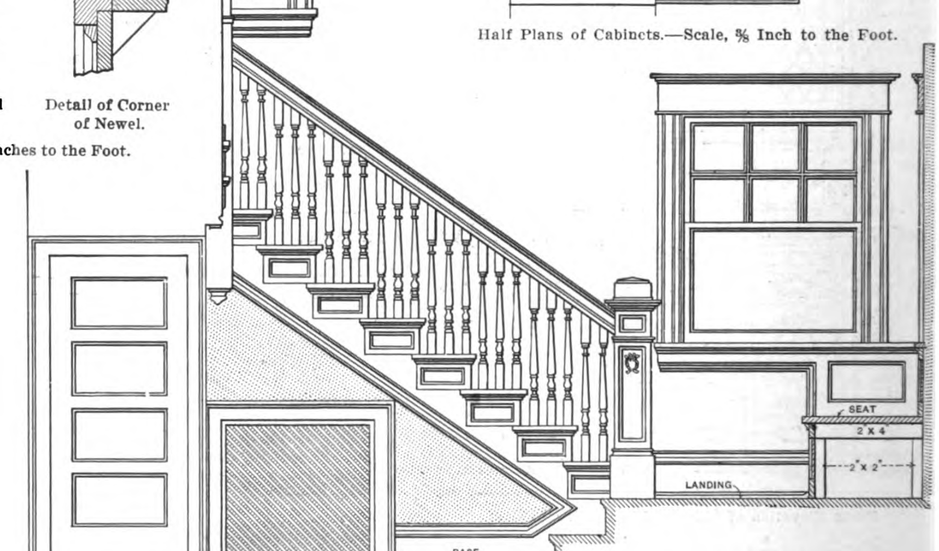
Half Plans of Cabinets.—Scale, ⅜ Inch to the Foot.



Section of Hand Rail.

Detail of Corner of Newel.

Scale, 3 Inches to the Foot.



Elevation of North Side of Reception Hall as Viewed from the Sitting Room, Showing Window and Seat at First Stair Landing, also Door to Closet Under Stairs and Large Bronzed Air Register.—Scale, ⅜ Inch to the Foot.

Competition in $5000 Frame Houses.—Third-Prize Design.—Miscellaneous Constructive Details.

Laundry Tubs.—Set of three porcelain enameled roll rim, painted outside.

The city water was in the lot and had been attached to a previous building, hence this part of the supply system is not included in this work.

Wiring.

The house was wired for city service. The fuse box is located in the rear hall upstairs. The switches are all three-way flush switches.

Estimate of Cost in Detail.

We present herewith the author's estimate of the cost in detail, together with his comments. "In the items will be found the estimate for a 3-inch concrete floor for the basement throughout and the addition of a sideboard. These two items are added separately to the general contract and the contractor has made his certificate to cover them. The owner is to furnish the mantel, one art glass transom, the grille over the stairs and the work in connection with the sidewalk. As he is also to furnish the bathtub, I have allowed for it. These items are not covered by certificate, but the work of connection or putting them in, with the exception of the sidewalk, is covered by the certificates, and as the total is considerably under the limit and the estimates covering the same is ample it is hardly necessary to have them so included.

"I wish to state that while the item of carpenter work and incidentals looks small in this estimate, the lumber bill is $51.20 higher than the lumber bill used on the house. I could not obtain from the lumber yard the detailed bill as I did from the planing mill. I therefore had to take the bill of lumber given me by the contractors as the material which went into the building and make the estimate at current prices for the same, which came out $698.20, while the same lumber was furnished on the work for $647. The estimate for the mill work is an exact copy from the books of the mill."

MILL WORK.

9 cellar sash and frames	$18.00
1 coal chute	4.00
2 cellar doors and frames	5.00
1 front door and frame, 6 ft. 6 in. x 3 ft. x 1¾ in.	25.00
1 rear door and frame, 2 ft. 10 in. x 7 ft. 6 in. x 1¾ in.	9.00
1 front window and frame for sitting room	20.00
1 double window and frame, 24 x 20 x 1⅜ in.	11.00
1 window and frame, 32 x 20 x 1⅜ in.	6.50
8 windows and frames, 44 x 32 x 1⅜ in., at $9	27.00
1 window and frame, 30 x 30 x 1⅜ in., coppered	25.00
3 windows and frames, 32 x 32 x 1⅜ in., at $8	24.00
1 window and frame, triple front, 2 24 x 28 in., 1 32 x 28 in., fancy top sash	22.50
1 window and frame, 36 x 28 in., upper sash leaded, D. S.	10.00
1 fancy front gable window and frame, top sash leaded	13.00
1 window and frame, 34 x 28 x 1⅜ in.	7.00
2 windows and frames, 24 x 30 x 1⅜ in.	10.00
3 windows and frames, 28 x 28 x 1⅜ in., at $6.50	19.50
2 windows and frames, 9 x 14 in., three lights, gable	5.00
2 windows and frames, 32 x 24 in., two lights, at $6	12.00
1 window and frame, 24 x 22 in., double	7.50
2 windows and frames, 30 x 18 in., at $5	10.00
2 windows and frames, 22 x 18 in., at $4.50	9.00
2 windows and frames, 32 x 28 in., at $6.50	13.00
2 windows and frames, 36 x 28 in., at $7	14.00
1 ice door	15.00
1 inside door and frame, 3 ft. x 7 ft. 6 in. x 1¾ in., veneered birch	22.50
1 colonnade complete	90.00
1 arched opening complete	20.00
1 pair inside sliding doors, 5 ft. 4 in. x 7 ft. 6 in. x 1¾ in., and frame	17.50
1 cased opening, 6 ft. x 7 ft. 6 in., birch	5.00
2 inside doors and frames, 2 ft. 8 in. x 7 ft. 6 in. x 2⅜ in., birch	18.00
2 inside doors and frames, 2 ft. 8 in. x 6 ft. 6 in. x 1⅜ in.	12.00
2 inside door and frame, 2 ft. 6 in. x 6 ft. 6 in. x 1⅜ in.	5.50
1 inside door and frame, 2 ft. 6 in. x 7 ft. x 1⅜ in.	6.00
1 set birch stairs complete	140.00
1 birch seat and platform	12.00
175 ft. birch base mold and strip	14.00
175 ft. birch picture mold	2.62
400 ft. Y. P. base and strip	13.00
2 Y. P. pantry cabinets, at $20	40.00
1 set pantry shelves and drawers	15.00
1 drip board	1.00
1 set cellar stairs	10.00
1 set rear stairs	30.00
5 inside doors and frames, 2 ft. 8 in. x 7 ft. x 1⅜ in., at $6	30.00
6 inside doors and frames, 2 ft. 6 in. x 7 ft. x 1⅜ in., at $6	36.00
1 inside door and frame, 2 x 6 ft.	5.00
200 ft. Y. P. picture mold	2.00
32 ft. closet shelves, at 3 cents	.96
100 ft. hook strips, at 1½ cents	1.50
Linen room strips	5.00
8 corner rolls	1.60
4 porch columns, turned, 10 x 10 in., 8 ft. long, at $5	20.00
2 porch pilasters, at $3.50	7.00
52 ft. box beam cornice, at 40 cents	20.80
40 ft. rail and balusters, at 35 cents	14.00
4 deck posts, at $2	8.00
2 ½ posts, at $1.25	2.50
50 ft. rail and balusters, at 75 cents	87.50
1 pair front steps complete	12.50
1 pair rear steps complete	5.00
1000 ft. lattice	5.00
180 ft. lattice framing stuff	1.80
2 porch columns, 5 x 5 in., 8 ft. long	2.00
1 porch post	.50
2 ½ columns	1.00
20 ft. plain rail	1.00
22 ft. beam and cornice, at 15 cents	3.30
60 ft. porch base and mold, at 4 cents	2.40
90 ft. ¼ round	.45
130 ft. belt course, at 20 cents	26.00
300 ft. main cornice, at 20 cents	60.00
2 large composition brackets	15.00
	$1,143.93

LUMBER.

13,600 ft. framing lumber, at $18	$244.80
7000 ft. 8-in. flooring, at $18	126.00
3500 ft. 4-in. clear siding, at $25	87.50
2000 ft. 4-in. sheathing, at $15	30.00
24,000 shingles, at $3.65	87.60
1600 ft. Y. P. flooring, at $32.50	52.00
1100 ft. pine flooring, at $33.50	36.85
500 ft. porch flooring, at $3.50	1.75
500 ft. porch ceiling, at $2.30	1.15
	$667.65

BRICK WORK.

29,000 brick, at $10 in the wall	$290.00
Chimneys, including mantel setting	110.00
	$400.00

RECAPITULATION OF GENERAL CONTRACT.

Mill work	$1,143.93	
Lumber	667.65	
Brick work	400.00	
Tin and galvanized iron work	87.00	
Painting	260.00	
Hardware complete, including all nails, &c.	135.00	
Excavating (there was an old stone walled cellar to be torn out and the old stone removed)	58.00	
Plastering	260.00	
Carpenter work and incidentals	400.77	
		$3,412.35
Add: For sideboard as shown		120.00
For concrete in basement, 2½ in. grout and ½ in. finish, 1230 ft. at 10 cents per ft.		123.00
Total for general contract		$3,655.35

GENERAL RECAPITULATION.

General contract	$3,655.35
Plumbing and fixtures	450.00
Heating	200.00
Electric wiring	48.00
Mantel	60.00
Grille over stairs	15.00
Art glass transom	15.00
Bathtub	40.00
Concrete sidewalks	125.00
Total	$4,608.35

The builder's certificate, not including the heating, plumbing or electric wiring, was signed by Frank Quint; the certificate for the plumbing and gas fitting by Fred. Greiser & Co.; the certificate for the electric wiring by N. R. Eader, and the certificate for the heating apparatus by W. U. Koons, all of Danville, Ill.

Quarrying by Means of Fire.

The quarrying of granite by means of wood fires has been brought to such perfection in Southern India, says an English journal, that an average of 30 pounds of stone can be quarried with 1 pound of wood. The method is as follows: A narrow line of fire, 7 feet in length, is gradually elongated and at the same time moved forward over the surface of the solid rock. The burning lasts eight hours, and the line of fire advances nearly 6 feet per hour. The area passed over by the line of fire is actually 460 square feet, but as the crack extends about 3 feet on either side, the area of the entire slab which is set free measures about 740 square feet.

STEEL-CONCRETE CONSTRUCTION.

A VALUABLE and timely article on steel-concrete construction has been contributed to the *Railroad Gazette* by A. L. Johnson:

So much is being written nowadays about steel-concrete construction, and so many apparently different theories of design are being offered by the specialists that the practicing engineer, having little time for winnowing, often prefers to stick to old standards rather than run the risk of getting chaff, especially as the doctors themselves do not agree.

But the disagreement is more apparent than real. Some of the theories are good, some bad. But, after all, there are so many tests available, to some of which at least, in all cases, the theories have been made to conform by the insertion of proper empirical coefficients, that it may be said that all theories have more or less common ground. It is not to be denied that there is a good deal of chaff, but at the same time there are certain main facts which cannot be gotten away from, and in locating a road it is well once in a while to climb a tree and take a look around.

An examination of the topography of the field of steel-concrete construction will reveal certain prominent features, some of which are stated below:

1. It is a masonry construction having at least as much strength in tension as in compression.

2. It will not crack, hence is not injured by frost; is not disintegrated by the carbonic acid of the air, but is, in fact, hardened thereby, and hence is everlasting.

3. It is cheap and easily molded to suit any case with ordinary and available labor.

4. It can be nearly everywhere obtained of fairly uniform quality, getting the bulk material at, or near, the site.

5. Careful workmanship is of much less importance than with any other kind of engineering structure; a proper design and wet concrete will insure good results.

Now let us consider what the results would have been if for the last 2000 years we had had a material with as much strength in tension as in compression. Would our designs be what they are to-day. Manifestly not. Instead of small arches we would have beams, except where artistic effect was desired. Our large arches would probably be twice their present length. Many structures would look like the present ones reversed or turned upside down. For example, retaining walls would be thin, shaped like an L with the toe turned into the bank; sewers and culverts would usually have an arched bottom with a flat top. Masonry plate girder bridges of 100-foot span might now be in use. No doubt a successful permanent road bed would have been developed years ago. The present tinder box style of residence construction would probably never have originated. Masonry dams would be much like those we now have, but many disastrous failures would no doubt have been averted. These things we can readily imagine, but as to what marvels of construction the ancients would have wrought with such a material we can only wonder. And now comes the twentieth century bringing with it just such a material. Necessarily its advent marks a new era in structural art. Standing apart and taking a broad, common sense view of the situation. it takes no prophet to forsee that a complete revolution in our methods of construction is inevitable. When this condition is realized by the engineers at large they will very soon familiarize themselves with the few details necessary to enable them to separate grain from chaff and obtain such a material as above described.

Two things there are that are essential: First, a perfect and permanent bond must be provided between the concrete and the metal. Second, the metal must be distributed in small areas throughout the distorting concrete. The whole science and art of steel-concrete construction depend upon these conditions being met.

Those who have done much in this line of construction are satisfied that plain bars cannot be relied upon to meet the first condition and, as a result, various styles of reinforcing material have been devised to overcome the difficulty. Without drawing any invidious comparisons between these materials, but simply assuming that the adhesion does not exist, we see at once that theoretically the reinforcing material should be provided with surfaces nearly at right angles to the direction of stress, varying therefrom by an amount not exceeding the angle of friction between co...ete and metal. This is not theory alone, but common sense as well. To meet the second condition is very simple; in fact, it is cheaper and easier to lay the material in small areas close together than in heavy sections at widely distributed points. As a general proposition the metal areas should not be more than 12 inches apart.

Continuous Concrete Walls Without Expansion Joints.

Another matter that perhaps may be properly spoken of here, it not having been discussed in any literature so far published, relates to the practicability of building continuous concrete walls without expansion joints and without any danger of cracks.

The writer's company have built continuous walls 300 feet in length, 8 inches thick, and exposed on both sides to the weather, which are now about one year old and in perfect condition. He is satisfied that a wall a mile long could just as readily and successfully be constructed.

But it usually takes more than an optical demonstration to convince an engineer. He will not believe it when he sees it, unless he can understand why it is so. For this reason the following theoretical explanation is appended:

Continuous walls will crack vertically in lengths such that the weight of the section multiplied by the coefficient of friction on the soil is equal to the tensile strength of the wall. The temperature required to crack the wall in these lengths is that temperature requiring a shrinkage in excess of the ability of the wall to stretch. Now plain concrete can stretch very little before cracking. But concrete thoroughly reinforced with metal can take a proportionate elongation of .0018 before cracks will be developed.

The maximum shrinkage that would be required could not be due to a fall in temperature of more than 125 degrees. The coefficient of expansion of concrete is .0000055, which for 125 degrees becomes .0007 per unit of length, or less than one-half the ability of the reinforced concrete to stretch. No crack, therefore, could be produced with a fall in temperature of less than 250 degrees, which, of course, would be impossible to realize in practice.

The quantity of metal used should be enough to equal the tensile strength of the concrete at the elastic limit of the metal. Calling the tensile strength of stone concrete 200 pounds per square inch, and the elastic limit of the steel 55,000 pounds per square inch, the number of square inches of steel required would be 1-275 of the number of square inches in the wall section.

Prospective Building in Washington.

Architects and builders are looking forward to a period of marked activity in the way of building construction in Washington, D. C., within the next few years, as something like $20,000,000 is to be expended in the erection of public buildings alone. Among the improvements to be made are a new union railroad station, to cost $5,000,000; a new municipal building, to cost $1,500,000; an office building for the use of the members of the House of Representatives, to cover an entire square and to cost $3,000,000; an addition to the Department of Agriculture, with probably several millions more to be expended later; a new National Museum, to cost $3,500,000; a Hall of Records, to cost $2,000,000, and a number of minor structures, such as the new Freedmen's Hospital and additions to the Providence, the Garfield and the Homeopathic hospitals, costing in the aggregate about $1,000,000.

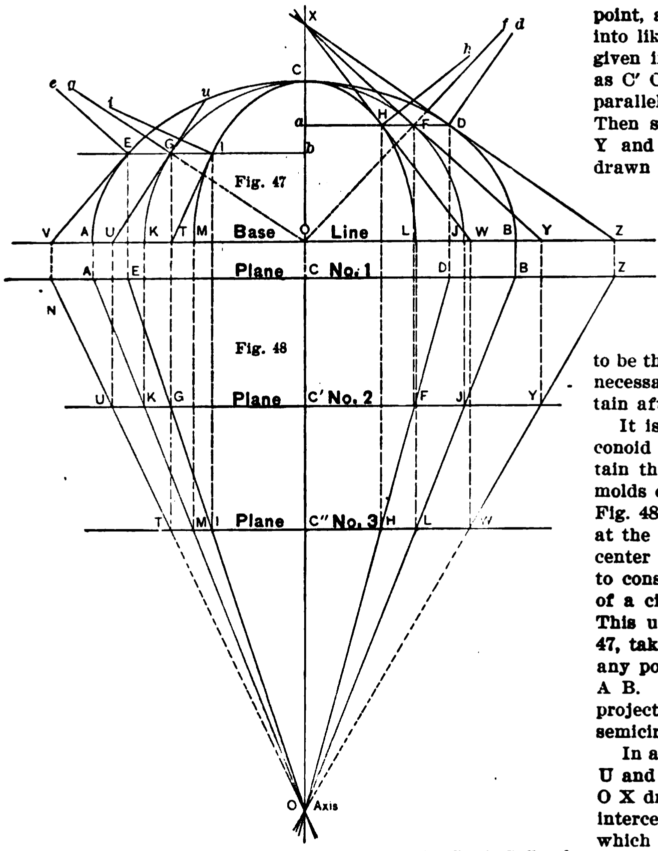
In addition to these expenditures it is probable that the erection of a Department of Commerce building and other Federal buildings along the Mall, all in accordance with the plans of the Park Commission, will be authorized by the Fifty-eighth Congress and will provide for the disbursement of many millions more from the United States Treasury.

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

BY CHAS. H. FOX.

BEFORE proceeding further we will explain the manner in which the soffit of the radiant arch may be generated. We shall for the benefit of the student make use of the proper designations, &c., so that he may become familiar with the proper terms of reference which apply to the several constructions of which use will be made. If the reader wishes to be master of the subject he will do well to carefully note the meaning and intention of each line, for the drawing here presented is of such importance that to pass over it lightly or without thought is to make the drawings which follow of little or no avail.

Let A E C D B, Fig. 47, be a semiellipse situated in



Figs. 47 and 48.—Diagram Showing Manner in Which Soffit of Radiant Arch May Be Generated.

Laying Out Circular Arches in Circular Walls.

a vertical plane of which A B of Fig. 48 is the horizontal trace. Let O, Fig. 48, be the horizontal projection of a vertical line through O, the elevation of which is given in O X of Fig. 47. Now let the semiellipse and the vertical at O be taken as the directrices of a surface, generated by moving a right line parallel with the horizontal plane, and in each movement touching the curve of the ellipse and the vertical line at O. The surface thus generated is that which forms the soffit of the radiant arch. This is a warped surface called a right conoid, owing to its directrices being perpendicular to the horizontal plane. The ellipse is called its curved directrix; the horizontal plane its plane director; and the vertical at O its right line directrix, and the right line the generatrix of the surface. In circle on circle the axis of the circular wall in which the arch may be situated will in each case be taken as the right line directrix, therefore we may designate the vertical at O as the axis line.

If now the conoid be cut by any vertical plane parallel with the vertical plane of the ellipse, the section there obtained will also be an ellipse. Another valuable property of the conoid is this: If a tangent line be drawn to the directing curve at any point, as that projected in D of Fig. 47, it will meet the horizontal plane in a point Z, which if this be joined with O will give in Y W of Fig. 48 points at which tangents erected to the points as F H of other sections at a hight above the horizontal plane as that of point D, also meets the horizontal plane.

We will now prove this by construction: First draw any line, as O X, then square with this draw A B of both diagrams; the latter we may designate the base line. Now construct the semiellipse A C B, and at any point, as D, erect the tangent X Z. Now project D Z into like points of Fig. 48, and together with the points given in A B, join them with O. Through any points, as C' C'', square with O X draw U Y and T W. Now parallel with O X draw Y Y, W W, H H and F F. Then square with O X draw D *a*. Now join X with Y and W. If the drawing is correct the lines just drawn will pass through the intersections already given in F H of Fig. 48. Project the points J L of Fig. 47 into like points of the base line of Fig. 48, and with O C and O L and O J, respectively, as the axes, construct the curves of the ellipse. The reader will find the curves if correct to pass through the points H, F. Now by construction, Fig. 25, we will prove the tangents X Y, X W. The reader will find the lines already drawn to be the correct ones, showing conclusively that it is not necessary to first construct the curves in order to obtain afterward the tangents.

It is by making use of the known properties of the conoid that we are in practice enabled to so readily obtain the projections of the joint lines, &c., of the face molds of the circle on circle arch. For making C' J of Fig. 48 equal to O C of the directing curve, the section at the plane C' J must of necessity be drawn with the center O, and we know from experience it is far easier to construct a tangent to a point on the circumference of a circle than to a point at the curve of an ellipse. This understood, at the left side of the diagram, Fig. 47, take K G C as a quadrant of a circle, and through any point, as G, draw *b* E, parallel with the base line A B. Then square with O G draw the tangent U *u*; project U into U of the plane No. 2 of the section of the semicircle.

In a similar manner project G into G of No. 2; through U and G draw O U V and O G E. Now parallel with O X draw I I, E E, &c., and it may be found these will intercept the curves already drawn in the points I E, which proves the constructions. The normals may readily be obtained by drawing E *e*, G *g*, &c., square with the respective tangent.

We will in a later issue explain the method by means of which a cardboard representation of the problem may be obtained, for we are convinced it is only by this means of constructing models that the truth and accuracy of many intricate drawings may be tested. There the student will not only be able to test the accuracy of the constructions just made, but will also be enabled to obtain a practical illustration of the manner in which the surface of the soffit of the radiant arch may be generated. This will, we know, repay him for the little trouble he may take in cutting the representation of the problem.

Having explained the manner in which the soffit of the radiant arch may be generated, it may be stated that the surface in question being a warped or twisted one, it follows that if the joint surface is made normal throughout to the surface of the soffit it will be also a warped surface. We will now show the manner in which the winding surface of the joint may be projected, and at the same time will explain a simple method by means of which a plane surface joint may be constructed instead of the other. This method has been adopted in order to avoid the inconvenience of constructing and cutting the twisted surface, for, as stonecutters know, it is far easier and quicker to cut a plane surface than a twisted one of the same area as that of the other. The plane surface joints are so taken that they are normal to the curve of the soffit at the center point of the right line element which belongs to the joint. In a manner a portion is taken from one face line and placed at the other, so that the joint surface is perpendicular to the curve of the soffit at the center point only.

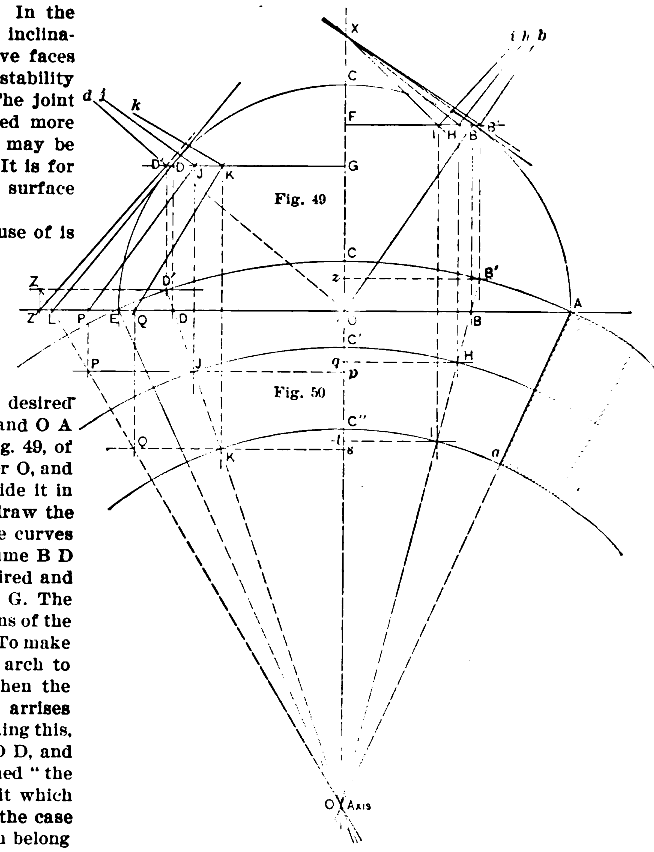
One of the conditions, we may say the principal one, required in the construction of arches, vaults, &c., is in the position of the joints. The condition required is that they be perpendicular to each other and to the curved surface which forms the soffit of the arch. Any material deviation from this principle destroys not only the general symmetry of the structure, but also diminishes the firmness and durability of the arch. In the radiant arch we do not in altering the angle of inclination of the joint lines of the convex and concave faces from the "normal" diminish in any way the stability of the structure; the arch is not weakened. The joint lines may be projected and the surfaces formed more expeditiously than the winding surfaces which may be normal throughout to the surface of the soffit. It is for these reasons that we have adopted the plane surface joint.

In Figs. 47 and 48 the directing curve made use of is an ellipse. Here we have taken it as a semicircle, shown in A C E of Fig. 49. We may assume the points B, D to represent those at which joints are desired. First, to draw the plan, take O as center, and with O A as the radius of the outer face curve draw the arc A C E of Fig 50. Then draw the center line O X of the drawing. Now square with O X draw E A equal to the desired width of the opening, and with O as the center and O A as the radius draw the directing curve A C E, Fig. 49, of the soffit. Then join A and E with the plan center O, and set off C C″ equal to the depth of the soffit, divide it in C′ into equal lengths, and with O as the center draw the curves respectively of the center and inside face curves of the plan, as shown in the drawing. Now assume B D at pleasure as the points at which joints are desired and parallel with the base line E A draw B F and D G. The lines just drawn are termed "the vertical projections of the elements at the soffit which belong to the joints." To make this point clear, let us suppose the soffit of the arch to be produced to the axis line O X of the plan, then the horizontals B F, D G are the elevations of the arrises which belong to the joints in question. Understanding this, parallel with the center line O X draw B B and D D, and join D B with O. The lines just drawn are termed "the horizontal projections of the elements at the soffit which belong to the joints." They are, when applied to the case above stated, "the plans of the soffit arrises which belong to the joints" of which the lines B F and D G are the elevations. Now draw B X and D L tangent with the curve at the points B, D. As may be noted, one of these meets the axis line in X, the other the base line in L.

To obtain the projections at the upper point B proceed as follows: Parallel with the center line O X draw B′ B′, H H and I I. Now join B H I with the point X of the axis line. These are the tangents to the points respectively given in B H I of the soffit. Drawing B′ *b*, H *h* and I *i* at right angles with the respective tangents, the normals to the points in question may be obtained. These lines in their practical application to our subject are the vertical projections of the inclinations of the joint lines, which may be transferred to the face molds in order to give the direction at which to form the surface of the joint. That is, B′ *b* gives the inclination as required at the outer face mold, and I *i* that at the inside face mold, when a winding surface joint may be desired. If the plane surface joint be that required then the inclination of H *h* is that to be transferred to the molds developed to apply at the outer and to those developed for the same purpose at the inside face of the arch stones. This may easily be explained by noting that the point H is the center point of the arris of the joint in question.

Now take the lower point, D. First join L with O, then parallel with the opening line draw D′ Z, J P and K Q. The object of the projections just made may readily be seen, by noting that we have at the lower point to not only find the projections which belong to the element of the joint, but to also ascertain from projections to be made at the plan the proper direction at which to project the tangent to the points at the element in question. To do this we proved as follows: Parallel with the center line O X draw Z Z, P P and Q Q of Fig. 50, then join Z D′, P J and Q K, which gives the tangents. Square with these draw the normals D′ *d*, &c. D′ *d* and K *k* are the projections of the inclinations of the joint lines as required to form the twisted surface joint, and J *j* is that required to form the plane surface joint.

Now in applying the problem to our subject we may



Figs. 49 and 50.—Showing the Manner in Which the Winding Surface of the Joint May Be Projected.

Laying Out Circular Arches in Circular Walls.

suppose that the points B, D are the projections or representations in which the joint line of the soffit of the arch stone meets the outer or convex face of the arch, that the points I, K are in like manner the similar representations in which the line meets the inside or concave face of the arch, and that H J are the representations of the center points at the soffit in question. It is to the curve found at the center point of the joint line that the surfaces of the joints are made normal in the plane surface joint. It is to make this point perfectly understood by our readers that we would advise them to work out and form the cardboard representation which we will now explain.

Fifty feet of boards will build 1 rod of fence five boards high, first board being 10 inches wide, second 8 inches, third 7 inches, fourth 6 inches and fifth 5 inches.

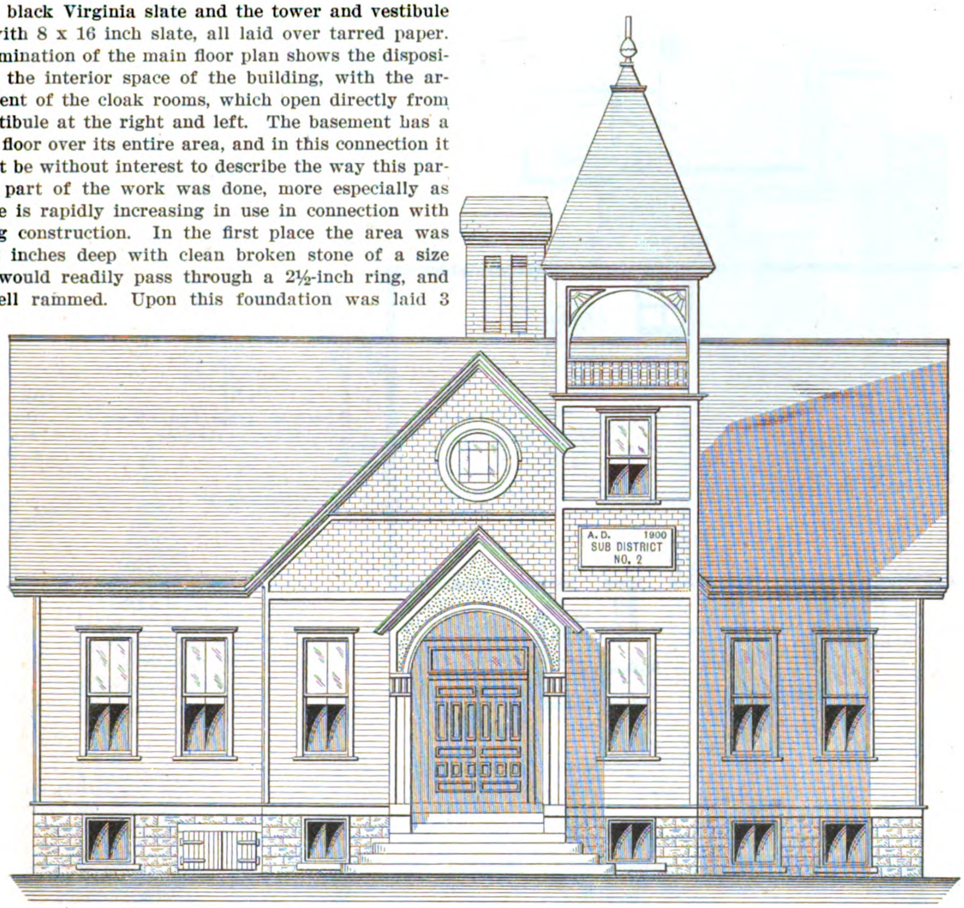
DESIGN FOR A TWO-ROOM SCHOOL HOUSE.

WE show upon this and the pages which immediately follow elevations, floor plans and a varied assortment of constructive details of a school house particularly adapted for country and suburban sites where ground space is plentiful. It is a two-room affair, one story in hight, and was erected not long since in Sub-District No. 2, Colerain Township, Hamilton County, Ohio. It has a blue limestone underpinning at the front and on two sides, with joints pointed with black Portland cement, while the rear wall is of cobblestones. The first story of the frame is covered with 6-inch white pine lap siding and the gables with Washington cedar shingles, which were painted before being laid. The main roof is covered with 10 x 20 inch black Virginia slate and the tower and vestibule roofs with 8 x 16 inch slate, all laid over tarred paper. An examination of the main floor plan shows the disposition of the interior space of the building, with the arrangement of the cloak rooms, which open directly from the vestibule at the right and left. The basement has a cement floor over its entire area, and in this connection it may not be without interest to describe the way this particular part of the work was done, more especially as concrete is rapidly increasing in use in connection with building construction. In the first place the area was filled 2 inches deep with clean broken stone of a size which would readily pass through a 2½-inch ring, and was well rammed. Upon this foundation was laid 3 inches of concrete, composed of one part cement, two parts clean, sharp and medium coarse sand, and four parts gravel, measuring from ½ to 1½ inches in diameter. The cement and sand were well mixed when dry, then made into a mortar and thoroughly incorporated with the gravel by means of shovels and hoes. Upon the 3 inches of concrete was laid a finishing coat 1 inch thick, composed of one part cement and two parts clean, sharp sand run through a No. 5 screen. The finishing coat was applied before the underbed of cement was thoroughly dry, and was troweled to a smooth finish. The steps leading to the vestibule are also of concrete, with 1-inch finish of cement similar to that of the cellar floor.

Under the school room floor is a 6 x 8 inch girder, resting on 6 x 6 inch posts, and under the wall between the vestibule and the school room is an 8 x 10 girder, resting on 8 x 8 posts. The girder under the tower wall is 6 x 10 inches, with 6 x 6 inch posts. The sills are 4 x 6 inches, halved at the corners and securely spiked together. The floor joist of the school rooms is 2 x 12 inches, and of the vestibule and cloak rooms 2 x 10 inches, placed 16 inches on centers. The ceiling or attic joist are 2 x 8 inches, and have a 2 x 6 inch stay lath securely spiked on top across the centers of each section, the outer ends being securely anchored in the wall. The bell deck joist are 2 x 14 inches, having a camber of about 2 inches, and are placed 16 inches on centers. The studding are 2 x 6 inches in all 8-inch walls, and 2 x 4 inches in the 6-inch walls, all being placed 16 inches on centers, doubled at the corners and up to the lintels at all doors. The subsills are 2 x 6 inches and 2 x 4 inches, the lintels being doubled and spiked together. The joist plates and rafter plates are 2 x 6 inches, placed 2 feet on centers. The trusses, the chords of which are to be in one length, have 6 x 6 inch posts for bearings, with 4 x 6 inch T-heads on them between the studs. The rods and bolts are of wrought steel and fitted with plates and washers.

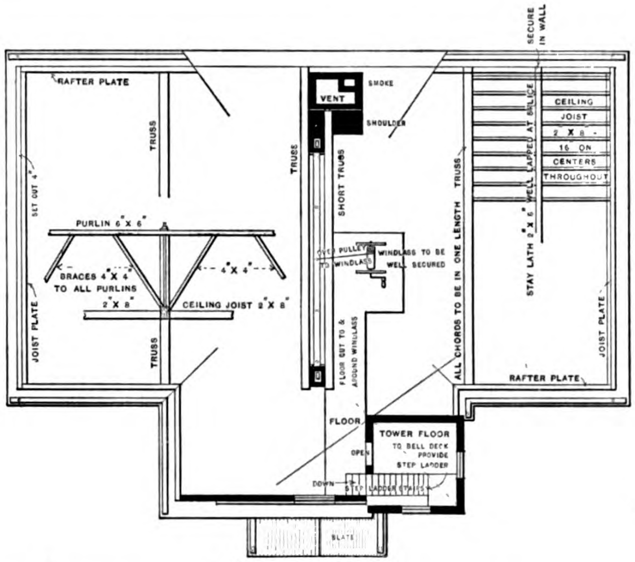
The floors are of yellow pine, secret nailed, and the walls are wainscoted to a hight on a line with window sills. Blackboard panels extend around the walls, between openings, as indicated on the sectional elevation. The plastering is three-coat work, the space above the blackboards having a hard float finish and blocked off to imitate cut stone work. The cloak rooms, vestibule and entrance are blocked and finished in the same way.

A feature of the building is the partition which divides the two school rooms, this being so constructed that it may be raised, throwing the entire area into one room.

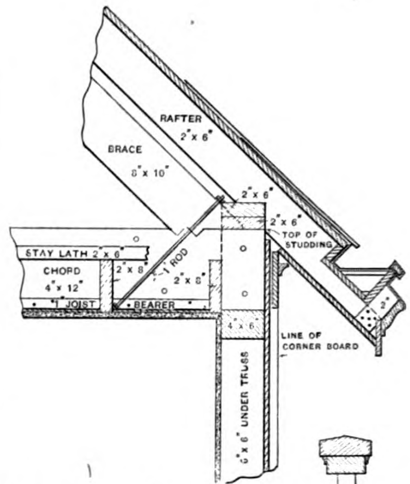


Front Elevation.—Scale 3-32 Inch to the Foot.

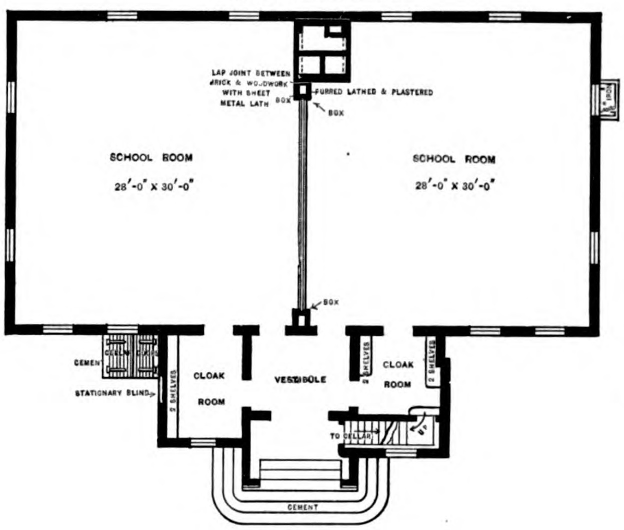
Design for a Two-Room School House.—N. M. Williams, Architect, Cincinnati.—George M. Barnes, Contractor, Mt. Healthy, Ohio.



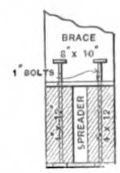
Attic and Roof Plan.



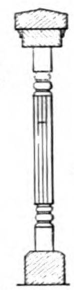
Details of Truss, Cornice, &c.—Scale, ½ Inch to the Foot.



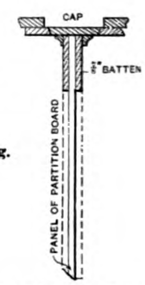
Main Floor.



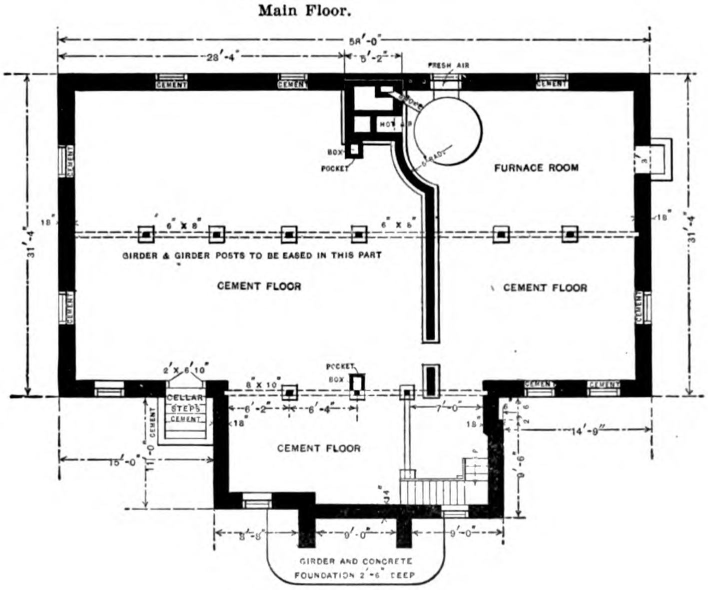
Detail of Truss End.—Scale, ½ Inch to the Foot.


Detail of Bell Deck Baluster. Scale, ¾ Inch to the Foot.

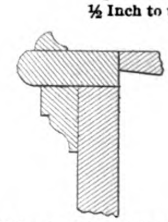

Interior Window and Door Casing.—Scale, 3 Inches to the Foot.

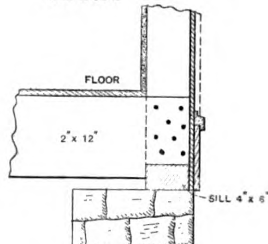


Section through Hoisting Partition.—Scale, ½ Inch to the Foot.



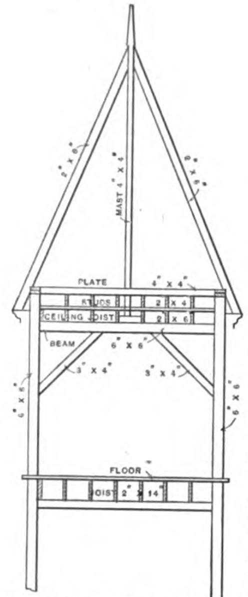
Foundation or Basement. Scale, 1-16 Inch to the Foot.


Wainscot Cap and Window Stool.—Scale, 3 Inches to the Foot.

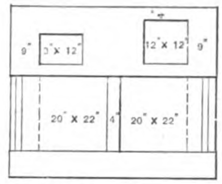


Detail of Water Table.—Scale, ½ Inch to the Foot.

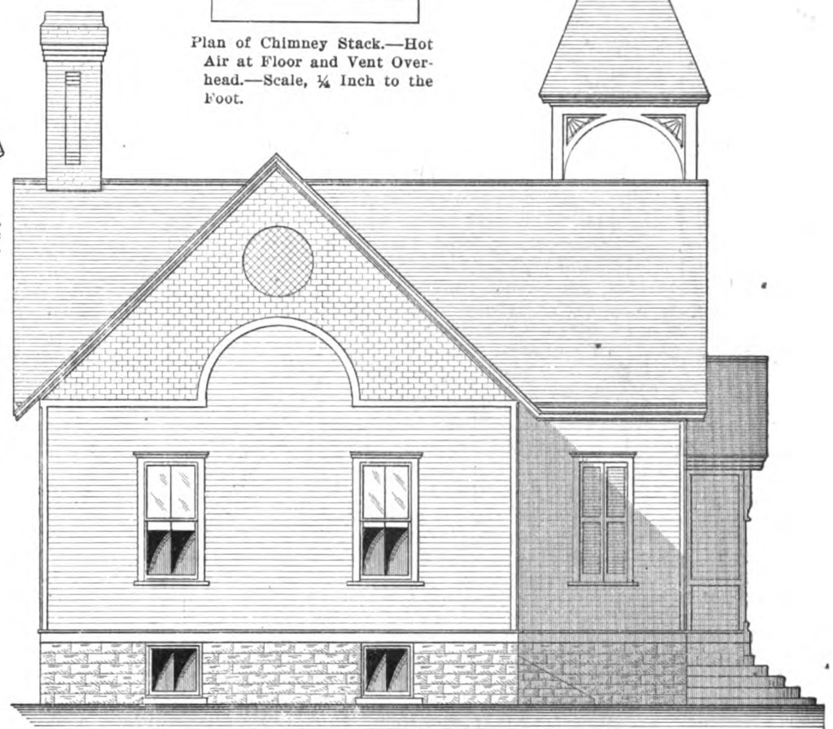
Miscellaneous Constructive Details of a Two-Room School House.



Sectional Elevation of Tower. —Scale, ⅛ Inch to the Foot.

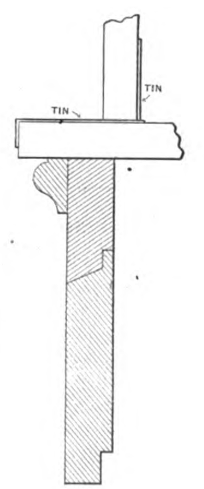


Plan of Chimney Stack.—Hot Air at Floor and Vent Overhead.—Scale, ¼ Inch to the Foot.



Side (Left) Elevation.—Scale, 3-32 Inch to the Foot.

Side (Right) Elevation.—Scale, 3-32 Inch to the Foot.



Section at Bell Deck Floor and Tower Belt Course. —Scale, 3 Inches to the Foot.

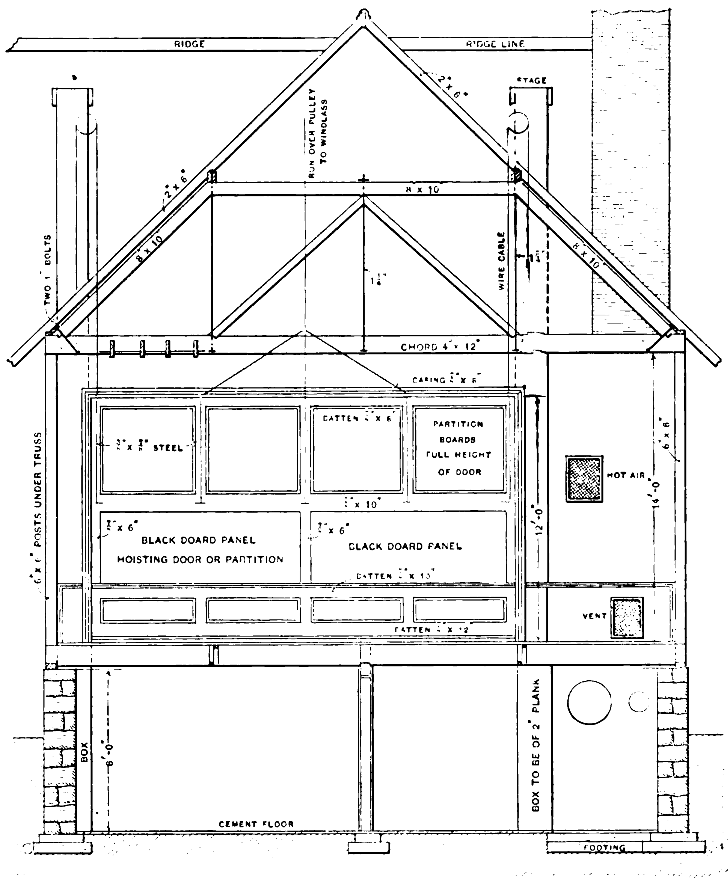
Design for a Two-Room School House.—Elevations and Details.

This partition is made of ⅞-inch boards, with battens on both sides, these being placed with dovetail joints, glued and thoroughly dried. The battens extend across the entire partition and are secured with screws. The partition is hung to iron weights with wire cable, which has a strength double the load it is required to sustain. A cable from the center of the partition runs up over a pulley to a windlass in the attic, as shown on that plan, this windlass being intended to raise the partition when it is desired to throw the two rooms into one. The boxes for the iron weights are made of 2-inch plank, tongued, grooved and spiked together. The partition slides in grooves from the floor up to the pulleys.

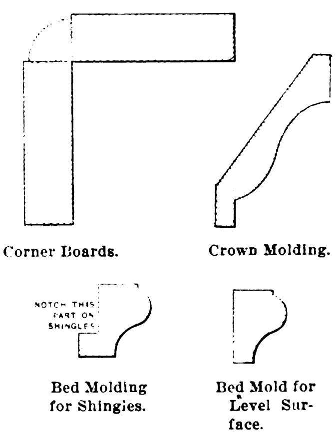
The exterior woodwork has three coats of linseed oil and lead paint finished in colors. All tinwork has two coats of Princess brown, and the tower ceiling has three coats of flowing varnish. The front and vestibule doors are finished in the natural wood. All interior woodwork in the school rooms, vestibule, cloak rooms, &c., has one coat of filler and two coats of best inside varnish. All sash throughout the building is glazed with double strength Pittsburgh glass.

The contract for the school house here shown was executed by George M. Barnes of Mount Healthy, Ohio, in accordance with plans prepared by architect N. M. Williams of 3270 Montana avenue, Cincinnati, Ohio. We understand that the contract price was in the neighborhood of $3350, but the work was done something like two years ago, which fact must be taken into account in considering the design at this time.

THERE are 20 common bricks to a cubic foot when laid and 15 common bricks to a foot of 8-inch wall when laid.



Sectional Elevation Taken on Line of Hoisting Partition and Showing Construction of Truss, &c.—Scale, ¼ Inch to the Foot.



Scale, 3 Inches to the Foot.

Design for a Two-Room School House.—Sectional Elevation and Details.

A Palatial Log Cabin.

There is at present in process of construction at Lamoine, on Frenchman's Bay, opposite Bar Harbor, on the coast of Maine, a summer home which, when completed, will be in many ways remarkable. The house will be of logs of rough exterior, the walls being of pine and fir, just as they come from the forest, but the interior will be richly fitted and furnished. The house is being erected by William F. Des Isle, a direct descendent of Louis Duparre Des Isle, as a memorial to his ancestors, and is to be a reproduction of the famous "Fountain La Val," a wonderful palace of logs, erected in 1791, upon the same spot by Madame La Val, who, with 30 followers, fled from the terrors of the French Revolution after her husband had fallen under the guillotine. This log mansion, which she called "Fountain La Val," was 60 x 100 feet in size, two stories high, very rough without, but within furnished magnificently with such of her household effects as she had brought from France, and in addition had purchased in New York and Philadelphia.

In the course of time Madame La Val became Madame Bartte, wife of the Governor of one of the West Indies, where she went to make her home. Upon her departure she conveyed to Louis Duparre Des Isle all her lands and other property, and until recently the great estate, extending 5 miles along the bay, remained in the hands of the Des Isle family. Upon the share that has descended to him, including the site of Fountain La Val, William F. Des Isle is now erecting a log palace of exactly the same size and design as the original mansion.

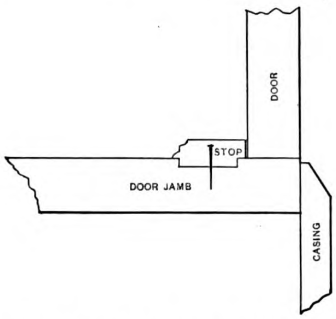
On the first floor of the new building will be a reception room, 16 x 20 feet, with a fire place in brick. From this room will arise the main stairway, its railing and newel post of logs in their natural state, except for elaborate carvings in places. Four other rooms on the first floor will be entered from the reception room through decorated arches, and in these rooms, as well as in those above, will be displayed a wealth of rich furniture and hangings with numerous relics of the Colonial days. There will be bathrooms and other modern comforts, but in no other respect will the house resemble any other on the coast, with the possible exception of the log palace of a Philadelphia family on an island in Penobscot Bay.

CORRESPONDENCE.

Nailing Stops on Door Jambs.

From LAZARUS, *Cliff, N. M.*—In answer to the query of Frank Rippon, Coalville, Utah, I would state the practice of nailing on stops to form a rabbet in door frames is not good practice unless the stop is glued as well as nailed. Some architects will not permit either method, but have the stop worked with a tongue and fitted into a groove in the door frame, which makes a very substantial job.

From "DOWN SOUTH," *North Carolina.*—I notice in the April issue that Frank Rippon asks if it is a first-class job to nail stops on a door frame instead of rabbeting. My experience is that extra good work usually calls



Nailing Stops on Door Jambs.—Sketch Submitted by "Lazarus."

for rabbeted jambs, but they have one disadvantage—if the door is warped, and many of them are, it will strike at one corner first, which makes an unsightly and disagreeable piece of work, whereas if stops are used they can be adjusted to the warp of the door, making it shut solid and close. It will doubtless be admitted that putting in the common ogee stops 1½ to 2 inches wide does not make so good looking a finish, and I would suggest cutting the stops just wide enough to show the same rabbet on both sides of the jamb, leaving the edges of the stop square. If properly put in this will make a first-class job.

From D. P. B., *Redford, N. Y.*—In the April issue Frank Rippon asks if it is a first-class job to nail stops on door jambs to form a rabbet. In my opinion it is no job at all and barbarous practice.

Cement for Making Glass Tank Water Tight.

From C. C. H., *Brookville, Pa.*—Will some reader tell me the kind of cement to use in order to render a glass tank water tight? For example, I want to take four pieces of glass and set them together so as to make the sides and ends of a box or tank, and then another large piece for the bottom. I want to use the glass box for gold fish, and desire to cement the pieces so that the receptacle will hold water.

Answer.—A good cement for glass, and one which is said to completely resist the solvent action of water may, according to Professor Schwartz, be prepared by the following process. From 5 to 10 parts of pure, dry gelatin are dissolved in 100 parts of water. To the solution is added about 10 per cent. of a concentrated solution of bichromate of potash, and the liquid is kept in the dark. When pieces of glass joined by this cement are exposed to the light the gelatin film is acted upon by the chemical rays, the chromate being partially reduced, and the film of cement becomes tough and durable.

Another formula consists of soaking in water until well swollen 2 parts of isinglass. The water is then poured off and the isinglass is dissolved in alcohol by the aid of heat. One part of mastic is then dissolved in 3 parts of alcohol and added to the above solution; then 1 part of gum ammoniacum. The solution is well shaken and evaporated to the consistency of strong glue, when it solidifies on cooling. When using the cement the parts to which it is applied should be warmed.

For making a transparent cement for glass it is recommended to dissolve 1 part of India rubber in 64 parts of chloroform, then add gum mastic in powder 14 to 24 parts and digest for two days with frequent shaking. Apply the cement with a camel's hair brush.

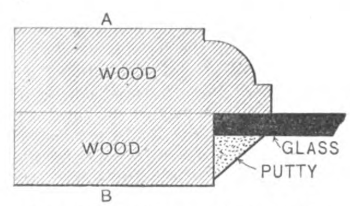
A recipe which is recommended by the *Pharmacist* reads as follows: "Take 1 ounce of Russian isinglass, cut it in small pieces and bruise well, in order to separate the fibers; then add 6 ounces of warm water and leave it in a warm place that the isinglass may dissolve, which will require from 34 to 48 hours. Evaporate this to about 3 ounces. Next dissolve ¼ ounce mastic in 4 ounces of alcohol, and when this is ready transfer the isinglass from the evaporating dish to a tin can (an empty ether can will be found convenient), heat both solutions and add the mastic solution to the isinglass in small quantities at a time, shaking the can violently after each addition. While still hot strain the liquid through muslin cloth and put in bottles"

What is the Best Method of Painting a Shingle Roof?

From J. F. H., *New Marion, Ind.*—Will some of the readers give me their views as to which is the better way to treat a shingle roof? Should the shingles be first dipped in oil or stain and then nailed on, or should they be painted after they are on the roof? I would also like some of my brother chips to tell me the best and quickest way to scaffold for shingling.

A Question in Transom Construction.

From J. C. A., *Oshkosh, Wis.*—Here is an easy one for some of the boys to solve. If you should order a transom to go over an outside door to be constructed of hard wood, the inside quartered white oak and the outside plain red oak, and submitted the accompanying sketch without mentioning which side you were to use as the outside, upon which side would you expect to find the red oak when the transom was delivered? The transom



Question in Transom Construction.

is to be made without beads, for glass and the latter is to be sprigged and puttied in place. In answering this question, will the readers kindly designate by the letters A or B the side on which they would expect to find the red oak and upon which side the quartered white oak, and give their reasons for such decision?

Laying Slag Roofing.

From C. D., *Philadelphia, Pa.*—Will you kindly give me some information regarding the proper method of putting on a four-ply slag roof? How much tar and slag are required for 100 square feet of roofing—that is, where a man would guarantee it for ten years?

Note.—With no desire to anticipate the suggestions which our practical readers may offer regarding the question of our correspondent, we would suggest that common practice among those giving attention to slag roofing is about as follows: Run five thicknesses of No. 1 tar roofing felt along the lowest point of the roof, turn back and mop between with a thin coating of any approved brand of roofing cement, then lap each successive layer at least three-fourths of the width over the preceding layer, turning each course back and mopping back as far as the next layer with a thin coating of the same cement. Over this surface mop a thin coating of cement and sweep crushed slag free from dirt and dust and perfectly dry, and with cement hot enough to hold slag, but not hot enough to burn the fiber of the felt. For work of this kind at least 70 pounds of felt and not less than 10 gallons of cement are required to each 100 square feet.

What Constitutes an Average Day's Work for a Carpenter?

From H. M. B., *Roxbury, Conn.*—I have been very much interested in the various communications dealing with the above subject which have appeared during the last few months. The comments of "Slow One" from Long Island are timely and offer food for reflection by those who claim to be able to lay 10,000 shingles in ten hours. I would like to ask how the 3000, 4000 and even 10,000 shingles were laid. I call 1500 to 2000 shingles, well laid, a good day's work. Our shingles are more or less tapering, some nearly 1 inch wider at the butts than at the points, but this is what our fast men want apparently. They spread the tips and nail them on with the butts tight. This is like laying an open gutter smallest at the bottom and is all rubbish. This method of laying shingles will also keep them moist and cause them to rot. The slow man has to trim the shingles in order to do his work well, and does not have to travel around from town to town looking for a job. I have had experience at almost all kinds of work, except farming, for a period of over 25 years. I have just concluded a school house, which was dedicated in January. I took the contract at a low figure, doing all the work above the foundation, painting and finishing the interior, but did not slight it in the least. It will bear inspection and will help to get another job. If I could lay the number of shingles and hang the number of doors and do all other work in proportion, as some of our brother chips say they can do, I probably could have put $200 or $300 in the bank. As it is, I will get enough out of it to pay my men and running expenses.

From HEE H. SEE, *Montreal, Canada.*—In regard to the above subject, I would like to say that if any one has a good, quick method of hanging doors, laying shingles, setting studding, or anything of the kind, let him trot it out and perhaps we will all be benefited thereby, but this other business of telling how many shingles have been laid by some one, or the number of doors we have heard about being hung in a day, is simply a waste of good space and printers' ink. I would like to know what use this kind of thing is to any of us, for I am sure no one would estimate by it, even if it were correct, for the average day's work by the average carpenter has little or nothing to do with the cost of the building. This depends almost entirely upon the man who is looking after the job—upon the foreman, who gets on the job half an hour before anybody else in the morning, and who goes around at night picking up lumber, locking up doors, storing away nails, &c.; the man who sorts out his men so as to work them to the best advantage; who takes the 20 doors a day man and sets him to building coal bins in the cellar, where his work will not be noticed; who knows where every man on the building is working, how soon he will be done and has another job ready for him when he is finished; the man who keeps everybody's time on the job, checks off all the windows, doors, &c.; measures up all the lumber as it comes from the mill; who is generally expected to do all of the most particular work on the building; who when things go wrong gets all the blame, and when they go right stands back and wipes the sweat from his brow while some one else takes the credit; the man who for all this generally gets about 2 cents an hour more than the other men and thinks himself well paid. This is the man, I say, upon whom more than anybody else depends the cost of the job. I know, for I have been there. This being my opinion, it may be asked why I am helping to swell the tide. I may perhaps be forgiven for saying a few more words upon the subject that is already pretty full, as I seem to have been singled out by "A. E. C." of Vancouver, in the March issue, for some comments. Right here I want to say to "A. E. C." that he has not scored the record yet, for I met a man the other day who told me that he and his brother in Jersey City some years ago hung 64 doors, large and small, in ten hours. I told him, however, that he could not stagger me for I had been reading *Carpentry and Building*, and that he might as well make it an even 100, as it was just as easy to swallow the one as the other while I had my mouth open. I had been looking for these 15, 16 and 20 doors a day men and had at last come to the conclusion that there must be some secret in the process, and that they only do it when there is no one around to see it. But "A. E. C." lets the secret out on page 65 of the March issue when he says: "In the first place, joint the hinge side of the door straight and have it square at the hinge bed, then put the door up and it will be found that it will just joint. . . . Use a sharp pencil or penknife, but before marking for the hinge see that the top fits with 1-16 inch play all around the door, except at the bottom, where it should be ⅜ or ½ inch." Now this makes everything as clear as mud, and after I have had 25 to 30 years' practice in door hanging and have learned how to fit the top all around the door and how to "set the hinge square with the door and flush on top," I have no doubt that I will be able to fit and hang 16 doors in a day. No, sir, not in the slightest, because, counting 16 doors to a day and 300 working days to a year, it makes a nice little total for the 30 years of 144,000 doors. If anybody has a million and a half doors to hang I wish he would send me word, as I would like to get the job over as soon as possible. A little further on "A. E. C." says it is harder to hang the door to a solid rabbet frame than to a stop frame. Well, "differences of opinion make horse races." Around here we generally cut in the stops before fitting the doors and do not nail them. The man who hangs the door nails the stops up to it. This at the lowest calculation takes five minutes more than for the solid rabbet.

Then, again, on the lock question we differ. I find it much easier to fit a lock with a long escutcheon, because it generally has only two screws, while the others have at least five, of which two are at the keyhole and three at the knob. Again, with the long ones the screws are a good way from the keyhole, and there is a chance to put them into wood instead of vacancy. After a ¾-inch hole has been bored in a 1⅜-inch door there is not much left to hold the screw, is there? Here we wouldn't call a lock put on in good shape if the keyhole were bored with a ½-inch bit. We do not believe in making the hole in the door any larger than the one in the escutcheon; then the key will go into the lock without ten minutes' dodging, and when a man takes the key out he won't be so liable to knock the escutcheon off with it. In reference to the question of "A. E. C." about the hight of the lock, I would rather put the lock a couple of inches one way or the other than cut the tenon out of the lock rail. The hight of the lock within certain bounds is not half as important as the stability of the door. In conclusion I wish to say that I think "A. E. C." is right when he says "Some are natural born carpenters and some natural born plowmen." Looking over the columns of *Carpentry and Building*, we might go further and say some are natural born liars, but we won't. We will say, however, that if it takes a man 10 or 12 years to learn to be a carpenter he can make up his mind he is not a "natural born" one.

From N. O. T., *Cuyahoga Falls, Ohio.*—I do not come to the editor very often, but it not because I lack great interest in *Carpentry and Building*, for I have bought every number since 1896 from the local newsdealer. I think no carpenter can afford to do without the paper if he wishes to keep abreast of the times. In regard to the discussion of the average day's work for a carpenter, I think a great many correspondents are giving us samples of what might be done under the most favorable circumstances—not at all an average. I consider a man is doing a good day's work when he fits, hangs and trims six or seven 1⅜ inch by 2 foot 8 inch by 7 foot pine doors in nine hours, or double nails four squares of 6-inch drop siding in the same length of time. I think for the benefit of the trade in general some of these skilled workmen should make known the methods by which they accomplish so much work in the time stated. I for one would like to see the average brought to a higher standard than it is at present. We have hundreds of so-called carpenters through this part of the country who want from 30 to 32½ cents per hour and who cannot hang four doors in a day of nine hours and make a first-class job of it. If the foreman has his back turned for half an hour he finds something has been done wrong, but still the men expect the best wages. I feel sorry for these so-called mechanics and also for the man who has to pay them. There should be some way to educate the mechanic in order that he may give better results to the man who employs him, better his own condition, and when he has locked his tool box for the last time people might say of him, "The community has lost a good mechanic that has been a credit to himself, and the labor he performed will remain a lasting monument to his memory."

From J. F. H., *New Marion, Ind.*—It seems to me that most of the mechanics who are discussing this subject do not view it from the proper standpoint. What we are trying to accomplish is to ascertain what amount of work the average carpenter should be able to do in a day. Some writers tell us they can nail on 10,000 shingles in nine hours, fit and hang 20 doors in a day of the same length, &c. We have some of these wonders here, but how many nails do they put in a shingle. Sometime two, but mostly one. I was recently told of a new roof which a carpenter had had put on only five years ago, and that a year ago the shingles were blown off that roof and they didn't have a nail hole in them. He said the men who put on the roof were good workmen and understood their business, he thought, but evidently they didn't use as many nails as they were ordered. No, they got in a hurry and slighted their work in order to do a big day's job. Why is it that some of our workmen exert themselves so in that way of doing things? We as a class ought to take more pride in our work and encourage a higher standard of skill, do a neat job, make good joints, have the buildings which we put up plumb and square, and then the boss will have confidence in his men and pay them good wages.

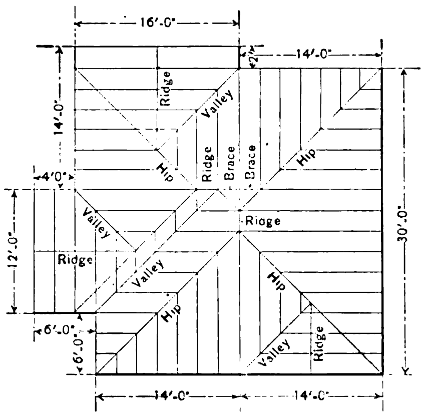


Fig. 1.—Framing Plan of Roof Submitted by "W. C. H."

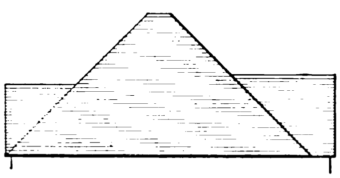


Fig. 2.—Right (Side) Elevation.

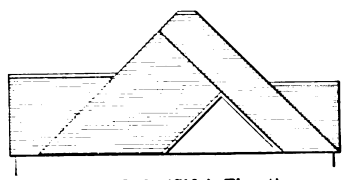


Fig. 3.—Left (Side) Elevation.

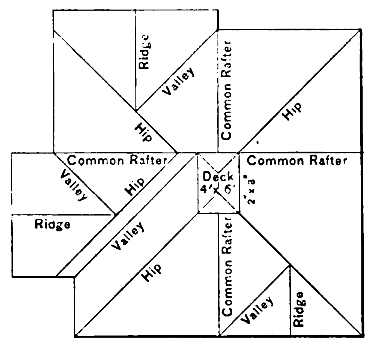


Fig. 6.—Plan Submitted by "H. L. F."

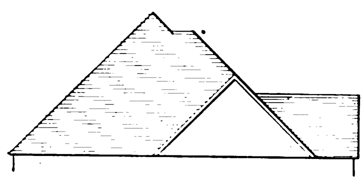


Fig. 4.—Rear Elevation.

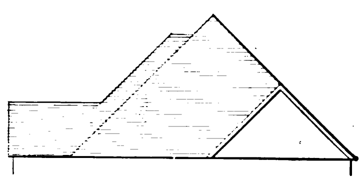


Fig. 5.—Front Elevation.

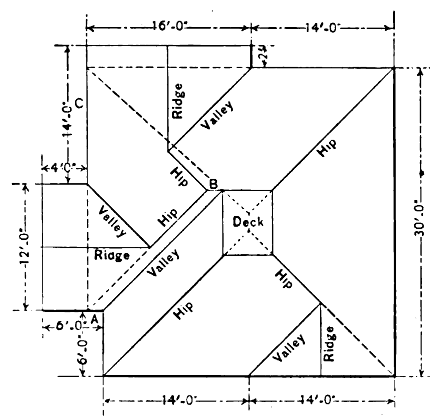


Fig. 7.—Outline of Roof as Suggested by "R. H. A."

Constructing a Half Pitch Roof—Scale, 1-16 Inch to the Foot.

Constructing a Half Pitch Roof.

From W. C. H., *Donaldsonville, La.*—In answer to the request of "H. M." of St. Louis, Mo., in the February issue, I inclose plans and elevations showing what I consider the best method for carrying a half pitch roof over his partial plan. Fig. 1 represents the framing plan, while Figs. 2 to 5 inclusive show the various elevations.

From H. L. F., *Dana, Ind.*—In answer to "H. M." of St. Louis, Mo., and for the benefit of "O. N.," Atkinson, Ill., as well as other interested readers, I submit a plan, Fig. 6, of a roof which is supported entirely by the outside plate of the building. I would suggest that in framing this roof he first construct the deck as indicated of 2 x 8 inch timber, extending the rear side of the deck timber 2 feet to the left, forming a ridge, to which to place the common rafter as indicated. After the deck is in place and supported by the common rafters the hips and valleys can be placed in their proper position and the spaces filled in with jacks and cripples. If "H. N." does not want a deck on his roof, he may place the rafters on top of the deck, bringing it to a ridge at the top, as shown. I have been a reader of *Carpentry and Building* for several years and have gained valuable information from its columns.

From R. H. Anderson, *Route No. 4, Portland, Maine.*—Although not a constant reader of the paper, I wish to submit the accompanying plan, Fig. 7, which answers the inquiry of "H. M." of St. Louis, in one or two ways. The projection A makes a valley necessary, as the projection is really an ell. The dotted lines show the plates and hips as if there were no gables. The short ridge B is equal in length to the projection A. Framed in this way, it will be seen that all the gable roofs make but one valley each, the other side of their roofs being simply a continuation of the faces of the main roof. Another way and obviously cheaper would be to carry the main plate at A out on a line with C, which would give a paneled soffit supported by a bracket at the corner. This would make the plate line 30 feet square and will do away with the upper part of the valley A and the ridge B, making the labor of framing much simpler. If "H. M." should build the roof according to my suggestion, I should very much like to have him send me a photograph of the building when finished and I will gladly pay the expense.

Note.—We also have a reply to this inquiry from "J. C." of Riverside, Cal., the roof plan being the same as that of "O. N.," published in the March issue.

Hanging Glass Doors.

From Lazarus, *Cliff, N. M.*—Responding to the inquiry of "E. E. F.," Wenatchee, Wash., I would say always hang glass doors with the putty or bead on the inside, and this applies to transoms as well. This method throwns the strain on the wood or frame instead of on the putty.

From D. P. B., *Redford, N. Y.*—Replying to the inquiry of "E. E. F.," at the bottom of page 97 in the April issue, I would say put the putty side of glass doors out. No well puttied glass will stir, as the glass vibrates and therefore takes up the shake.

Design for Picket Fence.

From J. F. H., *New Marion, Ind.*—I notice from recent issues of the paper that there is quite a difference of opinion as regards the construction of picket fences. The writer signing himself "D. P. B.," Redford, N. Y., says to set the posts 5 feet deep, while "Down South" in the April issue says the depth to which posts should be set depends on the nature of the soil, which I believe is true. He also says that he prefers to cut the lower rail in between the posts, which, I think, makes a good job and less work than it is to cut gains, but the people here seem to think that if you do not cut gains in the posts the fence is no good. Time, however, will tell which form of construction is the most durable. I would be glad if some of the readers of the journal would further discuss the subject, as I think there are many points which can be brought out that will be of benefit to many of us.

Importance of Explicit Builders' Contracts.

From F. K. W., *Lake Providence, La.*—I agree with F. G. Odell that it is difficult to estimate high enough as the thousand and one things which occur in connection with every building, and which cannot be foreseen by the wisest of us is what divides the profits. I much prefer to build under a good architect if he be one who knows his business and is reasonable. One reason is, the owner will more likely listen to him than to the contractor, thinking that the latter is looking out too much for himself. Of one fact I am quite sure, very few written contracts are sufficiently full and explicit, and the proviso should always be there that other work not specified must be paid for. I want to say to our friends, look out for the man who wants the cheapest thing he can get, for he will have the best and lots of it before he is done with you. Any old thing will answer until he gets you securely started with several hundred dollars of your money spent, and then he wants cement used instead of lime, then the shingles are not clear heart when he wanted cheap ones, the flooring is not "A" quality, and the glass in the windows is not bedded in putty, the hardware generally is very low grade, the locks are worthless, &c. Yet he asks you for the cheapest of all these, and when it comes time to settle he will offer you $25 less than is due you, with the alternative of a law suit. His name is legion, but he shies at a good, full and explicit contract.

Figuring Tank Capacity.

From A. A. M., *New Roads, La.*—Please inform me how I can figure to determine the size to make a circular tank to hold any given number of gallons.

Answer.—This can be done in two ways. First, by calculating the number of cubic inches in the number of gallons for which the tank is to be made. Divide this total by the hight that the tank is to be. This will give the area of the circle, which should be divided by the decimal fraction 0.7854, and the square root extracted from the quotient. Another way is to multiply the number of gallons by the decimal fraction 0.0034, divide the product by the hight that the tank is to be and extract the square root of the quotient. For example, to explain this operation: If the tank is desired to hold 25 gallons multiplying 25 by 0.0034 will give something above 7200 cubic inches. Then, if the tank is to be 18 inches deep it is only necessary to divide the 7200 by 18 to find that the area at the bottom of the tank will be something over 400 inches. To extract the square root of 400 would show that the tank ought to be a fraction more than 20 inches in diameter. To take exact figures and find the number of gallons that a tank of a given size would hold would mean to multiply the diameter, 20 inches, by 20, when the product would be 400. Multiplying this by 18 would give 7200 cubic inches, which multiplied by the decimal fraction 0.0034 would show that a tank of these dimensions would hold 24.48 gallons. We think that, with this explanation, our correspondent can readily arrive at a method of determining the size of any tank to hold any number of gallons.

A Convenient Door Clamp.

From J. L. C., *Howard, W. Va.*—I notice in the April issue the letter of the correspondent describing a clamp for holding doors in position while being fitted. My feeling is that the device requires too much time in taking care of it and is somewhat clumsy in handling. The plan which I have is to get a piece of board, 1 x 4 inches, and cut it off ¼ inch longer than the door opening is wide so that it will fit tight between the jambs. Cut a notch out of the center to receive the door, and the result is a clamp that beats anything I have ever seen. The door is right where you want it, and there is nothing in the way.

Coloring Copper Cornices.

From J. H., *Lowell, Mass.*—I have recently put up some copper cornices and have been asked if I could treat them with acid to give them an antique appearance, or if I knew how to accomplish this by means of oil, and my reply was in the negative. Will some one inform me how to accomplish this result?

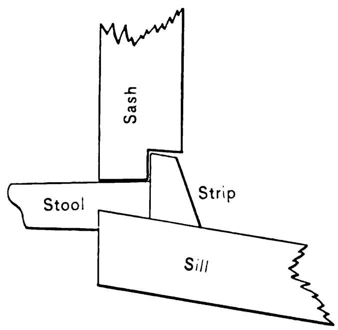
Answer.—One method most generally used for turning copper green is the application of a solution of sal ammoniac and water. Add about 1 pound of powdered sal ammoniac to 5 gallons of water, dissolve it thoroughly, and let it stand 24 hours at least before putting on the copper. Apply to the copper with a brush, just as paint would be applied, being sure to cover every place. Let it stand for one day at least and sprinkle it with water, using a brush, splashing it on lightly. If water is put on too freely it will run the color and streak it. After standing over night the color in the morning will be all that could be desired. The same effect can be produced by using vinegar and salt instead of sal ammoniac, using ½ pound of salt to 2 gallons of vinegar.

Supporting Roof of Lumber Shed.

From D. P. B., *Redford, N. Y.*—Referring to the question of "J. A. E.," whose communication and sketch appeared in the April issue, I would say that if the vertical section between B and C of his diagram is a wall, the best plan of the correspondent would be to support his roof by a line of light trusses.

Hanging Swinging Sash.

From YOUNG READER, *Takoma, D. C.*—I send herewith sketch showing my way of hanging rim sash. Plow the sash and nail a strip on the sill, as shown. The strip



Hanging Swinging Sash.

serves as a stop and also as a drip. I sometimes cover the strip and the sill with tin. The above may be of some service to "H. M.," who inquires in the April issue of the paper.

Water Pressure in a Tank.

From PLUMB, *Republic, Wash.*—I would like to ask some of the readers who are given to pondering mathematical problems what is the whole pressure on the sides, ends and bottom of a rectangular tank filled with water, the inside dimensions of the tank being: Length, 80 feet, width, 20 feet, and depth, 12 feet. Such a tank was built out here a year ago, and there was much argument among civil engineers, as well as some who have no handle to their names, as to the question above. While it is a little outside of the province of the Correspondence columns, yet it is something about which it might be well for carpenters to know, and I therefore submit it for their consideration.

Defective House Drainage.

From F. H. S., *San Francisco, Cal.*—I would like to get some information in reference to the arrangement of house drainage pipes, and submit herewith a sketch. I have shown two 3-inch cast iron stacks for slop hopper work with no water closets or other fixtures connected with them. One stack has three 2-inch traps and the other three 3-inch traps. If any of the upper traps on these risers are operated will not the flushing have a tendency to siphon the traps below the one that is operated, if they are not vented? If they will not siphon in this particular case, please explain why, and if there is any advantage in the 3-inch trap over the 2-inch trap. A great many such jobs are to be found in this city and are sanctioned by the plumbing inspectors. A 2-inch waste stack and a 4-inch soil stack are to be vented according to law—why not such a job as shown?

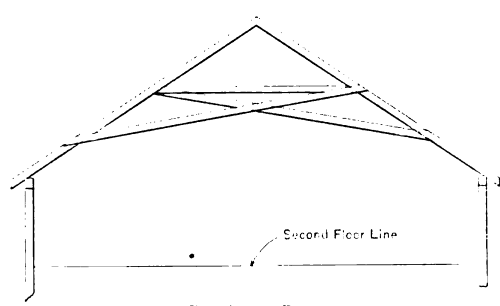
Answer.—Our correspondent submits a sketch showing two waste risers which run open through the roof, and in each case three slop hoppers are connected with the stacks with no other fixtures, the only difference being that one set of fixtures has 3-inch traps and the other 2-inch traps. This description we have deemed sufficient to thoroughly explain the conditions, and the sketch sent has not been reproduced for this reason. According to the regulations in many cities each one of the traps should be vented to protect the trap against siphonage and to permit of a circulation of air through the piping system. Without the vent pipe it is assumed that the flushing of the upper trap would cause a pressure of the air in the stack by the water falling down and forcing the air before it. This would cause the air on the sewer side of the lower trap to press heavily on the trap seal, and even if not sufficient to break the seal would start a motion of the water in the trap by which some would be lost, and if the operation was repeated it would be quite possible to break the seal in this trap. If there was a back air pipe connected with the sewer side of the trap the excess of air pressure could be relieved by the air passing up through the back air pipe without affecting the trap seal. On the other hand, if the lower trap was flushed, air to fill the space in the pipe that had been displaced by being forced ahead of the water would have to be replaced, and would be drawn with equal force through the pipe which extends through the roof and the pipe connected with the trap. This might also set up the oscillating movement of the water in the trap and eventually lead to the trap seal being destroyed. If the law requires fixtures connected with 2-inch waste stacks and 4-inch soil stacks to be vented, we see no good reason why the fixtures connected with 3-inch stacks as described should not also be vented.

Trouble With a Chimney.

From T. S. P., *Anna, Ohio.*—Will some reader of the paper inform me of the kind of a flue top to use on a chimney on a one-story addition built to the south of a two-story building? The dwelling faces north and the chimney has a back draft when the wind is from the south. I have tried a swing top with a 7-foot extension and this failed. I now have a flue top on the chimney 14 feet high without a swing top, and this does not prevent its smoking when the wind is from the south. I can correct the difficulty by carrying the top still higher, but would like to know if there is not some other form of flue top that will do so, and thus I shall not be compelled to run the top up so high.

Bracing a Barn.

From T. A. D., *Philadelphia, Pa.*—In answer to "W. T. M." of Cedar Lake, Mich., I inclose a rough sketch showing how I braced a roof six years ago, the building being 22 feet wide. I used 1 x 6 inch oak for braces, well spiked to the rafters, and I braced at each intermediate post, these being 10 feet apart. I would advise



Bracing a Barn.

"W. T. M.," as his building is wider, to use braces a little thicker, say 1½ inches. Before I put the braces on the barn to which I have referred I drew the plates in a little beyond their place at the center of the building, and two years ago it had scarcely gotten back to its original position.

Paint for Tin Roof.

From A. M. H., *Floyd, Va.*—I should like to know what is the best paint to put on a tin roof.

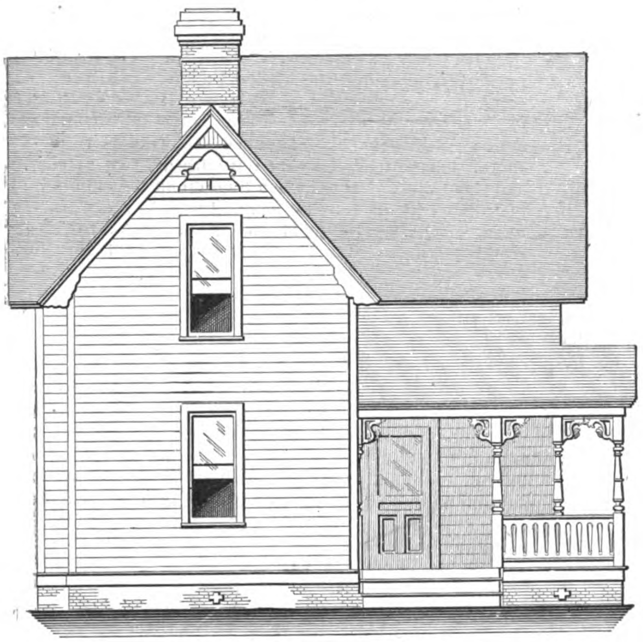
Answer.—In the opinion of experienced men any mineral paint, mixed not too thin with linseed oil and applied in two or three coats, makes as good a paint for tin roofing as can be desired. A correspondent some time ago wrote that he had seen Venetian red adhere so firmly to a tin roof that it could hardly be scraped off; it seemed as if coated with a layer of stone.

DESIGN FOR A LOW COST COTTAGE.

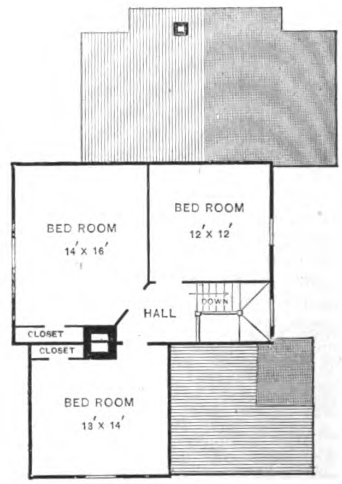
WE present herewith illustrations covering elevations, floor plans and a few constructive details of a low cost cottage erected not long since in Sylva, N. C., in accordance with drawings prepared by C. M. Wells of that place. We also give a small half-tone reproduction from a photograph which affords an excellent idea of the appearance of the completed structure. An inspection of the plans shows the interior to be divided into parlor, family room, dining room and kitchen on the first floor and three bed rooms on the second floor.

The frame of the building is inclosed with sheathing boards, over which at the first and second stories and gables is laid weather boarding or siding, as indicated on the elevations. The upper part of the gables is finished with ceiling strips, all as shown. The roof is shingled and was treated with two coats of Cabot's shingle stain.

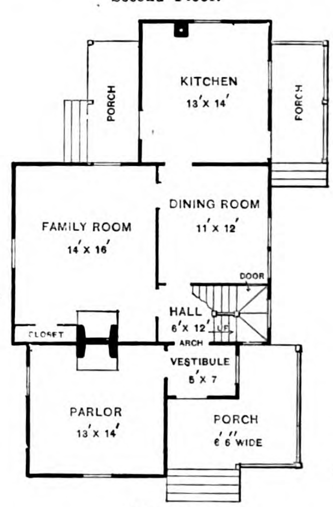
The architect states that the interior is finished throughout in North Carolina pine. In some of the rooms the wood work is treated with three coats of hard oil, while the remaining portions are finished with three coats of paint. The mantels in the house were made at the building of pine and ash. We understand from the architect that the total cost of the structure was in the neighborhood of $800, but the cost will vary somewhat with the locality and style of finish.



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



Second Floor.



First Floor.
Scale, 1-16 Inch to the Foot.

Design for a Low Cost Cottage.—C. M. Wells, Architect, Sylva, N. C.

New Engineering Building for the University of Pennsylvania.

The new Engineering Building which is about to be erected at the University of Pennsylvania, and plans for which have just been completed by Cope & Stewardson of the city named, will occupy a site at the corner of Thirty-third and Locust streets, Philadelphia, Pa. The building will be 300 feet long by 160 feet deep, with a wing 50 feet wide on the north end extending 40 feet further to Chancellor street in the rear. It will be three stories in hight, with a basement covering about one-third of the area. The construction will be fire proof throughout, the exterior being of dark brick with sandstone trimmings and the finish in strict keeping with the more recently constructed university buildings. The total floor space available will be approximately 128,000 square feet, of which 15,600 will be in the basement, 47,000 on the first floor, 32,600 on the second floor and the same on the third floor.

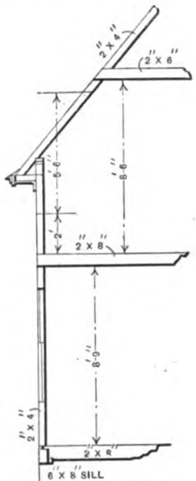
There will be two principal entrances leading to the main hallway, which will extend over the entire length of the building to staircases at both extremities. The interior will be lighted by two light wells about 80 x 50 feet, terminating in skylights over the first story. The basement will be occupied largely by locker rooms and lavatories, and by the necessary engines and machinery equipment for heating and ventilating purposes. There will also be laboratories for hydraulic and physical testing, and also a small one for testing brick.

On the first floor will be located the offices of the heads of the departments, also spacious laboratories for the testing of cements, mortars and concrete. This room will contain testing machines of various types for tensile, compressive and bending tests, a briquette making machine, immersion tanks, damp closets and a number of individual work tables, each completely equipped with an outfit of minor apparatus. It is intended to make special provision for investigating the effect of freezing on mortar and concrete by the installation of refrigerating apparatus. On this floor will also be located the main physical testing and hydraulic laboratories, the former containing universal testing machines of various types ranging in capacity from 30,000 to 200,000 pounds, machines for torsion, bending and impact tests, besides a complete outfit of extensometers, deflectometers, cathetometers, micrometers, &c. The hydraulic laboratory will contain apparatus for experiments on the discharge through orifices and tubes, the tanks being provided with partially removable ends in order to permit also of observations of flow over submerged weirs and dams. Various pipe circuits will be provided and from numerous connections along these pipe lines water will be supplied to different forms of apparatus. There will be an instrument testing room, and mechanical and electrical laboratories. The central space under the skylights will be utilized entirely for work shops. The wood working and the pattern shop will extend to the middle of the building and divide it into two parts, one for beginners and the other for students engaged on pattern work. A foundry will be another feature, and various forms of lathes, planers, &c., will be installed, besides a number of electrically driven tools. In the mechanical laboratory will be steam and gas engines and condensing apparatus, and there will be special testing rooms for refrigerating work, &c.

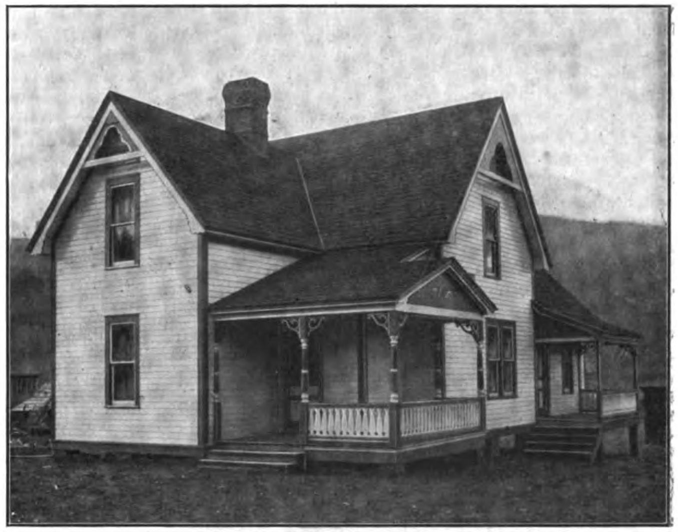
The second floor will be occupied by a reference library and reading room, the library having a capacity of about 20,000 volumes. Between the light well at the center of the building will be a students' assembly room, and along the south side will be numerous instructors' rooms. The rear portion of this floor will be devoted to drawing rooms, a separate room being allotted to each class and an individual desk to each student, so that he may have free access to it at all hours.

The third floor is intended for the use of the engineering societies, a general supply store, class rooms, instructors' rooms, &c. In the east and west wings spacious rooms will be set aside for engineering museums. The rear of this floor will be devoted entirely to drawing rooms, which like those on the second floor will have the full advantage of north light.

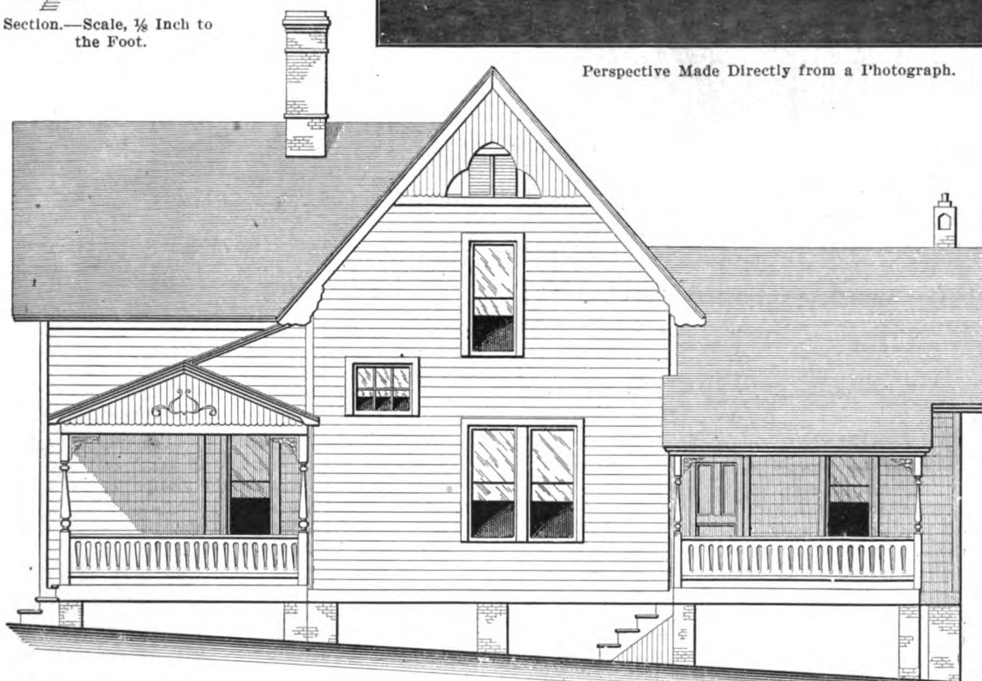
The structure will be heated by direct steam, the ventilation being provided for by electrically driven fans, supplying tempered air to the various rooms. The lighting throughout will be by electricity. It is expected to have the building completed and ready for occupancy by the fall of 1904.



Section.—Scale, ⅛ Inch to the Foot.



Perspective Made Directly from a Photograph.



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

Design for a Low Cost Cottage.

A Concrete-Steel Chimney.

A very interesting example of concrete-steel construction is found in the chimney recently completed in St. Louis, Mo., for a concern manufacturing fire brick. The chimney is 130 feet in hight, with an inside diameter of 5 feet, and was designed and built by Carl Weber of the city named, using the T-bar reinforcement patented by him. The work of building the chimney is described by Mr. Weber as follows:

The materials used in the construction of the chimney were river sand and Portland cement reinforced with steel T-bars 1¼ x 1¼ x ½ inches. Up to a hight of 65 feet from the base this stack consists of two shells, the outside shell being 6 inches thick, and the inside shell 4 inches thick, with an intervening air space of 3 inches. In the concrete mass of the outer shell are 20 steel T-bars, 2 feet apart, vertically imbedded, running from the foot of foundation to the top of the chimney, while ten steel bars 1 foot by 1 inch by ⅛ inch are in the same manner used for strengthening the inner shell. Every 2½ feet a horizontal ring of the same material encircles the vertical bars, being connected to them by steel clamps. The chimney is self supporting and monolithic—a single piece from base to top.

The concrete-steel base, on which the stack rests, 20 feet below ground level, is 5 feet deep and 16 feet square, and is built on solid rock. Above the hight of 65 feet there is only a single shell, the thickness of which tapers off in proper intervals to 5 inches, 4 inches and finally 3 inches.

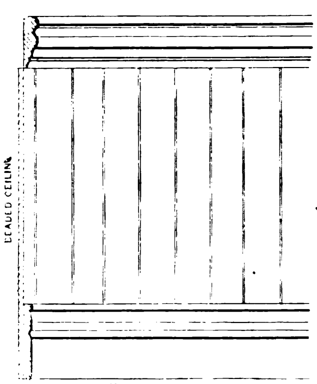
The air space, directly above the grade, is connected by four square openings with the outside atmosphere, allowing the air to enter, which at the upper terminal point of the inner shell will force itself through specially provided inclined pipes into the shaft of the chimney proper. One of the functions of the air space is to allow the inner shell freely to expand and contract, being protected by the outer shell against harm from sudden cooling, while in return the outer shell is shielded by the inner shell against the direct effect of the heat. By this arrangement it is made possible for these stacks to withstand heat up to 2000 degrees F.

The forms used in building this stack are made of wood, forming rings of 2½ feet in hight, and being divided into six sections, which are held together by iron hooks. In operation two such rings are in use for the outside and two for the inside of the chimney, while properly curved 3-inch molds provide for forming the intervening air space.

The method of procedure is as follows: After one form is completely filled with concrete, properly tamped around the vertical bars, the second form is placed on top of the first, and likewise filled in with concrete. The hooks connecting the several sections of the lower forms are then opened, the single parts, which are previously secured with ropes pulled up, and again placed on top of the last form, which remains adhering, and so on, *vice-versa*, till the top of the chimney is reached, two rings a day being easily completed.

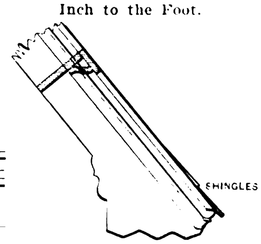
A very light frame staging is provided on the inside of the chimney for attaching the ladders and supporting a pulley beam, used to hoist material by hand.

The weight of the whole chimney is about 120 tons, without footing. Its outside surface will ultimately be coated with a cement wash, to secure a uniform color.



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

Water Table.—Scale, 1 Inch to the Foot.



Detail of Barge Board.—Scale, ½ Inch to the Foot.

Miscellaneous Details of Design for a Low Cost Cottage.

Day's Work for a Building Mechanic.

The discussion which has been in progress for some little time past in our columns relative to the amount of work of various kinds the average carpenter of ability and intelligence should be expected to perform in a day of a given number of hours, seems to have attracted widespread interest and attention. In a recent issue of one of our exchanges we find a statement regarding what constitutes a fair day's work for an industrious and competent workman in a day of eight hours, and we present it herewith for the benefit of those interested in the discussion now in progress. Under the head of "Carpenters," it says:

Cut and lay 500 feet of sheathing boards.

Cut and lay 250 feet of siding or clapboards.

Cut and lay 2000 shingles.

Place in position 750 feet of joists.

Place in position 500 feet of studding.

Place in position 400 feet of 4-inch finished flooring and 300 feet of 2-inch finished flooring.

Fit 150 lineal feet of baseboard—one member.

Fit 125 lineal feet of baseboard—two member.

Fit 100 lineal feet of baseboard—three member.

Case 12 doors and windows—one member casing.

Case eight doors and windows—two member casing.

Fit and hang eight doors.

Fit locks on 12 doors.

Fit and hang ten two-sash windows.

MASONS.

Lay 100 cubic feet of marble stone masonry.

Lay 1200 to 1800 common brick per day or 300 to 500 pressed brick per day.

LATHERS.

Put on 85 yards of laths per day.

PLASTERERS.

Put on 175 yards of brown coat mortar per day.

Put on 100 yards of finish or putty coat per day.

PAINTERS.

Give one coat to 18 doors, with casings complete, both sides, per day.

Give one coat to 125 yards of interior work (plain surface) per day.

The Fire Proofing of Wood.

After an exhaustive series of experiments, extending over several years, with a wide range of compounds, it is stated in an exchange that Joseph L. Ferrell has found in sulphate of aluminum a compound that appears to answer all the practical requirements. It has the additional feature, of no slight importance in its bearing upon the fire proofing effect, that when strongly heated it leaves an infusible and nonconducting residue to cover and protect the cellular structure throughout the wood. It absolutely prevents the propagation not only of flame throughout the wood, but even of a glow because of its nonconducting and unalterable character. Sulphate of aluminum, in concentrated solution, is far more efficient than an alum solution; as if the alkaline sulphate of the alum simply detracted from the power of the aluminum sulphate in the matter of making wood fire resistant.

Sulphate or phosphate of ammonia acts to make wood fire resistant by rapidly liberating ammonia gas, which has the effect of checking the flames on the surface of the wood. The fiercer the flame which plays against such wood the more rapid the liberation and exhaustion of the protecting vapor. There is no residual protective substance remaining in the wood, and the carbonization of the fiber proceeds apace. On the other hand, so soon as the sulphate of aluminum of the superficial layer of the wood impregnated with this chemical is decomposed by the heat of a flame, a deposit of aluminum is formed, the nonconducting properties of which make it a barrier against the propagation of the carbonizing effect and protect the interior in a very notable degree.

Cooling an Auditorium by the Use of Ice.

One of the very interesting and timely papers read at the semiannual meeting of the American Society of Heating and Ventilating Engineers at Atlantic City last summer was descriptive of the method pursued by John J. Harris, the author, in cooling an auditorium by the use of ice. At the annual meeting held in New York early in the present year Mr. Harris read another paper on the same subject, but involving addition data and illustrations which are of such a nature as to prove of more than usual interest at this time, and we present them herewith.

Two days previous to the commencement exercises in the Scranton High School, June, 1901, the writer was requested by the Board of Directors to devise some means by which the auditorium could be kept at a comfortable temperature during the exercises and not become overheated. Time being short, the only resource left was by the use of ice.

A rack, Fig. 1, was constructed in the fresh air inlet large enough to hold about 8 tons of ice, with several shelves having slatted bottoms, Fig. 2, the frame being made from 2 x 6 inch hemlock studs. At 6 o'clock in the evening the ice was placed in the rack and staggered in such a way that the air was compelled to pass around and between the cakes of ice until discharged by the fan through the flues into the auditorium above, to mingle with the sultry atmosphere, tempering, diffusing and maintaining a temperature that was most invigorating. The bottom or floor of the rack was made from matched pine lumber and lined with No. 28 galvanized iron, and drained by a 2-inch gas pipe. Two fans of the disk type are employed to ventilate this building, one 11 feet diameter, and an 8-foot diameter exhaust fan, located in the attic, the air being forced into the auditorium through a vertical flue at each side of the stage and from above the dressing rooms, foul air making its exit through the registers in the floor, and which are located in the aisles. The construction of this system admits of by-passing all the air intended for the building through the auditorium.

That such an arrangement is necessary can readily be seen from the fact that the seating capacity of this room is 900, but on occasions of this kind about 1400 persons gain admittance, filling every available space to overflowing. The outside temperature was 90 degrees F., while the inside temperature was maintained at 76 degrees F. The humidity was normal, and at no time reached a point of saturation. That it proved satisfactory can best be demonstrated by the fact that the directors were so well pleased that they desired the method to be used for the exercises in June, 1902.

The size of the auditorium is 80 by 80 feet by 20 feet high. The amount of ice melted was, on June 11, 13,600 pounds; June 12, 11,800 pounds; June 13, 13,000 pounds, making a total of 38,400 pounds melted during the three nights. The fans were designed to deliver 3,000,000 cubic feet of air per hour under the friction of the ducts; the speed of the plenum fan was 100 revolutions per minute and that of the exhaust fan 120 revolutions per minute. By the use of calcium chloride an absolute control of the moisture was maintained. In the case of rooms cooled by means of ice, or by direct ammonia expansion, or by any refrigerating plant, calcium chloride permits of an easy regulation of the percentage of moisture, as it has a capacity to absorb three times its own weight in moisture before becoming fully dissolved. The method of applying calcium chloride for this purpose is to dispose the same in shallow pans with perforated false bottoms, so as to allow the accumulated moisture to drain off and deposit in the bottom of the pans, and they should be placed in the ducts where the rapid currents of air pass over the surface of the calcium. The commercial calcium chloride should be practically chemically pure, containing no chloride of sodium or chloride of magnesium, which, with the above purpose in view, are absolutely useless, having comparatively little affinity for moisture.

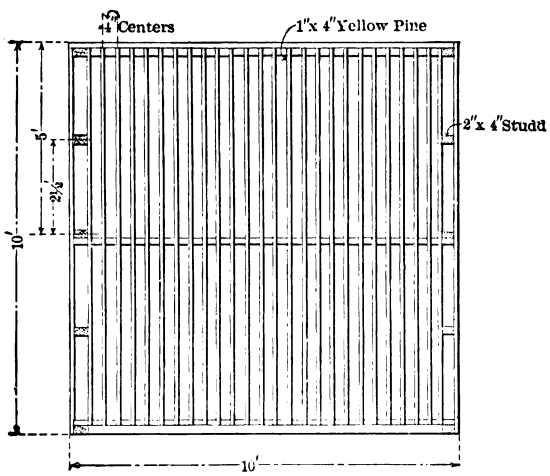


Fig. 1.—Plan of Rack.

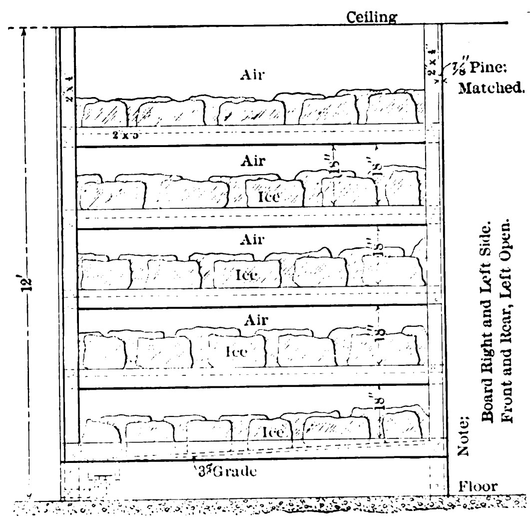


Fig. 2.—Front Elevation of Refrigerator for High School.

Cooling an Auditorium by the Use of Ice.

New Pennsylvania Railroad Station in New York City.

We referred in these columns a short time ago to the fact that McKim, Mead & White had been selected as the architects for the mammoth railroad station, which is to be erected in New York City on the site bounded by Seventh and Ninth avenues and Thirty-first and Thirty-third streets. According to the architects, the main portion of the building will be 60 feet in hight, one story, with a frontage on the four thoroughfares of 2500 feet. The structure will be of steel skeleton frame filled in with warm granite highly polished. The architecture will be of plain Doric order, and for the purpose of giving more importance to the exterior, as well as for the better accommodation of the public, the structure will set back 20 feet from the Thirty-first and Thirty-third street lines and 50 feet back from Seventh avenue, thus making the streets wider and giving to the building a more pleasing effect. At various points along the fronts there are to be colonnades of columns of the Doric order, and between them pilasters are to be used for the preservation of the same order.

The waiting room will be in the center of the block, measuring 100 feet wide, 300 feet long and 140 feet high. It will be vault-like, and lighted by semicircular windows 75 feet in diameter. The main entrance for foot passengers will be on Seventh avenue. Passing through an arcade lined with shops and stores, passengers will descend by stairs or elevators to the floor of the waiting room about 20 feet below the street level. Leaving the waiting room passengers will go down a short incline to the concourse, the full width of the building from Thirty-first to Thirty-third streets. Indicators will designate the trains and passengers may go to the one desired by descending 20 feet in an elevator, the tracks and side platforms being 20 feet below the concourse and 40 feet below the street level. Entrance may also be had to the concourse direct from the side streets by means of stairs or elevators. At the street level on Seventh avenue side will be a restaurant and lunch room, and below them will be the baggage rooms and above the kitchens.

From Eigth avenue to Ninth avenue will be the train shed, which Mr. Mead declares will be more beautiful than the noted train shed of the railroad station in Dresden. The roof is to be curved and supported by pillars, some of which will be nearly 100 feet in hight. The top of the shed is not to extend above the top of the 60-foot building, which will form the main part of the station. There will be a driveway from Seventh avenue at Thirty-first street for carriages along the side of building and leading to the waiting room or to the concourse, the grade being about 6 per cent. On the Thirty-third street side there will be a similar driveway for the carriages of passengers leaving the concourse.

While the plans which have been prepared for the station are preliminary, it is understood that if they are departed from it will be only in the matter of unimportant detail. The architects intimate that the station, when completed, will be the most perfect and much the largest railroad passenger station in the world.

Cleaning Marble.

A writer in one of our exchanges gives the following method for cleaning marble: Mix two parts by weight of sal soda, one part pulverized chalk or fine bolted whiting, and one part powdered pumice stone with enough water to make a thin batter, and by means of a scrubbing brush apply it to the spots, then wash off with soap and water.

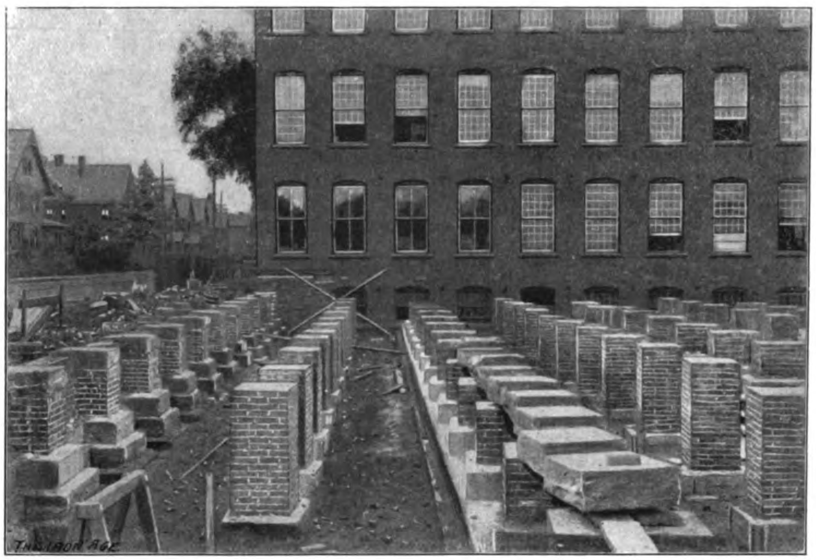
To remove grease spots from marble, moisten fine whiting or fuller's earth with benzine, apply it in a thick layer to the spots and let it remain for some time, then remove the now dry material and wash the spot with soap and water.

To extract oil stains from marble, make a paste by mixing two parts fuller's earth, one part soft soap and one part potash with boiling water. Apply this paste to the spots and let it remain three or four hours.

A Shop Foundation on Made Ground.

The large extension of skeleton construction, 80 x 120 feet and four stories in hight, which has just been added to their small tool department by the Pratt & Whitney Company of Hartford, Conn., involves some rather interesting features. In the frame yellow pine timbers are used, while the walls are of brick.

The peculiar feature of the structure is the foundation, which rests upon ground which was filled in many years ago. Cellar space was not required, as the present building provides all that is needed. Under these circumstances it would have been extravagant to have sunk piles. In order to secure a firm foundation, free from all danger of settling, the following method was pursued: The excavation was made over the entire plot to a depth of only 4 or 5 feet below the street level. Upon this were built concrete piers, topped with brick, for the walls and columns. Extending across the space are three concrete footings, which are stepped, as shown in the engraving. These extend the entire length of the building, and each forms one single block of concrete 6 feet wide at the bottom by 120 feet long. This distributes the load over an extremely wide area. On these footings are built brick piers which carry the floor beams. As additional supports for the first floor, which will be used as a storeroom for finished tools, there are rows of brick piers on concrete blocks. It will be seen that this method of construction furnishes a very great foundation area as compared with that of the entire building.



A Shop Foundation on Made Ground.

A Large Loft Building.

What is intended to be the largest loft building in New York City is now in course of erection on Nineteenth street, just west of Fifth avenue and extending through to Twentieth street. According to the plans of Architect Robert Maynicke, the structure, which will be 11 stories in hight, will cover an area of 20,700 square feet and will cost in the neighborhood of $800,000. There will be seven elevators in the building, three for passenger and four for freight service. There will also be a passageway in the middle of the building, extending through from street to street. The foundations are now being put in and the architect expects to have the building ready for occupancy by the first of the new year. The front will be of granite, limestone, brick and terra cotta. The building is being put up for Henry Corn, and, as showing the demand for accommodations which it will furnish in a business way, it may be stated that it is already fully rented.

WHAT BUILDERS ARE DOING.

THE first of May did not witness any serious disturbance in the building trades of Albany, N. Y., although the question of rates of wages of the carpenters is in a rather uncertain state, with the chances favoring an increase of 10 per cent. provided they waive certain demands which are decidedly objectionable to the contractors. If the advance is granted it will make the carpenters' wages 31¼ cents, 34½ cents and 36 cents per hour. The labor situation is also somewhat complicated by the agitation of the "card system," attempts to inaugurate which are being made but are meeting with opposition by the builders of the city.

Rates of wages in the leading branches of the building trades have been settled for the ensuing year on the following basis:

Bricklayers, Stone masons, Plasterers	50 cents per hour.
Roofers	43¾ cents per hour.
Plumbers	40 cents per hour.
Painters and decorators	31¼ cents per hour.
Plasterers' laborers	25 cents per hour.
Sheet metal workers	43¾ cents per hour.
Building laborers	25 cents per hour.
Gas fitters	$3.00 per day.
Common building laborers	1.50 per day.
Steam fitters	3.50 per day.
Steam fitters' helpers	2.00 per day.

Buffalo, N. Y.

Building is not particularly active in and about the city just at the present time and does not compare favorably with this season last year. Proably the most favorable feature of the situation is the lack of labor trouble of any kind to distress the building contractors. The bricklayers and stone masons are working without a contract, based on the same scale as last year—that is, 50 cents per hour. They made a demand for 55 cents per hour, to go into effect on the first of May, but the contractors did not see their way clear to meet these figures, and while it was at one time thought that the men would go out on strike, they evidently thought better of it, for all are at work at the scale stated.

Chicago, Ill.

Building operations projected during the month of April make a very fair showing, although the figures are not up to the same month of last year. This, however, is not altogether surprising, as a year ago the total for April was abnormally large, that time operations being in full swing, with both wages and materials lower than at present. The number of permits taken out in April this year was 542, covering improvements having a frontage of 14,355 feet, and involving an estimated outlay of $2,386,985. These figures compare with 666 permits for building improvements, having a frontage of 18,275 feet and estimated to cost $3,406,010, for April of last year. The totals for the four months of the present year are, with one exception, the largest for the corresponding period the last seven years.

Cleveland, Ohio.

The eleventh annual banquet of the Builders' Exchange was held in the auditorium of the Chamber of Commerce on the evening of Tuesday, April 28, the occasion being a notable one in the history of the organization. Among the guests were Congressman J. G. Cannon of Illinois, who delivered an address peculiarly suited to the occasion; Mayor T. L. Johnson, General Joseph Wheeler, Congressman T. E. Burton, Architect W. S. Watterson and President J. J. Sullivan of the Chamber of Commerce.

Prior to the banquet a formal reception was tendered Congressman Cannon, and at this time he shook hands with about 400 ladies and gentlemen. The *menu* cards for the dinner, at which covers were laid for 400, were presented in rather novel form. Printed on the heaviest enameled cardboard, they represented first of all the proposed Government building and the proposed court house as the ideal of the builders' art. They further illustrated what nature's builders can do by indicating the spider and his web, the beaver and his dam and the bird and its nest. The floral decorations consisted of palms, roses and carnations. After the *menu* had been duly considered and the speeches made, there was a season of dancing in which a large number of those present participated. The Committee on Reception comprised J. W. Conger, C. C. Dewstoe, Parker Shackleton, F. H. Glidden, B. F. Powers, J. H. Fuller, K. F. Gill, Henry G. Slatmyer, E. H. Towson, F. G. Hogan, E. W. Reaugh, L. N. Weber, J. W. S. Wood, Arthur Bradley, George Lang, John A. Kling and E. W. Fisher.

The arrangements for the banquet were conducted by the Entertainment Committee of the exchange, comprising W. B. McAllister, chairman: Harry Gill, F. A. Edmunds, Andrew Brymer and A. H. Rudolph. This committee was reenforced by the Entertainment Committee of last year, now designated as the Committee on Acquaintance, comprising Frank A. Towson, chairman; W. M. Pattison, Spencer M. Duty, J. H. Caunter, W. H. Waterbury and R. R. Wills.

The Committee on Dancing comprised E. H. Bohm, J. C. Callaghan, E. E. Teare, J. C. Norton and Ira Farley.

Duluth, Minn.

The members of the Builders' Exchange recently held their annual election, when the following directors for the ensuing year were chosen: H. A. Hall, E. C. Wallimer, W. J. McMartin, J. F. Schluens, H. M. Todd, Otto Johnson, J. A. Watterworth, S. E. Matter and Robert Freeman.

The board organized by electing C. E. Evans, president; E. G. Wallinder and J. F. Schluens, vice-presidents; W. W. Blackshaw, secretary, and George H. Lounsberry, treasurer.

Erie, Pa.

The building business in Erie and vicinity is not developing the activity expected in the early spring, especially when taking into consideration the fact that there has been no labor difficulty aside from the strike of the painters, which is in progress at the hour of going to press. The main reason assigned for the quiet condition of things is the high prices of all materials entering into building construction. During the past three months, however, the secretary of the Builders' Exchange has given information on 178 contracts awarded, over 80 per cent, of which work was done by members of that body.

The Erie Builders' Exchange is in a very flourishing condition, having during the past three months added 27 members to the roll, which now brings the total up to 128. This increase in membership and the amount of work which is being done in and through the exchange has rendered the old quarters in the Penn Building much too small and the management has had to seek new offices. These have been found in the Leibel Building, at the corner of State and Ninth streets, where the exchange now occupies the entire third floor, comprising 4200 square feet of space. The greater part of this is devoted to desk room and exhibition purposes, the balance being so divided as to give two rooms for private consultation or meeting rooms for subsidiary organizations. a plan room, 10 x 22 feet, with all modern conveniences, a secretary and directors' room and a lavatory.

Honolulu, H. I.

The chaotic condition of the building ordinances and the discontent arising therefrom have crystallized in a bill which has been formulated by the Builders' and Traders' Exchange for submission to the Territorial Legislature. The most important general provision of the new law is that all buildings 75 feet or over in hight shall be of fire proof construction, with walls of brick, stone or terra cotta, in which wooden lintels shall not be placed. The provision is also made that all foundations shall be of stone, concrete or brick, laid on solid earth, sand or rock. The outer walls of two-story buildings, or similar structures, shall be 12 inches thick for the first and 8 inches thick for the second story. In all buildings other than dwellings a graduated scale is provided for the thickness of walls, ranging from 24 to 12 inches.

Kansas City, Mo.

The report of the Building Bureau for the fiscal year of the city, which ended April 20, shows a heavy increase in the building operations as compared with the previous 12 months. The record for the year was notable in many respects, particularly in that about 70 per cent. of the capital invested was for dwellings. For the year ending April 20 there were 3492 permits issued, of which 405 were for brick structures, 1188 for frame and 2359 for miscellaneous, all estimated to cost $8,054,248. For the previous year there were 4216 permits issued, of which 390 were for brick buildings, 1419 for frame structures and 2407 for miscellaneous, involving an estimated outlay of $6,135,158. An encouraging fact connected with the figures is that the record shows a heavy increase in operations toward the close of the fiscal year, the operations for March having been the largest on record.

Los Angeles, Cal.

Although the city has been troubled more or less with building strikes during the last few weeks, the amount of building undertaken during the month of April was greater, both as regards the number of permits and the estimated cost of the improvements, than that of the corresponding month in either of the two preceding years. There were 449 permits issued in April for improvements, estimated to cost $732,468, as compared with 337 permits for buildings costing $731,410 in April, 1902, and 249 permits for buildings costing $438,709 in April of 1901. The major portion of the permits issued in April of the present year were for private dwellings, flat houses, &c.

The most important building operation at present under way is that of the hotel to be erected at the corner of South Broadway and Seventh streets by J. B. Lankership.

He has decided to put up a nine-story rather than a seven-story structure as originally intended, and the cost will approximate $300,000, exclusive of the site. The exterior will be of red sand stone for the first two stories and pressed brick for the upper ones. There will be four hydraulic elevators and a large service elevator, steam heat, electric lights, ice plant, hot water system, &c. The ladies' parlor and dining rooms will be finished in polished hard wood, while the other rooms in the same story will have tiled floors and marble wainscoting. The ceilings will be beamed, finished with plaster panels and frescoed. The second floor will have two private dining rooms, a banquet room and parlor, the remaining portion of that story and the seven above being devoted to 408 rooms, each suite having a bath. In the bathrooms and hallways the floors will be of vitrified tile and the wainscoting of glazed tile. It is expected that the hotel when finished will be one of the finest in Southern California.

Lowell, Mass.

The annual banquet of the Builders' Exchange was held at the St. Charles Hotel in Lowell on the evening of April 15, just too late for us to get an account of the affair into the May issue. The annual meeting of the exchange was held in the afternoon at the headquarters, 14 Appleton street, when annual reports were read and officers for the ensuing year were elected. The result was as follows:

President, Royal S. Ripley.
Vice-President, C. H. Nelson.
Treasurer, J. B. Varnum.
Secretary, H. R. White.

BOARD OF DIRECTORS.

In addition to the above named officials the Board of Directors for the ensuing year will consist of L. Clark, P. O'Hearn, D. Moody Prescott, G. P. Green and O. M. Pratt.

After the election the members repaired to the St. Charles Hotel, where a banquet was served, interspersed with eloquent speeches and inspiring music. The newly elected president acted as toastmaster, and spoke briefly of his appreciation of the honor which the members had conferred upon him by electing him president. He then introduced John C. Burke, who discussed various topics in a clever style, being followed by Robert J. Thomas, Superintendent of the Lowell Water Board; C. A. Nelson, the newly elected vice-president; Frank T. Weaver and Albert Burnham. The committee in charge of the entertainment were Frank T. Weaver, chairman; Charles F. Varnum and James Whittett.

New York City.

Since our last issue went to press the local building situation has been greatly complicated by the demands made upon the dealers in masons' building materials and lumber, resulting in the closing of the yards and the tying up of important building operations. Several thousand men were directly affected by the lockout, with the probability that the number will be largely increased should the struggle be prolonged. There have also been demands made in other lines of trade, so that the various employing associations have decided to hold a meeting with a view, if possible, of bringing order out of the present chaos, and it is thought that one of the first steps in this direction will be the formation of a compact organization of employers to deal with the demands of the unions. This meeting will be held Friday evening, May 15, the call being signed by the president and secretary of the Building Trades' Association.

In many branches May 1 brought a change in the rates of wages, the new scales going into effect and for which agreements were made being, according to the secretary of the Board of Building Trades, as follows, all the organizations named having the eight-hour work day:

	Rate per day.
Amalgamated Painters and Decorators	$4.00 and $4.50
Brotherhood of Painters and Decorators	4.00 and 4.50
Cement Masons' Union No. 1	4.55
Cement and Ashphalt Laborers	2.64
Electrical Workers' Union No. 3	4.00
Elevator Constructors	4.25
Granite Cutters	4.50
Housesmiths and Bridgemen	4.50
Journeymen Stonecutters' Association	$4.00 to 5.50
Marble Cutters	5.00 to 5.50
Marble Polishers and Rubbers	4.00 to 4.50
Marble Cutters' Helpers	3.00
Marble and Enamel Mosaic Workers	3.75
Mosaic Helpers	2.60
Mosaic and Encaustic Tile Layers' Union	5.50
Plumbers' and Gas Fitters, Local No. 2	4.00
Portable Hoisting Engineers	5.00
Slate, Tile and Metal Roofers	4.00
Steam and Hot Water Fitters' Helpers	2.50
Second-Hand Building Material Handlers	3.00
Tar, Felt and Waterproof Workers	$2.75 to 3.50
Tile Layers' Helpers	3.00
United Derrick Men, Riggers and Pointers' Union	4.25
Blue Stone Cutters	4.50

A comparison of the above figures with those which we published in our last issue will show the extent to which wages have in many instances been advanced.

Philadelphia, Pa.

While no records were broken in April, the amount of new building improvements projected was up to the average, and the figures of the Bureau of Building Inspection indicate a healthy growth. Permits were issued for 816 building improvements, covering 1175 operations, and involving an estimated outlay of $3,732,810. These figures compare with 885 permits, covering 1359 operations, estimated to cost $2,676,960 for April of last year. It will recall that March of this year was somewhat abnormal in that a single permit, that for Wanamaker's new department store, provided for an expenditure of $5,000,000, and single operations involving more than $1,000,000 are exceedingly rare in the city. Of the total involved in the April permits, private dwellings call for over $800,000, manufactories nearly $500,000, municipal buildings $700,000 and alterations and additions over $600,000.

Henry Reeves has been elected treasurer of the Master Builders' Exchange, to succeed Charles H. Reeves, who has resigned on account of ill-health.

Pittsburgh, Pa.

With a view to regulating matters in the building trades of the city there has recently been formed in Pittsburgh what is known as the Builders' League, the object of which as announced in the by-laws is "to protect members in their rights to manage their respective business in such lawful manner as they may deem wise without the interference from organized labor, and the adoption of a uniform and legitimate system whereby members may ascertain who is and who is not worthy of their employment." Another matter, which we understand the League will take up for consideration, is a uniform date when contracts with the unions in the building trades will be signed. At the present time the scales of the unions expire all through the year, and there is more or less friction, but we understand the League hopes to arrange matters so that all scales shall begin on January 1. In this way contractors would know what the rate of wages would be throughout the year, and could base their estimates accordingly. Architects usually prepare their plans for large building operations the first of the year and contracts are ready to be let as a rule by April 1. With all scales signed contractors would know just what they would have to pay, and would be able to figure intelligently on all work submitted to them.

We also understand that the League will encourage the formation of associations among employers in the various building trades, each association to be represented in the League by two delegates. It is said that 20 associations are already represented by delegates. The officials of the Builders' League are: President, H. R. Rose of the firm of Rose & Fisher, general contractors, and secretary, E. J. Detrick of E. J. Detrick & Co. The headquarters of the League are in the Lewis Block.

Portland, Ore.

Building is at a low ebb in the city, owing to the disastrous effects of the building strike, combined with the scarcity of lumber and the departure of building mechanics to other cities. Some efforts have been made to settle the strike by arbitration, but without important results. All work upon the buildings and other improvements for the Lewis & Clark Exposition, to be held in Portland in 1905, has been suspended on account of the disagreement of the directors of the exposition and the union workmen.

San Francisco, Cal.

A fair degree of activity characterizes the building situation in and about the city, the major portion of the work being confined to inexpensive rather than costly structures, such as flat houses, private residences, &c. The largest contracts awarded during the month of April were for the construction of the Merchants' Exchange Building, these aggregating $887,803. Some of the work contemplated for the summer, but contracts for which have not yet been awarded, includes a three-story fire proof warehouse with pressed brick front, to cost $125,000; a seven-story hotel at Third street and Sherwood place, to cost $50,000; two three-story flat houses, to cost $26,000; 12 flat houses on Polk street and Ivy avenue, to cost $25,000; a three-story brick store and office building at the corner of Hayes and Larkin streets, to cost $26,500, and a three-story structure at the corner of Valencia and Sixteenth streets, to cost $26,000.

Tacoma, Wash.

The most noticeable feature of building operations this season in Tacoma is the number of medium priced residences which are in progress. Architects report numerous plans on the boards for buildings of this sort, and it is expected that a large number of residences, varying in cost, will be commenced during the next few weeks, notwithstanding the high prices of labor and materials. In addition to these improvements a rotel and a number of business buildings will be constructed, ranging in cost from $6000 to $30,000, the latter being a three-story brick building, 61 x 155 feet, to occupy a site at the corner of St. Helen's avenue and D street.

Youngstown, Ohio.

The third anniversary of the Youngstown Builders' Exchange was celebrated by a banquet on the evening of Tuesday, April 21, the affair occurring at the Elks' Club. The programme was arranged in two parts, so that some of the addresses were delivered in the assembly room of the club prior to the banquet. The gathering was in all respects a representative one, there being present as guests lawyers, politicians and business men, as well as visitors from Cleveland, Columbus, Akron and other cities.

The first session was called to order by President George S. Hess of the Youngstown Builders' Exchange, who in a short address stated the purpose for which the gathering was held, and then introduced C. W. McCormick of Cleveland who discussed the question of "The Builders' Exchange from a Business Standpoint." He was followed by Arthur Bradley, also of Cleveland, who spoke on "The Builders' Exchange from a Social Standpoint." The next speaker was the genial secretary of the Cleveland Builders' Exchange, Edward A. Roberts, who responded to the toast, "The Secretary and His Duties." He referred to what was expected of a secretary, and how much of success depended on the work allotted to that official in a builders' organization. The ideal secretary, in his opinion, was a good servant, willing and able to do anything to advance the interests of the members. The secretary, he intimated, was in the employ of any one in the exchange who pays his dues, and at the same time the secretary must also be a promoter and thinker. The first session concluded with some remarks by Fred. Weldon, Building Inspector of Columbus, who responded to the toast, "Building and Plumbing Inspectors."

At the conclusion of Mr. Weldon's remarks the members were conducted to the dining room, which was beautifully decorated for the occasion, and where a substantial *menu* was enjoyed. After full justice had been done to the good things set before them Stephen S. Conroy was introduced as toastmaster. In a few well chosen words he took up the duties of the evening and introduced F. L. Baldwin, who replied to the toast, "The Benefits of Fraternity." He was followed by Hon. R. W. Tayler, Mayor Elect W. T. Gibson and Louis Heller of the firm of Heller Brothers, who made some very witty remarks in reply to the topic asigned him, "Our Guests."

The success of the banquet was due to the untiring efforts of the members of the Social Committee having the matter in charge—viz., W. Campbell, M. J. Hornberger, W. F. Wake and John Squires.

Zanesville, Ohio.

The outlook is good for considerable business this season in the building line, although the high prices of building material are having some little effect. The current rates of wages in the principal trades in the building line are as follows:

	Hours.	Rate per hour. Cents.
Carpenters	9	30
Bricklayers	8	50
Plasterers	9	30
Painters	..	30
Sheet metal workers	9	30
Plumbers	9	30
Steam fitters	9	30
Building laborers	9	17

The painters demanded an increase from 27 2-3 cents an hour to 30 cents per hour, and carfare, to take effect April 1, and the demand was granted by the master painters.

Notes.

The Master Builders' Association of Waterbury, Conn., recently filed a certificate of incorporation, the incorporators being John W. Gaffney, J. K. Smith, William F. Chatfield and Henry S. Peck.

The Builders' Exchange at Memphis, Tenn., have recently removed to new quarters in the Planters Insurance Building, where they have accommodations better adapted to the requirements of thir increasing organization.

The formal opening of the rooms of the Boston Builders' Exchange occurred late in April, when brief addresses were made by the president and others, and refreshments were served. The new quarters are at 17 Roxbury street, Roxbury, Mass., and were inspected by a large number of business men and citizens of the district.

The differences existing between the master builders and carpenters of Cheyenne, Wyom., have been settled, and the men will hereafter receive 45 cents an hour instead of 50 cents per hour as demanded. We understand that the sliding scale, which the builders sought to have adopted, will not be enforced.

The master carpenters and builders of Malden, Everett, Melrose, Medford, Woburn and adjoining places in Massachusetts have recently organized a Master Builders' Association, with headquarters at Malden, that State. The officers elected are: President, R. C. Guptill of Malden; vice-president, Everett Mann of Evertt; scretary, E. G. Freman of Malden, and treasurer, J. Smith of Woburn.

As a result of a recent agreement between the Master Builders' Association and Building Laborers' Union No. 3 of Paterson, N. J., eight hours will constitute a day's work, and from May 1, 1903, to May 1, 1904, the rate of wages will be 30 cents per hour. Overtime will be paid for at double the regular rate. All questions in dispute must be referred to the foreman on the job, and in case it cannot be adjusted it shall be referred to the Joint Board of Arbitration, consisting of three members of the Mason Builders' Association and three members of the local union.

The Builders' Exchange at St. Paul, Minn., have just issued a directory of their organization, which is issued in a size and style which will readily permit of its being carried in the pocket. The matter is arranged in such a way as to be of ready reference, there being given a list of the officers and members of the various standing committees, while the membership of the exchange is presented not only in alphabetical order, but also classified according to the branches of business in which the members are engaged. In the alphabetical list, following the name of each member, is the street address, after which are the telephone calls. There is also a list of architects of St. Paul, which is of interest in this connection. The entire make up gives evidence of careful compilation and reflects much credit upon the secretary, A. V. Williams of the exchange.

LAW IN THE BUILDING TRADE.

MEANING OF "IMMEDIATELY" AS APPLIED TO COMMENCEMENT OF WORK.

Where a contract provides that the work shall commence "immediately on the signing of this agreement," the word immediately must be construed as such convenient time as is reasonably requisite to do the thing.—Water Co. *vs.* Borough, 20 Pa. Supr. Ct., 149.

LIABILITY OF OWNER FOR EXTRAS ON ORAL DIRECTIONS.

Where an owner orally directed alterations in buildings under process of construction, which directions were accepted by the contractor, the owner thus waived the provisions of the contract requiring written evidence of any alterations in order to render the owner liable for same; and oral evidence was admissible to show that such directions were given and their reasonable value, in an action by the owner on the bond of such contractor.—Crowley *vs.* U. S. Fidelity & G. Co., 69 Pac. Rep., 784.

WHEN CERTIFICATE OF ARCHITECT IS A CONDITION PRECEDENT.

A provision in a building contract that the architect shall certify that the work is completed to his satisfaction is a condition precedent to the contractor's becoming entitled to final payment. A guaranty in such a contract of the roof of the building for five years against ordinary wear and tear does not dispense with the necessity of the contractor's completing the roof according to contract, or put the roof in any condition different from the rest of the work as to the necessity, under another provision of the contract, for the certificate of the architect that it is completed to his satisfaction.—Davison *vs.* Martin, 14 Man. Rep., 141.

PARTY WALLS.

Where a visible party wall encroaches on the land of an adjoining owner, such owner's failure to ascertain such fact by a survey will not prevent the other owner from obtaining an easement—or right to maintain same—by prescription, as it stands.—Browning *vs.* Goldenberg, 76 N. Y. S. Rep., 1010.

LIABILITY ON CONTRACTOR'S BOND.

A bond given by a building contractor and conditioned to hold the owner harmless from any mechanics' liens which might be filed, covered payments which the owner had to make in order to prevent the filing of liens, a contention that it was only against those actually filed being without merit.—Chapman *vs.* Eneberg, 68 S. W. Rep., 974.

CONTRACTOR ENTITLED TO PROFIT ON EXTRAS.

A contractor who has been required to furnish materials and do extra work, both within his contract, is entitled to recover, in addition to the actual cost of the labor and materials, a reasonable sum of profit.—Venable Const. Co. *vs.* U. S., 114 Fed. Rep., 763.

LIABILITY OF OWNER ON AGREEMENT WITH MATERIAL MAN.

Where one stated he would furnish materials for a building if assured that the contractor would pay him for same, and the owner agreed with the consent of such contractor to retain possession of a sufficient amount to protect the material man, the latter was not obliged to await a completion of the contract before suing on the agreement.—Roussel *vs.* Mathews, 63 N. E. Rep., 1122.

SOME HINTS ON KITCHEN SINK PLUMBING.

GREAT advances have been made during the last decade regarding the appearance and utility of the fixtures used in domestic plumbing, says M. L. Kaiser in a recent issue of *The Metal Worker*. The kitchen sink has not been neglected in the general shake up. From a dirty wood or zinc lined receptacle for slops, located in a dark corner, it has been brought out into the light, and given a beauty and value which is only limited by the amount of money which the house owner is willing to put into it. Made of almost any size desired, of iron or steel, plain or painted, galvanized or enameled white, blue or gray, slate, solid porcelain, or vitreous china, with flat or roll rim, with waste and overflow, with plug and chain, or with standing concealed waste and overflow, or with unobstructed waste and no overflow.

One of the first fixtures whose setting is intrusted to the young plumber is the kitchen sink. While the actual work connected with the setting of this fixture is simple, there are several points to be observed which are sometimes neglected by the experienced plumber. There is small likelihood that the setting of the better classes of sinks, which are furnished with all fittings complete, will be poorly done. To prove that the more common kinds are often woefully slighted needs only the evidence of sight, although the evidence of the sense of smell is often unwillingly added.

It often occurs that the opinion of the plumber is solicited regarding the location of the sink, and it may be well to first describe as nearly as possible the ideal location for this fixture. To be sure it is not always possible to locate the sink in the best position for it, on account of the interference with other—and perhaps more important—fixtures or furniture. In the first place it should be so located as to receive plenty of light; not necessarily directly in front, but quite close to the sink. This requirement also presupposes good ventilation, by moving one or both of the window sashes through which the light passes. The next requirement, although not so important, is that it shall be so located in relation to the range, the pantry and the dining room door as to necessitate the fewest steps possible to the worker in the kitchen. Attention to this feature will also lead to the consideration of the location of the drip board ; whether it shall be placed at either or both ends, and if at both ends, which shall be the larger. The next item is the distance from the range boiler, as the nearer it is and the more direct the piping the less time and water need be wasted in drawing hot water at the faucet. This requirement and the one relating to its position in reference to the range should rever result in locating the sink so that the worker shall be uncomfortably near a hot fire or warm range boiler. As hinted before, in many kitchens it is only possible to strike a medium which shall least conflict with other interests.

There are many styles of sinks, from the roll rim porcelain sink provided with patent overflow and with a screw spud cemented in place, ready for connection with nickeled trap and pipe, down to the common cast iron sink, provided with strainer and collar for lead pipe connection. The last mentioned is first considered, as it is this style the learner is first "up against." Whether the sink is plain, painted, galvanized or enameled, the work of setting may be considered the same, so long as they are all of one style of connection. As it is con-considered unsanitary to inclose any sink, or, indeed, any plumbing fixture, in wood work, the sink with plain flat flanges must have bolt holes at both ends to receive the bolts which fasten it to the brackets. These holes are usually cored in at the foundry, and it is only necessary to make sure that the holes are clear and large enough to receive the bolts. In the long side, which is to be placed next the wall, two additional holes should be drilled, to allow for the fastening of the flange of the sink on the back ledge in such a way that it cannot pull out from the walls. It is often necessary, in the absence of the carpenter, that the plumber shall nail this ledge in position, and Fig. 1 shows the method of fixing it so that the top casing of wood may be placed with the least trouble. It will be noticed that the outer ledge is placed about ¼ inch lower than the strip through which the supply pipes pass. The same method may be used on the front edge as well, when the setting may have its plainness relieved or hidden by the wood apron, as shown in Fig. 2. The apron may be cut at the proper pitch to receive the drip boards. The drip boards should have no nails driven in the lower end unless it is intended to cover them with copper or zinc. The method of clamping the drip board shown in Fig. 3 stiffens it across the grain and prevents it from warping. A slight modification of the clamping strip makes it equally suitable for the drip boards on sinks with roll rims where special drip boards to match the sink are not used. The braces supporting the sink may be placed under the bottom of the sink or under the wood strips which support the end flanges.

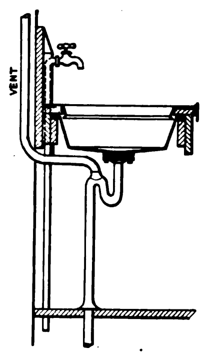


Fig. 1.—Arrangement of Wooden Supports.

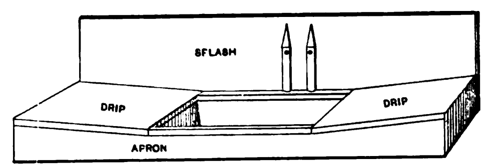


Fig. 2.—Sink Finished with Splash and Drip Boards and Aprons.

Some Hints on Kitchen Sink Plumbing.

The common yoke clamp and screw bolts form a simple and easy connection to make properly, and it is almost as easily made improperly. Rubber gaskets for making this connection are now furnished the trade, although, perhaps, the great majority of these connections are still made with putty. The former method is certainly the best, but an excellent joint may be made with putty. The sink bolts should be provided with tight fitting washers between the bottom of the sink and the first set of nuts, to guard against water following down around the thread and dropping off the end of the bolt. The putty should be carefully placed, so that there shall be a reasonable amount between the bell shaped end of the lead connection and the cast iron of the sink spud. Metal washers between the yoke and the second set of nuts permit of turning the nuts with ease. The nuts should be drawn up evenly and with easy tension, to guard against splitting the strainer or the yoke. This caution is especially necessary with enameled cast or steel sinks, as too great a tension of the bolts is apt to flake the enamel from the strainer.

The sink faucets should be no higher than necessary to accommodate the largest utensil likely to be used at the sink. Fifteen inches above the bottom of the sink will be found to meet the requirements in most cases. If placed much higher the water is apt to spatter too freely. The faucets should be spaced about 6 inches apart, so that both faucets may discharge into an ordinary vessel simultaneously. Although a location at the center of the long side of the sink presents a symmetrical appearance, the writer favors a location about one-third the distance from the end opposite the strainer, as shown in Fig. 2. One reason is that the entire length may be more easily flushed out, and when so located a dish pan may be shifted along in the sink far enough to allow of filling another utensil without lifting the full pan from the sink. For the same reason the sink should be wide enough on the bottom to accommodate the largest pan in use in the household and of a proportionate length. Too great a length is not advisable, as the space thus lost may be more valuable when used on the drip boards.

It is often desirable that the drip boards, front strip and splash board be covered with metal, preferably copper or zinc. This thoroughly protects the wood from the action of water and prevents the lodgment of grease and dirt. Even though the plumbing part of the work is well done, unless the finish of the covering is neatly done also it gives the whole job a "sloppy" appearance. As far as possible the seams should be soldered on the under side, especially when the covering material is copper. Such seams as must be soldered on the outside after the material is in position should be carefully done. A strip of paper may be pasted on each holes in the boards at these points will allow the nails to pass freely into and through the board, where they may be clinched on the under side. In the case of zinc covering the nails may be wire nails with the heads tinned for the purpose, although stiff nails must be clinched with great care, to guard against the marring of the covering metal by reason of straining of the nails in clinching.

For fastening the edges of the covering material to the wood work 1 or 1¼ inch brass nails with rounded heads, known as escutcheon pins, make a neat finish. These nails should be spaced with dividers to present a neat appearance.

It may seem that the method above outlined is too elaborate, and that overmuch care is used for such a common fixture as a kitchen sink. It must be remembered that in the ordinary household the lady of the house often sees the sink; and that servants are more likely to keep clean and properly care for a fixture which, by its appearance, suggests neatness.

The common cast iron sink is sometimes furnished with ornamental cast backs, with bib pipes and rosettes cast in place. Solid porcelain and enameled cast iron sinks are also provided with backs which completely hide the supply pipes. To all such fixtures the above description of covering the bib pipes does not apply, nor does the method of covering the drip boards apply to such sinks as are furnished with drip boards of metal

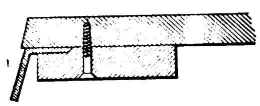


Fig. 3.—Clamping Drip Board to Stiffen.

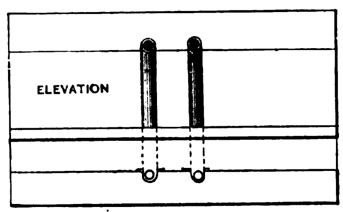


Fig. 4.—Plan and Elevation, Showing Finish of Metal Covering.

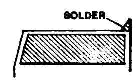


Fig. 5.—Edge Finish of Metal Covering.

Some Hints on Kitchen Sink Plumbing.

side of the seam, leaving only about 3-16 inch for the solder. This not only confines the solder to the space thus formed for it, but prevents the corrosive steam which arises when the soldering copper comes in contact with the acid from discoloring the work. The acid swab should be small, so that the paper is not soaked off before the seam is soldered. Where the pipes pass upward behind the sink there is need for special care in order to provide a good finish. Some tinners form a channel or gutter of the same size as the pipe in the piece of metal which covers the splash, carrying it up to the hight of the shoulders of the bib elbows, as shown in plan and elevation in Fig. 4. A better way is to make the channel large enough to easily accommodate the outside diameter of the bib elbows and run the channel a short distance above the elbow, finishing with a long cone at the top. A hole is cut through the face of the channel at the proper hight and of the proper diameter to fit snugly against the sides of the elbow. This method of construction permits of extending the splash board covering to any desired hight and obviates the trouble experienced in making a finish at the bib elbows which is proof against the lodgment of dirt and impervious to water.

A raised bead, as shown in Fig. 5, should extend around the front edges of the drip boards and sink and around the end edges of the drip boards also if they do not abut against a wall. This edge, to look neat, should not be more than 3-16 inch or at most ¼ inch in hight. This raised bead may be formed in the same piece as the drip board covering, and should be filled with solder to make it rigid enough to stand the battering of pans and kettles. If the drip board surface is large the metal may be protected from bulging by soldering the heads of 1¼-inch copper nails to the under side at the proper distance apart. The metal may then be laid on the wood work and pressed down so that each nail point make a mark on the board. Gimlet or soapstone, or other outfits which are furnished complete and ready to set up.

Advantages of a Small Kitchen.

In regard to the size of the kitchen in a house, a Boston writer suggests that a small one has many advantages over a large one, and says: "A large kitchen with a cellar door at one side, a table at another, and the sink at still another, requires too much walking. Time is consumed in going from one place to another rather than with actual work. Have the range placed in a light, convenient part of the kitchen. In front have a good sized table, containing drawers and spaces underneath for keeping utensils, one portion of the top covered with zinc and the other half left plain. Have underneath the top a baking board which can be easily pulled out. The sink should be near at hand. The pantry may be on the other side of the kitchen and be sufficiently large to hold a barrel of flour, a small pastry table, and a convenient arrangement of shelves.

"The floor may be of hard wood or it may be covered with linoleum or oil cloth, or the ordinary rubber coverings. A tile floor is exceedingly handsome, but rather hard on the feet, making small rugs or bits of carpet a necessity if comfort is to be considered."

THE Bureau of Forestry, Washington, D. C., is about distributing "Bulletin No. 38," relating to Redwood, the matter being compiled by R. T. Fisher. The first part contains an account of the distribution of the tree and discussions of its age, power of reproduction, resistance to fire and the effect on it of soil, soil moisture and fogs. Part II gives a brief account of Redwood lumber operations and a discussion of the timber and its use, while the third part is devoted to a discussion of cut-over lands, the possibilities of second growth, the markets for the lumber, together with tables showing the stand and rate of growth of second growth redwood in California.

Natural Woods and How to Finish Them.

Under the above title Berry Brothers, of Detroit, Mich., have issued the second edition, revised and enlarged, of a most interesting little work on wood finishing. The matter is presented in brief yet practical form and gives such facts and data as experience has shown to be useful to the architect and the wood finisher. There is nothing experimental in the methods presented for the various styles and schemes of wood finishing, but all are based upon actual experience, and it is stated may be relied upon as correct. The point is made that whatever of value may be found in the hints and directions presented within the covers of this little work is in no way impaired because of the suggested use of Berry Brothers' finishes. The staining, shellacking, filling, &c., as the case may be, are the necessary preludes to a successful finish, whatever varnishes may be employed to complete the work, and the mode of applying and manipulating all interior varnishes is specifically the same.

The early pages are given up to the consideration of materials usually employed in producing various styles of finish, following which directions are given for finishing all the usual woods employed in interior work, and also how to treat any particular wood in order to produce a specific style of finish. The concluding pages are given up to some general comments, which will be found especially useful in this connection.

The matter is contained in 78 pages, bound in stiff board covers with gilt side title, and is intended to serve as a useful reference book for the architect in writing his specifications, and is also of interest to decorators and wood finishers. We understand that a copy of the little work will be sent free to architects, finishers, &c., who may make application for it.

A Summer School for Artisans.

Announcement is made that the summer school for artisans which is held under the direction of the College of Mechanics and Engineering of the University of Wisconsin at Madison, Wis., will open July 6 next for its third annual session of six weeks. At the first session 44 students were in attendance. and this number was increased to 70 at the second session. The school has passed the experimental stage and is recognized as a practical and valuable institution. The departments of work include courses in heat, steam, gas and other heat engines ; applied electricity ; machine design ; materials of construction, fuels and lubricants ; shop work, including bench and machine wook in wood and iron ; foundry work, forging, tool making and machine construction and pattern work, and drawing.

The school is designed for the benefit of machinists, carpenters or sheet metal workers, engineers, superintendents and foremen of shops, water works, power stations, electric light plants, factories, &c., and for young men who wish to qualify for such positions. Theoretical and practical instruction is furnished in the trades named, and the pupils have the advantage of the use of the finely equipped shops and laboratories of the College of Engineering. All inquiries regarding the summer school should be addressed to F. E. Turneaure, acting Dean of the College of Engineering, Madison, Wis.

THE new law regulating the hight of buildings on residence streets in the city of Washington will probably make many changes in plans for future improvements. Hereafter no building on such streets can be more than 80 feet in hight, but the new law allows buildings facing Government parks and triangles to be as high as the widest street at the intersection is wide. It is said that there were a number of apartment houses for which permits were withheld awaiting the action of Congress, and many of these will have to be reduced in hight in order to conform to the provisions of the new law.

ARCHITECT TITUS DE BOBULA has just removed his offices to the Farmer's Bank Building, corner Fifth avenue and Wood street, Pittsburgh, Pa., which has the name of being the tallest skyscraper in that city.

New York's Latest Style Dwelling House.

This is the way a writer in one of the daily papers comments upon a certain style of dwelling which is now to be found in the fashionable quarter of the city:

New York at last has a *nouveau art* house. It is a dwelling far up in Fifth Avenue, opposite Central Park, and although not yet completed is the object of more attention than any other nearby.

It is four stories and narrow, done in red and black brick with colored tiles let in at apparently any point that the imagination of the architect suggested, but the colors are subdued in tone as if the designer had not quite dared to go as far as he might in a city as yet unsupplied with any large number of *nouveau art* homes. The balconies are ornamented with iron scroll work in the general style of the building and the whole is an agreeable variation in the monotony of the other residences. What an entire *nouveau art* block would look like is another matter.

In Germany and Austria and to a smaller extent in Belgium, this style of architecture has become very common. That seems scarcely likely to happen in this city. But there is a certain comfort about having at least one house of the kind. It shows that we are not without knowledge of the style. Whether we happen to care about it or not is different.

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DESIGN OF FRAME RESIDENCE AWARDED THE THIRD PRIZE IN THE THIRTY-FIFTH COMPETITION.

MARK H. WHITMEYER, ARCHITECT.

DANVILLE, ILLINOIS.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

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

JULY, 1903.

Building Situation in New York City.

The developments of the past month in the local building trades have been of a rapidly changing character, and while operations were in some degree resumed a short time ago, the movement was of a temporary nature and at the present time a complete tie up of building exists throughout the city. The employers are standing firmly together, with a view to bringing about more staple conditions in the trade, and it seems quite probable from all that can be learned at the time of going to press that operations will be suspended until the objects sought are practically accomplished. The interests of the contractors are being ably cared for by the Building Trades Employers' Asocsiation, which was formed at a meeting on May 15 and which embraces in its membership the more important local organizations in the various branches of the building industry. The Governing Board, consisting of three members each from 35 trades, in due course adopted a constitution and by-laws, elected permanent officers and is actively engaged in bringing matters into such shape as will ultimately permit of the resumption of operations all along the line. A plan of arbitration for the settlement of labor disputes has been adopted by the board, and in which the various unions are to be considered, but the walking delegate or business agent is not to be accepted as an arbitrator. From a board of general arbitrators not less than four is to constitute a court of appeals and decide all questions submitted to it for consideration. It should be stated, however, in this connection, that the proposed plan provides that in those trades which have arbitration boards any difficulty between employer and employee shall be adjusted in the arbitration board of that trade, if possible, and in case of continued disagreement the matter in dispute is to be referred to the General Arbitration Board before a strike or lockout is declared.

Skilled vs. Unskilled Labor.

Shortly after the announcement of this plan the United Board of Building Trades adopted a resolution requesting the Building Material Handlers' and the Building Material Drivers' Unions to withdraw from connection with them. This request was refused by the unions named, but subsequently 16 unions, representing the skilled labor element, seceded and later formed the United Board of Building Mechanics.

A treaty was then made with the Association of Dealers in Masons' Building Materials and the Lumber Dealers' Association, the result of which was an agreement whereby the lockout in the lumber and building material yards was raised and business resumed on the part of the dealers in these materials. This step, it was supposed, clearly indicated a general breaking away of the skilled labor organizations from those of unskilled labor heretofore affiliated with them. The idea of calling itself a "Mechanics' Union" was evidently intended to make a clear distinction between their body and the organizations of unskilled labor. Among the unions embraced in the new organization which has come to terms with the employers are those of the Carpenters and Joiners, Sheet Metal Workers, Plasterers, Plumbers and Gas Fitters, Electrical Workers, Marble Cutters, Tile Layers, Steam and Hot Water Fitters and Helpers, Granite Cutters, Stone Cutters, Derrickmen and Riggers, Painters and Decorators, Elevator Constructors and Slate, Tile and Metal Roofers, representing something like 30,000 workmen in New York City and vicinity. At the time it was thought that the opening of the yards of the dealers in building materials would speedily result in the resumption of active operations all along the line, but about the middle of June the Building Trades Employers' Association decided on a new course of action and informed their employees who were at work that when the material on hand was exhausted operations would be suspended until further notice. It is given out that no lumber or materials will be purchased until the employers are reasonably certain that work can be resumed under conditions which will insure the fulfilling of contracts within a specified time. It seems to be the opinion of many that such a state of affairs can be most quickly brought about by the adoption by the unions of the plan of arbitration submitted by the employers. The situation has been still further complicated by the agitation on the part of some of the workmen, more especially the bricklayers, for an increase in wages from 65 to 70 cents an hour and union foremen. In case the differences are not adjusted and the men go out, it will be the first strike of union bricklayers in the city for many years, and the first breach in that time between the Bricklayers' Union and the Mason Builders' Association. The strikes in the building trades and the shut down in the building materials and lumber yards have thrown more skilled mechanics into idleness than any general strike in the trade which has ever occurred in the city, the estimates running in the neighborhood of 100,000 men. The loss in wages, together with that sustained by the building contractors, aggregates an enormous total and is rapidly mounting to higher figures every day that the suspension of operations continues. It is sincerely to be hoped that matters will speedily be adjusted upon a basis which will permit of a resumption of building operations and the completion of the large number of structures under way when the trouble commenced.

Summer Schools for Mechanics.

It is becoming more and more common practice among institutions of the higher learning to arrange for classes for special students during the summer vacation. This method gives to many who are otherwise unable to avail themselves of a prolonged college course the opportunity for acquiring a valuable education along certain lines, which is calculated to benefit them in their individual careers. This summer school movement has spread throughout the United States, and is now an established feature of the educational life of the country. A branch of this work, which caters more particularly to the mechanic and the engineer, is the technological courses presented by certain of our universities and colleges. For example, the University of Wisconsin, at Madison, begins in July its second summer course, of six weeks' duration, in steam and gas engineering, electrical work, drawing and machine design, shop work, &c. The State College of Kentucky, at Lexington, has arranged for a ten weeks' summer school under the charge of the School of Mechanical and Electrical Engineering of that institution, and special courses have been arranged for technical students, mechanics and stationary and locomotive engineers. At the Syracuse University, Syracuse, N. Y., a six weeks' summer session is offered, with instruction by the university professors in civil, electrical and mechanical engineering, &c. The Columbia University of New York City also will hold a summer session of six weeks, beginning July 8, at which instruction will be given in chemistry, physics, mathematics, manual training, &c., and Harvard University will conduct a summer school of arts and sciences, covering a wide range of subjects, including drawing, mathematics, chemistry, surveying, shop work, physics, &c., as well as a number of literary subjects. In all these cases the students who are able to avail themselves of the courses of instruction provided will have the advantage of the use of the well equipped laboratories and shops of the institutions named, as well as hearing lectures by experts upon the scientific principles of the subjects which they are studying. The benefit of such courses to the ambitious young mechanic or engineer can hardly be overestimated. Progressive employers, who are alive to their own best interests and are anxious to stimulate the efficiency of their younger employees, could not do better than encourage them to take advantage of one or other of these summer schools, with the object of securing a better knowledge of the scientific and technical principles governing their crafts than they have the opportunity to acquire in the course of their daily work. It would, in many instances, be a profitable investment for the employer to pay the cost of tuition at one of these technical summer schools for two or three of his most promising young workmen. The fees are in all cases placed at a moderate figure, in order to enable young men of modest resources to enter the classes. Especially valuable are these opportunities to those young tradesmen who have been sufficiently interested in their callings to take correspondence courses, or to attend technical or trade school lectures in the evenings during the past winter. They will serve to give, as it were, the finishing touch to the technical education which they already have been acquiring out of working hours.

New Jersey State Association of Builders.

For some time past the building contractors of New Jersey have felt the necessity of a State organization and not long ago the matter was brought up at a meeting of the Builders' Exchange of Elizabeth, when a committee of 12, consisting of three master carpenters, three master masons, three master painters and three master plumbers, was appointed to canvass the state and take such steps as might be deemed essential looking to the accomplishment of the objects sought. This committee in the space of 45 days brought together representatives from nearly every section of the State, and at a meeting of the Builders' Exchange on April 5 reported the sentiment of the master builders to be strongly in favor of such an organization. The committee were then given power to form a State association and a meeting for this purpose was held in Newark, N. J., on May 20, when representatives were present from Newark, Jersey City, Paterson, Trenton, Atlantic City, Asbury Park, New Brunswick, Plainfield, Morristown, Passaic, Dover, Summit, Orange, Long Branch, Elizabeth, Perth Amboy, Glen Ridge, Boonton, Lakewood, Chester, Jamestown, Clinton, Camden, Washington and High Bridge.

The meeting was held in a hall at South Orange and Morris avenues, Newark, there being present about 300 delegates, representing at least 1500 masters engaged in the building line. The chairman of the committee, Henry Roolvink of Elizabeth, stated in a few words the object of the meeting and thanked those present for the hearty manner in which they had responded to the call of the committee. He further stated that the organization of the master builders did not mean the disruption of the labor unions, but was only a necessity for protection against unjust and unreasonable demands. A temporary organization was formed by the selection of Henry Roolvink as temporary chairman and A. W. Crowdor of Newark as temporary secretary. A motion to form a permanent organization was enthusiastically carried and the chairman then appointed as a committee to select permanent officers the chairman of each delegation. After a short recess the committee reported the following as permanent officers, who were unanimously declared elected:

President, J. C. McGuire of Essex County.

Vice-Presidents, Henry Roolvink of Union County, D. Mullins of Hudson County, G. M. Ruhl of Middlesex County, R. H. Hughes of Monmouth County, A. J. Dickson of Passaic County, L. T. Sturgis of Morris County and R. J. Torbin of Essex County.

Secretary, Alexander Pierson of Orange.

Treasurer, Henry J. Schaedel of Newark.

The newly elected officers then appointed a committee to prepare by-laws and constitution and report at the next meeting, which will be held in Newark at the call of the president.

The Associated Building Contractors of Newark looked after the needs of the inner man in a royal manner, and were given a rousing vote of thanks and three cheers for their generosity and the warm welcome extended to the delegates.

Death of a Noted Architect.

In the death of Bruce Price, which occurred early in June in Paris, France, the American architectural profession has lost one of its most noted and prominent members. He was born in Cumberland, Md., in 1845, and studied architecture under the late Mr. Niernsée of Baltimore. In 1869 he began independent practice as a member of the firm of Baldwin & Price, this partnership continuing in force, however, for only about four years. His work was characterized by striking individuality, and it was probably due to the fact that many of his designs partook of a rather English character that he was often spoken of as an Englishman. He was, however, an American of the purest race, being descended both on his father's and mother's side from the earliest Colonists of Maryland. Among his early work were the club house and other structures at Tuxedo Park, erected for the late Pierre Lorillard, together with many other houses in the Tuxedo settlement for various owners. He designed Osborne Hall for Yale University, the beautiful Chateau Frontenac in Quebec, and carried out various important commissions in the provinces, among them being the station of the Canadian Pacific Railroad. Mr. Price also designed a great number of churches and private houses in the city and country, as well as prominent skyscrapers, of which the American Surety Building in New York City is probably one of the best.

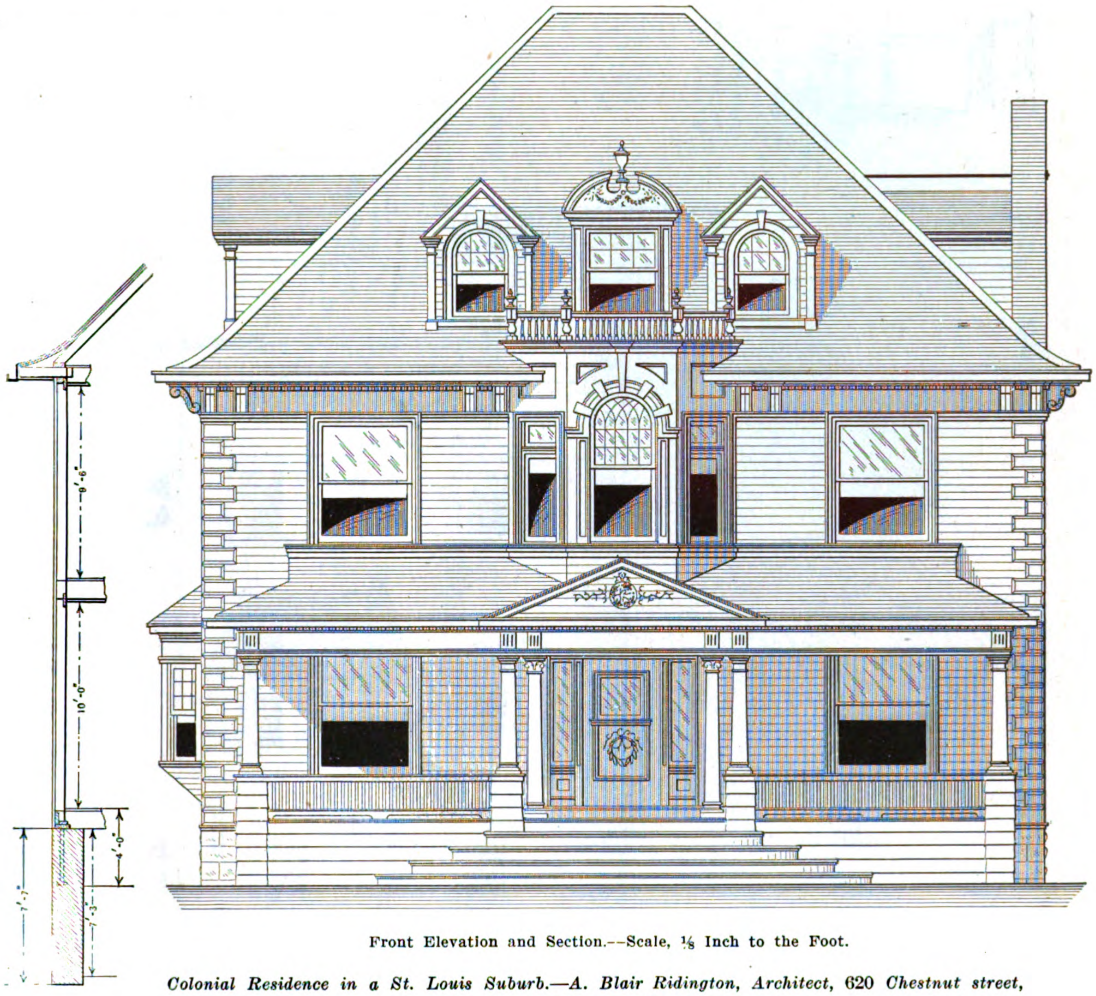
THE United States Department of Agriculture is about distributing through the Bureau of Forestry, Washington, D. C., what is known as Bulletin No. 41, relating to the "Seasoning of Timber." The matter consists of discussions of the relation of water to the decay of timber, seasoning and the preservative treatment, advantages of seasoning, how timber is seasoned, together with accounts of seasoning tests with Lodgepole pine, seasoning of oak timber, tests with telephone poles and an outline of future work.

AMONG the building improvements contemplated in New York City, in the way of additional hotel accommodations, is a 12-story brick and terra cotta structure to be erected on a site, 44 x 100 feet, at the corner of Lexington avenue and Thirtieth street, in accordance with plans prepared by Architect C. Steinmetz. The estimated cost of the building is placed at $400,000.

COLONIAL RESIDENCE IN A ST. LOUIS SUBURB.

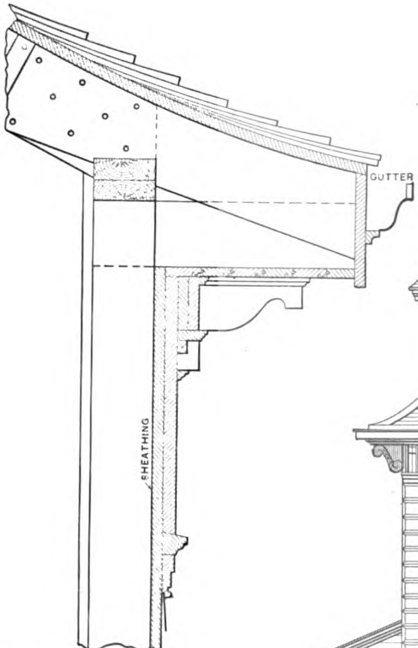
THE subject which forms the basis of our half-tone supplemental plates this month is a residence treated in the Colonial style of architecture which has lately been erected in one of St. Louis' many suburbs. One of the plates shows the appearance of the completed structure, while the other represents an interior view of the library and a glimpse of the dining room bay window and seat beyond. The point of view is taken just inside the front door in the reception hall. Noticeable features of the exterior are the broad veranda, extending entirely across the front of the house, the ornamental bay window at the second story, the projecting bays in the dining room and in the smoking alcove, together with the treatment of the dormers in the front elevation. Internally the house is commodious, while at the same time the space has been utilized in a way to invite careful study on the part of the interested reader. On the main floor the rooms are arranged at the right and left of the hall, while the main stairs rise from about the center of the house. An unusual feature is the smoking alcove, just before the main stairs are reached, and lighted by two windows, so placed as to form a projecting angle. Beyond the library is the dining room, connecting with the kitchen by means of a butler's pantry. The kitchen is so placed as to be shut off from the other rooms on the main floor, and at the same time the front door may be reached without the necessity of passing through any other rooms. The cellar stairs are placed directly under the main flight, while from the kitchen the second floor may be gained by means of a flight of stairs rising from the rear hall. On the second floor are five sleeping rooms and bathroom, the children's room being placed in the center of the house at the front and connecting with the rooms at the right and left.

According to the specifications of the architect, the underpinning of the house is of stone, while the superstructure is of balloon frame. The girders consist of three 2 x 8 inch pieces placed 2 inches below the cellar ceiling, with 2 x 4 inch piece nailed on each side to receive floor joist, which are "hatched over" the girders and spiked to them. The first, second and third story joist are 2 x 10 inches, placed 16 inches on centers; the collar beams and rafters are 2 x 6 inches, placed 24 inches on centers, with hip rafters 2 x 8 inches and valley rafters 4 x 8 inches. The studs are 2 x 4 inches, placed 16 inches on centers, and have a row of zigzag bridging throughout each story. The exterior studs are 2 x 6 inches, and are doubled at sides of openings and trussed over door heads. The porch joists are 2 x 8 inches, resting on double girders, which are placed on cedar posts extending to a flat rock 3 feet in the ground. The bottoms of all posts inside and out were dipped in tar. The rafters and ceiling beams of the porch are 2 x 4, placed 24 inches on centers. The outer walls of the frame of the house are covered with yellow pine sheathing boards, placed diagonally, this sheathing having on it two layers of rosin sized paper, over which is placed the best quality siding laid 4 inches to the weather. The roofs are covered with Oregon cedar shingles, laid with a good lap and securely nailed, while the fancy work

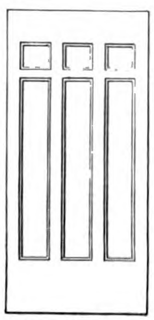


Front Elevation and Section.—Scale, ⅛ Inch to the Foot.

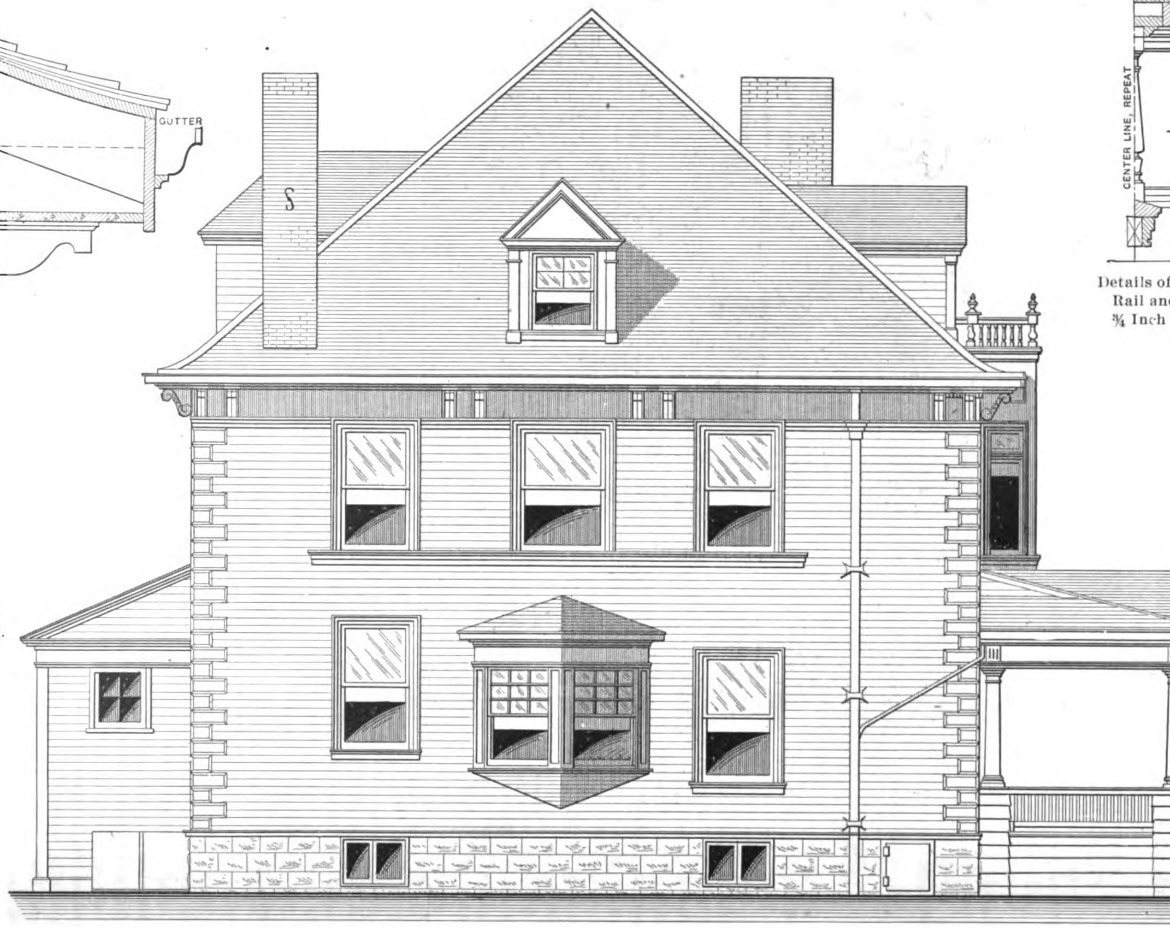
Colonial Residence in a St. Louis Suburb.—A. Blair Ridington, Architect, 620 Chestnut street, St. Louis, Mo.



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

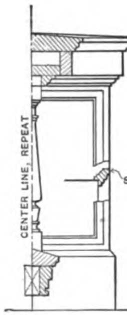


Elevation of Library Door.—Scale, ¼ Inch to the Foot.

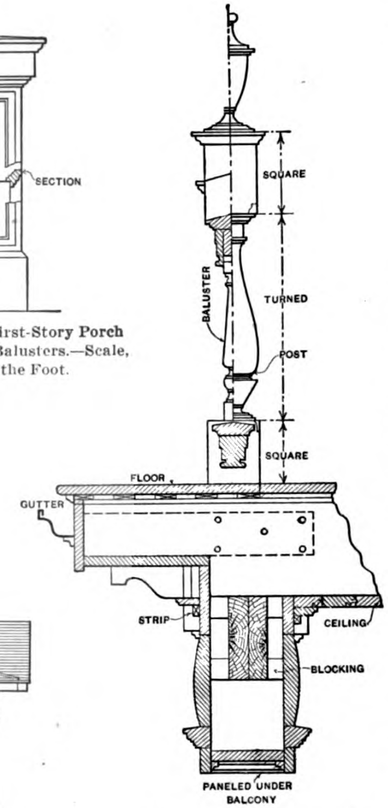


Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

Colonial Residence in a St. Louis Suburb—Side Elevation and Miscellaneous Constructive Details.



Details of First-Story Porch Rail and Balusters.—Scale, ¾ Inch to the Foot.



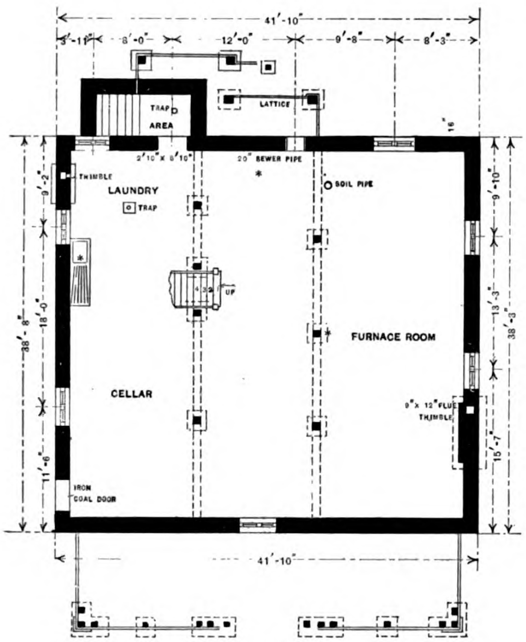
Details of Second-Story Balcony Cornice and Balustrade.—Scale, ¾ Inch to the Foot.

of the dormers, &c., is executed with shingles of even, narrow width.

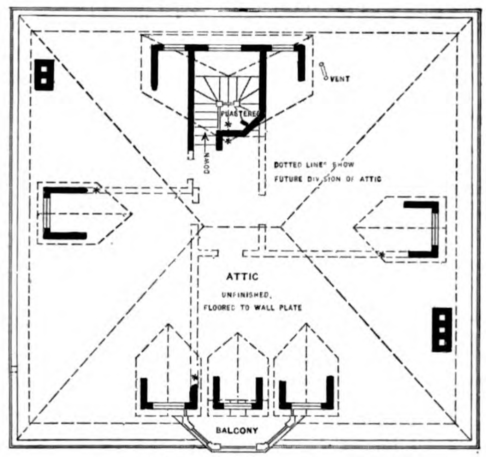
The first and second stories have a double floor of 1 x 6 yellow pine strips, laid diagonally and well nailed to each joist. The attic is floored to the plate with 3¼-inch yellow pine flooring. The library, dining room, hall and panel backs, &c., to match. The kitchen, bathroom, hall and rear stairs have a 3½-inch molded wainscot cap and base. The newels, balusters, rails, face and wall strings and paneled spandrels are quartered oak, while the rear and attic stairs have ash rails, with yellow pine treads and risers.

The entire first and second stories and the finished portions of the attic are lathed and plastered, the kitchen, rear halls, stairs and bathroom having Stone brand cement wainscot 5 feet high, troweled to a smooth surface and tooled into tiling. The library has a rough sand finish.

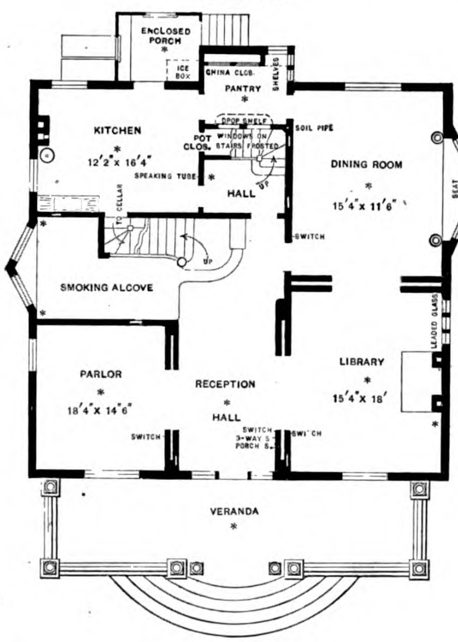
The building is wired for incandescent lighting and call bells, the position of the main switches being indicated on the floor plans. The bathroom is fitted with a



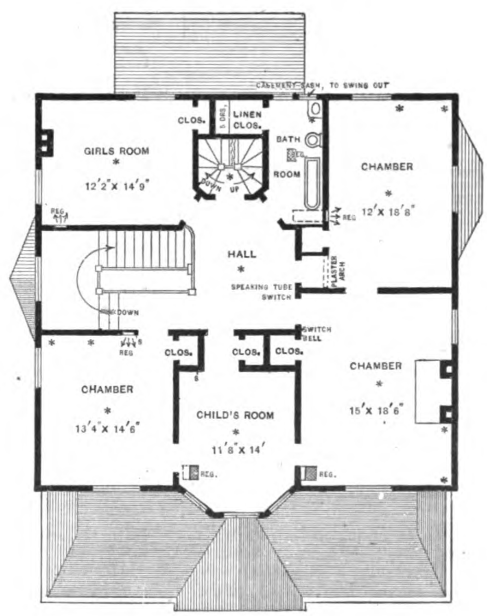
Foundation.



Attic with Outline of Roof.



First Floor.



Second Floor.

Colonial Residence in a St. Louis Suburb.—Floor Plans.—Scale, 1-16 Inch to the Foot.

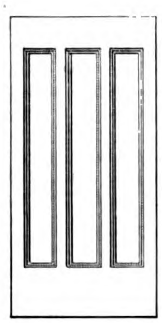
alcove have a vertical grain floor, on which is laid yellow pine strips of 2½-inch face, dressed and smoothed after the finish was put on. The second floor and the balance of the first floor have 3¼-inch face yellow pine flooring, laid after the plastering was finished. The porch floors are of 1⅛-inch white pine 2¼-inch face, laid with white lead joints. The third-story balcony floor has a tar roof under it, so as to avoid any possibility of leaking.

The finish of the interior is of cypress, with doors, roll rim enameled iron French pattern bathtub, a 15 x 17 inch oval stone china bowl, with a 20 x 30 x 10 inch white Italian marble slab, countersunk, with brass fixtures and a water closet with low down tank. In the kitchen is a 20 x 30 inch enameled iron sink arranged for slate cap, with brass Fuller bibs. Water is brought to the house from cistern to the pump in the kitchen, with shut off so arranged that the water can be taken from it or taken from the city supply at will, and from there carried to a tank in the attic, which, in turn, is connected with the fixtures and hot water boiler in the kitchen. The boiler has a capacity of 40 gallons, and drains into the laundry sink in the basement.

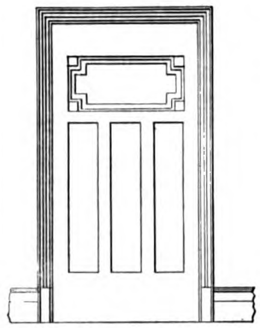
The house is heated by means of a 60-inch Front Rank steel furnace, with return registers in the halls, made by the Front Rank Steel Furnace Company of St. Louis.

The residence here shown was erected for Mrs. E. D. Garrett, and is pleasantly located on Oakwood avenue, in Webster Park, Webster Groves, Mo., which is situated about 10 miles southwest of the city of St. Louis. The plans were prepared by Architect A. Blair Ridington, with offices at 620 Chestnut street, St. Louis, Mo.

The new office building, which is to be erected at the intersection of Pearl and Beaver streets, New York City, and which in its general outlines will somewhat resemble the famous "Flat Iron" Building at Broadway and Twenty-third streets, will be 15 stories in hight, and will cost in the neighborhood of $600,000. The plans have been prepared by Clinton & Russell of this city, and these call for a building having a frontage of 20½ feet at the point of street intersection, a frontage of 89½ feet on Beaver street and 137 2-3 feet on Pearl street. The façades are to be of brick, limestone and terra cotta, and the frame of skeleton steel construction. It will be fire proof throughout, and finished and equipped entirely in keeping with a structure of this character.

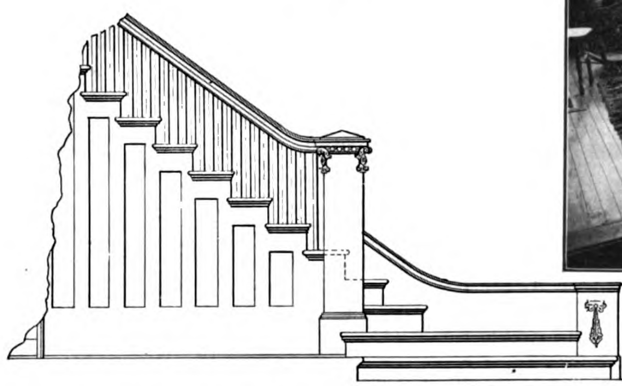


Dining Room Doors.—Scale, ¼ Inch to the Foot.

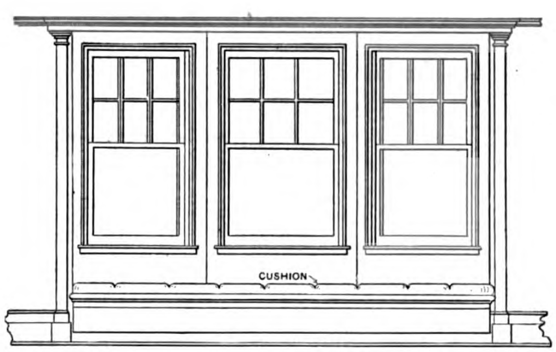


Parlor and Hall Doors and Finish.—Scale, ¼ Inch to the Foot.

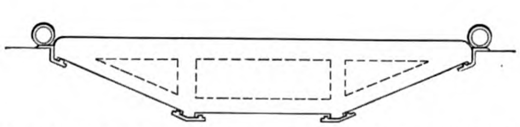
View from Foot of Main Stairs, Looking Toward Window in Smoking Alcove.



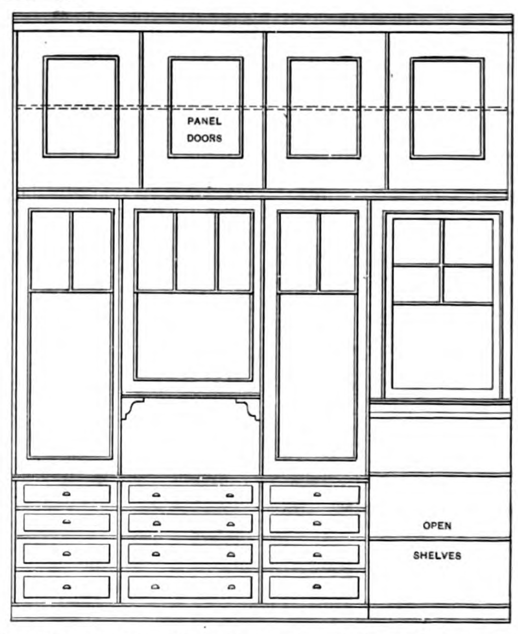
Partial Elevation of Main Staircase.—Scale, ¼ Inch to the Foot.



Elevation of Dining Room Bay Window.—Scale, ¼ Inch to the Foot.



Plan of Dining Room Bay Window.—Scale, ¼ Inch to the Foot.



Elevation of China Closet in Pantry.—Scale, ⅜ Inch to the Foot.

Miscellaneous Constructive Details of Colonial Residence in a St. Louis Suburb.

CABINET WORK FOR THE CARPENTER.*

BY PAUL D. OTTER

THE best of reading in the way of magazines and periodicals will gradually accumulate upon the family center table, and if there be no reserve place set aside for them they become a shifting nuisance to the tidy housewife, and when the good man of the house has an extra desire to wade into some back numbers, while enjoying the warmth and cheer of the home, he may be provoked to learn that his missing numbers formed part of a bundle of reading which his good wife gave to some worthy poor of a literary bent. To a busy man the flood of literature within paper covers comes altogether too swift at times and it needs a stormy Sunday to catch up. So we have arranged for the carpenter to construct a stand which may also be used for sheet music or portfolios of prints if desired.

This article of furniture has not until recently been on sale and is classed among the special pieces for which there is an increasing demand similar to the plate rack which, in truth, we do not need, but, like the monthly magazine, we get them nowadays in large quantities, and would any man deny his wife the pardonable pride of showing her pretty plates, which were bought, presented or won at her card club? So she has her rack for plates, and the oncoming monthlies create a new demand also, which gives rise to the display of the accompanying sketches and necessary description. Referring to Fig. 7 it may be stated that the position of shelves, which are of ½-inch material, is optional. The three may be put in evenly spaced or varying as best suits a particular need. To avoid securing them on the ends from the outside, thus marring the plain panels of the case, it is best to have them nicely fitted and resting upon a quarter round cleat under each end. The arched framing consists of ⅜-inch stock fitted over the edges of the case, glued and held with sunken brads. This breaks the angular crudeness which most primitive structural pieces possess. The inner edge of this arch is well rounded off, and the outer edge should have the sharp edge struck off also. Main dimension figures are merely given for the general proportion to this and to Fig. 8.

When the detail is laid out in full working drawing the most direct constructional features can then be studied. If it is for personal use these articles of furniture will no doubt represent more labor and material than would naturally be expended in making them in quantity. This does not imply that to manufacture in quantity one should resort to questionable methods, with attractive features on the outside only. In all work to be placed on the market scheming in careful detail is very necessary and the outward essential features must be presented in an attractive and, in furniture, the most substantial way possible. With solidity of appearance the sale is more than half consummated, and it matters little with the average customer how this same piece of furniture is held together, whether by the old way of mortise and tenon, or the now generally accepted practice of doweling.

Judgment must be exercised in using some of the modern ways of securing a joint. In the primitive forms of furniture now so popular it certainly is a sham to represent the main structural parts as piercing another member by a sturdy projected tenon with a cross pin. The temptation to do this in imitation only by the easily applied dowel joint on one side and a glued on *fac-simile* of the tenon and taper key on the other is just as liable to be met with as graining maple furniture in imitation of oak. The latter is less reprehensible than the former by reason of equal strength to oak; but a sham is sham for all that.

Relative to the magazine stand, Fig. 7, the case itself consists of practically the two ends and top board, with the front trimming and bottom rail. These brought together in a solid construction would still make a weak body, with great liability of ends, and possibly the top, splitting by overweight, or rough handling. The construction must be held together by a framing immediately under the lower shelf. The making of this framing is an illustration, then, not necessarily confined to this particular article, of the value of utilizing the least amount of material to secure the proper support for the outer case.

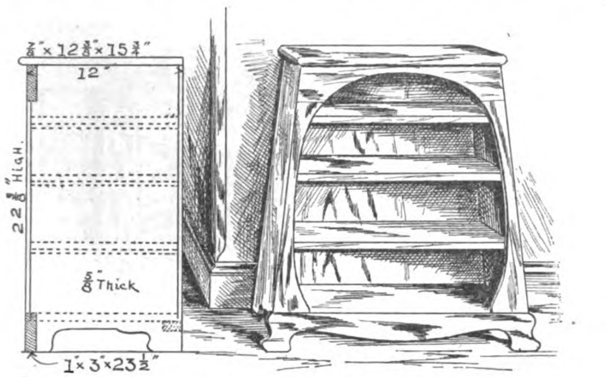


Fig. 7.—Magazine or Music Stand.

Fig. 8.—Another Style of Stand.

Cabinet Work for the Carpenter.—Magazine or Music Stand.

Turning again to the stand, the ½-inch shelving may be used with equal reason for the lower shelf, when immediately supporting this is constructed a skeleton framing consisting of two 1 x 1½ inch strips held apart, the width of the stand back of the foot board, by three ⅝-inch dowels chucked and glued. Screws from the inner edge of these strips may be driven into inside of foot board and to the bottom, upon which the back filling is tacked, this of a sheet of heavy white wood veneer, or low grade ⅜-inch tongue and grooved lining. On the line of, and fitting between this dowel framing, a similar strip is glued and screwed from inside to the end panels. Arrange for bottom shelf to fit over this framing snugly and set in a ½-inch rabbet on edge of foot board. Through end strips and dowels underneath screws should be driven to hold the shelf board securely.

It will be seen that many under structures can be held together by the use of dowels, rather than dimension stock and the extra work of mortising and tenoning; in fact, some instances of making joints which are not absolutely depended upon for strength. The use of the "corrugated steel fasteners" is very successful, as it oftentimes is desirable to use a cheap mitered framing, which is used in the nature of a reinforcement, the facility of driving them in across the freshly glued joint being accomplished much more readily than the work of halving, or attempting to drive long brads.

* Continued from page 125, May issue.

The Serving Stand.

When living rooms are necessarily small, heavy furniture oftentimes proves to be a "white elephant." The cost of ground, particularly in large cities and towns, is a factor in compressing our ideas, and in building it is frequently required to plan a certain number of rooms within a given space, with so many windows and doors that are communicating, that the usual large sideboard for the dining room is found to be a misfit. This living in "band box" style among city dwellers and flat occupants has created a demand for intermediate sized pieces, or the "patent back action" all around utility furniture. While it is not on record that the apartment dweller has as yet been supplied with a folding bed to be converted, on arising, by the turn of a lever into the breakfast table, yet the general utility idea does provide a bed by night and to all appearances a mantel by day. The "much-in-little" space requirements have incited many bright ideas, and the carpenter has exceptional advantages by his constructive ability to study and experiment in this field of compressed utility. The invention of the most compact kitchen cabinet, containing everything needed, from a nutmeg to a half barrel of flour, is undoubtedly a blessing to the housewife of a 10 x 12 foot kitchen.

The serving stand is a modified type of the sideboard, or, properly speaking, it was the original food serving stand, from which, with a desire to inclose some articles of food or drink, the buffet was designed, with its drawers and cupboard-like inclosures, it was a transition as wealth and the family increased to have this piece of furniture made very large, and the sideboard became a repository of riches in family plate and silver.

These are a valued inheritence to the few who are fortunate in having one left to them, but it is feared that many were not properly appreciated to be in evidence to-day, on account of the weight and size, and so, like the old four-post bed, modern requirements call for something which does not quite take up the entire room. The illustration, Fig. 9 is an elementary pattern from which many modifications can be made leading up to the pattern in Fig. 10, which approaches the so-called buffet. This in turn offers sufficient suggestion to use the same size treated in various ways and still have the same directness of construction. The two pilasters in front offer a good field for variety in outline and in surface for carving. By the exercise of a little study on paper it is surprising how two such members will present great variety in treatment. Those who have profited by the articles on "Veneering" will also have an admirable outline for display of "crotch" grain on drawer fronts and pilasters.

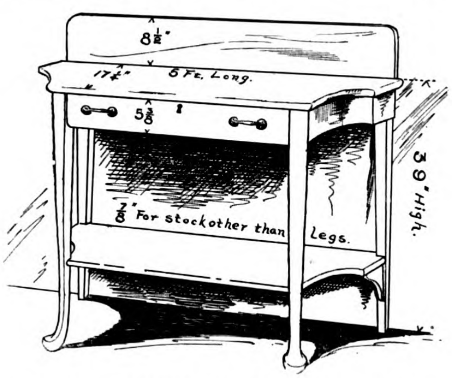


Fig. 9.—Elementary Pattern of Serving Stand.

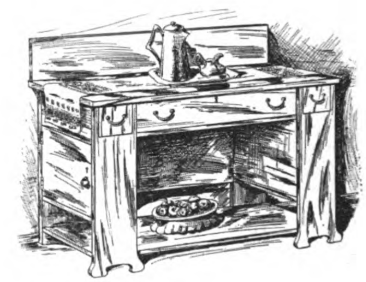


Fig. 10.—Design for a Buffet.

Cabinet Work for the Carpenter.—Serving Stands.

THE Board of Trustees of Bellevue and allied hospitals have appointed McKim, Mead & White, of 160 Fifth avenue, architects of the new Bellevue Hospital, which is to be erected in New York City at an estimated cost of $3,000,000. It is expected that ground will be broken for the new building about the first of October and every effort will be made to render the new structure the most modern and best equipped institution of its kind in the world.

Training Young Men for Building Superintendents.

It is believed that if the technical schools would take up the matter of qualifying men for building superintendents it would soon be found one of the most important courses of study, says a writer in a recent issue of *Construction News*. There is to-day a great lack of men qualified for this work. It is said that it is a position short-lived at most, and that no one would be justified in undertaking to make it a calling for life. This is unquestionably an error. There is no doubt whatever but that competent building superintendents could find constant employment all the year round, because it is one of the most important branches of the building industry. The great difficulty, however, would be from the tendency on the part of the building superintendent to embark in the contracting business either upon his own responsibility or in partnership with others, for the simple reason that men with the qualifications are in such strong demand, and further, that there are none in the building business more keenly alive to it than the modern contractor, for if he is successful he has on his hands almost all the time more work than he can properly care for, and is constantly on the lookout for competent, reliable and trustworthy men to aid him. Furthermore the compensation would be far beyond the ordinary, and in either case he would be in every respect amply repaid.

Architects in Chicago as well as in other parts of the country find it difficult to secure the services of competent superintendents. It is not that the men they have are not competent, but so many young and educated draftsmen, much to the surprise of most people, do not care to undertake this branch of the work. This is in very much the nature of a surprise to most people who are competent to judge of these matters. Office practice is very likely to result in a narrow minded, one talented sort of a man, whereas the broader application which one gets with superintendence fits him to take up almost any part of the work, to negotiate and deal with men and to broaden his mind so generally that after a few years' experience he is capable of doing almost anything that comes to the man in the more advanced walks of life. It unquestionably fits him to deal with men, which is an important consideration in architectural practice. The thing to-day is to get the work, and the man who sticks too closely to his office and does not have the command of men is very apt to enjoy a limited practice. In the same connection it is interesting to note that some of the leading architects have taken from their force men who thought themselves incompetent to handle these questions but valuable employes when it came to the matter of superintendence. It was discovered that they were very valuable men in the latter position and acquitted themselves with remarkable credit, but the unfortunate phase of it was that the young men didn't like the work.

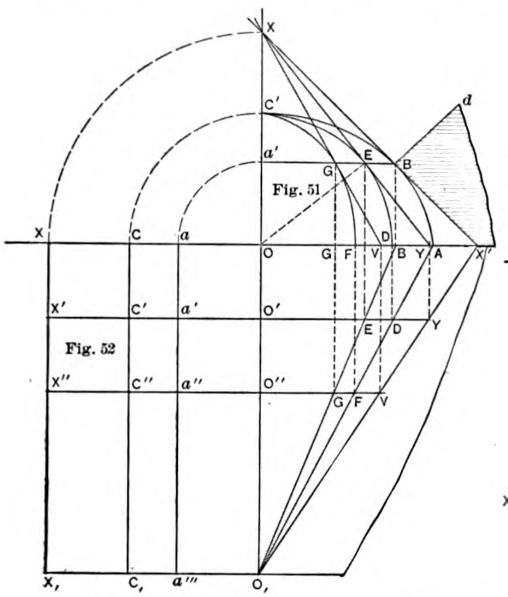
LAYING OUT CIRCULAR ARCHES IN CIRCULAR WALLS.*—VII.

BY CHAS. H. FOX.

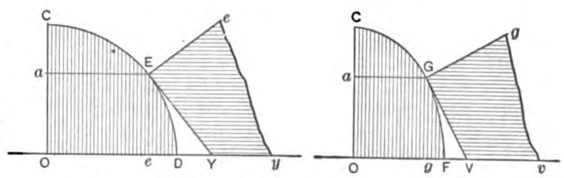
IN this issue we present an explanation for forming a cardboard representation by which a practical illustration may be obtained of the problem presented in Figs. 47 to 50, inclusive. To obtain the representation of the problem it is first necessary to make the drawing upon cardboard, and then, cutting the several pieces, place them in their proper positions as directed. In order to make the drawing proceed as follows: In Figs. 51 and 52 draw the line O, X, which may be taken as the center line of the drawings. Square with this draw X X', which corresponds with the opening line of the preceding figures. Now, taking O A at pleasure as the major axis of the directing curve of the soffit, and O C' as the minor axis, construct the ellipse shown by A B C'. With OO as center and O C' as radius draw the quadrant C' E D. Now in Fig. 52 join A with O,; then parallel with O, X draw D D; square with O, X draw D O'; set off O' O" equal with O O' and square with O, X draw O" F. In Fig. 51, with O" F of Fig. 52 as the one semi-axis and O C' as the other, construct the ellipse C' G F. Now assume the point B of the directing curve at pleasure, and through B draw B *a'* parallel with O X'. In the manner fully explained for the similar constructions in preceding chapters project the tangents X' X, X Y and X V. At the center O, of the plan square with O, X draw O, X,.

This is the representation of the axis line, or the axis of the wall. This understood, proceed as follows: With center O of Fig. 51 rotate *a* C' X into the corresponding points of Fig. 52. Then parallel with O X draw *a'''* *a*, C, C and X, X. Now upon other pieces of cardboard, as shown in Figs. 53 and 54, construct *facsimile* figures of that given in C' E D and C' G F, together with the corresponding tangents and normal lines of the diagrams of Fig. 51. Now in Fig. 53 take a sharp knife and cut through the board at the outline of the drawing, following the direction as given by the curve C E. Repeat the operation in Fig. 54.

Now in Figs. 51 and 52, starting, say, at the center point O, of the plan, cut through the board at the outline of the drawing around to *d*, then at the underside of the lines O, O, O X', cut about half through the board, which will admit of the rectangle O, O X X, being revolved around the center line O, O as on a hinge until it is perpendicular with the lower portion of the drawing forming the plan. In the same manner the section O C' B *d* may be revolved around the line O X' into a perpendicular position. The lines O X of the diagrams will then meet, and may be held in position with common pins, or liquid glue. Now take Fig. 53 and place it exactly over or rather to coincide with the lines given in Y O X' of Fig. 52. In the same manner place Fig. 54 into its position over the line V O X".



Figs. 51 and 52.—Diagrams for Construction of Tangents and Normals.



Figs. 53 and 54.—Portions of Cardboard Model.

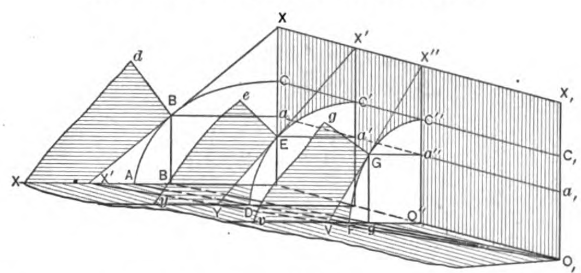


Fig. 55.—Representation of Completed Model.

Laying Out Circular Arches in Circular Walls.

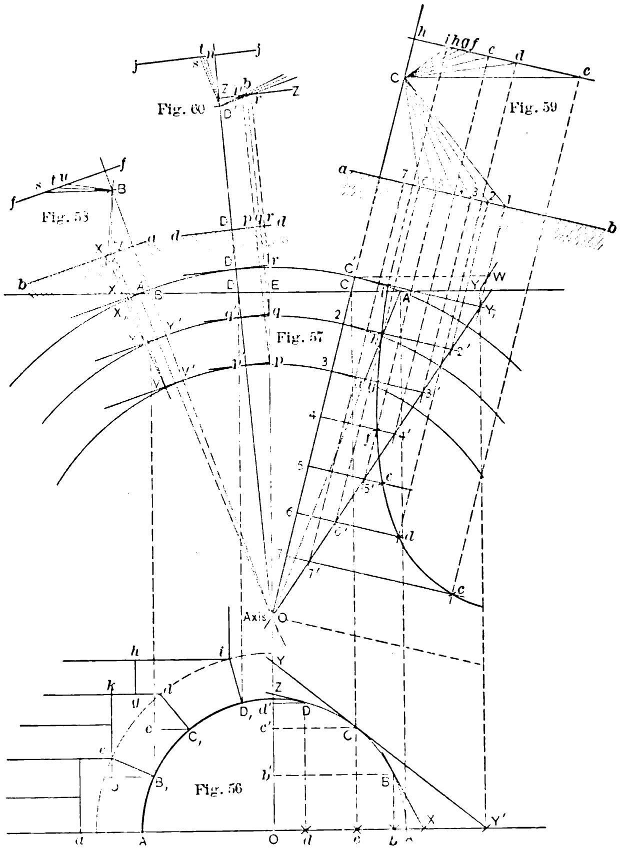
It may now be seen that the inclinations of the normals are unequal—that is, the inclination of B *d* in its relation to the horizontal plane of the plan will be more obtuse than that of G *g*. In this manner may the "twist" of the joint surface be seen and understood. Now cut clear through the sections, Figs. 51, 53 and 54, and remove the portion containing the tangents and normals, then replace the curved sections in their proper positions. This done, take a ruler and move it in such a manner that in each movement it may be parallel with the horizontal plane and touch both the curve of the directing ellipse and the axis line at O X. If this be done the student will find the ruler to not only touch the lines in question, but also to touch the other curved sections which belong to Figs. 53 and 54. This shows the manner in which the soffit of the radiant arch may be formed, and will in a very simple manner prove the accuracy of the drawings.

In the same manner place the ruler to the points X' X, X' Y, X" V of the tangents, and it will be found the ruler will also meet the points B, E, G of the respective sections. This will prove the construction of the tangents and normals. We may remark the sections in question correspond to those which may be obtained at vertical planes which may intersect the surface of the soffit at the points given in B H I of Fig. 49, and of which the lines *t* I, *q* H, &c., are the horizontal traces.

In conclusion we may ask of the beginner to note that in the vertical projection as given in Fig. 51, the points X, X" X' X of the model are projected in the one point X at the axis line. The same remark applies to the projections of C, C" C' C and *a'''* *a"* *a'* *a* of the model. They are projected in four separate points in the diagram, Fig. 52, while in Fig. 51 they are represented in the one point as C. From these remarks the student will see the utmost importance of obtaining a thorough knowledge of that branch of geometry called projection. In Fig. 55 is shown a representation of the completed model. Letters of reference correspond to those made use of in the diagrams of Figs. 51 and 54.

The method already explained by means of which the tangents and normals have been projected gives only an approximation. It is, however, so nearly correct that for all practical purposes it may be adopted. It is our intention in the diagrams, Figs. 56 to 60, to show the method by means of which the correct normals may be obtained. In Fig. 57, O is the center with which the outer A A′, the center Y h and the inside face curve V a may be drawn. In Fig. 56, A C, A represents the directing curve of the soffit. The tangents to the point, as B C, &c., at which joints are desired are shown in B X, Y′ C Y and D Z.

First, take the construction of the tangents and normals which belong to the element O C′ of the soffit. Project C Y of Fig. 56 into C Y of the opening line of the plan and join C with O; then square with O C′ draw C′ Y, 2 2′, 3 3′, &c., indefinitely. Also at the point C′ of



Figs. 56, 57, 58, 59 and 60.—Diagrams Showing Method by Which Correct Normals May Be Obtained.

Laying Out Circular Arches in Circular Walls.

the outer curve draw C′ W parallel with the opening line. Now through Y draw the radial Y W; then parallel with O C′ draw W Y,; now join Y, with O. Produce O C′, as shown in Fig. 59, and set off a C equal with C C of Fig. 56; draw a 1 square with O C. Then parallel with O C′ from the points given in Y, 2′ 3′, &c., of the plan, produce lines meeting a 1, as shown in the points 1 2, &c., of Fig. 59. Join these with C, which gives the vertical projection of the tangents respectively to the points C′ 2 3, &c., of the element. Now drawing C i, C h, &c., square with its respective tangent the vertical projection of the normals may be obtained.

Now let us suppose the line h′ c to represent the top or horizontal bed of the arch stone at a hight, C h, equal with that of the horizontal bed k d above that of the point C, of Fig. 56. Suppose further that a mold is required to give at this surface the proper direction at which to form a winding surface joint.

To develop the mold proceed as follows: Parallel with O C from the points given in i h g, &c., of Fig. 59, produce lines, as shown on the plan intercepting C′ Y,, 2 2′, &c., in the points i h, &c. A curve traced through these points gives the contour of the mold required. This is an hyperbola, and the winding surface of the joint is named "An Hyperbolic Paraboloid." A similar construction, as shown in Fig. 58, will give the required normals at the points B Y′ Y′ of the element which belongs to the soffit at the joint. In finding the tangents to the points D′ q′ p′ of the upper joint, as the horizontal trace would be too far removed, we use instead the point Z, Fig. 56, and the points r q p of Fig. 57. In Fig. 60 set off D D′ Z equal with d D Z of Fig. 56; square with D D′ draw Z Z. Now parallel with O D draw r r, q b and p p. Joining these points with D′ gives the vertical projection of the tangents. The normals are obtained in the lines D′ s, D′ t and D′ n.

New System in Jail Design.

The new county jail which is in course of construction at Akron, Ohio, embodies in its general scheme of design something of a radical departure from buildings of this class as usually projected. It is in two parts, with separate entrances; the front part forming the sheriff's quarters consists of two stories, a basement and attic. The rear, or prison, section is trapezoidal in plan and incloses a triangular court open to the sky. The prison contains four stories, including the basement, of which all but the upper floors are for men. The basement of the residence half is utilized for the ventilating and heating plant for the entire building, and a part of the second floor over the sheriff's office is fitted up as the prison hospital ward, with adjoining attendants' rooms and complete toilet conveniences.

According to the plans of the architect, F. O. Weary of Akron, each cell has a window into the court, but is inaccessible from any outside rescue, as the court can only be reached through the jail corridors. The windows are arranged in a series of receding bays and staggered in such a manner as to prevent the prisoners seeing one another, but to enable them to see and hear any one addressing them from the speakers' gallery. This makes it unnecessary to assemble them in one room where they would be liable to communicate with one another. The cell windows are to be heavily grated from the inside on a plane with the inner steel lining of the cells, while the sashes are on the court side of the wall, wholly inaccessible to the prisoners; they will have patent locks which are manipulated by the keeper from the balcony extending around the inner court. The floors of these balconies will be of glass so as not to cut off the light to the cells beneath.

An electric transmitter will be placed just outside each cell window, connected with a sensitive megaphone receiver in the jailor's office, which will report any communication of prisoners through their cell windows, or any unusual noises, such as sawing, filing or other indications of attempts at escape. A similar device will be placed in the padded insane cells to detail all the ravings or relapses of the inmates to the office.

A shower bath and laundry tray for the prisoners to do their own washing will be located at the forward end of each exercise corridor, with hot and cold water mixing chambers and measuring tanks in the outer corridor, so that the keepers may control and limit the use of water. Instead of the usual iron cots, hammocks of heavy duck, bound with leather, will be used in the jail, for economical as well as sanitary reasons, as they can be readily fumigated or burned if unfit for further use, and may be cheaply replaced. The top floor is divided into two parts, one half being for boys and the other for women.

The ventilating and heating of the entire building, including the jail and sheriff's residence, is done by a combined forced and induced hot air system. The circulation is established by a large motor driven blower, which takes its air through an inlet 14 square feet in area and containing a steam coil for slightly tempering the air in the severest weather. The blower discharges partly through a heater and partly through a by-pass into a plenum chamber.

The blower is a 90-inch fan with a 64 x 32 inch wheel, and runs at 225 revolutions per minute, the fan being belted to a 5 horse-power motor.

CORRESPONDENCE.

Addresses of "Turner," Poughkeepsie, and "C. H. R." of Philadelphia Wanted.

In our issue for March, 1902, there appeared in this department a very interesting article by "Turner," descriptive of his method of making wooden rings for curtain poles. We are now desirous of communicating with the author of this article, but having mislaid his address we shall take it as a favor if he will forward it to this office at his early convenience.

If the correspondent signing his communication "C. H. R.," Philadelphia, will forward his full name and address, we shall take pleasure in giving attention to his request regarding the steel square. We have often mentioned in these columns that it is essential that each correspondent should sign his communication with name and address, not necessarily for publication but in order that the editor may correspond with him should the occasion demand. The lack of this essential part of a communication will explain why certain letters forwarded to the editor have not yet received attention in the paper.

Key to the Different Orders of Architecture.

From C. A. WAGNER, *Port Jervis, N. Y.*—I send inclosed blue print of a chart or key to the different orders of architecture, which may be of benefit to some of my brother chips. I would like to see some of the others contribute good articles on the subject or to cut this key to pieces if I am wrong. The chart will explain itself with a little study. I would say, as to general proportions, that in the Tuscan, Doric and Ionic orders the pedestal is 4 parts, the column 12 parts and the entablature 3 parts, the whole hight being divided into 19 parts.

In the Corinthian and composite orders the pedestal is 7 parts, the column 20 parts and the entablature 5 parts, the whole hight being divided into 32 parts.

The base in each order is one-half the bottom diameter of the column in hight.

Hight of Tuscan capital is one-half the lower diameter of column.

Hight of Doric capital is one-half the lower diameter of column.

Hight of Ionic capital is one-third the lower diameter of column

Hight of Corinthian capital is seven-sixths the lower diameter of column.

Hight of Composite capital is seven-sixths the lower diameter of column.

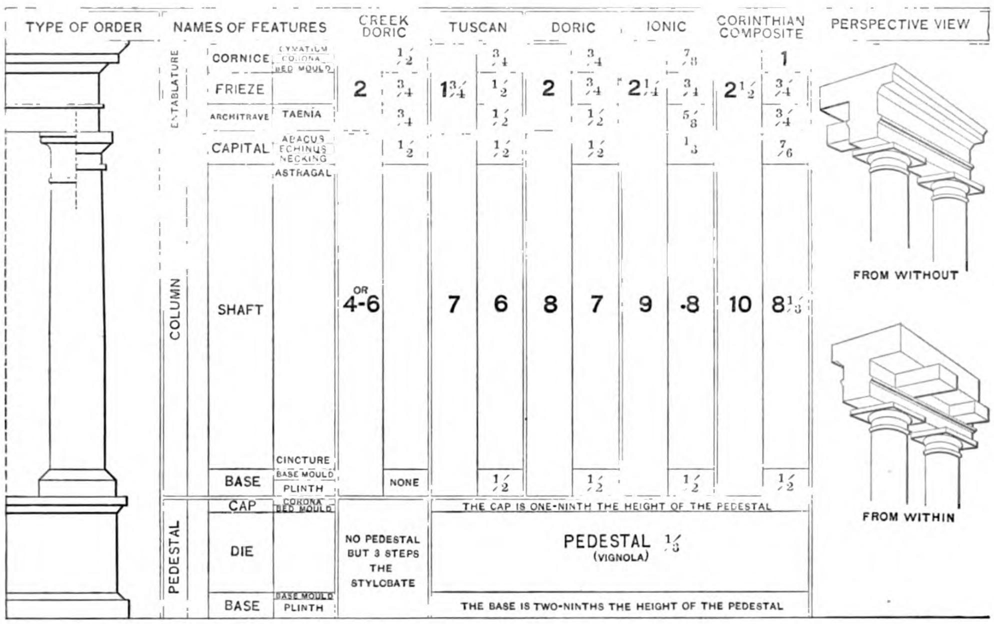
The hight in each case is measured from the top of the necking to the top of the abacus. The hight of the architrave, frieze and cornice is measured by parts of the lower diameter of the column, and are as follows:

	Architrave.	Frieze.	Cornice.
Tuscan	1/2	7/12	2/3
Doric	1/2	3/4	3/4
Ionic	5/8	3/4	3/4
Corinthian	3/4	3/4	1
Composite	3/4	3/4	1

The lower diameter of—

Tuscan	column	is 1/7	the hight;	the upper 19/24.
Doric	"	" 1/8	"	" 5/6.
Ionic	"	" 1/9	"	" 5/6.
Corinthian	"	" 1/10	"	" 5/6.
Composite	"	" 1/10	"	" 5/6.

The inclosed chart and general information I should not feel disposed to furnish for publication did I not want to see the younger generation well informed along the lines of their chosen vocation. If any of the other subscribers have anything that is good and useful to the craft I should like to hear from them.



Key to the Different Orders of Architecture.

Should Outside Work Be Primed as Soon as Finished?

From W. A. K., *Garnavillo, Iowa.*—I have long been a reader of your valuable magazine and regard the Correspondence department as most interesting. I send herewith a query which I shall be glad to have the practical readers consider. Is it advisable to prime outside work, such as cornice, siding, &c., as soon as put on? It certainly protects the wood work from shrinkage and warping, but the painters tell me that it is harder to make the paint stay on afterward.

Hanging Glass Doors.

From S. F. B., *Wellington, Ohio.*—I am getting so many good things from *Carpentry and Building* that I feel I should give something in return if I can. Possibly what follows may be of some service to the "Young Chips" among the readers. I would say in reply to "E. E. F.," whose inquiry appears on page 97 in the April issue, that I never saw an outside glass door with extra trimmings on it but what had the putty on the same side. Would "E. E. F." turn the door inside out to get the putty inside? I agree with the views expressed by "D. P. B." on page 162 of the June issue.

From C. A. WAGNER, *Port Jervis, N. Y.*—With regard to glazed doors, I say always place the putty side in, as well as where they are beaded, for then it is not so easy for the burglars to remove the glass and at the same time it gives a neat appearance from the outside. I have seen doors hung with the putty on the outside, and have seen them slammed shut and the glass laid on the outside, but this is not the case when placed on the inside, for the wood is there and not the soft putty and the glazier's points.

Quantity of Material Required to Cover Roof.

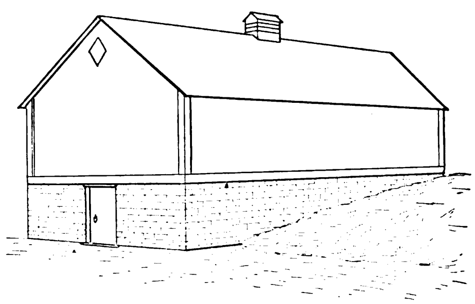
From J. N. W., *Logan, Iowa.*—In answer to "W. R. T." in the April issue, who inquires how much sheathing and shingles are necessary for a certain roof, I will give a rule which I have used for estimating roof surfaces and which may be of interest to others as well. In case of a half pitch roof add 5-12 of the square feet of the building to itself, including, of course, the projection of the cornice all around; the product will be the number of square feet of roof surface. For instance, suppose the building is 28 x 30 feet, and that the projection of the cornice is 12 inches all around, this would make the surface 30 x 32 or 960 square feet. Now, 5-12 of 960 = 400, and 960 + 400 = 1360, which would be the number of feet of sheathing required for a roof of this size regardless of hips, valleys or gables. If the shingles are to be laid 4½ inches to the weather then 1360 x 8 = 10,880, or, say, 11,000 would be required. In regard to obtaining the length of the principal rafters I would say there is no more practical and correct way than "stepping off" with the square, as he says, although, of course, he might make a drawing to any scale desired and obtain the correct lengths of all the different members of the roof. In this particular roof if he will multiply one-half the width of the building by 17 he will get the length of the principal rafter, to which, of course, he must add the lookout necessary for the cornice projection.

Design for a Small Ice House.

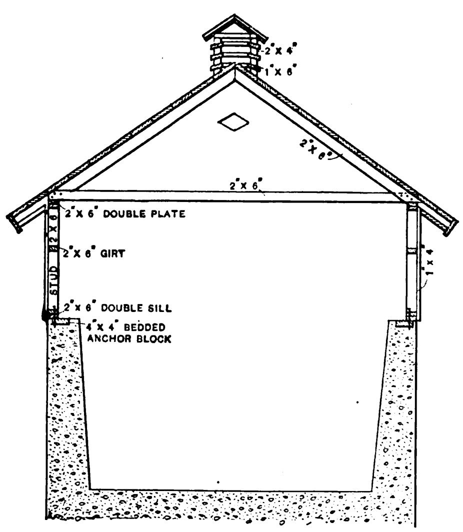
From D. P. B., *Redford, N. Y.*—Some time ago one of your correspondents asked for a design for an ice house, and in reply I send herewith a floor plan, a sectional view and perspective of a house which I built recently, and which is giving excellent satisfaction. The size is optional and may be of any good proportions, as for example 17 x 21 feet, smaller or larger. I prefer a small size with hill and wall around the base. The walls should be 6 to 8 feet high, 2 feet thick at the bottom and on the inside should batter up to 15 inches at the top. All the dimension stuff is 2 x 6 inches. For a larger building the timbering may be larger, and for a smaller construction 2 x 4 inch material will make a safe job. The anchor blocks should not come closer to the outside than 1 inch and should be key shaped, with the thick end inside. Between the sheathing and shingles it will pay to use the Johns-Manville Hair insulator, "Neptune" brand. The posts or other wood construction in the bottom is only a poor makeshift, and concrete is better than good masonry and cheaper than poor masonry. The floor is of concrete, 8 to 10 inches thick, the composition consisting of one part Portland cement, three of good sand and six of stone. Smashing the stone with a hammer and leaving no very large pieces nearer than 1 inch of the surface will make a good job. The floor should be covered tightly with boards as soon as the concrete is tamped and left so for a few days. Do not put any plastering coat on to finish. Rub the walls with a flannel rag wet with neat cement. Building tin cans in the wall above the ground will greatly check conduction of heat. The door should face the prevailing winds. Incline the floor a few inches so that the water will run out at the door.

The "Iron Clad" brand of cement will give splendid results. We use it in this severe climate for reservoirs. Pressed crushed brick will give good results in case stone is not available.

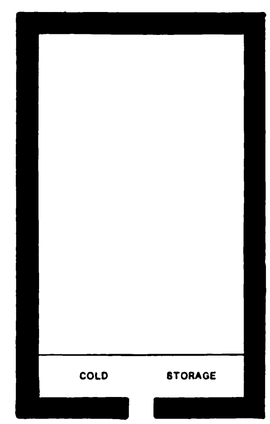
The side walls above the concrete may be 5 or 6 feet high. A neat, tight cornice consisting of plancier and facia is all that I used. The boarding is 3½ x ⅞ inches, matched and planed, the planed side being out and painted white. The frieze, base and corner boards are in imitation green. The door frame is 2 x 18 inches and anchored in the wall. A ventilator is in each gable and a door behind to put in ice. Instead of paint the whole exterior may be soused in properly made whitewash. In a real warm climate I would pack the inside with mineral wool about 2 inches thick and would expose the inside to the coldest weather before putting in any ice. Before filling put a foot of coarse straw, well packed, on the floor. Chink all the holes with ice and pack straw or sawdust tightly between the walls and the ice.



Perspective View.



Vertical Cross Section.—Scale, ⅛ Inch to the Foot.



Floor Plan.—Scale, 1-16 Inch to the Foot.

Design for a Small Ice House.

A Question in Window Sash Construction.

From DRAUGHTSMAN, *Pittsburgh, Pa.*—In response to the request made by "H. M.," St. Louis, Mo., in the correspondence columns of the April issue I submit the accompanying sketches, Figs. 2 and 3, and the following suggestions for publication. I desire to say that I have seen this method in use many times and always with success. The solid lines in the sketches, with the exception of A, represent a reproduction of the sketch accompanying the letter of "H. M." I would say that I have never seen this method applied to sash where effect is sought because, if the construction is neat, as it should be, I see no reason why it would not be applicable in any form of common carpentry without interfering seriously with appearances. As will be seen from the sketches, the method consists merely of plowing out the sill as indicated by the dotted lines to receive the sash, planting into the sash a drip strip, A, of about ¾ or ⅞ inch in hight. It should be brought across the bottom as desired, but not less than ¾ inch on large sash and on small ones ⅜ inch at least, all of course depending on the size of the sash. It should be planted into the sash ⅜ or ¼ inch, with a small air space behind it, and have a groove plowed on the underside of it so that water falling down the sash and glass will drip off, and if the sill has a proper inclination the water will readily flow down. I would suggest that in case "H. M." applied this method he increase the thickness of the sill as per his sketch to make up for the loss in thickness caused by plowing for the sash, and that he make it at least as thick as shown by the dotted lines on Fig. 2 of the sketches which I send. I also show a small section, Fig. 3, indicating this method as applied to cellar or laundry windows, also by the dot and dash lines on the other section.

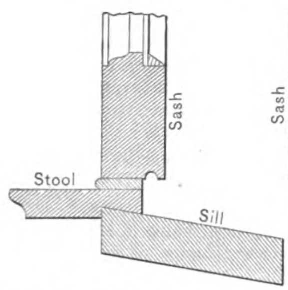
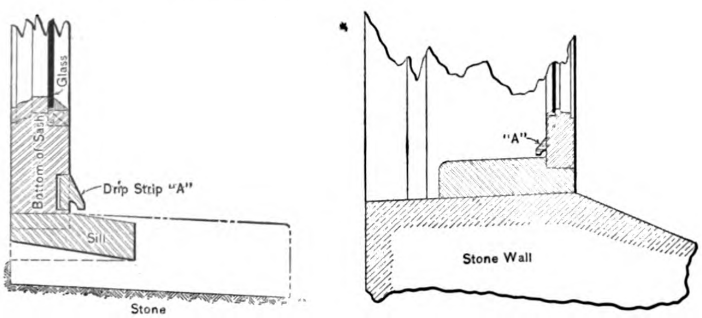


Fig. 1.—Sketches Submitted by "W. N. H."



Figs. 2 and 3.—Construction Suggested by the Correspondent Signing His Letter "Draughtsman."

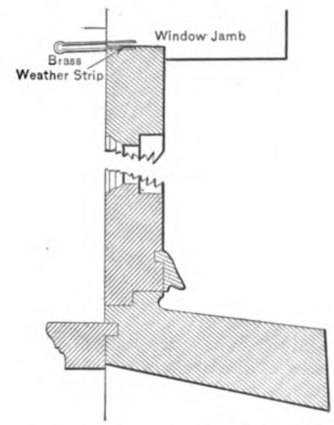


Fig. 4.—Method Recommended by "Old Timer."

A Question in Window Sash Construction.

From OLD TIMER, *Pennsylvania.*—In answer to the inquiry of "H. M." of St. Louis, Mo., in the April issue of the paper, the accompanying sketch, Fig. 4, shows a good way to construct the window sill and lower part of the sash of a casement window opening into a room. The piece that goes across the bottom of the sash should have a good coat of white lead when put together and fastened with wood screws. There should also be brass weather strips at the sides and top of the sash, fastened to the jambs so they will press against the stiles and top when the window is closed, and a good fastener that will draw it tight against the rabbet when closed, will make a good job.

From W. N. H., *Newport, R. I.*—The question submitted by "H. M." in a recent issue of the paper was very nicely answered by "O. N.," but, with his permission, I will finish his drawing, as shown in Fig. 1, so that there will be no trouble from water driving under the sash on to the bead and getting in on the window stool. The groove in the bottom of the sash stops the water from being driven further, and that is the whole secret. Sometimes we put a mold on the outside, as indicated in the smaller sketch at the right.

Nailing on Door Stops.

From J. W. H., *Petersburg, Va.*—Dear Old Friend *Carpentry and Building:* Perhaps I am unknown to you, but you are familiar to me, for I have been receiving your visits for many, many years, and expect to continue to have you call on me for some time to come, if Providence permits. You are exceedingly practical and especially helpful to me. I have been a building contractor for about 30 years and I am now engaged in the planing mill business, but still need your assistance. In the Correspondence department I notice an inquiry as to nailing on door stops. I agree with the sensible fellow who nails on a ½-inch square edge stop, forming a rabbet on each side of the frame so that the door can be hung on either side, while at the same time the stop may be shifted a little to take up any possible wind of the door.

From C. A. WAGNER, *Port Jervis, N. Y.*—I do not consider it necessary that door stops should be rabbeted for the reason that all doors are not out of wind and are more or less untrue. I should by all means use a stop the full width, or, in other words, a blind jamb, or what we call a built-up jamb.

Constructing a Wooden Scaffold Bracket.

From G. R. S., *New York City.*—Will some of the readers give me their opinion as to the strongest form of construction for a wooden scaffold bracket?

Figuring Tank Capacity.

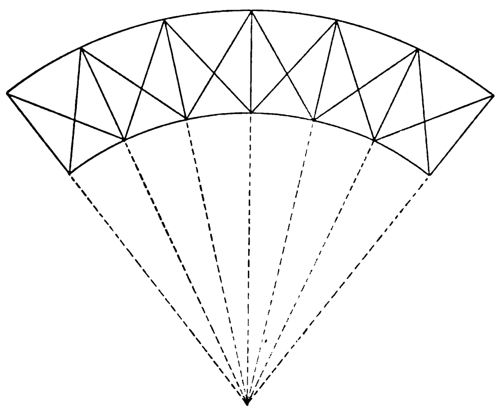
From S. D. S., *Portsmouth, Va.*—Referring to the question of tank capacity on page 162 of the June issue, it seems to me the multiplying and dividing became rather badly mixed in the second solution, and that it would be easier for people not accustomed to such work to solve the problem as follows: Multiply the required number of gallons by 294, and divide the product by the assumed hight of the tank. Extract the square root of the quotient, and the answer will be the diameter of the tank in inches.

Comments on Picket Fence Construction.

From C. A. Wagner, *Port Jervis, N. Y.*—In constructing picket fences I would say burn the posts before putting them in the ground; then cut down 3 to 4 feet below the surface. Have them well tamped, and all joints and tops of posts well bedded in good stiff lead and oil. I favor gaining in the posts, but paint the ends of the rails and also the gains. I have put up fences in this way for the past 15 years, and they stand to-day for inspection and in a good state of preservation.

Cause of Camber in Steamer Gang Plank.

From O. N., *Atkinson, Ill.*—I submit herewith a sketch showing the principles involved in the construction of the steamer gang plank, about which inquiry was made in



Explanation of Cause of Camber in Steamer Gang Plank, Submitted by "O. N.," Atkinson, Ill.

the April issue. The rods in the truss radiate from the center of the circle of which the truss is a segment.

From C. F. C., *Paris, Texas.*—In the April issue a correspondent inquires the reason for the camber in a steamer gang plank. If I understand the sketch the same rule can be applied that is used in bridge construction. First, determine the number of panels, in this instance six. Take for example 3 inches for the camber, which would make the top panel a ½ inch larger than the bottom panels, measured each way from the centers of the chords. In order to have the end posts stand plumb set the bottom back one-half the amount of the camber. Braces are all cut the same length. In adjusting the rods tighten the end sets first, working from the end toward the center and finishing with the center sets. During more than 30 years' experience in the B. & B. Department of the Texas & Pacific Railway Company I have framed a good many Howe truss bridges, using this method to obtain the camber. I have been a reader of *Carpentry and Building* for several years and think every carpenter should subscribe for it.

Best Method of Treating a Shingle Roof.

From O. A. G., *Dresden, Tenn.*—In reply to the question of "J. F. H.," of New Marion, Ind., in the June issue, I would say the best way to treat a shingle roof is to dip the shingles in creosote stain two-thirds their length. It is best to have a brush to wipe the shingles as they are withdrawn from the stain. Do not allow the shingles to soak, but after dipping withdraw at once and throw them in a loose pile to dry with a free circulation of air. The advantage of dipping is that the shingles are more thoroughly impregnated with creosote and are therefore better preserved. It is well to apply a brush coat after the shingles are laid.

The best and quickest way to lay shingles is to not scaffold from the ground. Lay a few sheathing boards on the ceiling joists, on which to stand, and nail three or four courses of sheathing on the rafters at the eave of the roof. Run up the sheathing and shingles in this way as far as one can reach; then nail a footboard on the roof where the shingles have been laid. In my opinion the quickest way to lay shingles is to have one man lay them and another one to nail them on.

Seasoning Oak Without Checking.

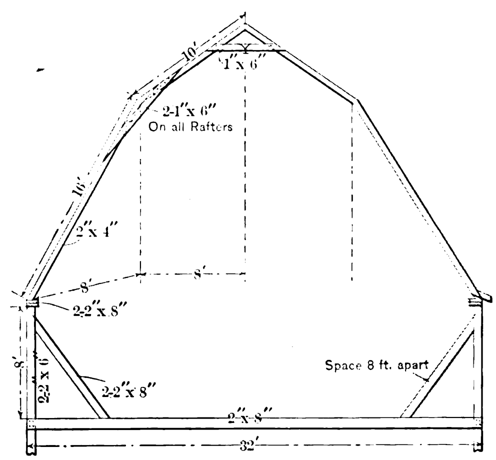
From J. W. H., *Petersburg, Va.*—Will some of the practical readers tell through the columns the best way to season oak without checking?

Note.—With no desire to anticipate the suggestions which may be furnished by the practical readers interested in the above subject, we would state that the United States Department of Agriculture, Washington, D. C., is about issuing through the Bureau of Forestry a bulletin known as No. 41, which relates to the "Seasoning of Timber," especially of oak. It is possible that our correspondent may obtain from this bulletin valuable information along the lines indicated.

A Barn Roof of Insufficient Strength.

From J. H., *Treesbank, Manitoba.*—Will some practical reader—or might I suggest Mr. Kidder?—criticise the sketch of roof construction which I enclose. The plan is taken from *Breeder's Gazette.* I want to build with a clear center for the hay fork. The snow in this part of the country never stays on the roofs, but we have very strong winds.

Answer.—The sketch of our correspondent was submitted to Mr. Kidder with a view to obtaining his criticism, which is as follows: "I would not advise 'J. H.' to put up a roof as per his sketch. It might stand under its own weight, although 2 x 4's, 16 feet long, are very light. Under a heavy wind I feel quite sure that the



Bent of Barn of Insufficient Strength.

roof would collapse. Much better and safer methods of attaining the same end are shown in *Carpentry and Building* for February, 1901, and July, 1902."

A Question in Transom Construction.

From G. T., *Mount Etna, Pa.*—In reply to the question raised by "J. C. A.," Oshkosh, Wis., in a recent issue, I would say place the red oak outside and the quartered white oak inside. My theory for putting the putty on the inside is that the solid wood should stand the jar rather than the putty.

From J. W. H., *Petersburg, Va.*—In reply to the correspondent who raises the question as to whether to place the red or white oak side of his transom in or out, I would say that it depends altogether on the inside finish of the hall. If the hall is to be finished in white oak, I should put the white oak side of the transom inside and the red oak and putty outside. If the hall is painted wood, I should place the red oak and putty inside.

Constructing Joint Molds in Arches.

From DONALD FRASER, *Philadelphia, Pa.*—Very often in the construction of a house in the Gothic style numerous little difficulties appear which cause much trouble to the carpenter or stone cutter foreman in charge of the work. Those who have read books giving illustrations of French Gothic cannot have failed to notice that the arches of porches, vestibules and some of the interiors do not spring from a cap, but for the most part from a round or splayed pier; in other words, the members of the arch die away in the pier, as indicated in Fig. 5, which necessitates a separate joint mold for each joint until the arch becomes clear to receive the square section, as at C D of the elevation. I have worked on a *porte-cochere* where the springer and arch stone above it were squared, set, and the members cut afterward to range with the clear part of the arch. This required a longer time, as well as greater care and expense, than if they had been cut on the banker, simply for the reason that the men lacked a little knowledge which would have saved them much trouble. In Fig. 5 of the diagrams presented herewith are shown the half elevation and half plan of an arch, being one of a series in a porch of a suburban residence. It will be noticed that the members die away in a splayed jamb, which requires a separate pattern or section for the joints E F and G H.

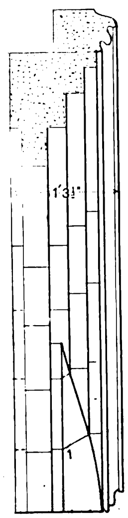


Fig. 4.—Section through Arch on Line A B of the Elevation.

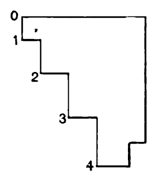


Fig. 1.—Square Section.

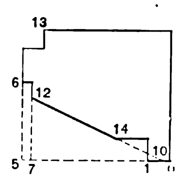


Fig. 2.—Section through G H.

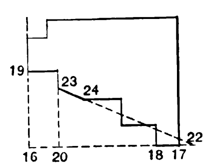


Fig. 3.—Section at E F of the Elevation.

Scale, ½ Inch to the Foot.

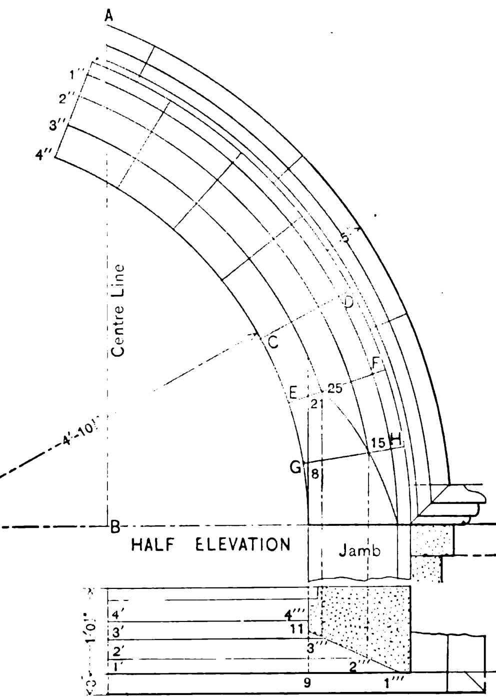


Fig. 5.—Half Elevation and Plan of Arch.—Scale, ½ Inch to the Foot.

Constructing Joint Molds in Arches.

In order to find the shape of these patterns the arch plan is required so that the different members may be projected to meet the corresponding lines in the elevation at 15 and 25. These lines are taken from the square section, Fig. 1, and placed on the elevation and plan, as figured. Make the section G H of the elevation as shown in Fig. 2, making 0 5 equal to G H. Then lay on the square section so that the points 0 1 6 correspond with 0 1 4 of Fig. 1. Next make 5 7 equal to G 8 of the elevation. Draw a line from 7 square with 5 1; then from the half plan take the distance 9 1''' and place it on Fig 2 as at 7 10. Now take the jamb mold and place it so that points 1''' 11 touch at 10 12; then 0 1 12 6 13 will be the section G H for top of springer and bottom of No. 1 arch stone.

It will be observed that at 15 in the elevation the first check of the section, Fig. 1, clears itself and that part of the splay 12 14 will be plumb. As the arch turns the splay becomes smaller. It is necessary to find the size required for the top of No. 1 and the bottom of No. 2. In Fig. 3 make 16 17 equal to E F of the elevation. Square up a line from 16 and apply Fig. 1 so that the points 0 1 4 will correspond with 17 18 19. Next make 16 20 equal to E 21 of the elevation and raise a line from 20. Again make 20 22 equal to 9 1''' of the plan. Now apply the jamb pattern so that the points 11 1''' touch at 22 23; draw the splay line; then 17 18 24 23 19 will be the section required. The cutting of these stones requires no explanation, for with a face pattern and sections any stone cutter can finish without trouble.

Water Pressure in a Tank.

From S. D. S., *Portsmouth, Va.*—In the June issue is an inquiry from "Plumb." Republic, Wash., relative to the water pressure in a tank. Permit me to say, first, that any person calling himself a civil engineer who cannot solve the problem given is sailing under a false title. He may be a land surveyor, but is most certainly not a civil engineer. The rule is: Multiply the area of the wetted surface by the vertical depth of its center of gravity below the surface of the water and that product by 62.5, all dimensions being in feet. The figures 62.5 represent the weight approximately of 1 cubic foot of water. The center of gravity of a rectangle is at the middle of its depth. To apply the rule take the longer side, thus: 80 x 12 equals the area of the wetted surface—that is, 960. Now

$$960 \times 6 \times 62.5 = 360{,}000 \text{ pounds.}$$

The shorter side has one-fourth the area, hence the pressure on it is one-fourth of 360,000 pounds, or 90,000 pounds. There are two long and two short sides, hence

$$360{,}000 + 90{,}000 = 450{,}000 \times 2 = 900{,}000 \text{ pounds,}$$

which is the total pressure on the sides. The center of gravity of the bottom is 12 feet below the surface, hence

$$20 \times 80 \times 12 \times 62.5 = 1{,}200{,}000 \text{ pounds,}$$

and the total pressure is

$$900{,}000 + 1{,}200{,}000 \text{ pounds} = 2{,}100{,}000 \text{ pounds.}$$

The total pressure on 1 square foot of the sides next the bottom of the tank would be

$$1 \times 1 \times 11.5 \times 62.5 = 718.75 \text{ pounds.}$$

In this connection I think it would be very interesting to have a description of the way in which the tank was built, and I trust the correspondent signing himself "Plumb" will favor us.

Note.—We also have a somewhat similar solution of the problem from "G. R. S.," New York City.

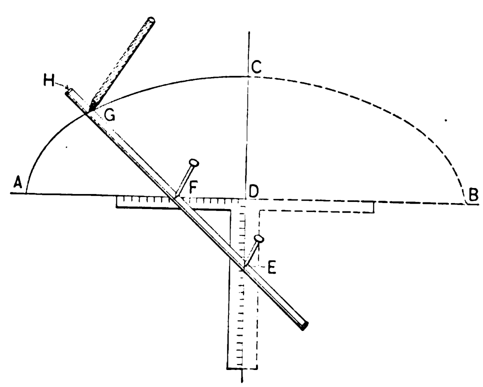
From S. E. S., *Homestead, Pa.*—In reply to "Plumb," Republic, Wash., relative to the entire pressure against the interior of a rectangular tank, 80 feet long, 20 feet wide and 12 feet high, filled with water, I would say that the pressure on the bottom of the tank is the weight of the water, which in this case is 1,190,000 pounds. The pressure against each side is 360,000 pounds and against each end 90,000 pounds.

Then 1,190,000 + 360,000 + 360,000 + 90,000 + 90,000 = 2,090,000 pounds, or 1045 tons.

The problem is not a very difficult one, but for the benefit of my fellow workers I will give the method of solving it. To find the pressure on the bottom of a tank, multiply the area of the base by the perpendicular hight, and that product by the weight of a cubic foot of water, which is 62½ pounds. To find the pressure on the side of a tank, multiply the area of the side by one-half the perpendicular hight, and that product by the weight of a cubic foot of the liquid. I would say further that if the tank is in the form of a cube, three times the weight of the water will be the entire pressure on the five sides. I think the problem a very useful one, as it is very necessary to know the pressure in order to determine the size of timber to use in the construction of a tank.

Laying Out Elliptic Arches.

From R. H. A., *Portland, Me.*—I noticed on page 29 in the February issue a method of laying out elliptic arches, but as the article was unaccompanied by an illustration I have thought to make it somewhat plainer by submitting the accompanying diagram. This illustrates the method described, except that I always use the steel square when the arch is not too large. In the diagram the distance A B represents the width of the arch on the springing line and C D the hight of the spring. Lay the square as shown, then drive nails F and E through the stick for sliding points. The distance G to F is the same as that from C to D, and the distance G E is equal to A D. Sliding the point on the square the pencil at G marks one quarter of the ellipse, and by turning the square as indicated by the dotted lines the other quarter may be obtained. For small ellipses I consider it quicker to use the string and pencil, which is so common as to be generally understood by all of the craft.



Laying Out Elliptic Arches.

Capacity of a Cylindrical Tank.

From W. S., *Napoleon, Ohio.*—Kindly tell me how to find the capacity of a cylindrical tank 23 inches in diameter and 30 inches high. How many English and how many American gallons will it hold?

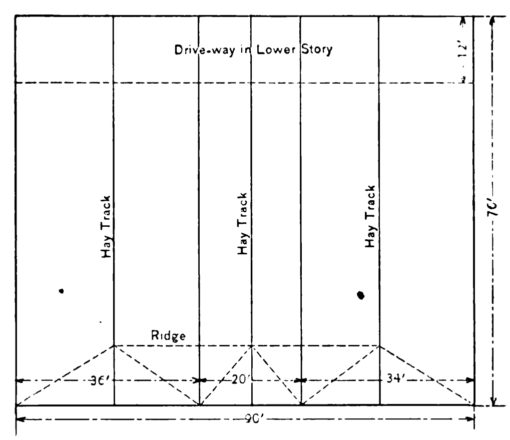
Answer.—To find the capacity of a tank of this kind the area of the base should be multiplied by the altitude. The base is a circle 23 inches in diameter. To determine its area, multiply the square of the diameter by 0.7854. Thus, $23^2 \times 0.7854 = 415.4766$ square inches.

Multiply this by the altitude, 30 inches, and we have, 415.4766 square inches × 30 inches equals 12464.2980 cubic inches, capacity of the cylinder.

Now in order to find the number of gallons in the tank divide the capacity by the number of inches in a gallon. The United States standard gallon contains 231 cubic inches, and the British Imperial gallon 277.274 cubic inches. Divide the total number of inches in the tank by the number of inches in the kind of gallon desired and the result will be the total number of gallons in the tank. The tank in question contains 53.958 United States gallons, or 44.953 British Imperial gallons.

Constructing a Barn Roof.

From C. A. B., *Petersburg, W. Va.*—I enclose herewith plan of a barn taken at the square or top plates. I wish some of the practical readers to tell me the best plan of constructing a roof over it. There is a driveway in the lower story, from which the hay will be handled with hay carriers, three in all. The ridge should be 12 feet if the carrier is put up with rafter irons for a common rafter. All the ridges should be of the same hight as indicated on the plan.



Plan of Barn at the Plates, Submitted by "C. A. B."

How Many Men Should Work on a House?

From Novice, *Zion City, Ill.*—I am a recent reader of *Carpentry and Building*, but I enjoy the paper very much. I was induced to subscribe for it at the beginning of the year through the solicitations of a friend who gave me a sample copy. I did so rather reluctantly, as my first hurried glance through its pages somehow left the impression that the paper was just an advertising sheet and little else, but when my first number came and I found time to read it carefully I changed my mind, for I am sure I obtained from it practical ideas many times the value of the year's subscription. Now I wish to ask a question of the practical readers, and I may as well say right here that I mean by practical readers men who have by honest dealing and good work built up a business as contractors, or workmen and foremen who by their honesty and skill as practical mechanics have been sought after by employers, and as a general thing are busy while the "Wonder" is loafing and telling what he can do. The fact is I have lined down and shaved gable shingles, patched new roofs, soldered up gutters, shingled around chimneys, patched and plugged, torn down, puttied and puttered after that kind of freak until I simply do not want to be bothered even to read his nonsense. Now will some plain, honest foreman or contractor give me his opinion as to how many men—that is, as carpenters average up—it would be practical to work upon an eight-room house estimated to cost $2300? In other words, how many men could a good foreman use to advantage?

WHAT BUILDERS ARE DOING.

THE labor disturbances which have been in progress for some weeks past in the city of Chicago have undoubtedly had more or less effect upon building operations, if one may judge from the figures issued by the department covering the month of May. At least the showing as compared with May of last year is decidedly unfavorable, the falling off representing a heavy percentage. The number of permits issued for May of the present year was 622, covering buildings having a frontage of 17,451 feet and involving an estimated outlay of $3,317,200, while in May, 1902, there were permits issued for 566 buildings, covering a frontage of 18,784 feet and estimated to cost $5,245,125.

In our article on current rates of wages in the building trades published in the May issue a typographical error made the rate for carpenters 60 cents per hour, when it should have read 50 cents.

Elizabeth, N. J.

The strike of the bricklayers and plasterers, which had been in progress since May 1, was brought to an end on Thursday, June 11, resulting in a victory for the Master Masons' Association, who were supported by the Builders' Exchange. The strike grew out of a refusal of the master masons to accede to the demand for an increase of 5 cents per hour in the rate of wages. The men were offered 3 cents additional if they would withdraw from the "Trades Council," but this proposition the men would not accept, although they agreed to withdraw from the council if the 5 cents an hour increase was allowed. This was refused, and after several conferences the men finally agreed to accept 2½ cents an hour increase and to withdraw from the Trades Council. According to the new agreement for the coming year the wages will be 52½ cents per hour, eight hours to constitute a day's work and with a half holiday on Saturday, no third party having the right to call a strike. By this arrangement the journeymen will work entirely independent of the other trades.

Emporia, Kan.

The serious damage resulting from the recent floods which have inundated large areas in the sections of the country tributary to the Mississippi and Missouri rivers is likely to call for a vast amount of building in the not very distant future. A valued correspondent, writing under date of June 8, from Emporia, Kan., states that while situated at such an elevation as to escape the floods of the Neosho and Cottonwood rivers, the extremely wet weather which prevailed for so protracted a period seriously interfered with building operations in that section. He intimates, however, that other causes than floods are affecting the work of building construction, and these are the high prices of materials and the attitude of the labor unions. These have delayed and in some cases indefinitely postponed a great deal of work, and the building situation in that section is not as promising as could be desired. The carpenters organized a union in the city last fall and other branches of labor subsequently perfected organizations, these being the first ever formed in the city. The contractors, being unaccustomed to dealing with labor unions, are at present unable to reconcile the existing conditions to the demands which are being made. It appears that the carpenters are asking 30 cents per hour for a nine-hour day, and other labor is demanding more than has been previously paid. Lumber is very high, also stone and other materials entering into the construction of buildings, so that there is no little complaint and dissatisfaction. There is, however, a considerable demand for houses, such as private dwellings, as rents are rather high. The feeling seems to be that as Emporia is quite a railroad center there is no reason why the city should not offer a good opportunity for investment of capital in building as soon as the people can adjust themselves to the labor unions, &c. Work has already been commenced on a jail to cost about $21,000, and operations will soon be inaugurated on a Carnegie Library costing about $30,000. A Government building, to cost about $60,000, is under way, and the Normal School has about completed a library costing about the same sum. In addition to these improvements there are a few residences of moderate cost in process of construction. As for the future the building situation ought to be good. Emporia has a population of about 10,000 inhabitants and is a great place for schools and churches, but the manufacturing industries are on a rather limited scale.

Los Angeles, Cal.

Very little fluctuation is noted in developments in the building line. Work in all branches continues active, and from the undertakings now on hand and known to be in contemplation it is reasonably safe to predict that this condition will continue for some time to come. The number of new building permits during May, and which were issued by Julius W. Krause, City Superintendent of Buildings, numbered 433, valued at $1,081,111. This shows an increase both in permits and value over the corresponding month of 1902, when 373 permits were issued aggregating $846,584. Of the permits issued for May, 1903, one was for the erection of an addition to a nine-story brick building, to cost $150,000; one for a five-story brick building, to cost $100,000; three for three-story brick buildings at $59,977; two for two-story brick buildings at $4300; seven single story brick buildings for $18,800; four three-story frame buildings at $56,750; 68 two-story frame buildings at $242,344; ten story and a half frame buildings at $19,400; 176 single story frame buildings, $170,600; 30 frame flats at $118,285, and 29 sheds valued at $3750. The remainder of the permits were for alterations and repairs and amounted to $59,450.

Lowell, Mass.

There is a much better feeling in building circles in and about the city owing to the fact that the textile mills are now running with practically a full force after a rather protracted shut down. Although there has been a direct loss of a large amount of money, both in wages and the local purchase of minor supplies during the eight weeks of the strike, the effect on general trade was not as severely noticed as might have been expected under the circumstances. There is a fair amount of building in progress, including several fine residences, a number of apartment houses and some cottages. An addition is to be made to one of the mills, while several others are making minor repairs and small alterations and improvements. The work on the new dormitories and the heating plant at the Middlesex County Truant School is now well under way, the work having been awarded to Lowell contractors. Frederick F. Ayer, who has already done so much for Lowell, has again shown his interest and generosity by a gift of $50,000 to the Lowell Textile School, which amount will enable the institution to complete and fully equip Southwick Hall. Mr. Ayer has also given the Young Women's Christian Association $40,000 for the purpose of constructing and furnishing their new building. This liberal gift will provide the association with one of the finest structures of the kind in the State. With the prospect of the mills in the city now running full, there is every encouragement to look forward to a prosperous season in the building line.

New Orleans, La.

The amount of building projected during the month of May in New Orleans showed a heavy advance over that of the corresponding month of last year, the gain being due in some measure to numerous additions and repairs to frame and brick structures. The number of building permits issued by the city authorities were 151, calling for an expenditure of $377,460, as against 90 permits for building improvements costing only $34,107 in May of last year. According to the classification of buildings, as made by the Mechanics', Dealers' and Lumbermen's Exchange, there were, among others, 46 frame dwellings projected, three brick public buildings and 97 additions to frame and brick structures of a miscellaneous character.

In this connection it may be interesting to show the current rate of wages in the leading branches of the building trades, it being claimed that the increases granted since April 1 have been the largest ever allowed and covering a greater number of unions. The present rates, with the number of hours constituting a day's work, are as follows:

	Hours.	Present rate.
Carpenters	8	$2.80
Bricklayers	8	$5.00 to 6.00
Plasterers	8	3.00
Slaters	8	3.50 to 4.00
Painters	8	2.25 to 2.50
Plumbers	8	3.00 to 3.50
Sheet Metal Workers	8	2.25 to 3.00
Steam Fitters	8	3.00 to 3.50
Gas Fitters	8	3.00 to 3.50
Architectural Iron Workers	10	4.00
Building Laborers	8	1.60
Plasterers' Laborers	8	2.20

New York City, N. Y.

Building operations in the city have been almost at a standstill during the past month, and the outlook at the time of going to press is not altogether flattering for an immediate resumption of work. Certain steps have been taken looking to a return of the men to work, and for several days operations were resumed on many buildings. At a meeting, however, on June 12 the Board of Governors of the Building Trades Employers' Association, which was organized shortly after our last issue went to press, decided to extend the shut down of work to all buildings, including those where special work was being done, in order to bring to an end the conditions resulting from the exactions of the walking delegates. When the material is exhausted on such buildings where it was on hand when the shut down was declared all work will have ceased. Just how soon it may be considered expedient to resume operations no one seems prepared to say. It is stated that one object of the action of the Board of Governors is to get the members of the various unions to seriously study the employers' plan of arbitration without being biased by the walking delegates, who naturally object to any curtailment of their powers. The employers say they are not fighting the labor unions, or even the walking delegates, but are determined to make it impossible for the latter to hold up work at their pleasure.

While building operations have shown a falling off as regards the number of permits issued during the month of May, the estimated value of the contemplated improvements is something like $2,000,000 in excess of those projected during May of last year. Since the first of the year the aggregate value of the improvements amounted to $51,119,490, as compared with $51,943,875 for the same time a year ago, these figures showing that there is little, if any, change in the amount of work in progress. If the resumption of building operations in the near future is upon an unrestricted labor basis, it is thought that the volume of business for the year will make a very gratifying showing. It is expected that the increase will be especially noticeable in flats and tenement houses.

The Slate and Metal Roofers' Union has signed an agreement with the Employing Roofers' Association for a year providing for an eight-hour workday at $4.50 a day, and double wages for holiday work and overtime. It is provided that a sympathetic strike shall not be looked upon as a violation of the agreement.

The Building Trades Employers' Association, which was formed at a meeting held May 15, has the following permanent officers: President, Charles L. Eidlitz of the Electrical Contractors' Association; first vice-president, L. K. Prince of the Iron League; second vice-president, Hugh Getty of the Master Carpenters' Association; chairman of the Board of Governors, Otto M. Eidlitz of the Mason Builders' Association; secretary-treasurer, William K. Fertig of the Marble Association. In the new constitution the objects of the association are set forth as being "to foster the interest of those engaged in the erection and construction of buildings and other structures; to reform abuses relating to the business of persons so engaged; to secure freedom from unjust and unlawful exactions; to obtain and diffuse accurate and reliable information as to all matters affecting such persons; to procure uniformity, harmony and certainty in the relations between employers, employees, mechanics and laborers."

The Mason Material Dealers' Exchange of Brooklyn, which was recently incorporated, has for its purpose "to foster and protect the interest of persons engaged in the business of dealing in masons' building materials in the Boroughs of Brooklyn and Queens; to secure freedom from unjust and unlawful exactions; to diffuse accurate and reliable information as to the standing of merchants and builders, and regarding other matters, and to settle differences between those engaged in said business."

The officers are Audley Clarke, president; William N. Kenyon, William V. Burroughs, vice-presidents; John Williams, secretary, and Joseph H. Colyer, treasurer.

Philadelphia, Pa.

Notwithstanding the strike of the carpenters in the city of Philadelphia, the estimated value of the projected building improvements in that city during the month of May showed a slight increase as compared with the corresponding month of last year. The figures, however, represent a marked falling off as compared with April. According to the report of the Bureau of Building Inspection there were 703 permits issued in May of the present year, covering 1170 operations, the estimated cost of which was $2,933,470. These figures compare with 827 permits, covering 1353 operations, estimated to cost $2,836,055 in May, 1902, and 922 permits, covering 1672 operations, involving an estimated outlay of $3,877,325 in May, 1901. Of the total improvements for which permits were issued in May of this year private dwellings call for nearly $1,300,000, a gymnasium calls for $375,000, schools and churches something over $300,000, and alterations and additions nearly $400,000. The Twenty-seventh Ward heads the list in point of value of work undertaken within its borders with $871,400.

On June 8 nearly 1500 striking carpenters affiliated with the Brotherhood of Carpenters and Joiners returned to work for independent master carpenters. It is stated that work was resumed on a compromise schedule of 45 cents per hour and a 44-hour week.

Pittsburgh, Pa.

As we go to press a movement which has been on foot for several weeks past looking to the organization of an International Association of Builders is assuming tangible form and a convention is about to be held in Pittsburgh, Pa., for carrying the scheme into effect. We understand that the object of the new organization will be the fixing of scales, settling all disputes that may arise between contractors and their employees, and the taking of such action on other matters relating to their business as may be deemed necessary and expedient. It is expected that there will be present at the convention representatives of associations in Pittsburgh, New York City, Cleveland, Chicago, Philadelphia, Cincinnati and New Orleans.

The Pittsburgh Master Builders' Association is arranging to tender the visiting delegates a banquet and in other ways look after the comfort of the visitors.

At a recent meeting of the Master Builders' Association it was decided, after some discussion, to form a stock company to be capitalized at $100,000. It is said that they will erect a building three stories in hight for their purpose, the first floor to be devoted to a restaurant, to be conducted by the company, and a reading room, while the second floor will be for the offices of the members. The third floor will be devoted to meetings and for convention purposes.

The lockout recently ordered by the Master Contractors' Association and the Stone Contractors' Association and approved by the Builders' League, and which threatened to throw many thousands out of employment indefinitely, was called off on June 15, when building operations in the entire Pittsburgh district were resumed. Nearly 10,000 bricklayers, stone masons, stone cutters, carpenters and members of other crafts, who had been idle for two weeks, returned to work.

San Francisco, Cal.

More or less building is being done in the city in the way of private dwellings and apartment houses, but there is not at the moment anything of special magnitude to note. Most of the building contracts which have been awarded during the last few weeks, says our correspondent, under date of June 6, have been for small amounts. One of the largest was for $39,000 for work preliminary to the erection of St. Mary's Help Hospital. Among the operations under way or about to be carried into effect are a seven-story and basement store, office and apartment building of semi-fire proof construction, with front in enameled brick and terra cotta, from plans prepared by J. E. Krafft, who is also the architect of a two-story and basement residence in Colonial style to be built by S. E. Newman at a cost of about $16,000. The foundations are being laid for an artistic residence for Mrs. M. G. Pickering which will cost between $12,000 and $13,000. Another residence which is being built by a representative of the Alaska Commercial Company will cost about $16,000, and the same amount will be expended for six flats at the corner of Post and Broderick streets.

A banquet complimentary to James H. Wilson, secretary of the Builders' Exchange, was given by the members of that organization at the California Hotel on the evening of Saturday, May 30, President S. H. Kent being master of ceremonies. In an appropriate address he introduced Mr. Wilson, the guest of the evening, who fittingly responded. The toast, "The Builders' Exchange," was responded to by S. H. Kent, followed by J. D. McGilvray, who talked about "Stone Contractors." The toast, "Brick Masons," was replied to by O. E. Brady; "House Movers," by M. Kelleher; "The Carpenters," by R. McKillican, and "The Plumbers," by W. F. Wilson. The toasts were interspersed with songs by a quartette.

Notes.

The strike in the building trades, which has been in progress in Omaha, Neb., since March, was brought to an end on June 15, the main cause of the break being the settlement of the bricklayers with the contractors upon terms which were said to be a compromise.

The strike of the carpenters at Utica, N. Y., for $3 per day of eight hours, and which was inaugurated April 1, resulted in tieing up a great deal of work which was in progress and causing a number of projects to be postponed, the latter embracing many private dwellings. Among the work delayed may be mentioned the House of the Good Shepherd, the new St. Luke's Hospital and Home, the extensions in connection with School No. 18 and an addition to the James Street School, the total aggregating something over $200,000.

An organization of rather pecular yet interesting origin has just been incorporated at Dunkirk, N. Y. It is known as the Union Builders' Co-operative Contracting Company, of which there are 29 incorporators named in the certificate, all being union carpenters and members of the local of that city. The organization grew out of the fact that on April 23 the carpenters' union ordered a strike, and the contractors refusing, after nearly two months, to grant the demands of the striking carpenters, have organized and purpose going ahead and building themselves. The company are said to be entirely co-operative in their operations.

The master builders have recently advanced the wages of journeymen carpenters in Northampton, Mass., from $2.50 to $2.75 a day. An agreement has been signed, taking effect May 18 and continuing in force until May 1, 1905. It provides, among other things, that a dispensation be granted by the journeymen to those wishing to work for less than $2.75; that men over 50 years old be paid $2.50 per day; that any journeyman carpenter wishing to be a contractor shall apply for membership in the Master Builders' Association; that men who are discharged or not given work shall not cause the journeymen to take any action unless such discharge is because of membership in the local union, and that a committee shall be appointed from both bodies to prepare rules and regulation and to act generally upon questions which may arise between the two parties.

SOME HINTS ON KITCHEN SINK PLUMBING.

IT would not be necessary to mention the waste pipe from the sink, were it not for the fact that very often this part of the work is improperly done. The trap, of course, should be located directly under, and as near to the bottom of the sink as is consistent with a proper pitch of the local vent from the crown of the trap. The waste pipe where it passes through the floor should be flanged over, and the waste pipe from the trap should be wiped over the flange, thus forming a firm support for the trap. A good workman will scarcely need a guide other than the waste pipe itself in wiping the flange joint on the floor. For a workingman who is not so sure of hand, a loose collar or flange of lead may be slipped over the end of the waste pipe on the floor, and the end of the pipe flanged down on top of it. This loose collar should have the diameter it is desired that the finished wiped flange joint shall be, and should be soiled on the outer edge, to permit of the easy removal of the surplus solder. Several thicknesses of tough paper, with the top surface well greased, should of course be used to protect the floor from heat in either case. The same protection should be afforded the finished wall when wiping the flange joint where the vent pipe enters the wall.

It is often desirable that the waste pipe from the sink shall enter the wall or partition, instead of passing through the floor. There are different ways of doing this, as shown by Figs. 6 and 7.

The method shown in Fig. 7 is the simpler of the two, and is allowable in most plumbing ordinances. When the connections are made of lead, as shown, the ferule should be wiped on the vent branch and calked into the double hub before placing it in position. The same style of connection may be made with iron pipe with a tee branch to receive the sink waste pipes. This arrangement is not always possible, as in cases where the vent pipe must be extended below the sink to receive the branch vent from fixtures in the basement. Some sinks are provided with ornamental hollow cast iron legs, through one of which the sink waste pipe passes. This necessitates the placing of the sink trap beneath the floor and complicates the venting somewhat, to say nothing of the increased fouling surface thus exposed to the air in the house.

The Ventilating Pipe.

The vent from such a trap (in fact, the trap of any fixture) should rise higher than the top of the fixture itself before branching into the main vent pipe. A failure to arrange it so will provide an easy and unintentional passage through the vent pipe for the waste water, in case of a stoppage of the waste pipe from the fixture. An arrangement of this sort is shown in Fig. 8, where a nickel plated grease trap of well-known make is connected to waste and vent pipes. It will be seen that a stoppage in the waste pipe from the trap allows the waste water to flow with the greatest ease down through the laundry trap vent. If the vent were run as shown by the dotted lines, the sink would overflow before it would be possible to flood the vent pipe. Such a grease trap as shown is of no value whatever for the purpose intended, as it is much too small to hold a sufficient quantity of cold water to chill and harden the grease. Even if it accomplished the purpose for which it was made the limited capacity of the pot would make necessary so frequent a removal of the grease as to constitute it a greater nuisance than the presence of the grease in the pipes. In case it is desired for any reason to keep the grease from the drainage system a grease trap of proper capacity may be arranged with a water jacket through which passes all of the cold water used at the sink, or the cold water which supplies the boiler. The using of the cold or hot water from the sink faucets will then produce a constant change of the water in the jacket, chilling and hardening the grease for easy removal.

Stoppages in Branch Vents.

While considering the subject of the occasional flooding of the branch vent it may be well to call attention to the fact that waste water frequently rises in the vent pipe a short distance above the junction of the vent with the crown of the trap. A partial stoppage of the waste pipe from the sink prevents the waste water from passing away as rapidly as it should. The waste water then enters the trap more rapidly than it can pass out through the channel provided for it. The result is that the grease laden water rises a few inches into the branch vent, to subside when the volume of water has passed away. This leaves a coating of scum and grease on the comparatively cool inside surface of the vent pipe. Each repetition of this process thickens the coating of filth until the bore of the pipe is entirely closed. The fact that the vent pipe is always cool and that there is no current of water to wash away the accumulation of filth makes this pipe peculiarly susceptible to stoppage.

In case this condition exists on the lower sink of two placed on the same line, and the vent pipe to the crown of the lower trap is the lowest end of the vent line, a stoppage of the waste pipe at the upper sink might, under some conditions, permit of the waste water passing into the vent pipe through the upper vent branch, and on encountering the solid plug of grease in the lower vent to fill up the section of vent piping between the two sinks, there to remain and putrefy until some unlucky plumber taps the vent branch, as shown in Fig. 9, at the lower sink for the purpose of inserting a cleaning wire.

Foot Venting.

For this reason "foot venting" should be practiced wherever possible, as shown by dotted lines in Fig. 9. This not only provides an outlet for any accidental water which may be present in the vent pipe, but often relieves the trap of the liability of evaporation of the water in the trap by reason of the rapid current of air passing upward through the pipes. For the same reason the vent branch at its junction with the crown of the trap is less

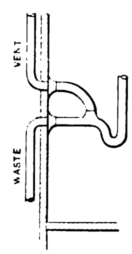


Fig. 6.—Separate Vent and Waste Connections.

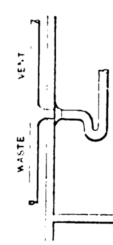


Fig. 7.—Combined Vent and Waste Connections.

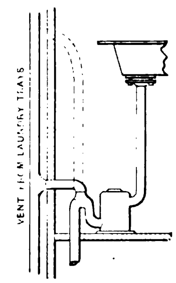


Fig. 8.—An Improperly Vented Grease Trap.

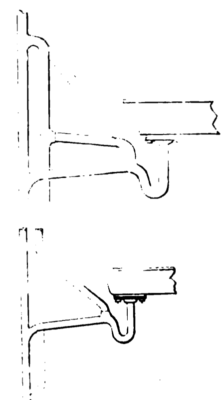


Fig. 9.—Corrections for an Improper Vent System.

Some Hints on Kitchen Sink Plumbing.

likely to be so cool as to rapidly congeal any grease with which it may come in contact.

Another argument in favor of foot venting is that it affords a firm support for the vent line. Besides the stoppage of the vent pipe through the process above described at the junction with the crown of the trap, this connection is often in such a location as to render it peculiarly liable to the entrance of lint and light floating solids which are passing through the trap with a strong flush of water. The slightest roughness will retain at least some of this solid matter, forming a nucleus, which gathers to itself other solid particles until the vent is completely plugged. This condition of things is apt to draw the attention of the proper authorities to it, as the collection of particles is likely to proceed until the sink trap is stopped up also.

Connecting to Avoid Stoppage.

A partial cure for this latter class of stoppage is shown in Fig. 10, where the vent branches are shown taken off the trap a short distance outside the crown of the trap beyond the point where the water strikes with force on making the turn. The plumbing regulations of most cities require venting at the crown, however, and the letter of the law is almost invariably observed. It is difficult to provide a remedy for the occasional stoppage of a branch vent, and there is at present no acceptable arrangement for making the insides of these pipes easily accessible. Clean out screws would be convenient at these points, but the danger of leakage through imperfect washers or carelessness in screwing up by those who open them more than counterbalances the former evil. That such pipes do stop up occasionally is not an argument against back venting any more than the occasional stoppage of the sink waste pipe is an argument against the general use of sinks.

Removing Stoppages.

Until some better arrangement is devised the cutting open of the branch vent by the plumber will continue to be the means generally employed to clean out known stoppages at these points. This can best be done in the manner shown in Fig. 11. Instead of cutting a round hole with a tap borer and capping it with a piece of sheet lead, as is common practice, two cross cuts the proper distance apart should be made on the top of the pipe. A longitudinal cut along the center of the top of the pipe and connecting the two cross cuts, as shown, will permit of bending back the two leaves thus formed, opening up a space as wide as the diameter of the pipe and a trifle longer if desired, as shown. The cuts should be made with a sharp, thin bladed knife well wetted and the two cross cuts should bevel slightly toward each other. After the obstruction has been removed and the pipe thoroughly cleaned and all is ready to close up the opening, the cut edges should be neatly trimmed and the two leaves bent back in place, when the pipe will again present the appearance originally presented. If the work has been well done there will be no projection inside of the pipe and the cuts may be slightly soldered without fear of the solder running through.

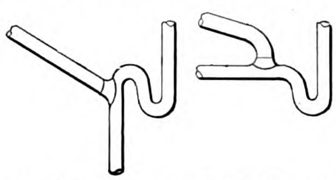


Fig. 10.—Vent Connections Not Easily Choked.

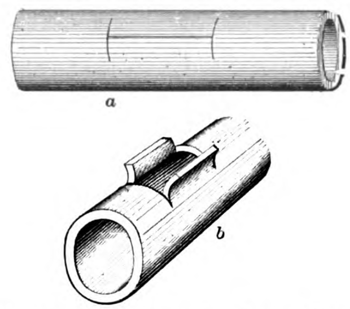


Fig. 11.—Pipe Cut and Opened to Remove Obstruction.

Some Hints on Kitchen Sink Plumbing.

Among the building improvements contemplated in New York City is a 12-story fire proof business building, to be erected at a cost of $175,000, on the north side of Thirty-fourth street, covering the westerly end of the site of the old A. T. Stewart mansion. The new building will have a frontage of 50 feet and a depth of 106¾ feet. The *façade* will be of brick, limestone and terra cotta, and the structure will be erected in accordance with plans prepared by Clinton & Russell, architects, of this city. The plans have also been filed with the Building Department for a new 12-story fire proof apartment hotel, to cost $350,000, to occupy a site on the north side of Forty-sixth street, 200 feet east of Sixth avenue. According to architects Neville & Bagge, the new building will have a frontage of 55 feet and a depth of 85 feet, with *façades* of brick and limestone.

An Iceless Refrigerator.

In these days of horseless vehicles and wireless telegraphy it is not surprising to learn that an iceless refrigerator has been invented by an Oregon man, who uses the principle of the evaporation of water to reduce temperature. According to the inventor, quoted in the New York *Evening Post*, the iceless refrigerator presents much the same appearance as do ordinary refrigerators. The outer casing and door may be made of plain or expensive woods, as taste may dictate. The upper half and the top are closed tightly. The lower portion is formed of inclined slats through which air may be freely admitted. The door is also made tight at the top and provided with slats at the bottom. The interior frame is made entirely of galvanized iron, to prevent shrinking and expanding or becoming moldy with constant dampness, and it is also a good conductor of heat, and therefore assists in reducing the temperature lower than it could otherwise be maintained. Burlap or other fibrous material is fastened upon this inside frame so as to form an interior wall, which stands at sufficient distance from the outer wall of the structure to form an annular space between the two.

In the top of the inner structure is an opening covered with screen material. Through this and the slats around the bottom of the outer casing a constant draft of air passes, thus causing an evaporation of moisture, with which the fibrous material is saturated, so that the interior of the apparatus is maintained at a low temperature. All around the top of this frame is a strip of galvanized iron with an inclined lip bent over. The edge of the burlap is fastened upon the face of the frame, ⅛ inch above the edge of the lip, so that the water which is discharged upon this inclined surface will not flow over the burlap, but will be directed against it so as to be absorbed, thus saturating the burlap. The fastening for this burlap or other fibrous material consists of a double pointed tack or holder, the head of which is soldered or otherwise secured to the face of the galvanized iron. The fibrous material being pressed over the points they are folded down to hold it in place. This renders is easily removable for change or cleaning.

Above the top of the frame is a tank for holding water. Projecting from the sides and ends of this tank, and at a suitable distance apart, are horizontal pipes having in the outer ends vertically disposed needle valves, which control the flow of water from openings in the lower parts of the pipes. These openings and controlling valves are situated in line above the slanting lips so that water delivered from the openings falls upon the lips and flows down into the fibrous material, keeping it constantly saturated.

FELT AND GRAVEL ROOFING.

IT is no uncommon thing to hear the remark from people who are not posted, "I wouldn't have such and such a roof on a house of mine. Look at that of Smith's; leaked since it was put on." Whether it be of tile, slate, tin or felt and gravel, we might have a poor, leaky roof of a certain kind, but for that reason we should not condemn all roofs of that kind, says a writer in *The Metal Worker*. A little study of some of the weak points of a felt and gravel roof may be of advantage, and by putting into practice those things that have proved good and omitting those that have shown themselves to be bad, a roof that will give good satisfaction may be obtained with the aid of first-class materials. It was the common thing to give these roofs a uniform slant from front to rear, the water being removed by an eave trough, which projected a foot past the wall. In a cold climate with a severe winter this was a weak spot. The heat from the interior melted the snow and the water got away all right until it came to the eaves, which would mean a strip of roof 1 foot wide and the width of the building. This strip, as it receives no heat from below, allows the formation of a ridge of ice, which gradually accumulates until it is anywhere from 6 inches to a foot deep. This jams back the water until a miniature lake is formed, and it may be said to the credit of a roof of this kind that many of them remain tight under these conditions until the water has overflowed the flashing, when a trip up with an axe has removed the trouble and all was well until the dyke formed again.

In Figs. 1 and 2 are shown the front and side sectional views of a roof with a good record. Nine out of ten gravel roofs that have given trouble had had no ventilation or insulation. The ceiling joists were also the roof joists, and the space between them not vented or poorly so, with the results as outlined above. In Fig. 1 the panels shown are fitted with screen wire, which gives free access to the space between the ceiling and roof joists, as is clearly shown in Fig. 2 at V.

The ceiling joists are 2 x 12 inches, placed level. An air space of about 2 feet at the high end is provided by scantling placed on end and cut to the proper grade, these in turn supporting the roof joists. It is good practice to grade to some central point and remove the water through a conductor carried down through the interior of the building. This pipe should have ample capacity to remove a large quantity of water in case of a heavy storm, and should have a hopper at the roof with a coarse strainer let down in it about 2 inches, as at A.

If there is a point that has given more trouble than another that distinction should be awarded to the flashing around fire walls, skylights, &c. By reference to Fig. 3 there will be seen a brick projecting some 2 inches past the wall line and about 6 inches above the roof line, which is continued around the roof, a piece of bond timber being built into the wall at A to give a nail hold for fastening a wood strip about 1 x 3 inches to secure the felt, which is first turned up against the wall and well pitched, another coat being applied after the strip is in place. This was the old method, but experience showed that the projecting brick was a bad feature. The rain follows the under side and gets in behind the strip and felt and gradually rots them out. It is a difficult matter to get the felt to lie in close to the inside of a right angle, as the sun beating down upon it soon dries it out and makes it useless for shedding water.

An improved method of flashing is shown in Fig. 4. A triangular block is placed in the corner, as at A; the felt is carried up over this and a galvanized iron flashing, D, is let into a seam in the brick and brought down to the roof line before the gravel is put on, and the felt at the junction of the wall and roof is then entirely covered and protected from the weather.

When it is desirable to take the water from the eaves the roof should only just clear the walls nicely, as shown in Fig. 5. It was the practice to turn the felt over the edge of the eaves 2 or 3 inches into the trough or gutter, but this strip of felt being exposed to the weather was one of the first places to go, and resulted in rot and leakage. This is overcome by a weather strip about 6 inches wide, which is formed up, as at A, Fig. 5, and shown applied at A, nailed closely along the edge and well pitched. When the gravel is on the top of strip is flush with the top of roof. The eave trough or gutter may be slipped under it.

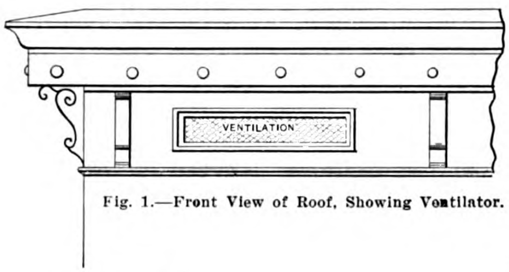


Fig. 1.—Front View of Roof, Showing Ventilator.

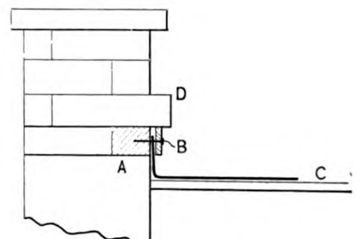


Fig. 3.—Old Method of Flashing that is Faulty.

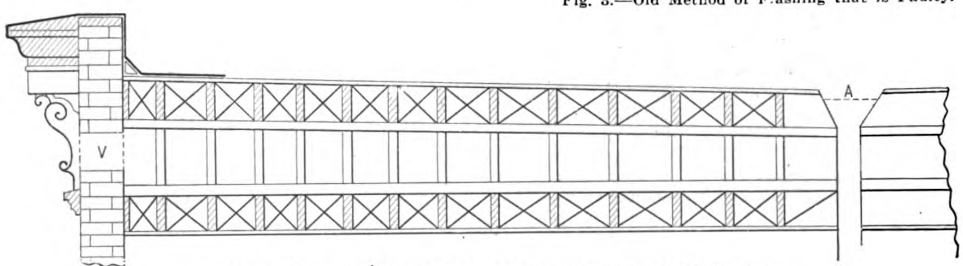


Fig. 2.—Sectional View of Ventilated Roof, Showing Inside Conductor.

Felt and Gravel Roofing.

WE have received a copy of the third annual volume issued by the Ontario Association of Architects and containing the proceedings of their annual meeting in January at Toronto. In addition to topics discussed at that time, there is given a register of the association for 1903, including officers, council, presidents, committees and boards, as well as list of members in good standing. One of the interesting features of the volume is a lecture delivered by W. A. Langton before the Central Ontario School of Art, on the subject of city planning. This is followed by a chapter descriptive of materials, methods, tools and trade definitions used in plastering, prepared by W. J. Hynes, on behalf of the Plasterers' Section of the Toronto Builders' Exchange. The object of the author was to assist in bringing into use specifications that shall be more nearly uniform than those heretofore employed. It is probable we may publish extracts from this at some future time. The volume of proceedings was compiled from the minutes, the Editing Committee being W. A. Langton and C. H. C. Wright.

The Weston Employees' Club.

A social movement, embodying important features of originality and launched under favorable auspices, has recently been inaugurated among the employees of the Weston Electrical Instrument Company at Waverly Park, N. J. One of the features which marks this enterprise and distinguishes it from similar efforts is the perfect freedom granted to the men by their employers, as the men are to manage and operate the entire affair themselves. In constructing their new works at Waverly Park the company planned one of the large buildings with a view to providing quarters for the proposed Employees' Club. At present the quarters occupy two floors of the building, the latter being so designed that as the social work grows additional room can be placed at the disposal of the men. The rooms and fittings have been turned over to the men, and their organization is now being completed for the purpose of carrying out the work in a systematic and businesslike manner.

The club rooms occupy the first and second floors of a building which is about 200 feet long and 38 feet wide, together with the second floor of a wing extending at right angles and making the entire length of the second floor about 387 feet. This floor is to be used as a dining room, and has a polished maple floor with fire proof wood fittings and ceilings, with tasteful decorations. There will also be two smaller dining rooms partitioned off from the larger one, for the use of the working staff, so that in this way the members of the company and heads of departments will gather in one room, while the other employees will be allowed to dine by themselves, free from any embarrassment which might exist if their employers or department heads were present. The main dining hall contains 40 polished cherry top tables, each of a size to seat eight persons. The 300 chairs are numbered to correspond to numbers given the individuals, each person being assigned to a certain seat. The company have presented the club with a complete equipment of silver plated ware of special design and table ware sufficient for the service of 300 diners. Each piece is marked with the monogram of the club. Adjoining the dining room is a well appointed modern kitchen with ranges, boilers, steam tables and other appliances requisite for the preparation of an elaborate meal on a large scale. Below the kitchen, which contains a refrigerator equipped with refrigerating coils, is a large ice machine and refrigerating plant.

Perhaps one of the most interesting features in connection with this club is the swimming pool, which is one of the largest in the country. The main floor of the building is depressed somewhat below the ground level and is devoted to the bathing facilities of the establishment. The swimming pool is 150 feet long, about 20 feet wide and the bottom is sloping, from 4 feet at one end to 8 feet at the other. This entire room and the pool are built of tiling, marble and cement, so that it can be subjected to a thorough flushing by means of hose. The swimming tank is so arranged that its contents can be used for fighting fire, if necessary. In other words, the storage tank, which would otherwise have been placed on the top of the building, is used to advantage as a swimming tank. On one side of the room is a long row of individual bathrooms, containing porcelain tubs and shower baths, these being intended for use by the men before taking a plunge in the pool. Another room in the building is devoted to the regular wash rooms and lavatories for the employees, and adjoining is a locker room equipped with metal lockers.

A complete technical library is to be provided on the second floor of the building, together with a reading room containing all of the latest periodicals. While the work is still in its infancy, every means is afforded for making it one of the most successful movements of the kind ever attempted in the country. The ideas embodied in the construction of the building are the result of elaborate study and preparation, considerable time and money having been expended in investigating similar projects in other sections of the country.

The C. M. Schwab Industrial School.

The C. M. Schwab Free Industrial School, at Homestead, Pa., was formally opened on Saturday, May 16, by C. M. Schwab, president of the United States Steel Corporation, in the presence of a large concourse of distinguished guests and residents of Homestead. All business was suspended in the town in honor of the occasion. The C. M. Schwab Free Industrial School is housed in a building 62 x 98 feet in area and three stories high, with basement and attic. The floors are all of concrete and the building is absolutely fire proof. Electric power is used everywhere for the lighting plant, power plant and ventilating system. The equipment of the school includes a dozen forges in the blacksmith shop, a full line of wood and iron working tools and machines, chemical and electrical laboratories, facilities for teaching drawing, wood carving and modeling, wood turning and pattern making. A large lecture room is provided, where the instructors of the various classes will give instruction in the theory of the various trades, and a capacious auditorium with a seating capacity of 700. The school is for both boys and girls, and special facilities are given for the teaching of cooking and house work, besides the ordinary educational subjects. The completed building and equipment has cost $125,000, and Mr. Schwab has arranged for an endowment which will secure the permanent maintenance of the institution.

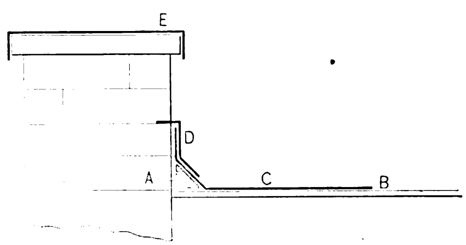


Fig. 4.—An Improved Method of Flashing.

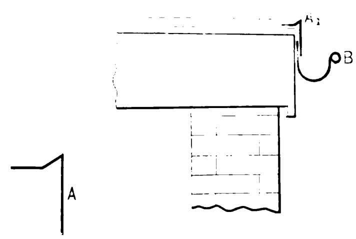


Fig. 5.—Connecting Eave Trough.

Felt and Gravel Roofing.

An Historic Mansion.

The manor house of the old and distinguished family of Van Cortlandt, situated in one of the suburbs of New York City, and now owned by the Society of Colonial Dames of New York, is an excellent example of the Dutch Colonial style of architecture. It was constructed over a century and a half ago and has sheltered many men of national prominence in the early days of the Republic. In the July *Delineator* Miss Alice M. Kellogg describes this old structure, and fine illustrations of both interior and exterior add to the suggestiveness of the article.

PLANNING A KITCHEN.

SOME months ago we presented in these columns plans of what might be termed model kitchens, considering them from the standpoint of domestic convenience and utility. The matter was prepared by Nina C. Kinney for the *American Kitchen Magazine*, and in a recent issue of that periodical we find two more schemes of kitchen arrangement which cannot fail to prove interesting to many of our readers. It is a well-known fact that the kitchen does not always receive the attention on the part of the architect, especially in houses of moderate cost, that its importance would seem to warrant, and the plans which are given herewith are therefore likely to embody suggestions for those desirous of closely approximating the requirements of what the housewife would regard as a model arrangement. With a small family a kitchen without a pantry is all very well, especially if the building cost and the cost of steps for the kitchen worker crowd the space in and the pantry out, and if the housekeeper can keep rigorously within pantryless kitchen limits as to what she will have, and as to what she will attempt to do; but where is the true housewife who does not, down in her heart, hanker after a roomy, airy pantry? What delightful memories and enticing anticipations does the very word call up? Pantry and store room add to the housekeeper's confidence, and give a comfortable feeling of preparedness, of being ready for emergencies, that dwells not with the woman not so equipped.

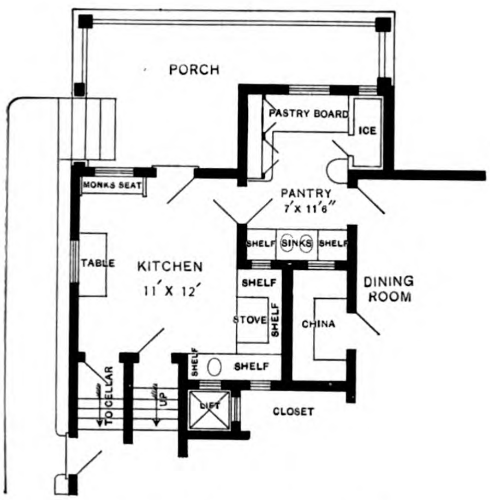


Fig. 1.—Kitchen of Moderate Size.

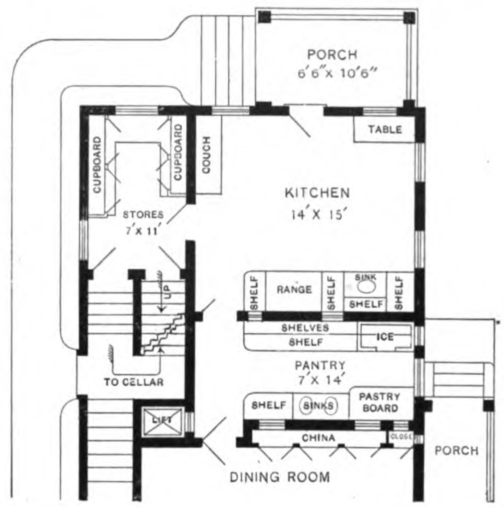


Fig. 2.—A More Liberal Arrangement.

Planning a Kitchen.—Two Schemes of Arrangement.

Pantries mean quiet working space, and store rooms mean possibilities for the economical buying of supplies, both as to the money cost and the time cost, for the daily visits of the grocer's wagon cost daily time in the ordering and in the receiving; moreover, true economical buying for a large family can be practised only where one has means to buy and room to store the staple supplies in quantity. One may then take legitimate advantage of market fluctuation and buy when the price is down. My grandmother used to say, "It is impossible for the poor to practise a fine economy because they are obliged to buy as the demand comes, or, 'from hand to mouth.'" This limit in means makes of no avail the planning ahead —the thoughtful prevision, where much of the real skill and generalship of the housewife flourishes and finds field for exercise.

In both these kitchens the details of the pastry corners and of the sinks are very similar to those described in the former paper.

The kitchen, of which the plan is shown in Fig. 1, may be entered from any one of four doors—the basement door, the stairway door, the dining-room door through the pantry, or the porch door. Let us go down the stair and enter by the stairway door. The stairway is well lighted from above by two large windows on the landing; but to insure against a possible dark hole at the foot on cloudy days, the door into the kitchen has a large glass panel. As you swing this door open the kitchen lies fair and clear before you. The porch door opposite is stretched wide against the wall space into which it just fits. The sunshine falls in flickering, shifting splashes on the porch floor. Some loose sprays of honeysuckle and rose vine swing in the fragrant breeze which reaches you as you stand in the stair doorway, and you cannot help thinking what an airy, dainty, fragrant spot it is. The monk's seat back is down, and the cushions in clean washed covers look inviting even to one who is not weary. An easy rocking chair stands between the monk's seat and table. Under the table is a low stand with raised edges, a lower shelf, and four large rubber casters. This small piece of furniture stands ready to run its swift and silent errands at your touch, a solid wooden chair stands at this end of the table, and here at the left is the door leading to the basement entrance and to the laundry, the fruit, vegetable and furnace rooms. Here at the right of our entrance is the gas range, almost surrounded by shelves and flanked at the right by the kitchen sink. All these shelves are neatly covered with zinc—the zinc running up to two inches on all joining wall spaces. The sink shelf is wood enameled or of rubber tiling. A high shelf, within easy reach, runs around this range and sink nook, and upon this shelf, and on hooks beneath it, repose and hang all the pots, pans, kettles and other cooking utensils. All the wall space in this nook above the zinc is enameled in white. The ceiling is hooded, and looking up you can see in the apex of the cone-shaped ceiling of the hood the 6-inch hole, which is the entrance to the flue to carry off cooking heat and fumes. If necessary to insure a draft a small gas burner might be placed at the opening of this ventilating flue.

At times it is convenient in any kitchen to have three tables. The abundant sink and range shelving here supplies the place of one table, the monk's seat supplies a second at need, and there is always the large stationary table at the other window, with the errand stand waiting beneath. Just beyond the range nook is the pantry door. Here we have the china sinks, the icebox, which is filled from the porch, cupboards, shelves and the pastry board, which is a glass slab. Here in the pantry are kept all the baking supplies and utensils.

In Plan Fig. 2 both kitchen and pantry are on a somewhat larger scale, and there is added a comfortable storeroom for staple supplies. In the pantry there is a cold closet between the pastry table and the dining room. It has a window opening its whole hight outdoors. This closet is a great convenience in cool or cold weather for placing cold desserts, cream and butter on the way to the dining table, awaiting time of serving. The pastry table is, of course, a glass or marble slab. The icebox is filled from the walk outside. In the kitchen the range and its shelves are not in a nook but out in the open.

There is a space in this kitchen for a long couch, a rocking chair, another chair, and the convenient, big castered errand stand. A simple wall desk or a monk's seat, which makes a convenient extra table, might be placed between the two windows.

While this kitchen is not so cozy as the other, it is far more practicable for a large family. Its mistress might stand in the center of its airy space on a warm day and catch the cool north breeze through the side window to her storeroom, where she knows the sure bases for supplying almost any household need lie carefully stored. She may listen to the house wrens over their houskeeping in the porch eaves, and through the open south windows she may get the breath of flowers. In times of heavy strain she may find the needed few moments' relaxation on its broad couch, and she may calmly stand in her roomy pantry combining and arranging her daintiest dainties, her icebox in reach behind her on one side, and her oven, beyond the sliding doors, on the other; from outside her open window come the songs of birds, while the blossoming vines flutter between her and the sky.

Estimating for Stone Work.

A contractor should expect that the estimator is able to produce an estimate which shall represent the net cost of production, and should understand that this estimate is governed solely by the cost of getting the work out in his own shop, whether it be higher or lower than that which may be expected from the shop of his competitors, as it is obvious that any difference in the cost of production in his shop, as compared with that of his competitors, is chargeable to the methods of operation in vogue in the shop, the degree of difficulty in working the material, as well as to the means of handling work which may be at the disposal of those charged with the conduct of operations—this under the assumption that his competitors, as well as himself, work along the lines indicated herein, according to a correct system. Insomuch as the contractor fails to observe these principles, says *Stone*, he is justly blamable for losses which may accrue from a failure to do so, always implying that all other requirements for the production of a correct estimate are not wanting in his shop.

An estimator should first of all be a practical man; and the more practical he is as a stone cutter, the more extensive his knowledge of the stone to be figured, and the working of it, the more valuable he is as estimator. In fact, outside of simple, plain figuring, without practical knowledge which comes from the use of the tools and observation in the shop, and at the building, no person can honestly lay claim to being capable of producing an estimate which can be considered safe in any particular. Then the estimator must, as a prime requisite, be prepared to figure correctly from such units of value as may be gathered from the shop records, but he must also be ready and able, by reason of previous experience in a practical sense, to determine the values of such intricate or new work to which the shop records have no reference; for it is evident that only a man who is qualified through practical experience and trained observation is able to ascertain the value of such work safely.

Another qualification of the estimator is his ability to read drawings. And he is still better qualified if he is skilled in the making of all kinds of drawings which are to be found within his sphere of duty; because he is thus able to see with the draftsman's eye and discover, accordingly, much that is necessary to the proper discharge of his duties, and which, otherwise, would escape his notice. The more thorough the estimator is as a draftsman, the more thorough he is as an estimator.

Next to the estimator's ability as draftsman comes the mathematical qualification, which, in general, is simply arithmetical, although there are moments when he can advantageously use his knowledge of practical, descriptive and rational geometry, as well as plane trigonometry. This is so obvious a necessity that it is simply mentioned here as a qualification, and dismissed from further consideration; but the last and very important requirement of the estimator, outside of "taking off quantity," which is understood to come within the bounds of draftsmanship, is the preparation of the "quantities" for estimate. This presupposes that the estimator is well versed in the science of construction as applied to buildings, &c., that he understands from the drawings and specifications where to expect and look for all stone work in connection with the contract, whether it is a "girder block" hidden away in the brick backing, or stone work plainly shown on the elevations, plans, &c.; that he understands how the stone work butts against the different materials, whether they be iron, brick, wood, &c.; and, in general, that he understands from the requirements of the drawings and specifications exactly how the stone work should be cut and set in the wall; for then, and then only, will he be prepared to say fully how much stock shall be used in the execution of the contract, and how much labor must be involved. This being settled, we will consider the preparation of the quantities for estimating purposes.

In arranging the quantities for estimating, it should be determined upon, at the outset, that all similar stones shall be grouped; that is, all of the same size, profile, and finish should be written in a column together, with the three dimensions and cubes, so that the calculations may be simplified as much as possible, on the principle that simplicity in this respect means speed and safety. Next in order is the arrangement of those pieces which cannot be classified as similar. Having listed in this way all the stone in the building, the cubes should be brought out and added, in order to determine the amount of stock, and the cost of freight and handling. Before doing so, however, the estimator would do well to scan closely the specifications, and read them all through carefully, and ascertain whether some particular stones are hidden away, which are not shown on the drawings. The next step for the estimator is to determine the labor and to find the net cost, all as has been indicated herein.

The next to be considered is the superintendent of the shop, and, perhaps, the quarries. It can be truthfully said that in him should be found all the qualifications of the estimator. His duties as superintendent require of him, if not at one time at another, all the qualifications already described, and he should, in a well regulated establishment, be charged with the preparation of the estimates; as it is obvious, unless a check be contemplated on the figuring, that he is in a position, with reference to all that which enters into the cost, to render the best service available.

It will become apparent to the contractors that it is of paramount necessity for the success of their business that they should, first, systematize it so far as it relates to the work; and, secondly, having secured the services of those well qualified to direct the work, there should be no difficulty in avoiding the financial pitfalls into which so many contractors have plunged unwittingly, and which can be easily guarded against when seen.

THE ARMOUR INSTITUTE OF TECHNOLOGY, Chicago, Ill., have issued an illustrated pamphlet announcing that in response to urgent requests from architects, contractors and insurance companies, they will offer a four years' course in fire protection engineering, which will be inaugurated at the opening of the college year, September 21, 1903, under the direction of Prof. Fitzhugh Taylor, formerly engineer of the Underwriters' Laboratories. A special feature of the course will be a series of lectures by prominent architects, contractors and insurance officials upon the practical features of their work.

Glass Shutters for Lighting an Office Building

A most striking example of the monetary value of light is found in connection with the scheme to be inaugurated on the south face of the Commercial Cable Building, which extends through from Broad to New streets, in this city. Adjoining this structure the Blair Building is being completed, both skyscrapers rising to a hight of 20 stories, with a space of about 1 foot intervening between the two above the fifteenth story. Before the Blair Building was put up negotiations were conducted with a view to providing for an air court between the two structures, but no understanding was reached and the new building was constructed close up to that of its neighbor. The lower five stories of the Commercial Cable Building occupy the full Broad street frontage, but its architecture is such that the upper 15 stories are set back 1 foot, leaving a space of 1 foot intervening between the two structures. The Blair Building entirely shuts off the light from the southerly windows of its neighbor as far up as the sixth story and as far back as the Commercial Cable Building's regular air shaft, but the upper 15 stories obtain the benefit of such light as filters down from the roof through this 1-foot aperture. The Commercial Cable Company now intend to make the experiment of using glass transoms, or shutters, suspended from the window tops and pitched at the proper angle, with a view to increasing the light in the rooms below. This scheme is often practiced in connection with buildings where more light is desired, but it has probably never before been used to obtain light out of a "court" which is only 1 foot in width.

Buildings of Ancient Rome.

At a meeting of the Illinois Chapter of the American Institute of Architects, held in Chicago the third week in February, the principal feature of the evening was an address on the use of cement in ancient times by L. G. Hallberg, who stated that the buildings of ancient Rome were remarkable not only for their size and massiveness, but also for the use of vaults, arches and domes. Many of the vaults, he said, were formed of concrete by placing it the desired thickness upon wood centers over large and small areas. In many of the structures concrete was the principal building material and was permanently held in place by a thin facing of brick or stone.

Two courses of brick were run diagonally through piers at certain intervals, usually about three feet apart, and the rest was rough concrete, composed of stone of all sizes, from gravel to heavy boulders, and cement—not of the best—it contained gypsum, which hydrates, hence the mass was loose and was washed away by rains. A great deal of restoration has been done, making it difficult to determine what was there originally.

The walls and piers were covered with excellent mosaics, marbles and bronzes, samples of which are to be found in the ruins as well as in museums in Italy. After examining the Agrippa Pantheon, the Saint Sophia, at Constantinople, Mr. Hallberg was led to the conclusion that in his opinion the Coliseum was domed over at least the greater part of the sittings, it being open over the arena, affording an abundance of light from above. By using brick, these extraordinary spaces could be covered without the use of staging or centering, each course of masonry, when completed, being a firm part of the entire dome.

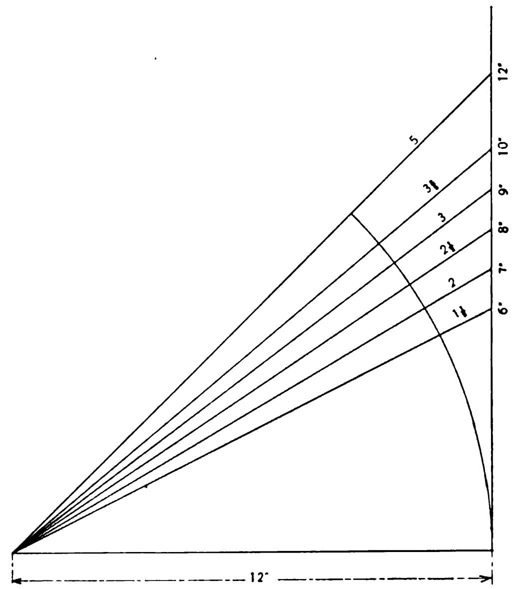
Coloring for Mortars.

Very often the builder for various reasons desires to make use of colored mortar, but is in doubt as to the exact proportions of the necessary ingredients. A writer, in a recent issue of *Headquarters*, gives the following interesting information bearing on the subject:

Mortar colors should be made from the best metallic oxides, free from sulphur. Never use Venetian red or lamp black, as they run and fade, and soften the mortar. Excelsior carbon black is the strongest black known. Mix the following colors with either prepared lime flour or stainless Portland cement mortar to obtain excellent results: Black, 2 per cent., excelsior carbon black; red, 10 per cent., best raw iron oxide; brown, 6 per cent., best roasted iron oxide; buff, 10 per cent., best ochre; blue, 6 per cent., ultramarine; white, marble dust or white silica sand.

Calculating Number of Squares in a Roof.

The following method of calculating the number of squares in a roof is submitted for the information of the readers, says I. N. Phillips in a recent issue of *The Metal Worker*, in the belief that it will be found to possess some advantages over the method of getting the length of the rafter and multiplying by the middle length of each section, in that it saves time occupied in poring over drawings when there may be others waiting for them. It also reduces the chances of making mistakes, where two or three are using the drawings at the same time. As a general thing, in residences having steep or Queen Anne roofs, the pitch is uniform, except on towers, and varies from 6 inches in 12 inches for quarter pitch, to 12 inches in 12 inches for half pitch. A favorite pitch in this section is 10 inches in 12 inches. Instead of measuring each section of roof plan separately and adding them up, an easier method is to measure the roof plan flat, as if it were to be covered like a floor. Say that this amounts to 3000 square feet. Have at hand a diagram, like the accompanying sketch, which shows different pitched roofs, from 6 in 12 to 12 in 12. Divide the 3000 by 12, the length of the flat line, and multiply the quotient by 5, add the result to the 3000. The calculation will be as follows:



Calculating Number of Squares in a Roof.—Diagram.—Scale, 3 Inches to the Foot.

12 | 3,000 | 250
24   5
60   1,250
60   3,000
0   4,250 square feet in roof.

The correctness of this method can be proved by assuming a plain roof, 40 x 75 feet in the plan, which is 3000 square feet flat. With a roof 12 x 12 inches pitch, with ridge through the middle, the rafter is 56.7 feet over from eave to eave, as near as can be measured with a rule, which, multiplied by 75, gives 4252.5 square feet.

My method is correct, so long as the pitch is uniform. It is also quite simple. The multiplier 5 is what is left after the 12 inches is taken from the pitch line. If the pitch were 9 inches in 12 inches, the multiplier would be 3, as shown. Now, while the multiplier 3 is absolutely correct, 5 is a fraction too large, which can be demonstrated by the well known principle in geometry—viz., the square of the base added to the square of the perpendicular equals the square of the hypothenuse. But that is as near as can be measured on an ordinary rule, and it does not affect the correctness of the method. I mention this for the fellow who can see a fly on a church spire 1 mile off. If he wants to be excruciatingly exact, he can extract the square root of his multiplier, but the average Rosinhead knows very little about square root —and cares less.

Market for Roofing Material in Mexico.

There would be a good market in Mexico, if it were properly cultivated, for all kinds of roofing material, says a correspondent of *The Iron Age*, writing from Durango. With the exception of the modern buildings in two or three of the largest cities, leaky roofs are the rule. There are comparatively few houses in this city whose roofs would withstand a 12-hour downpour in the rainy season and afford no evidence of water dripping down the walls inside the living rooms. Roofs are generally constructed over adobe buildings in a very defective way. Common "shakes" are laid across huge roof beams, or "vigas," making a flat covering, upon which is laid earth from 1 to 3 feet deep. This earth is capped with small earthen tiles. No patent roofing material of any kind is used to make the roof water tight. Between the seams of the tiles the heavy rains soon find a way, softening the earth and rotting the "shakes." After heavy rains, not infrequently half a wheelbarrow load of the earth covering falls within the rooms beneath with the proverbial "dull thud" of journalistic usage. Terne plate, galvanized and corrugated roofing, as well as roofing felt and the other patent materials common in the United States ought to find a market here if pushed in a systematic way and recommended by architects. The costly new opera house in this city has been roofed by a St. Louis firm who obtained the contract for the cornice work, roofing and the interior metal ceiling. The work has been in hand for a year, and it will soon be completed. It ought to prove a good advertisement for tin roofing in this district and induce builders of the better class of houses, at least, to improve upon the defective system now in vogue. It is suggested that manufacturers of the cheaper kinds of roofing materials open up correspondence with supply houses in the principal cities of Mexico with a view to the introduction and sale of their specialties. If descriptive reading matter is sent out it should, of course, be in the Spanish language.

The Fire Proofing of Wood.

After an exhaustive series of experiments, extending over several years, with a wide range of compounds, it is stated in an exchange that Joseph L. Ferrell has found in sulphate of aluminum a compound that appears to answer all the practical requirements. It has the additional feature, of no slight importance in its bearing upon the fire proofing effect, that when strongly heated it leaves an infusible and nonconducting residue to cover and protect the cellular structure throughout the wood. It absolutely prevents the propagation not only of flame throughout the wood, but even of a glow, because of its nonconducting and unalterable character. Sulphate of aluminum, in concentrated solution, is far more efficient than an alum solution; as if the alkaline sulphate of the alum simply detracted from the power of the aluminum sulphate in the matter of making wood fire resistant.

Sulphate or phosphate of ammonia acts to make wood fire resistant by rapidly liberating ammonia gas, which has the effect of checking the flames on the surface of the wood. The fiercer the flame which plays against such wood the more rapid the liberation and exhaustion of the protecting vapor. There is no residual protective substance remaining in the wood, and the carbonization of the fiber proceeds apace. On the other hand, so soon as the sulphate of aluminum of the superficial layer of the wood impregnated with this chemical is decomposed by the heat of a flame a deposit of aluminum is formed, the nonconducting properties of which make it a barrier against the propagation of the carbonizing effect and protect the interior in a very notable degree.

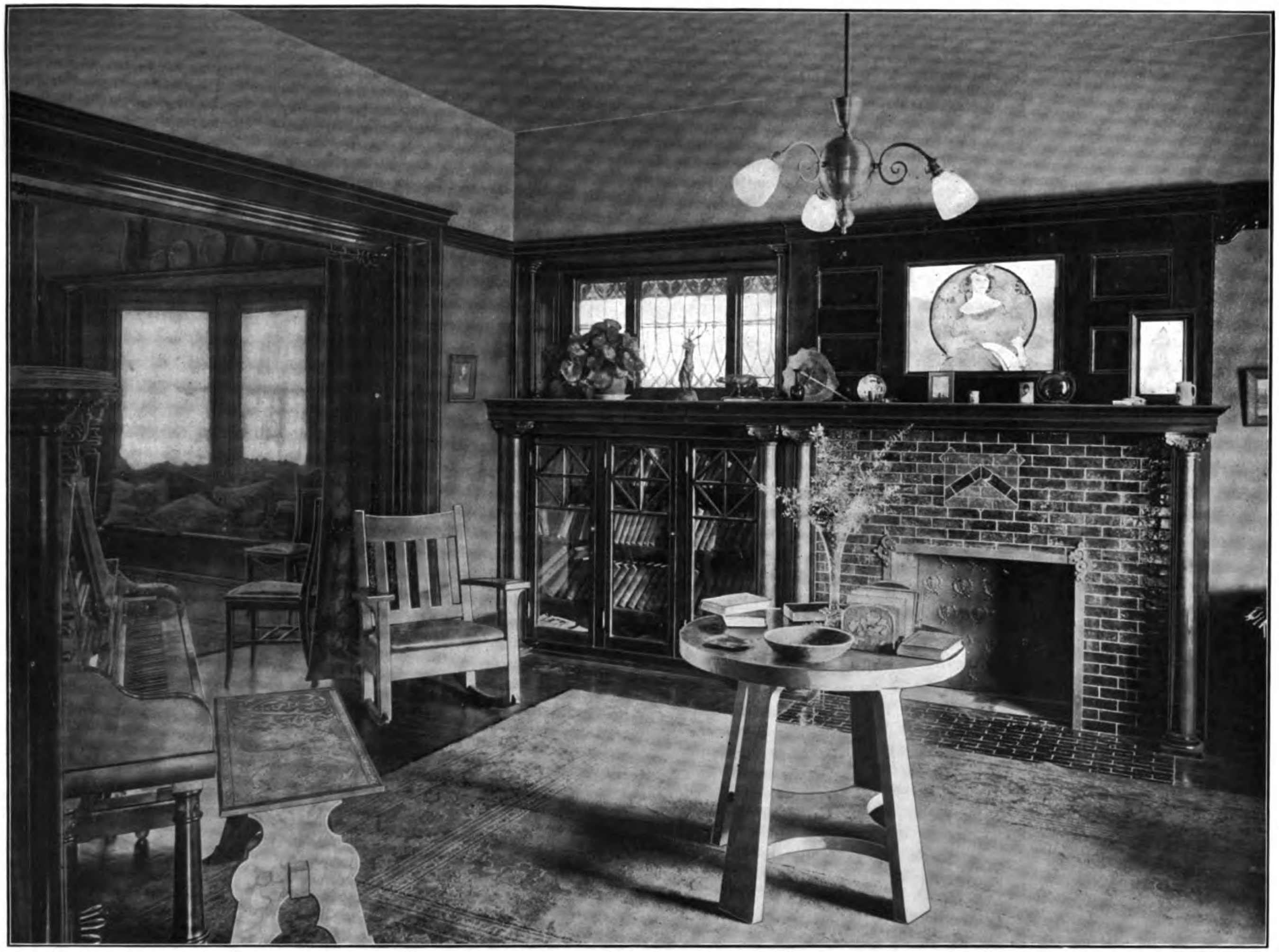
Easy Lessons in Roof Measurements.

The David Williams Company, 232 to 238 William street, New York, have issued in book form 12 short lessons on figuring, from architects' or scale drawings, the amount of material required to cover a given surface in flat, hip or irregular shaped roofs. The matter here presented was written by William Neubecker, and appeared originally in the columns of *The Metal Worker* and of *Carpentry and Building*. It is issued in this convenient shape to meet the wishes of those who desire to have the information in book form. It is profusely illustrated. The price of the book is 25 cents per copy.

Veneered Construction.

An architect was submitting plans of a building to a committee not long ago, and one of the committeemen, an idealist, who had led a sheltered life and whose motive was truth, said: "Mr. Architect, there is one thing I want to insist upon, and that is that there must be nothing veneered about this building." "My dear sir," said the architect, "it will all be veneered. The outside will be veneered with brick, the inside will be veneered with plaster, the woodwork will be veneered with paint and varnish, the roof will be veneered with copper, and the yard will be veneered with grass. All buildings are veneered with something. The building may be of stone or terra cotta and brick, or concrete and wood, but if it is architecture it is veneered." The plans were accepted.

CONTENTS.



VIEW IN LIBRARY IN RESIDENCE OF MRS. E. D. GARRETT, ON OAKWOOD AVENUE, WEBSTER GROVES, MO.

A. BLAIR RIDINGTON, ARCHITECT.

COLONIAL RESIDENCE OF MRS. E. D. GARRETT, ON OAKWOOD AVENUE, WEBSTER PARK, WEBSTER GROVES, MO.

A. BLAIR RIDINGTON, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, JULY, 1903.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

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

AUGUST, 1903.

A Handsome Apartment House.

One of the most costly among the recent apartment houses in New York City is that now in process of erection on a site facing Riverside Drive, and having a frontage of 100 feet on Seventy-second street and the same on Seventy-first street, with a depth of 200 feet. The plans, which have been prepared by Architect J. E. Scharsmith, call for a structure that will cost in the neighborhood of $1,100,000. Taking the value of the land into consideration, the enterprise will involve an expenditure of something like one and a half millions of dollars. The building, or family hotel, as it may be designated, will be of the modern French Renaissance style, 12 stories in hight, and will contain 84 suites of rooms or apartments. There will be only one entrance to the building, and that on Seventy-second street, leading into a vestibule about 16 feet square, out of which will open a corridor 44 feet wide and 64 feet long, upon which seven elevators will face. The front of the building will be of granite up to the second story, while above that will be limestone and terra cotta. The apartments facing on Seventy-second street are to have doors on reversible hinges so that they may be folded up like a fan, thus permitting of three rooms being thrown into one, measuring 23 x 65 feet. At the westerly side of the Seventy-first street frontage will be a driveway entrance 10 feet wide for the wagons of tradesmen, the driveway leading into a court 40 feet long and 30 feet wide. The building will be fire proof throughout, and will be equipped with every modern convenience and appliance to be found in the most costly structures of the kind. By an ingenious device hot water and cold salt water will be available to the occupants of the building, the water main being run out into the Hudson River a distance of 1000 feet.

Apprenticeship in the Plumbing Trade.

The report of the Apprenticeship Committee of the National Association of Master Plumbers, presented at the recent convention held in San Francisco, together with the discussion which followed it, make unusually interesting reading. The fact that the report was adopted by the convention stamps its recommendations as the official policy of the Master Plumbers' Association. The position taken is absolutely correct. For too long the journeymen plumbers' unions have been permitted to restrict the admission of young men into the plumbing trade, for the avowed purpose of preventing a surplus of skilled workmen and maintaining a high rate of wages, until at the present time, when business is active throughout the country, a scarcity of journeymen plumbers exists in many sections and the master plumbers are hampered in the fulfillment of important contracts by lack of sufficient help. This is the experience of employers of skilled labor just now in many cases in which restrictions on the number of apprentices are enforced by the unions. In the plumbing trade, for example, it is very evident that no excess of skilled workmen exists, and yet the unions insist in demanding not only that their former limit of apprentices shall be maintained, but in many cases are even calling for a further limitation. It is to be hoped that the members of the National Association of Master Plumbers will consistently follow up their declared policy in regard to apprentices. It is not right that obstacles should be put in the way of any American boy who desires to enter a mechanical trade, whether it be that of a plumber, carpenter, stone mason, or any other craft.

The Trade School Movement.

The indorsement given to the trade school movement by the Master Plumbers is also a gratifying sign. The trade school offers the best solution of the problem of training young men in the mechanical arts. So far as the plumbing trade goes the system of apprenticeship is virtually a dead letter to-day. Employers and foreman are too busy to take time to give the proper instruction to apprentices, and therefore they are forced to pick up their trade as best they can. The trade school, on the other hand, gives the youthful mechanic a valuable insight into both the practical and the theoretical sides of the trade and turns him out as a helper with a good groundwork of information, which enables him to quickly secure the skill and knowledge of the trade only to be had by practical experience in the shop. We venture to say that in spite of the hostility of many labor unions to the trade school, that institution is bound to take the ascendency and to become the ruling method of trade training in the United States, as it is already in some of the European countries. We congratulate the Master Plumbers' Association upon the public stand they have taken in the matter, and trust that their employers in other trades, where similar difficulties in regard to the limitation of apprenticeship exist, will follow suit. This is the only way in which the matter of securing an adequate supply of trained workmen can be brought about and the right of learning a trade be secured to the American boy.

Half Year's Business Failures.

The statistics of commercial mortality for the six months ended June 30, 1903, given in *Dun's Review*, show business failures amounting to 5628 in number, with $66,797,260 of defaulted liabilities, compared with 6165 bankruptcies for the same period last year, when the defaulted indebtedness amounted to $60,374,856. While the decrease in number is about 9 per cent., the sum involved increased in similar percentage. This was due to several large failures which occurred in the past six months. In view of the business conditions prevailing in the first half of the present year, these statistics are regarded as gratifying, for while no great crisis menaced the business of the country, there were a number of occurrences of a disturbing character which tended to produce extreme conservatism. Doubtless this very caution is responsible for the comparatively light insolvency returns. Disasters due to the elements were more numerous than usual, floods, tornadoes, fire and drought having caused havoc and loss in many parts of the country. Labor troubles, too, were numerous, reducing the purchasing power of an immense number of wage earners, and thereby curtailing the consumption of many products outside of the bare necessaries of life. Of the 5628 business failures embraced in the half yearly record 1280 were in manufacturing, with total liabilities of $26,135,144, a decrease of 138 failures and an increase of $1,200,000 in the liabilities, as compared with last year. Traders are credited with 4038 insolvencies, as against 4410 a year ago, and the liabilities in this branch were $30,544,443, against $29,145,622. In so far as failure statistics are a gauge of the country's business situation, it would seem that there is warrant for confidence in the future, especially in view of the fact that the June liabilities of failed concerns were much smaller than those of any earlier month of 1903.

New Building for the "New York Times."

The building which will occupy the triangular plot bounded by Broadway, Seventh avenue, Forty-second and Forty-third streets, New York City, will embody many interesting features in its construction and internal arrangement. It is to be the home of the New York *Times*, and as the subway will run directly under a portion of it, the structural problem of erecting a modern office building bestriding a railroad right of way 50 feet wide was complicated with the problem of carrying the foundations of the building 30 feet below the level of the tracks. The subway takes about one-third of the plot at a level 22 feet below that of the street, and the area remaining at this level and for 10 feet below it, the depth occupied by the structure supporting the tracks, was quite inadequate for the uses of the *Times*. It was necessary, therefore, to excavate and occupy a still lower level with a basement having a head room of 20 feet. The floor of the *Times* pressrooms will be 55 feet below the street level, or the hight of more than four full stories, although the actual division is into three. The building will be of steel skeleton frame construction, with a light granite for the basement and terra cotta for the superstructure. The main portion will be 16 stories in hight and the tower portion 22 stories. According to the plans of the architect, Cyrus L. W. Eidlitz, the first 16 stories have been designed as a general office building. The editorial department of the New York *Times* will occupy the lower stories of a tower, which will rise above the main structure on the Forty-second street half of the site. The publication office will be at the street level, the composing room on the sixteenth floor, and the press and stereotyping rooms, with the presses, in the basement. Ventilation for the lowest part of the building is provided by an inlet of fresh air through a shaft opened for the purpose, while the exhaust for foul air incloses the main chimney, which extends from the floor of bed rock to the top of the tower. If measured from the bottom of the excavation for its rock foundation the building will be the tallest steel structure in any city in this country. The structure will tower 375 feet above the sidewalk and extend 55 feet below the street level. The summit of the building will be only 17 feet lower than that of the Park Row Building, now regarded as the most lofty in the country, and will be 27 feet higher than that of the building of the Manhattan Life Insurance Company, which was practically the first skyscraper of note erected in this city.

The Building Situation in New York City.

Comparatively little progress has thus far been made in the way of resuming work in the various branches of the building trades in the city, although efforts are constantly being made to this end. Since our last issue went to press several unions have agreed to the modified plan of arbitration proposed by the Building Trades Employers' Association, which while not abolishing the business agent, provides that he cannot be an arbitrator, and at one time it looked as though work was about to be resumed all along the line. The action, however, of the United Board of Building Trades in expelling several of the unions whose representatives had signed the plan of arbitration brought into the situation a feature which has decidedly changed the aspect of affairs. It is thought that one effect of this action will be a split in the United Board of Building Trades and a new organization will be formed by the unions who are willing to abide by the plan of arbitration.

Thus far the losses entailed by the strike both to employers and workmen is estimated high in the millions. The opinion is expressed that as a result of the present situation it will be a long time before strikes or a shut down on a large scale will again occur, and that while the men will never recover the wages directly lost, yet in the future they will be the gainer by the fewer periods of enforced idleness.

The bricklayers have not yet had their grievances adjusted, and they are still holding for 70 cents per hour, which the employers have refused to grant, and have decided to continue the present rate of 65 cents per hour. Various unions among the bricklayers are to hold meetings in a day or two for the purpose of considering the matter, and if no satisfactory understanding can be reached the present shut down will be changed into a strike, at least so far as they are concerned. Altogether, the situation is greatly mixed, and time only will determine just what will be the outcome.

San Francisco's New Hospital.

The plans which have been completed for the new city and county hospital, to be constructed at San Francisco at a cost of $1,000,000, call for the structure to be built in the American Renaissance style, and to have accommodations for 600 beds.

The hospital is to consist in the main of an administration building, a laboratory with surgical amphitheaters, seven two-story ward buildings, a building for the kitchen and power and boiler plants, another for the laundry, storage room, ice plant and men's dormitory, and a building to be used as a nurses' home, a morgue and pathological laboratory and an ambulance building. The administration building will be three stories, with basement, and will be surmounted by a dome 36 feet in diameter, rising to a hight of 110 feet above the ground. On the first floor are the bureau of information, general offices, resident physician's apartments, matron's room and a dining room for the executive officers; also an examination room, with waiting and dressing rooms.

The seven ward buildings, which constitute the hospital proper, are each to be 40 feet wide by 198 feet long. The pavilions are to be placed 75 feet apart, except in the case of the two between which space is reserved for a possible future passageway to the rear group of pavilions, where 100 feet has been allowed. One of the pavilions is to be used for gynæcology, two for surgery, two for medicine, one for obstetrics and children's orthopædics, and one as a pavilion for tuberculosis and contagious diseases. The pavilions are all placed with axes north and south, and each is to have at its southern end a suitably arranged sun room. The tuberculosis and isolating pavilion will in addition have a sleeping and exposure veranda.

The nurses' home is to be a three-story building, with a basement, similar in construction and exterior treatment to the administration building. On the first floor of this building will be a lobby, reception room, parlor, library, dining room and the like, while the upper floors will serve as dormitories.

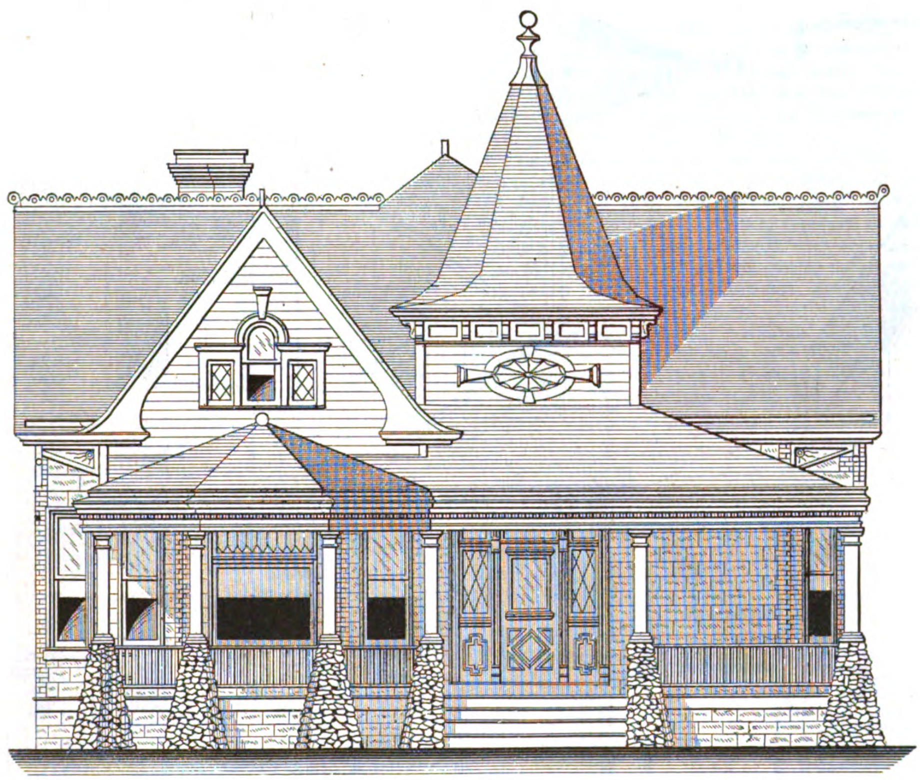
All of the principal buildings are to be interconnected by a system of covered passageways. In the mortuary and pathological building there is to be a morgue on the first floor, an autopsy room, an exposure and cold storage room, also a crematory and sterilizing apparatus. On the second floor of the building will be rooms for private research and for pathological demonstrations. In the ambulance building, or stable, there will be room for seven stalls, for a carriage room, a feed room and a harness room; also sleeping quarters for the driver and hostler and a space for the storage of hay and grain.

A possible future expansion of the hospital to a capacity of 1000 beds by the addition of more pavilions has been indicated on the plans.

A DWELLING CONSTRUCTED OF HOLLOW TILE.

ONE of the forms of construction which at the present day is attracting no little attention on the part of the building fraternity is that involving the use of hollow blocks, made either of a composition in which concrete is the important ingredient, or of vitrified brick or tile, as the case may be. The employment of this particular form of building material for the outside walls and partitions of dwelling houses and churches, as well as for buildings intended for business purposes, has been rapidly growing in favor during the past few years, more particularly, perhaps, throughout the Central and Northwestern sections of the country. Many interesting examples are to be found in Western Pennsylvania, Ohio, Wisconsin and other localities, all of which show in a most striking manner to what extent it is possible to combine molded and ornamental blocks to produce pleasantly located on Montgomery boulevard in Norwood, one of the many attractive suburbs of the city of Cincinnati, and was erected for Henry Smith after his own designs.

The frame of the house is of Southern yellow pine, with white pine for the exterior finish. The first and second floor joist are 2 x 10 inches; the ceiling joist and studding are 2 x 4 inches, all placed 16 inches on centers, while the rafters are 2 x 6 inches, placed 24 inches on centers. The joist and bearing partitions are cross bridged with 1 x 2 inch stuff, and all door and window studs are doubled, as are also the joist under the partitions. The footings for the posts in the cellar are of stone, 24 x 24 x 10 inches thick. Between the joist and flush with their tops is a filling of grouting. The outside walls from the footing to the grade line are plastered with a heavy coat of Portland cement. In the basement



Front Elevation.—Scale, 1/8 Inch to the Foot.

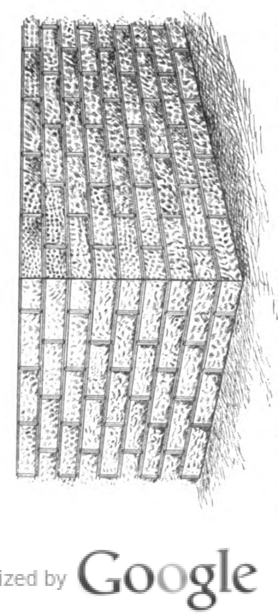
A Dwelling Constructed of Hollow Tile.—Erected for and Designed by Henry Smith of Norwood, Ohio.

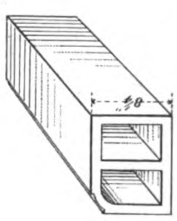
ing architectural effects. Houses built of hollow blocks are said to be much cooler in summer and warmer in winter than the ordinary construction, owing among other things to the dead air spaces in the walls, while at the same time the use of the blocks adds much to the fire resisting qualities of the building in connection with which they may be employed.

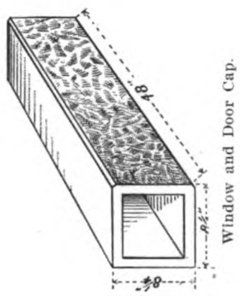
A most striking example of what can be accomplished through the use of vitrified hollow tile in cottage construction forms the basis of our supplemental plates this month, and is illustrated in detail upon the pages which immediately follow. It is a story and a half building, with the major portion of the rooms located upon the first floor, but with several finished rooms in the second story, these including the "den" of the owner, which occupies the tower near the center of the front, a sewing room, three sleeping rooms and a storeroom. The arrangement of the interior, especially the front, is somewhat unusual, as will be noticed from an inspection of the main floor plan. The dwelling here shown is pleas-

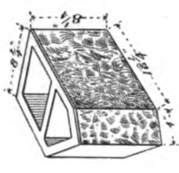
is a cement floor composed of 2 inches of cinders and 4 inches of concrete and cement, on top of which is a finishing coat made of one part Portland cement and two parts of fine sand.

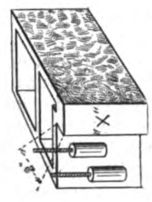
The material used for the outside walls of the first story is hollow vitrified rock faced building brick, made in blocks measuring 8¼ inches high, 10½ inches wide and 16½ inches long, each block being tested to bear the weight of 20,000 pounds and each weighing by itself about 45 pounds. A detail of these blocks is presented among the illustrations accompanying this article. The blocks are thoroughly vitrified and absolutely frost proof, and as they do not absorb any moisture whatever they make a perfectly dry wall, which is cool in summer and warm in winter. In constructing the house in question the blocks were laid in the best Portland cement, neatly pointed with blue-black mortar. Among the illustrations on page 206 is one showing the method used in laying joist at the eaves, while another on page 204 illustrates the style of corner block used for the window jambs.

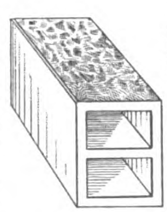

Section of Wall Made of Imitation Rock Faced Hollow Blocks.

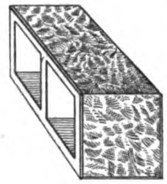

View of Hollow Tile Used for Water Table.

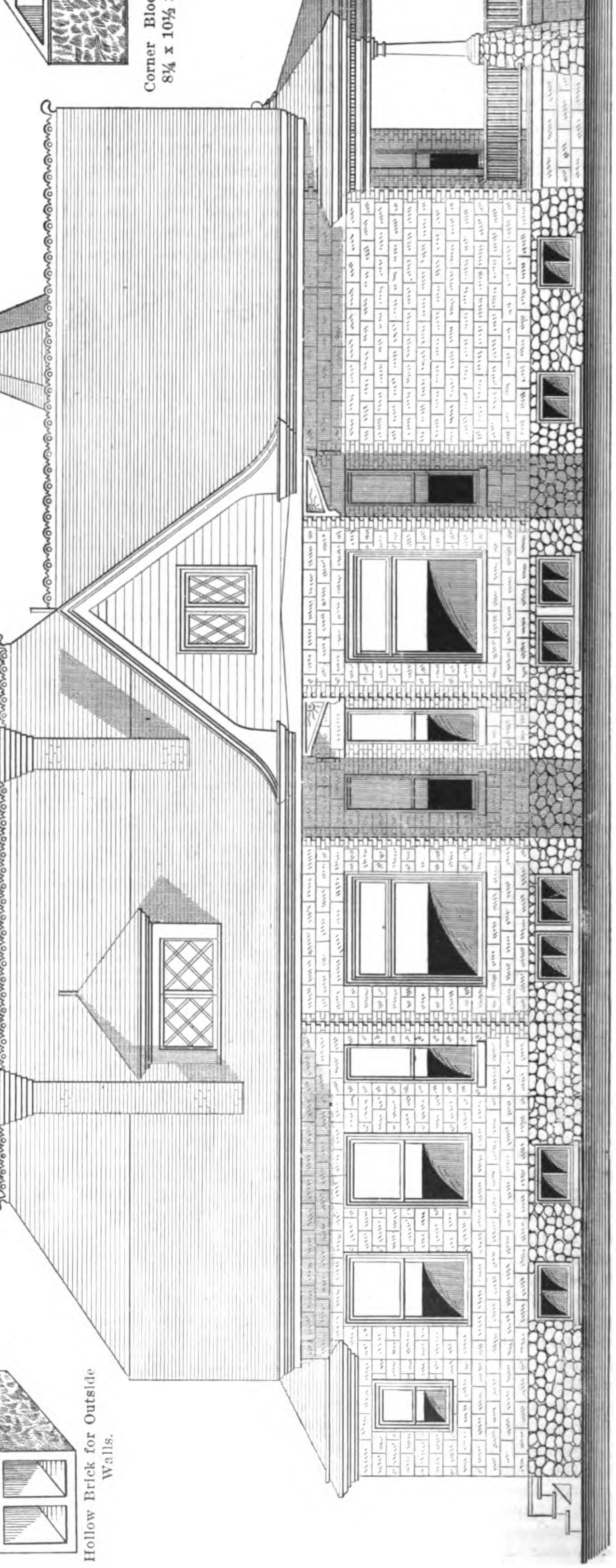

Window and Door Cap.


Block for Bay Window Corners.


Window Jamb Corners for Weights.


Hollow Brick for Outside Walls.

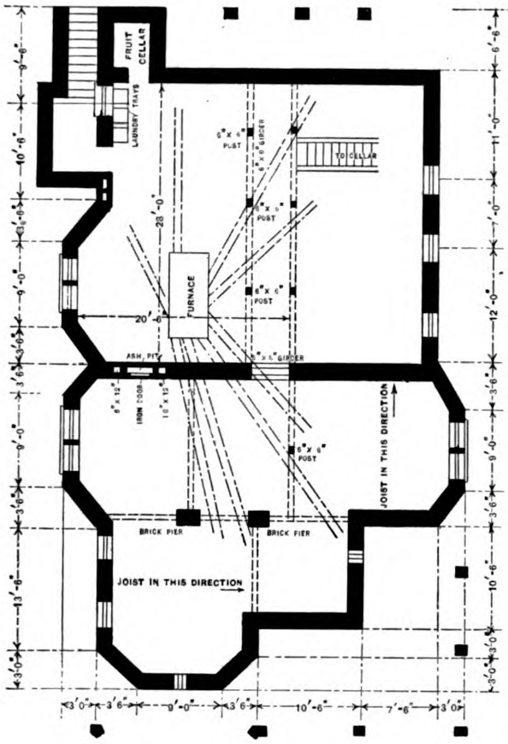

Corner Block Measuring 8¼ x 10½ x 16½ Inches.


A Dwelling Constructed of Hollow Tile.—Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

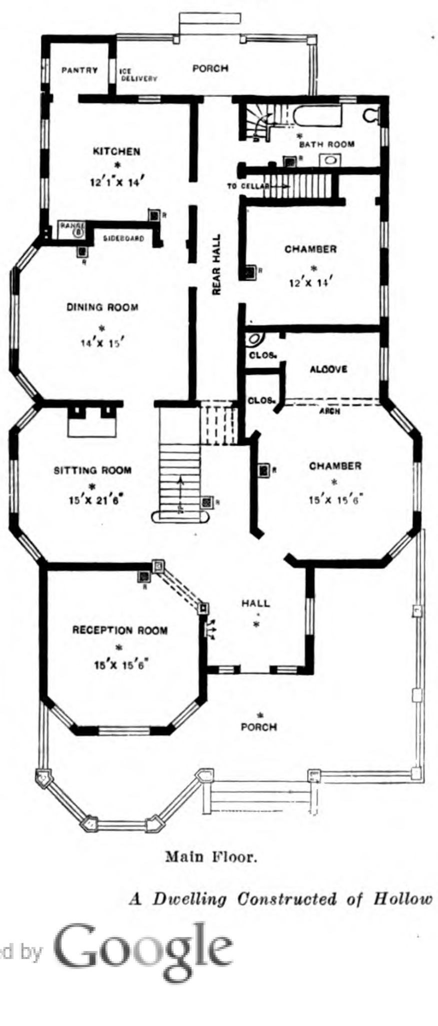
The ordinary style full box frame was used, the hanging stile of the window coming up against the face marked "X." Where the window or door caps were wider than 48 inches a series of keyed blocks were used instead of one piece. Angle blocks for the bay windows, although made for the purpose, were not used, as it was thought by the owner that a contrasting color, such as would be found in the use of dull pressed brick, would enhance the appearance of the building and at the same time serve as a neat trim; hence this material was used, as shown in the photographs. The color of this hollow brick or tile, as furnished by the Louisville Brick & Tile Company, Louisville, Ky., is a dark brown, and with the glazed surface presents a very pleasing and cleanly aspect at all times, especially after a rain.

The frame of the second story is covered with sheathing boards, over which are laid 4-inch poplar siding, with a layer of building paper between. The roof is covered with slate, laid on ⅞-inch surfaced roofing strips properly spaced. The porch has 8 x 8 inch columns with turned caps and base, the floor consisting of 1⅛ x 3 inch pine strips laid with leaded joints. The porch is ceiled with ⅞-inch white pine ceiling, not more than 4 inches wide. The plastering of the house was applied directly to the inside face of the hollow vitrified blocks or tile, thus dispensing entirely with outside siding and lath, making practically a 12-inch wall when finished. A strip of 2 x 4 was inserted near the ceiling of each room for picture molding and near the floor to serve as grounds to which to nail the base.

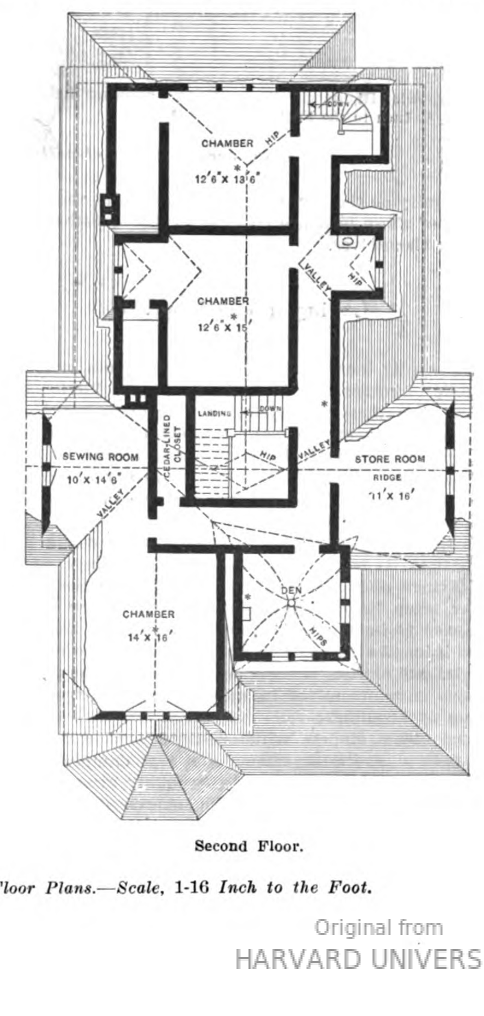
The floors of the first and second stories are of surfaced white pine and the window frames of hard pine, the sash being hung with "Silver Lake" cord and cast iron weights. The front door is of veneered quarter sawed red oak, both sides, and is glazed with bevel plate glass. The parlor, front hall, dining room, bathroom and all other trim in the house is red oak, sandpapered smooth and having a dead wax finish. The kitchen and pantry are wainscoted 3 feet high with ⅞ x 3 inch face beaded oak ceiling, with neat cap and mold. Back of the sink the wainscoting is 5 feet high. The bathroom is wainscoted 4 feet high. The transom lights over the large sash in the parlor, sitting room, dining room and front chamber



Foundation.



Main Floor.



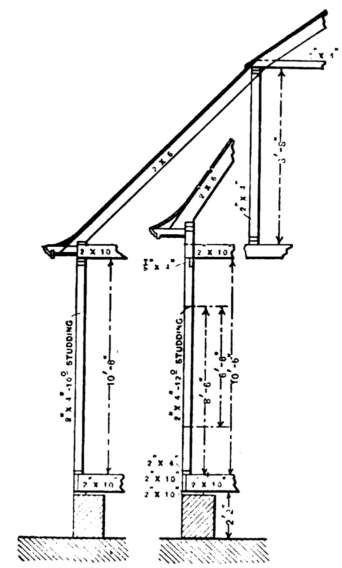
Second Floor.

A Dwelling Constructed of Hollow Tile.—Floor Plans.—Scale, 1-16 Inch to the Foot.

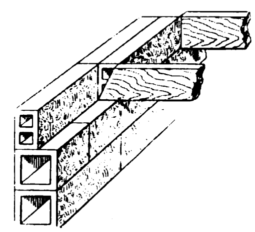
are of leaded glass. The plumbing fixtures consist of a Douglas syphon jet combination closet with antique oak panel tank; wash bowl with overflow and countersunk 1¼-inch Italian marble top and back; a roll rim porcelain iron bathtub with nickel plated fittings; a 20 x 26 inch flat rim white porcelain sink with brass bibs; a 40-gallon boiler, and a set of two-tray porcelain laundry tubs, with hot and cold water connections.

The house is piped for gas and wired for incandescent lighting, bells, signals, &c., all installed in accordance with the rules and regulations of the Board of Fire Insurance Underwriters. The exterior wood work is painted two coats of white lead mixed with boiled linseed oil and tinted to suit the owner.

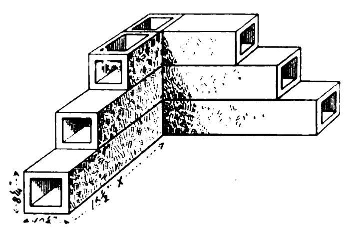
By reason of the material used in the construction of this residence, with the pleasing effects which have been produced, as well as the fact that it is the only dwelling of its kind in that locality, the building is the source of much inquiry on the part not only of architects and builders, but of those who are considering the question of a home for themselves.



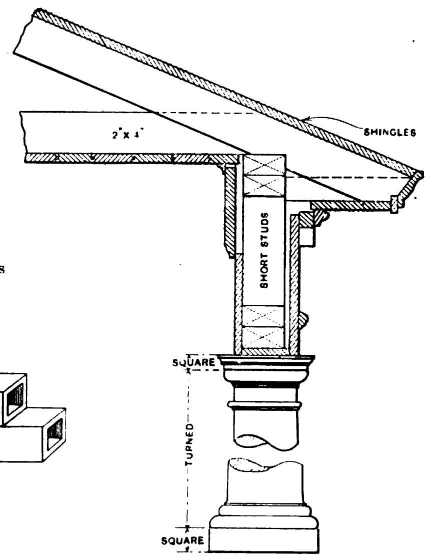
Sections Showing Hights of Ceiling.—Scale, ⅛ Inch to the Foot.



Showing Joist Construction at Eaves



Showing Right Angle Corner in a 10-Inch Wall.



Details of Porch Cornice, Column, &c.—Scale, ¾ Inch to the Foot.

Miscellaneous Details of a Dwelling Constructed of Hollow Tile.

Laying a Tile Floor.

The rapidly increasing use of tile for floors, not only in public buildings, but in bath rooms, and kitchens of private dwellings and elsewhere, renders interesting some comments on the subject indicated by the title above presented by J. E. Hyde in a recent issue of *Municipal Engineering.* What he has to say appeals so strongly to many of our readers that we take pleasure in reprinting the article herewith:

No tile floor can be laid level or lasting over a poor foundation. It is the custom, in many buildings, to use the leavings of the mason or other *débris* in the cellar, scatter some Rosendale cement over it, throw it into the space to be filled, then drown it with a hose and pound it in. As a consequence, there is no bond and the material will shift by vibrations. Sometimes the plasterers' scrapings are mixed in, and this will always cause trouble by swellings.

Good steam cinders with one-third sand mixed dry with natural hydraulic cement and just dampened and turned over several times and thoroughly rammed, will make a good foundation, care being exercised to see that all spaces are filled solid. It is customary for the mason to bring this level up to about two inches from the required finished levels. If there are any pipes to carry steam or hot water, cinders only should be used in a bed of about two inches on either side of them.

Presuming that the mason's foundation has set properly, and has not been disturbed, levels are established and a mixture of six parts sharp, clean sand to one of good Portland cement, well turned before wetting, then only dampened, and mixed thoroughly, is spread with a rake two inches thick, rolled or rammed down and scraped over with a straight edge, leaving this foundation one inch below the finished level.

This tile foundation should be laid twenty-four hours ahead of the tile setting and protected by boards for mechanics to walk upon.

Tile Setting.

If the tile are semi-vitreous they should be soaked in clean water for two hours and then drained on edge on boards for half an hour before being set in floor and should be supplied to the tiler on boards about three feet long, piled up with the top sides up and the edges flush.

Provide sufficient straight edges of white pine three-quarters of an inch thick by four inches wide, planed true on all sides, also several beating-in blocks of apple, cherry or some close-grained wood eight inches long, four wide by two thick, one side smooth. Lay a straight edge against the base board or line of same and another parallel to it about three feet distant, but the actual width of the tile border and an exact number of tiles. Lay these straight edges in lime-cement mortar, the top surfaces being the level of the finished tile floor. Behind the outside straight edge drive some long nails into the foundation to keep it in place. Take a straight piece of board six inches longer than the space between the straight edges and make a screed by cutting back on one edge about four inches from the ends and to a depth of two-thirds the thickness of the tile, so that, when the cement is spread with the flat trowel, it can be screeded off with the board, the ends working on the straight edges previously set.

Mix thoroughly three parts sharp, clean sand to one of Portland cement dry, then wet sufficiently to allow of stiff flow under flat trowel, fill in space, screed, sprinkle a little dry cement and place in the tile, scatter a little fine, white sand over the tile (we use screened sea sand in this district for this purpose) and beat in gently with wood beater by hand till tile are all placed, then use hammer on block till driven home. When home use the block like a scrubbbing brush with a rotary movement till tile are true. If water comes up over the tile the mixture was too wet. Take up a few tile and sprinkle some dry cement.

It is better to start tiling in a square corner away from supply. If the corner is not square the border may be cut a little, but architects prefer to show full width of border, in which case lay from longest straight side of room so as to have cutting on one side. Do not hammer in the tile till all the cement surface is covered with tile.

Remove straight edges, relay five feet from last finished edge after cutting cement close up to the laid tile, make new screed for this width and proceed as before, laying plank on tiled portion and working from both sides. Do not leave straight edges down over night, but clean off thoroughly and lay flat. Be sure to cut cement up close to tile. After laying first section of tile, the laid tile is used as the inside straight edge.

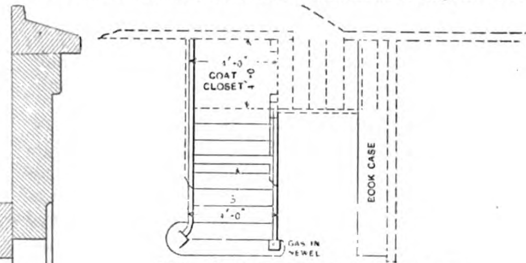
The next day sweep the tiled floor clean, mix up pure cement and water to a thick cream and spread in this grout with the edge of a short board. After two hours' set, rub clean with sawdust or excelsior and, when finished, cover with clean sawdust, if other mechanics are going on the work. One part commercial muriatic acid to ten parts of water mixed in wooden pail and applied with broom will remove Portland cement stains.

Tiles up to three inches can be laid close joint, but above that should be laid with open joint. All nickel work should be thoroughly protected with a mixture of vaseline and whiting and further protected near the floor by rags wrapped and tied. Do not remove vaseline mixture till after the acid has been used.

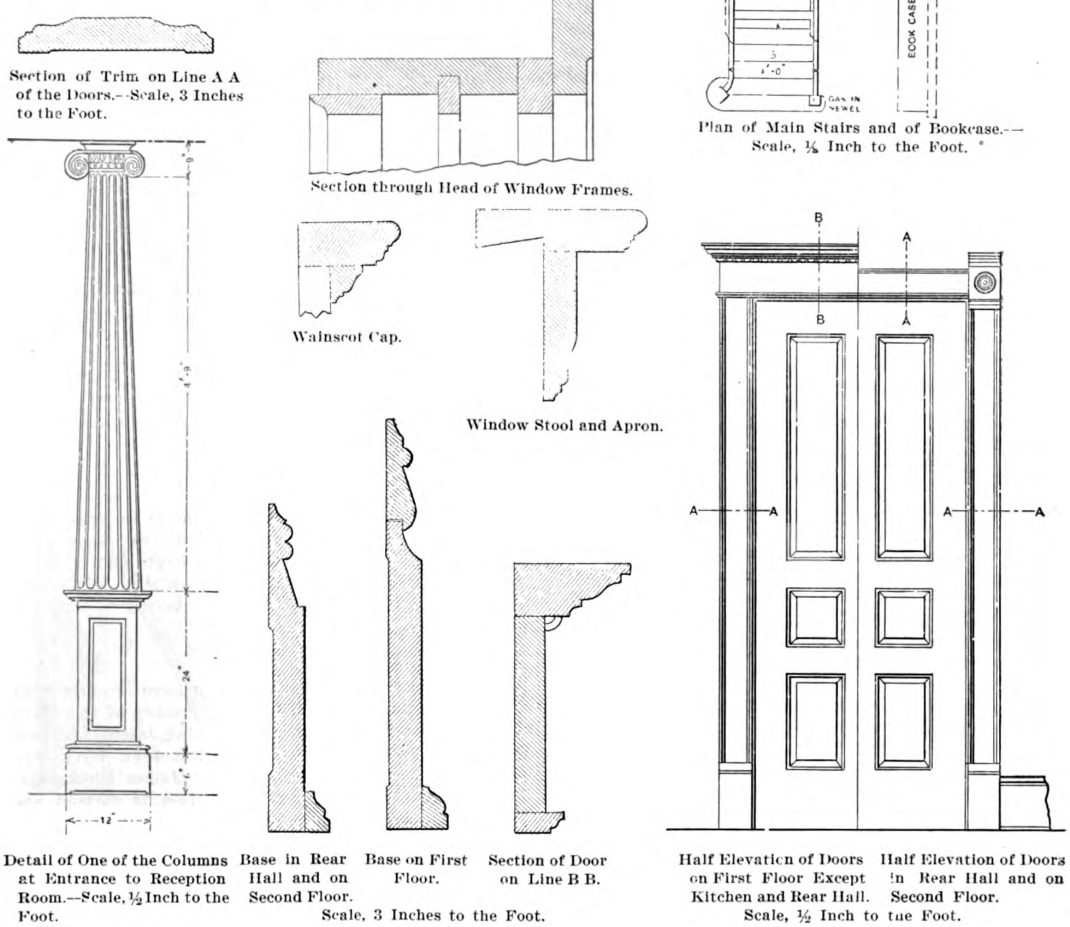
Care should be taken in obtaining levels from someone responsible, and where borders are to meet base boards not yet placed, obtain the lines from the marble man or carpenter or you may be obliged to relay your borders.

Lead Roofs.

In commenting upon the above subject a writer in an exchange says that when the roof is of steep pitch and shows conspicuously against the sky lead is not suitable, except to monumental and lofty buildings, in which the proportion of visible roof to wall surface is not large. A cottage roof, with eaves ten feet or less from the ground, would not be a pleasing object if covered with lead. When the roof is flattish and but little seen, or entirely hidden by parapets, lead is the obvious material to use. It is especially suitable to those small and highly decorated roofs, such as often surmounted octagonal turrets of the Tudor period. As with other kinds of roof, so with lead: there are several devices in the laying invented for purely practical reasons, but which lend esthetic effect and interest. In many old churches the sheets are not laid parallel to the gable copings, but strike into them at an angle. Then, too, the boarding under the lead in mediæval roofs was not close laid, but with gaps of about 2 inches between the boards. The motive of both these devices was by increasing the friction to keep the lead from creeping, and each gives some interest to an otherwise mechanical surface. The boarding in old roofs is almost invariably oak; with modern imperfectly seasoned wood chemical action is set up and the lead perishes; but if the boarding be thin, say ½ inch, and water seasoned, it is probably safe to use oak.



Plan of Main Stairs and of Bookcase.—Scale, ⅛ Inch to the Foot.



Section of Trim on Line A A of the Doors.—Scale, 3 Inches to the Foot.

Section through Head of Window Frames.

Wainscot Cap.

Window Stool and Apron.

Detail of One of the Columns at Entrance to Reception Room.—Scale, ½ Inch to the Foot.

Base in Rear Hall and on Second Floor. Base on First Floor. Section of Door on Line B B. Scale, 3 Inches to the Foot.

Half Elevation of Doors on First Floor Except in Kitchen and Rear Hall. Half Elevation of Doors in Rear Hall and on Second Floor. Scale, ½ Inch to the Foot.

Miscellaneous Details of a Dwelling Constructed of Hollow Tile.

Improved Roof Construction for Manufacturing Plants.

Until quite recently skylights and ventilators in the roof have been the only means of obtaining light and ventilation in manufacturing buildings of great width. Obtaining sufficient light in structures of this kind by the use of skylights adds materially to the cost of the roofs, and in many cases this cost is prohibitive, forcing the use of a series of buildings of moderate width, with spaces between the buildings for light and ventilation. Such construction occupies much more space than where an industry can be placed under a single roof. A new form of construction, designed and patented by Henry Aiken of Pittsburgh, is intended to permit the erection of buildings of great width and of such form that all parts shall have ample light and thorough ventilation, thus permitting the grouping of all departments of a manufacturing plant under one roof.

This construction consists of a series of trusses, 8, in Fig. 1 placed parallel with each other, and alternate roof surfaces, 3 and 4, at different levels extending between the trusses, thus affording intermediate spaces between the elevated sections of the roof for light and

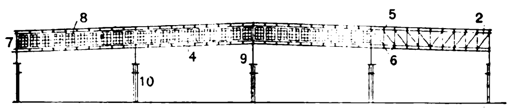


Fig. 1.—Cross Section of Building.

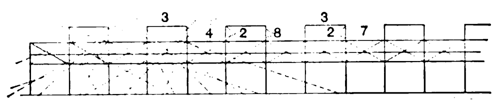


Fig. 2.—Diagrammatic View Showing Light Distribution.

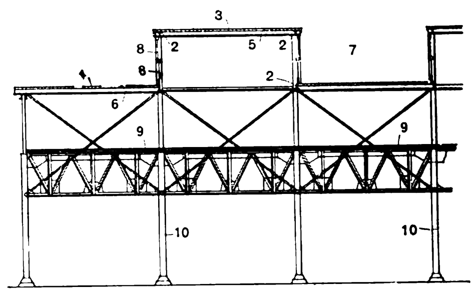


Fig. 3.—Partial Section Showing Details of Roof Construction.

Improved Roof Construction for Manufacturing Plant.

ventilation. The upper roof surface is supported on the top chords of the trusses and the lower roof by the bottom chords. The windows, designated by the figure 8 in Figs. 2 and 3, for the admission of light and ventilation, are placed in the sides of the parallel trusses, and admit both light and air in the most efficient manner, the light being diffused throughout the building evenly and without dark shadows. This will be understood from the sketch, Fig. 2, in which the dotted lines show the entering rays of light and their complete diffusion. The roof is almost flat, having a slight pitch of 2 feet to the hundred. The roof sheathing is supported on either wood or steel purlins, and is covered with 2 inches of spruce plank, tongued and grooved, the whole being covered with four-ply felt and gravel roofing, thus making a weather proof, sweat proof and semifire proof structure.

This construction of roof permits the lower portions to be used as a walk for the window cleaner. From the lower to the upper roof the distance is about 9 feet, which permits the use of a continuous line of sash on each side of the raised sections for a distance equal to the entire width of the building. The depth of the sash is about 7 feet. Each upper section of roof is provided with a bridge which forms a continuous passageway the whole length of the building. Buildings constructed in this manner can be added to at any time, in width or length, as light and ventilation are not dependent on either side or end lights or on the width of the building.

This scheme of roof construction has been adopted by a number of concerns connected with the iron industry, one at Butler, Pa., having three buildings, consisting of power plant, a central or main building in which all the manufacturing departments are under one roof, and a car painting department, which is separated from the main building to avoid danger from fire. The main building for part of its length is five aisles wide, and the remaining portion is three aisles wide. Each aisle is 80 feet wide, making the building at its greatest width 400 feet by 1612 feet long. This single roof covers an area of over 11 acres.

A Scientific Kitchen.

The kitchen in the home of Mrs. Ellen H. Richards, a teacher of domestic science, is described in *Good Housekeeping* as part of a scientific home. This kitchen is a model for any private house. It is well lighted and ventilated, and so arranged that the work can be done with ease and comfort. The cooking is all done with a gas range equipped with a hood, by which all odors pass off without floating through the house. Besides this hood there are two ventilators on opposite sides of the room, opening directly out of doors, which also tend to keep the kitchen free from odors. Hot water for all purposes is heated by pipes connecting with the furnace and a small laundry stove in the basement; and the basement is large, light, well ventilated and in absolute order. There is never a lack of hot water at any time, and the complaint so often heard in other dwellings that "there is no hot water," might be avoided if this idea was generally carried out. Even in warm weather it is possible to have hot water without heating the house, as the pipes connected with the small laundry stove are for this purpose, and not in any way connected with those of the furnace.

Back of the kitchen is a large pantry with a window. This would please any housekeeper, as it is large, well ventilated, in perfect order and stored with many good things in the way of home preserved fruits and relishes. The laundry is also on this floor, which is an advantage when one maid is kept, as there is a saving of strength and time.

The Albany Builders' Association have recently filed articles of incorporation with the Secretary of the State of New York, the directors named being James Ackroyd, Edmund A. Walsh, Morris L. Ryder, John Dyer, Jr., Thomas Stephens, Peter Keeler and James Blocksidge. The objects for which the corporation is formed are given in the certificate as follows: "To foster the interest of those engaged in the erection and construction of buildings and other structures; to reform abuses relating to the business of persons so engaged; to secure freedom from unjust and unlawful exactions; to obtain and diffuse accurate and reliable information as to all matters affecting such persons; to procure uniformity, harmony and certainty in the relations existing between employers, employees, mechanics and laborers, and in all lawful ways to promote and protect the business interests of the members of this association; 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."

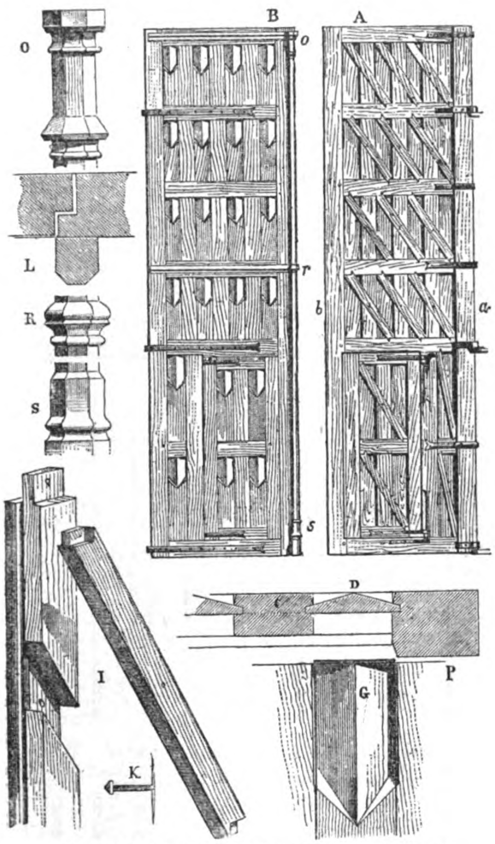
The directors of the Commercial Cable Building Company have decided to erect an addition on the L-shaped site adjoining their present structure, which extends from Broad to New streets. The L has a frontage of 49 feet on Exchange place and 30 feet on New street and contains approximately 4400 square feet. The idea is to make the new building 23 stories in hight, to correspond with the present structure, which was erected about eight years ago.

DOORS AND DOORWAYS.—III.*

BY FRED. T. HODGSON.

MANY old doors still in existence on the Continent of Europe exhibit fine and ingenious workmanship, as for example the door shown in Figs. 16 and 17, which is quite an odd affair. It is drawn from an example in the Cathedral of Poitiers, and dates from the beginning of the fourteenth century. It possesses a certain interest because it appears as a transition from leaves composed of a frame work to which was fastened a covering of oaken boards to leaves with panels grooved into the frame work itself. It will be observed, too, that some of these leaves have wickets.

The inside of one of these leaves is shown at A, and its outside at B. The stiles *a* and *b* are thicker than the upper and lower rails, being 5 inches, while the latter are



Figs. 16 and 17.—Old French Cathedral Doors.

joiners commenced to make paneled doors with internal and external surfaces alike, and composed of stiles and rails, between which boards were grooved in with beveled or rectangular tongues. The Church of Notre Dame at Beaune still retains at the commencement of the northern side aisle of the choir a leaf of this kind that dates from the end of the fourteenth century. It is shown in Fig. 18, where one of the surfaces of the leaf is given at A and is composed of two side stiles, two upper and lower rails, three intermediate rails, and two series of muntins tenoned into the rails. At B is shown the detail of a rail connected with the muntin D and the end of a panel, E. At F is the horizontal section of a panel and two muntins; G is the vertical section of a rail with two panels and their tongues; H shows a detail of a separate muntin, its upper end being at *a*. The panels are strengthened at their centers, as indicated by the section F, and the angle beads of the stiles and rails receive between them the tongues of the panels, otherwise left free. At the lower ends of panels chamfers worked on the rails take the place of the beads, so as not to catch dust. These beads are mitered at the upper ends of the panels and stop against the lower chamfers, as shown by the perspective detail H. The beads and chamfers could then be worked on the stiles, rails and muntins without stops, the joints

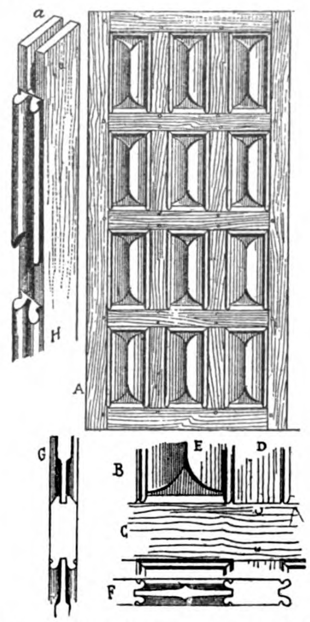


Fig. 18.—Another Old Church Door, with Details.

Doors and Doorways.

but 4 inches, and the intermediate rails are only 3 inches. Muntins of equal thickness are tenoned into the rails to receive the panels, as shown at C and D in the detail P. On the exterior the entire frame work and the panels are in the same plane, the panels being distinguished from the rest only by a decoration shown at G in detail P. Inclined pieces, having half the thickness of the stiles C, are gained into these (and tenoned and notched into the rails) to prevent the leaf from sagging and straining the joints by its weight. At I is a perspective of the connection of the inclined pieces with the muntins, the pieces being fastened together at their intersection by nails K with square heads and double points clinched inside. At L is a detail of the meeting rebate, with a small polygonal column projecting externally, O being its capital indicated at *o* of the elevation, R the band, shown at *r* of the elevation, and S its base, shown at *s* of the elevation. These details are one-tenth full size.

It was only at the end of the fourteenth century that

being made afterward by removing as much of the moldings as required for the bearings and mortises. This door, like the other, is altogether of oak, and all the moldings used upon it were worked from the solid, which entailed the finest kind of workmanship.

Owing to carelessness, a desire for change and a false taste, a vast number of these works of art have disappeared. To find them now it is necessary to ransack the whole country or to seek their remains in museums and to collect sketches which are yet preserved in old engravings or drawings. Normandy, Picardy, Champagne and Burgundy, in France, were especially rich in beautiful doors and other joinery.

The leaves and panels of doors in the early part of the fourteenth century were quite simple and plain, but later it became fashionable to decorate with carvings, bronze ornaments and coverings of painted leather. Small openings or wickets were usually left in the doors, so that a person could communicate with the outside without opening the whole door, a practice worthy of continuance.

* Continued from page 89 of the April issue.

New Buildings at West Point.

The Commission to remodel the buildings and grounds of the United States Military Academy at West Point, N. Y., has been awarded to Cram, Goodhue & Ferguson, architects, of Boston, Mass. It will be recalled that Congress, by an act approved June 28, 1902, appropriated $5,500,000 for the improvement work, and provided that none of the money should be expended until the complete plans for all the improvements had been made and approved by the Secretary of War. Ten leading architects submitted preliminary plans under the condition that the successful competitor was to prepare the complete plan for the Government. The jury to examine the plans and decide the winner of the contest consisted of General John M. Schofield, Colonel Albert L. Mills, George B. Post, Cass Gilbert and Walter Cook, the latter three being architects in New York City.

According to the plans of the winning firm of architects, the Post Headquarters, being the central Administrative Building of the academy, is to be built around an inner court, the lower story being devoted to a military museum. The new Academic Building is to be placed directly opposite the old one and connected with the latter by a monumental arch and bridge. This connecting link is to be made the richest in design of all the buildings, with space for statues and memorial inscriptions. The riding hall has the logical position on the lower plateau. A large, low tower at its corner forms in its lower story a room for equipments, as well as a public or gallery entrance. The Administrative Building, for the corps of cadets, is to be placed on the minor axis of the proposed quadrangle, raised on the present terrace and approached by broad steps. Other buildings of minor importance have been treated in such manner as to best meet the needs of the academy. In every respect the buildings and proposed roads have been adapted to existing grades, while roads and paths have been improved and emphasized, and others have been opened where they seemed necessary for convenience or architectural effect.

We understand that $3\frac{1}{2}$ per cent. of the cost of the buildings will go to the Boston architects, and in addition a salary of $5000 a year will be paid them, together with traveling and office expenses, these expenses not to exceed $1\frac{1}{2}$ per cent. of the cost of the buildings. The unsuccessful competitors will each receive $2000 and traveling expenses.

Heating Brick Drying Rooms.

The following information on exhaust steam heating for drying the bricks in a drying room is given in a recent issue of the *Iowa Engineer* for the benefit of clay workers:

In order to heat the drying rooms successfully and economically the exhaust steam from the engine should be utilized. At the same time the back pressure on the engine should be kept low. This can be accomplished and at the same time a good circulation of the steam in the coils obtained if the coils are built as manifold or heater coils, but not if the return bend coils are used. The latter offer too much resistance to the flow of the steam. The heating main, or exhaust pipe continued, should be carried up to and along the ceiling of the drying room and hung with a pitch downward away from the engine. The furthest point of the main should be connected by a large drip to the return main, which should be two-thirds the diameter of the steam main and should pitch downward toward the hot well or heater in the boiler room.

The supply pipes for the several coils should be taken from the top of the steam main and should pitch downward toward the coils which connect them with the return main. The point of discharge of the return main into the hot well or heater should be the lowest point on the system so as to insure a "dry" return, and a trap should be provided at this point to prevent the steam from blowing through. The main exhaust of the engine should be provided with a back pressure or relief valve set to work at a lower pressure than the trap, and a grease extractor should be placed in the heating main to keep oil from being carried through the system to the hot well. The construction here outlined will secure in addition to its main object the incidental and important advantage of a supply of condensed steam for the boiler feed, and this at a temperature such that the waste steam from the pumps will be able to raise the temperature of the feed well toward the atmospheric boiling point by means of the heater and purifier above mentioned.

Ventilation is essential and can be secured by stacks or fans or both. Generally speaking a fan is a more economical method of moving air than is a column of hot air and is more easily controlled, but the stack is simpler and therefore frequently more desirable.

Driven Wells for Fire Purposes.

A driven well for fire purposes which has proven to be a great improvement on cisterns has been established in Janesville, Wis. It consists of two 12-inch water pipes connected so as to extend in a line and a 5-inch wrought iron pipe all connected to a central T, the wrought iron pipe extending to the surface, as shown in the elevation given in Fig. 1, and on both sides

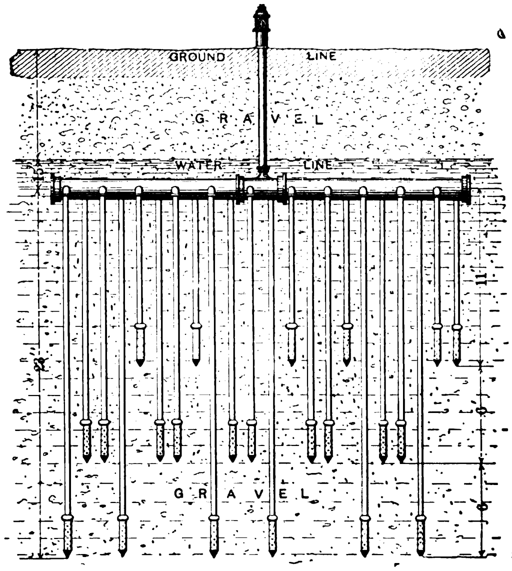


Fig. 1.—Vertical Cross Section of Well.

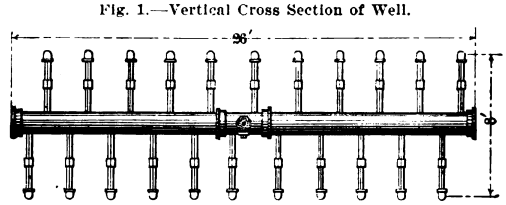


Fig. 2.—Plan View.

of the water main, or reservoir, points put down at irregular depths, from 10 to 20 feet. The points are driven from 4 to 6 feet from the main, as shown in Fig. 2, which is a plan, and in line with the nipple to which they have to be coupled.

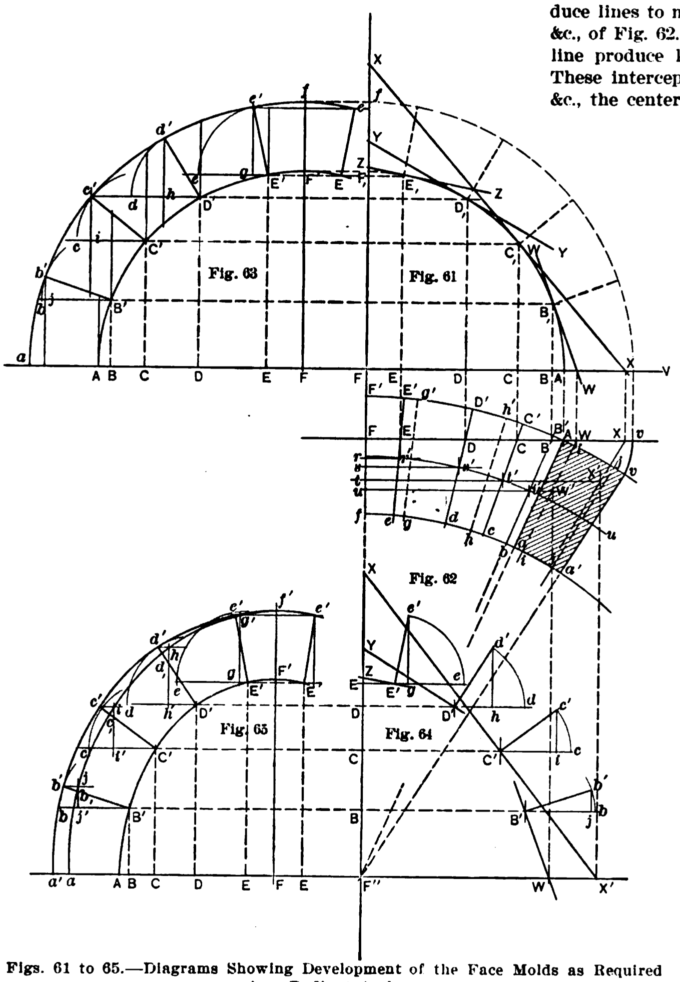
Before laying the apparatus the earth should be excavated to the level of the water, where the excavation should be not less than 28 feet long by 14 feet wide. This kind of water supply, says *Municipal Engineering*, connot be obtained in all localities. The water line must be within reach of the suction of the engine, and the points, no matter how deep they are, must rest in a gravel formation. The placing of the 12-inch water pipe, to which the points are all connected 2 feet below the water line, gives a free flow of water in the pipe under an 18-inch head, faster than any steam fire engine can take it out.

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

BY CHAS. H. FOX.

WE now take up the development of the face molds, as required in the radiant arch. The solution of the problem presented by the accompanying diagrams explains all that is really necessary to know for a complete understanding of the construction of the face molds for any radiant arch, no matter how elaborately it may be molded or carved. As this is the first of a series of working drawings, the student should be accurate in each development, for upon this depends the success of the undertaking. In the construction of the diagrams here given the principles already shown and explained are applied practically to the subject. In order to avoid as far as possible any confusion of lines, we have drawn each projection and development, as the plan, elevation, &c., entirely separate one from the other; but after the student has made himself fully conversant with the method used to obtain the projections he will be able to project them in a much smaller compass than that here employed.

First, to draw the elevation and plan we proceed as follows: At any convenient part of the drawing board lay out F″ X of Figs. 61 and 62, this representing the center line of the drawing. Square with this at any point, as E, draw F V of Fig. 61, and produce it to the left, as shown. Now with F as the center and with the length, as F A, of the half opening of the arch as the radius, draw the quadrant A C, F,. Divide this as at A, B,, C,, &c., to correspond to the half number of stones that the arch may contain, in this example nine. Having done this, at any point, as F of Fig. 62, set off F″ f equal to the width of the soffit of the arch, and divide it in r into two equal parts. Then with F″ as the center draw the curves F′ v of the outer, r U of the center, and f a′ of the inside faces of the arch. Then parallel with the center line draw A A, and parallel with the base line F A of Fig. 61 draw F A of Fig. 62. This represents the actual opening line of the arch, and it is the horizontal trace of the vertical plane which contains the directing curve of the soffit. Now parallel with the center line from each point, as B,, C,, &c., of the directing curve produce lines to meet the opening line, as shown in B, C, D, &c., of Fig. 62. Through each point given at the opening line produce lines to the center point F″ of the plan. These intercept the outer curve in the points A, B′, C′, &c., the center curve in the points u′, t′, s′, &c., and the inside face line in the points a, c, d, &c. At the points u′, t′, s′, &c., at which the radials meet the center curve, parallel with the opening line, draw u u′ W, t t′ X, &c. Now in Fig. 61 draw the tangents, as W B, W, X C, X, &c., and from the points given in W X at the base line, parallel with the center line, draw X X and W W. Then draw the radials X X′ and W W′ of Fig. 62.



Figs. 61 to 65.—Diagrams Showing Development of the Face Molds as Required in a Radiant Arch.

Laying Out Circular Arches in Circular Walls.

Now to obtain the projection of the tangents and normals of the center points u′, t′, s′, &c., of the plan, in Fig. 64, square with each other, draw F″ X and F″ X′; then set off F″ B, F″ C, F″ D, &c., equal with B, B, C, C, D, D, &c., of Fig. 61; then parallel with F″ X′ draw B B′, C C′, D D′, &c., respectively, equal with u u′, t′ t, s′ s, &c., of Fig. 62; then set off F″ W and F″ X′ equal with u W′ and t′ X′ of Fig. 62. Join B′ W, C′ X, &c., and the projection of the tangents to the points may be obtained. Then square with these draw B′ b′, C′ c′, &c., and the projection of the normals may be obtained.

Now to develop the face molds, Fig. 63 of the outside and Fig. 65 of the inside faces, proceed as follows: In Fig. 63 set off A, B, C, &c., equal to A, B′, C′ of the outer face curve of the plan. At each point obtained square with the base line F a, draw B B′, C C′, &c., equal to the lengths given in B, B, C, C, &c., of Fig. 61. Through the points given in A, B′, C′, &c., trace a curve, as shown, which is the development of the curve formed at the intersection of the conoidal surface of the soffit with the cylindrical surface which forms the outer face of the wall in which the arch may be situated. Now by Figs. 9 and 10 of the series set off the angles, b B′ b′ and c C′ c′ of Fig. 63, equal with the corresponding angles given in Fig. 64, and in this manner the normals may be transferred to their proper position at the developed face molds. Now set off A a, B′ b′, &c., each equal with the required width of the arch stones at the outer face, and through the points obtained bend a flexible strip and trace the curve of the exterior surface of the outer face. In this manner setting off the equal length of the normals we obtain an arch of a uniform width at the outer face.

In Fig. 65 draw the base line F a′, and square with it the center line F f; then set off F, E, D, &c., equal with f, e, d, &c., of the concave or inside face curve of the plan, Fig. 62. Parallel with the center line draw E E′, D D′, &c., equal with the corresponding projections of Figs. 61, 63 and 64. Through the points obtained in A, B′, C′, &c., bend a flexible strip and trace the curve; then in the manner above explained transfer the normals of Fig. 64 to their corresponding positions at Fig. 65.

* Copyright, 1902, by Charles Horn Fox.

Now in order to obtain the points through which to trace the curve of the exterior surface which belongs to the inside face we have to find on the plan the projections of the level elements which belong to the points projected in *a*, *b'*, *c'*, &c., of Fig. 63. These may be found as follows: In Fig. 63, parallel with the center line F F', draw *b' j*, *c' i*, *d' h*, &c. On the plan set off B' *j*, C' *i*, D' *h*, &c., respectively equal with the corresponding lengths as given in Fig. 63. Through each point produce the radials *j j'*, *i i'*, *h h'*, &c. In Fig. 65 set off A *a'*, B *j'*, C *i'* &c., respectively equal with *a a'*, *b j*, *c i*, &c., of the concave curve of the plan. Then parallel with the center line F *f* draw *j' j*, *i' i*, &c. Through the points obtained in *b'*, *c'*, *d'*, &c., of the normals, parallel with the base line, draw *b' j*, *c' i*, *d' h*, &c., and through the intersections given in *a*, *j*, *i*, &c., bend a flexible strip and trace the curve, which completes the face molds as required at the inside face of the arch stones.

The exterior bounding surface of the arch stones, which may be formed to the direction given by the molds of Figs. 63 and 65, will be a conoidal surface, similar to that of the soffit, and the elements will in the same manner radiate toward the axis of the wall. It sometimes happens that the face proper of an arch may be situated in the concave surface of the circular wall, and the arch stones require to be of a uniform width at the face in question. This may readily be done if the lengths of the normals are made of an equal width, as shown in A *a'*, B *b'*, &c., of Fig. 65. Through the points thus obtained in *a'*, *b'*, *c'*, &c., trace the curve, as shown. The molds will now give the proper direction for forming the arch stones so that they may be of an equal or uniform width at the concave face. The molds of Fig. 63 in this case are those to apply at the convex face as before.

Chicago's Half Year Building Record.

The building record for the month of June, while showing a considerable falling off compared with the operations in the same month a year ago in regard to the amount of money expended, makes a better showing than had been anticipated from the interruptions to building operations resulting from labor difficulties. During the month of June, 1903, permits were taken out for 642 building improvements, extending over a frontage of 16,655 feet, and involving an estimated cost of $3,932,950, against 579 permits for buildings covering 19,206 feet of frontage and costing approximately $4,215,810 for the corresponding time a year ago, showing an increase of 63 in the number of buildings, but a decrease of 551 feet of frontage and a loss of $282,860 in estimated cost.

One of the principal features of building operations, not only during the month of June, but thus far during the year 1903, is that no construction—or rather very little, if any—is being done from an investment standpoint. Such buildings as are being erected are made necessary by business demands for manufacturing and warehouse purposes. Another point of interest is that recently, especially during the last two months, buildings which have been erected for residence purposes are in the nature of small flat buildings or single dwellings on the cottage order. A large part of the building is being done in the south division, over one-third of the buildings, involving two-thirds of the total cost, being reported in this section. The southwestern division comes next as a very poor second.

It is to be noted that while the amount of money expended upon construction during the month of June is less than in June, 1901 and 1902, the falling off is not great, while compared with the period from 1897 to 1900 the comparison is very favorable to the month just closed. Our present record, too, is greater than that of 1894 and 1896, but was exceeded by expenditures in 1895.

Building statistics for the first half of the current year make an unfavorable comparison with the figures for the first six months of 1902. The records of the Commissioner of Buildings show that permits were taken out during the first half of this year for the construction of 2890 building improvements upon a frontage of 80,683 feet, involving an estimated expenditure of $16,771,610, against 3101 building improvements extending over a frontage of 95,555 feet and an approximate expenditure of $28,817,105 for the corresponding period of 1902, showing a decrease of 211 in the number of buildings erected, 14,872 feet in the frontage occupied and $12,045,495 in the amount of money expended.

The figures in detail for the first six months of 1903 and 1902 are as follows:

1903.	Number of buildings.	Feet frontage.	Cost.
January	225	7,700	$1,377,250
February	290	8,111	1,225,675
March	569	16,411	4,531,500
April	542	14,355	2,387,035
May	622	17,451	3,317,200
June	642	16,655	3,932,950
Totals	2,890	80,683	$16,771,610

1902.	Number of buildings.	Feet frontage.	Cost.
January	322	9,723	$3,549,450
February	336	11,415	8,595,510
March	632	18,152	3,805,200
April	666	18,275	3,406,010
May	566	18,784	5,245,125
June	579	19,206	4,215,810
Totals	3,101	95,555	$28,817,105

It should be noted, however, that the record of February, 1902, was unprecedented in the number of permits issued and also was conspicuous for the construction of a large building by Marshall Field & Co. It is to this fact largely that the unfavorable comparison is brought about. It should also be noted that a much larger number of permits were taken out for construction of large buildings which have not yet been erected. This is probably due mainly to the change in the building ordinances removing the limit of hight from buildings, and hence necessitating a change in plans which will eventually be reflected in increased building operations. Another reason which is assigned for the diminished total for the first half of the present year is the change made in the tenement house law, which places a number of restrictions upon contractors and builders and which therefore has added seriously to the delay in constructing large flats and apartment houses. But the changes in the ordinances referred to have had powerful auxiliaries in curtailing building operations, which have been the numerous strikes in the building trades and in other industries, causing a delay in the furnishing of material. The other retarding influence has been the increased cost of building material, especially of lumber.

Producing a Flat Finish.

In replying to an inquiry of one of its readers as to the best method of doing a first-class job of flat work, a recent issue of the *Painter's Magazine* says: "We must assume that you refer to interior work in white or in tints. On new wood work a priming of white lead in oil, a second coat of white lead, thinned with equal parts oil and turps and a third coat of white lead, thinned all turps, with a small portion of white japan in each, is sufficient for a good foundation for a good flat finish, providing brush marks have been avoided and the last coat of lead smoothed down with No. ½ sandpaper. Next one coat of best French zinc white in oil is thinned with turpentine and a little white japan, applied with a chisel point flat brush. This dries with eggshell gloss, if manipulated properly, and the job is then finished with one coat of French zinc in damar varnish, thinned with turpentine only and applied with a camel's hair brush. A job done in this way gives an air of solidity and will not turn yellow.

"For plastered walls we would recommend the same method, excepting that the first coat of lead be applied directly on the wall without any size, and that puttying, if necessary, be done on this priming coat. Then a glue size is to follow before the half and half lead is applied, to stop further suction, or in place of glue size a thin coat of wall or suction varnish may be given. Balance of work to be the same as for wood work. For tinted work the ground coats should be of the same color as the finish.

"For old work the surface should be prepared by cutting out cracks and plastering or puttying up preparatory to painting and all new patchwork or cut out and filled in cracks touched up to match the old color. In such case, one coat of lead, thinned equal oil and turps, and the two coats of zinc white as above will generally suffice, but good care must be taken that the renovated places will not show through."

CORRESPONDENCE.

Cement in Building Construction.

From C. G. TAYLOR, *Massachusetts.*—Noting the several articles in recent issues of the paper dealing with the use of cement in building construction prompts me to offer a few remarks based upon personal experience and observation. Cement has been in use to a limited extent ever since the time of the Romans, and perhaps long before, yet its great cost and the low price of wood in many localities have retarded its use in any great degree. It would appear that conditions are being reversed, wood being greatly reduced in supply and higher in price, while cement is becoming more and more abundant and therefore lower in price. It is my intention at this time to give to the readers of the paper a brief description of the use of cement in the construction of a simple piece of work which I personally superintended. At the same time I shall enumerate a few uses to which cement can be put in replacing wood and costly mason work, and call attention to the fact that cement is, in my opinion, likely to be one of the great building materials of the future.

In the latter part of July, 1902, I was called upon to revise the plans and superintend the erection of buildings and other work which were being undertaken by Mack & Co. of Ann Arbor, Mich. During the following five months a large amount of cement was used in their work, but nothing of particular interest developed in connection with its use. except in the construction of one foundation, the details of which I will briefly describe. It is not done, however, because there is much that is new or original about the work, but because it may awaken an interest in others who have not before used cement to do something of the sort and secure a good piece of work at small cost.

The work in question was a wall for a cellar, 22 feet wide, 48 feet long and 7 feet high, with an areaway and stairs. At first it was intended to construct the work of field stone, but as no mason could be procured at the time to do the work for a reasonable price it was necessary to devise other means of securing a foundation. At first a 14-inch wall was thought to be all that was needed, but a 12-inch one would have answered the purpose. A trench 24 inches wide was dug, leaving the excavation of the cellar until the wall was in for the holding of the curbing, although this was of little consequence. Next 2 x 6's were placed upright in the trench every 5 feet, with their edges resting against the inside bank. These were covered with 2-inch dressed plank, held with a few small nails in such a position as to form the inside of the cellar wall. This made a straight smooth surface. On the outside 2 x 4's were placed opposite the 2 x 6's, and 18 inches from them, extending down into the bank 6 inches and fastened at the top with 1-inch boards to the 2 x 6's. The 2 x 4's were then planked from the top of the wall down 3½ feet, with 2-inch dressed plank 10 inches wide, thus leaving a 14-inch space between the plank and about the same below the outside plank for the wall. By this method we made use of the outside bank where the wall did not show, thus saving somewhat in labor.

The window and door frames were lowered into position in the mold, fastened to the inside plank, and the space to the outside plank was filled out with strips, fastened in such a way as to give the wall a neat appearance around the windows when the mold was removed. Next ¾-inch V-shaped strips were placed on the inside of the outside plank over the joints and perpendicularly, as indicated in Fig. 1 of the sketches. This gave the appearance when finished of cut sandstone blocks 3 feet long by 10 inches wide. In all the corners V-shaped strips were also placed. This completed the mold for one side, except the placing of a few stoppers at each end, as shown in Fig. 2, for the purpose of making a strong lap joint with the next wall.

The cement used was Peninsular Portland and gave excellent results. It was mixed with clean, coarse, sharp gravel, in the proportions of one of cement and eight of gravel. It would do for light structures to use one to ten, but heavy ones must have more cement. The two were cut over twice dry and once after the water was added. One peculiar feature which differed from many pieces of cement work, but gave excellent results, was that the mixing was made thin so as to run a little. This made it easy to settle down and conform to every shape of the mold. After hardening there was no appreciable shrinkage. When it is used in this way care must be taken to have the work come up about level, and when it is once settled down to place do not keep pounding.

When the mold for one side had been filled it was allowed to stand for 48 hours and then all planks were removed and cleaned. It will be noticed that no openings were cut for windows and doors in the curbing, so that the waste in lumber was only about 4 per cent. If the planks are cleaned with a hose and broom as soon as removed it requires but little effort to do it, and it is also much better if the planks are kept well soaked with water. After the work was finished and the wood work removed it presented the appearance of cut sandstone blocks above the ground on the outside and a fine, smooth surface on the inside of the cellar. Every window and door frame fitted the wall perfectly and was far tighter and more solid than is the case in ordinary mason work. The outside was somewhat improved in appearance by making a thin aqueous solution of cement and then spraying it with a spray pump such as painters use for rapid work.

When it is possible to secure small or crushed stones at a low price it will make just as good work to use about one-half of this material mixed in properly while the filling of the mold is going on, as this method will lessen the expense. The cost of this wall was barely two-thirds what it would have been if made of stone, and had a 12-inch wall been built, instead of a 14-inch one, and had stone been mixed in, the cost would have been only about one-half. No mason was employed on the work; only laborers.

In this connection I would mention the following interesting facts: 1. Just as good and satisfactory a foundation can be made of gravel and cement as of stone, and this without the aid of costly masons. 2. The expense in many localities is only about one-half that of

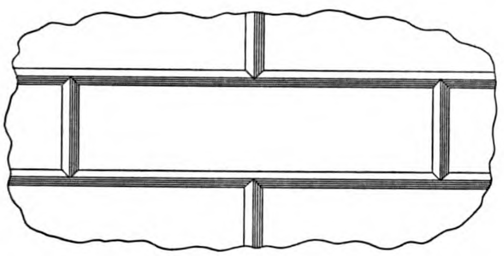


Fig. 1.—Showing Method of Using V-Shaped Strips.

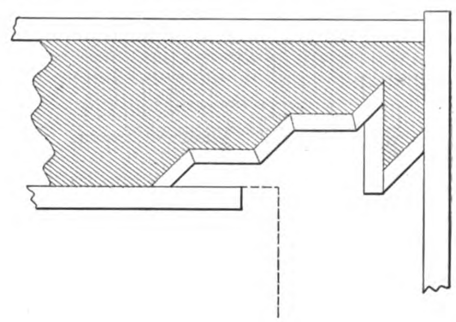
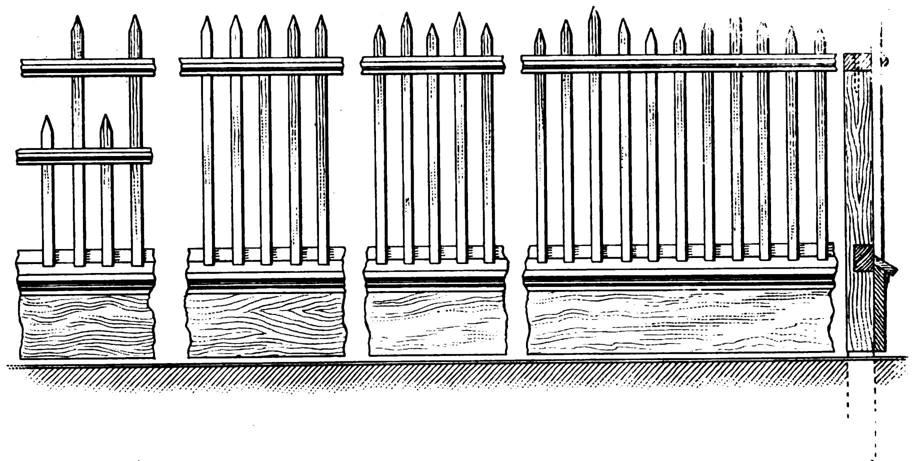


Fig. 2.—Method of Placing "Stoppers" at End of Mold.

Cement in Building Construction.

mason work. 3. Foundations made of this material look better and are better than those made from brick. 4. The inside of walls made of this material is cleaner and smoother than walls made of brick or stone. 5. Such walls are warmer and tighter than those made of brick or stone. 6. Cement walls keep dry and are very good for keeping out moisture. 7. Properly constructed cement walls would make strong, cleap, warm, durable and fire proof work for the construction of houses, factories and other buildings, thus being especially desirable for factories where it is intended to paint on the inside.

It is apparent, therefore, that houses, shops and other buildings often constructed of wood can be made of cement, and such buildings would be neat in appearance and very durable. Cement can and is being used for the construction of fence and other posts, porch columns, door steps, walks, buildings, bridges, culverts, dams and many other kinds of work. Should the use of cement become very general it would greatly reduce the consumption of wood. This seems to be almost a necessity, for the United States Forestry Bulletins show that wood in this country is being consumed more than twice as fast as it is grown, and it is only a simple mathematical problem to calculate how long it will take to destroy all of the American forests.



Designs for Picket Fences.—Reproduction from Sketches Submitted by "Down South."

Designs for Picket Fences.

From Down South, *North Carolina*.—I send a few sketches of picket fences and would ask those interested to refer to my communication on the subject in the April issue of *Carpentry and Building*. It will be observed that my ideas are somewhat different from those of "D. P. B." of Redford, N. Y. Setting fence posts 5 feet deep would be somewhat of an extreme in any part of the country that I have ever visited, but might be necessary in some latitudes on account of frost. I must say, however, that his plan of driving stakes and using two sets of braces to his posts tends to provoke a smile. I think I could set the post to the line, plumb it and have it rammed while he was getting up his stakes and braces, and I must confess I do not exactly see the necessity of his bottom rail or stringer. The designs which I send are simple, but will make a neat fence if properly executed, and may help some of the inexperienced. A good size for pickets is 1¼ x 1¼ inches, but of course the size can be varied to suit individual taste or convenience. The sketches will, I think, explain themselves sufficiently for any wood butcher of ordinary capacity.

I wish to ask in closing if someone will tell me what kind of varnish is used on canes, umbrella handles, &c. Can it be had already prepared, and, if not, what is the formula for preparing it?

Finding the Strength of Semicircular Brick Arch.

From G. H., *Joplin, Mo.*—Will you kindly explain in your paper the method of finding the strength of a semicircular brick arch of 20 feet span, or the thrust of it at different points.

Answer.—Our correspondent will find a very clear explanation of the method of determining whether or not a brick arch is stable and also the thrust at different points in the arch ring, on pages 200 to 204 inclusive of Kidders "Architects' and Builders' Pocket Book." The explanation, with the necessary diagrams, is too lengthy for presentation in the space at our command, but our correspondent can probably find the book in the public library at his place, or, if he so desire, he can obtain a copy through this office, the price being $4, postpaid.

Is It Transom or Fanlight?

From R. H. G., *Borough of the Bronx*, N. Y.—Observing in the Correspondence columns of *Carpentry and Building* a question on transom construction and two answers to the same in the July number, I feel inclined to ask a question of the readers concerning the proper use of terms employed in the question and answers thereto. According to the architectural works and dictionaries a "transom" is the bar or cross piece in the door frame separating the door from the fanlight, which is the fast or movable sash placed over the door for purposes of ventilation and light. Of late years it seems to be the custom to call the fanlight by the name of transom, but why, I do not know. Again, I observe that manufacturers of builders' hardware invariably mention their transom lifters for raising and lowering the so-called transom. Has it not occurred to them that it is the fanlight which is moved, and that the transom bar is stationary? Possibly some of the readers will be interested in this subject. At all events, I shall be glad to see their opinions published.

What is Current Practice in Preparing Mortar for Plastering?

From J. C. B., *Glenwood, Mich.*—What is the practice of masons and plasterers in preparing lime, sand and hair for the different coats of mortar in up to date work? A mason in this vicinity claims that it hurts the hair to beat it in order to separate the mass. Can any one give any information in regard to pulp plaster or substitute for lime, sand and stucco that is coming into the market?

Thanks are due C. A. Wagner for his key to the different orders of architecture which appears on page 185 of the July issue of the paper. May we have something more on the same subject?

Designs Wanted of Shingled Gables.

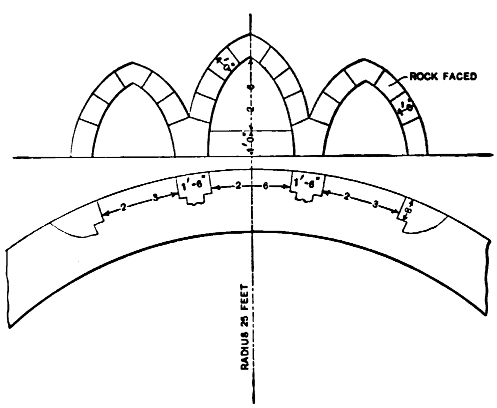
From M. D. H., *Mount Vernon, Ill.*—I should like to have some of the readers of the paper furnish for publication drawings showing neat designs of shingled gables, as I have no doubt that matters of this kind would prove interesting to others as well as myself. I have a number of gables to finish, and I would like to have some new ideas as to the effects which may be produced by the use of shingles in work of this kind.

Circular Arches in Circular Walls.

From R. H. G., *Borough of the Bronx, N. Y.*—I greatly admire the articles of C. H. Fox on "Circle on Circle." They are, in my opinion, the best on this subject that *Carpentry and Building* has so far given to its readers. I have read them all, from those of Mr. Secor, published about 1888 or 1889 up to date. I hope, though, Mr. Fox will give the wood worker an insight into the construction of curves, as well as the stone cutter—that is, show how to properly get out the twists in the solid as one would get out a twist for a hand rail.

Gothic Arch in a Circular Wall.

From A. B. G., *Great Falls, Mont.*—Will Charles H. Fox, or some of the other readers of the paper, kindly explain the method of laying out and constructing patterns for the stones for a Gothic arch in a circular wall, and to



Gothic Arch in a Circular Wall.

have plain surface joints and rock face? I inclose herewith a sketch of a window.

Boring Porch Columns and Gluing Built Up Columns.

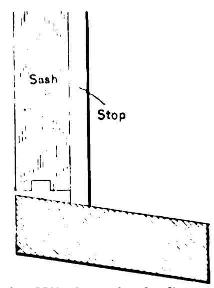
From Sunbury, *Ontario.*—Would some of the readers of *Carpentry and Building* give through the Correspondence columns their ideas of the best way to bore solid porch columns, and the best method of gluing built up veranda columns? In this locality we find that the glues are affected by the dampness, and we should like very much to hear what those who have had experience in this particular line have to say.

Does the Roof Leak?

From J. E. R., *Hamilton, Ohio.*—I wish readers would tell the cause of a roof leaking under the following conditions: The roof is so framed that it has an almost flat portion in the center, and at each side there is a section with more pitch. The central section is covered with felt and gravel. One of the sides is covered with shingles and the other is covered with magnesia roofing. This section of the roof has a pitch of about one-third, and apparently leaks when it is perfectly dry and the sun is shining on it. The building is used as a wood working factory, having an average temperature of about 65 degrees, and the space under the roof is used for a shipping room, while the first floor of the building is used for a wood storing room. I claim that the moisture in the building condenses and causes the trouble. The proprietors claim that the dampness is caused from the outside, and that when the sun shines on it it is condensed and causes the trouble. I have used the same roofing material on a large grocery warehouse and the owners never had a complaint to make, although it has been in use for several years, while previous to that time they had always been in trouble with their roof.

A Question in Window Sash Construction.

From M. W. C., *Glen Easton, W. Va.*—In the April number of the paper, "H. M." of St. Louis asks with regard to the best method of constructing a swinging window sash so as to keep out the elements. To my mind

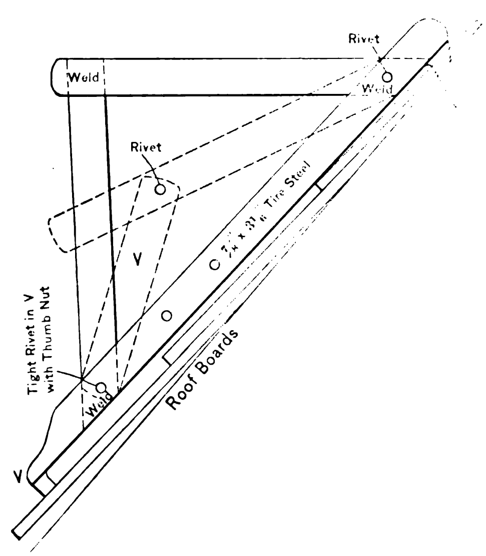


Question in Window Sash Construction.

this is one of the most difficult things a carpenter finds himself called upon to do in a sample way. If the correspondent will construct his sash and sill, as shown in the sketch which I send, I think he will have little trouble with rain finding its way through. An examination of the sketch will show that the sash is grooved on the bottom, and the sill is sloped from a point close to the inside of the sash, the idea of the groove being to prevent the water from "crawling" by reason of capillary attraction to both sash and sill. I have found this scheme an excellent method to fix the bottom of ordinary windows and also of outside doors where exposed to driving rain. I like *Carpentry and Building* very much, and think the Correspondence Department very profitable reading.

Staging a Shingle Roof.

From S. F. B., *Wellington, Ohio.*—In answer to "J. F. H." of New Marion, Ind., I would say dip the shingles before laying or do nothing. Painting after laying is worse than useless. The correspondent also asks for some good way to stage a roof, and I think I have it. I send a sketch of what I consider to be the best bracket in use to-day. It is light, strong, durable and will work anywhere. Another thing, it is unnecessary to shingle the roof in order to use it. The brackets are free to the world and to New Jersey. The drawing I send is correct for half pitch, but can be made adjustable by following



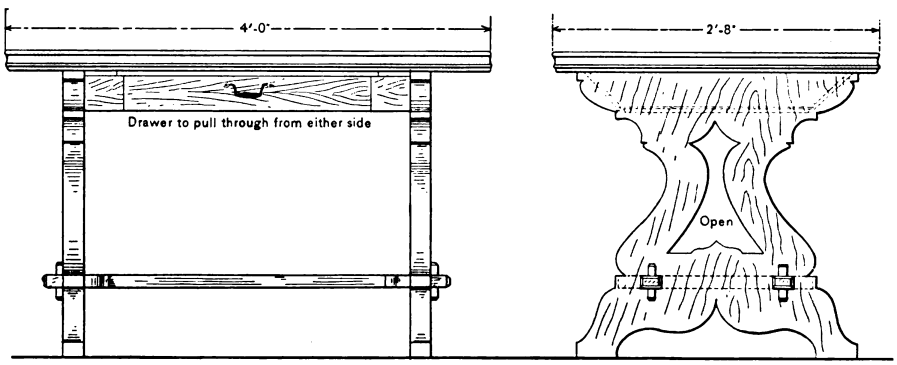
Staging a Shingle Roof.—Form of Bracket Suggested by "S. F. B."

the dotted lines. The brackets can be used on the rafters or on the roof boarding. Put them down, pile on the boards and go to work. For tight roof boarding they beat the bunch, and they can be used for papering a roof for slating; also for slating by using the same base as the slating brackets. When it comes to shingling, the men do not have to crawl along on all fours on the corner of a scantling. In using the brackets for shingling, when I get up to within two courses of as high as I can reach, I lay a narrow shingle over the joint, not nailing it; then lay the next shingle and nail it, after which I take the loose shingle and stick it under the butts below for future reference. I repeat this operation as often as I want a bracket. I then lay two more courses, and see that the shingle is wide enough to lap both ways over the one I left out. Now drive the spur of the bracket into the joint, close up to the butts above, and go on. The two courses being laid above the staging makes the work easier. When the roof is done, take hold of the bracket by the level part, and hit it a few light blows at the point marked V in the sketch and it will come loose. Now take the narrow shingle and drive it up within ½ inch of its place. Put the nail in, close up, drive the shingle in place and the trick is done.

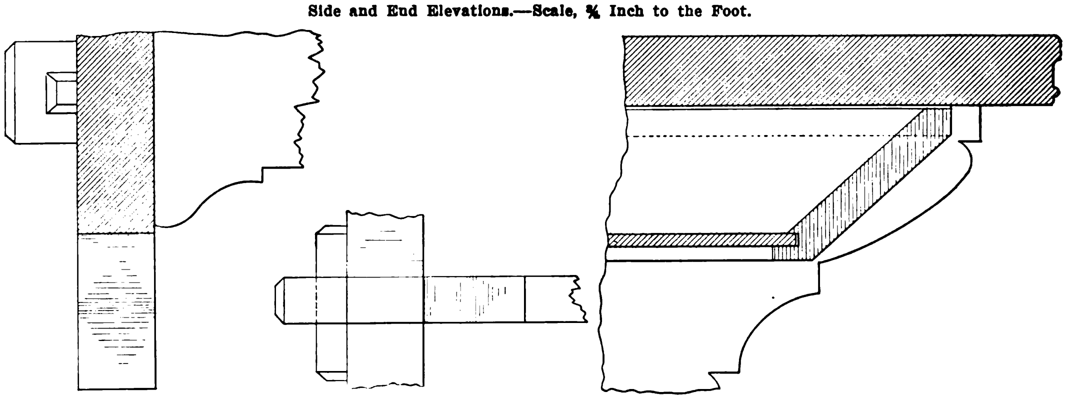
In the issue for January of the present year, "C. A. L." of Homestead, Pa., says he has a box 10 x 11 for traveling. I have always noticed that the 10 x 11 man gradually has to "move on," while the man with the "freight car" stays on the work. Does "C. A. L." think that a contractor can see no difference between a man with a box and one with a full outfit for all kinds of work? The man with the box can take the jobbing. I prefer to stay with my "freight car" on good work.

Design for a Library Table.

From Arthur M. Joslin, *Boston, Mass.*—I send herewith drawings showing a library table, which, in view of the articles on furniture now running in the columns of the paper, may not be without interest to some of the many readers. The drawings so clearly indicate the general construction that comparatively little comment is necessary. The table is intended to be made of oak, chestnut or other wood showing a large grain, upon which, to a certain extent, it depends for its effects which appear to particularly good advantage on the large surfaces. The style is somewhat heavy, and closely follows the "Mission style," so much in vogue at present. By having the edge of the top molded and the standards band sawed in the shop any good carpenter can do the rest with the average kit of tools, and the whole cost, especially if made of chestnut, would be comparatively light. A piece of furniture of this style is best filled very dark with a slight tinge of green; then shellaced three or four coats and finally rubbed down. The drawer shown in the table is intended to be alike on both sides and pulled out from either side.



Side and End Elevations.—Scale, ⅜ Inch to the Foot.



Plan of Low Shelf and Key. Elevation of Low Shelf and Key. Section of Top and Drawer with Partial Elevation of Standard.
Scale, 3 Inches to the Foot.

Design for a Library Table.—Contributed by A. W. Joslin.

Frost Proof Roof for Stone Reservoir.

From F. B., *Bolton Landing, N. Y.*—Will some of the practical readers of your valuable paper kindly inform me through its columns how to construct a frost proof roof over a stone reservoir which is used to furnish water for the house, both summer and winter. The reservoir in question is about 10 feet square outside and is made with an 18-inch stone and cement wall. It is sunk into the ground about 3 feet, leaving about 4 feet of the wall above ground. Would it be advisable to bank this to the top of the wall with earth, grading back each way with a slope? The water is led to the reservoir by underground pipes from a spring and thence to the house the same way. In the summer time all that is necessary is a roof to keep out the dirt, leaves, insects, &c., with plenty of ventilation, but for winter it must be frost proof. I have roofed several reservoirs of the same description, which were used only in summer and were empty in winter, so had to make no provisions to keep out frost. I do not want any sides to the covering. The sills resting on top of the wall are also the plates, or rather they are the plates, and there is no sill. I would be much pleased for any suggestions in regard to the above from any of the practical readers of the paper. Economy of cost must be considered as much as is consistent with the conditions.

WHAT BUILDERS ARE DOING.

CONDITIONS in the building lines in and around Buffalo, N. Y., are not exactly what would be designated as of a boom order, but considered as a whole they are most satisfactory. A number of large business blocks are being constructed, several factory buildings are under way and numberless flats and houses, both frame and brick, are in process of erection. There is an especially good demand for frame houses in and around the Lackawanna Steel Company's plant. Rents out there are high, and it may be stated as a fact that rentals have advanced about 10 per cent. the past year. Builders generally seem to be of the opinion that not in a number of years have so many prospective buildings been figured as during the past season. Many estimates ran considerably higher than the owners expected they would, so the plans had to be revised. It is evident that the high prices of labor and materials affect the business to some extent, and there is a marked sentiment against allowing the pay of building craftsmen being advanced any higher than the present scale. The labor situation, generally speaking, is quite satisfactory, there being no strikes or disturbances of any kind and no particular dearth of workmen.

According to the figures of Deputy Building Commissioner Henry Rumrill, Jr., there were 204 permits issued in June for building improvements estimated to cost $951,894, these figures comparing with 146 permits for building improvements estimated to cost $285,441 for June of last year. For the first six months of the current year there were 957 permits issued, calling for an estimated expendtiure of $3,281,864, while for the first half of 1902 there were 965 permits issued for building improvements, aggregating an estimated outlay of $1,936,350.

Cincinnati, Ohio.

Building operations in the city have been very active during the first half of the year, the 1313 permits which were issued for building improvements calling for an estimated outlay of $2,757,830. This was a slight increase in the value of the improvements as compared with a year ago, although the number of permits are slightly less than at that period, when 1334 were issued, calling for improvements estimated to cost $2,516,270.

The high prices of materials entering into the construction of buildings is being felt by those contemplating new improvements, in consequence of which many projected buildings have been indefinitely postponed, if not altogether abandoned The larger portion of the work now under way is confined to several large office and flat buildings. Labor troubles have not been of such a nature as to appreciably restrict operations in building industry, and it is the opinion of those best qualified to judge of the situation that an upward tendency in building operations may be expected in the early part of the fall.

Cleveland, Ohio.

During the first half of the year building operations in Cleveland were seriously interrupted by the brick makers' strike, which has just been brought to an end after a six weeks' struggle. The manufacturers refused to grant the demands of the men for a horizontal raise of 25 cents an hour, and for a time the outlook was very threatening. The men decided finally to return to work without an advance in wages, and matters are again running smoothly, although the damage done to the season's business is considerable. The last half of the year promises a large volume of business well distributed among the various classes of buildings. There are at present no labor troubles in the city, as both contractors and workmen are apparently satisfied to continue operations on the present basis.

According to the figures of the Building Department there were 302 permits issued in June for buildings estimated to cost $870,476, as compared with 283 permits for building improvements costing $566,955 in June of last year. The figures for the first six months of the current year show that 1576 permits were issued for improvements estimated to cost $3,606,236, as against 1641 permits issued for improvements costing $2,831,540 in the first six months of 1902.

Detroit, Mich.

There has been a slight increase in the volume of building in the city during the first half of the current year, as compared with the corresponding six months of 1902, yet it is stated that workmen are more plentiful than they have been heretofore at this season of the year for some time past. Architects are not being overworked, and much of the building that is in progress consists of frame dwellings, ranging in cost from $1000 up to $2000.

During the month of June 317 permits were issued for building improvements, estimated to cost $561,200, these figures comparing with 240 permits for new buildings and additions, estimated to cost $524,700, for June of last year. Taking the first six months of the current year, we find that 1691 permits were issued for new buildings and additions, estimated to cost $3,453,200, as against 1321 permits for building improvements, costing $2,859,200, for the corresponding period of last year.

Kansas City, Mo.

Considering the damage done by the recent floods in this section and the depressing effect for a time on all lines of business, the building outlook is very flattering. Architects report more business than they can handle at the moment, and, according to Superintendent of Buildings McTernan, the chances are that the report of building operations for the next six months will show a volume of business far in excess of that of the corresponding period of last year. Prior to the floods the unsettled attitude of labor had a depressing effect on building operations, but the deluge seemed to have had the effect of obliterating these, and now the only thing of which complaint is made is the scarcity of labor in all branches.

For the first half of the present year there were issued 1798 permits for building improvements, estimated to cost $4,258,685, as against 2041 permits for improvements, costing $3,316,408, in the first six months of 1902. The major portion of the work this year is confined to dwellings. the percentage of classification being about 60 per cent. residences and 40 per cent. structures for business purposes.

Lowell, Mass.

The general feeling among contractors and architects seems to be that the building business will about reach in volume that of last year, although it is probable that the strike in the cotton mills interfered to a more or less extent with building operations. The addition to the Lowell Textile School is well under way, the contract having been awarded to Charles B. Conant, who has also the contract for the erection of a $10,000 residence and a block of five stores. The contract for a new office building and mill, measuring 40 x 118 feet, and a storehouse, 76 x 100 feet. for the Appleton Company has been awarded to C. H. Nelson, who also has charge of the new building of the Young Women's Christian Association. The contract for the new schoolhouse at Wigginsville has been awarded to C. F. & J. B. Varnum. The mason work will be done by W. H. Fuller. Several residences and more or less alteration work are in progress.

The members of the Builders' Exchange held their annual outing on Thursday, June 18, the objective point being Canobie Lake. A special electric car left Merrimac square at 11.30, taking about 75 members and their friends to the park bordering the shores of the lake. An excellent dinner was served in a large tent, which was pitched for the occasion, Col. George A. Ripley being master of ceremonies and Mayor Charles E. Howe the guest of honor. After the dinner all adjourned to the ball field, where a most exciting game was played and other athletic sports indulged in under numerous instructions from the aged and infirm members on the grand stand. The party returned to Lowell on their special car, arriving home at 7 o'clock, well satisfied with the admirable manner in which the committee having charge of the outing had discharged their duties. The special committee consisted of Frank L. Weaver, chairman; James Whittett and Charles F. Varnum. The Committee on Sports was made up of Herbert R. White, chairman; T. F. Costello, W. F. Farrell, A. J. Ryan and J. P. Walsh.

Los Angeles, Cal.

The number of permits issued during June by the City Superintendent of Buildings was 464, and the improvements authorized a cost of $941,028. In June, 1902 the number of permits was 325, and the improvements authorized involved an outlay of $784,316. In June, 1901, the number of permits was 192, and the improvements cost $281,467.

For the six months ending June 30, 1903, the total number of permits issued was 2790, the improvements authorized amounting to $6,418,663, while for the first half of 1902 the number of permits issued was 1966, and the improvements authorized were estimated to cost $3,823,182. For the first half of 1901 the number of permits was 1134; the improvements authorized, $1,717,953. For the corresponding period of 1901 the number of permits was 936, and the improvements $1,090,949.

Milwaukee, Wis.

According to Inspector of Buildings, Michael Dunn, there is more building going on in Milwaukee and immediate vicinity at the present time than was the case a year ago. The greater portion of the work is in connection with buildings intended for business purposes, although there is an active demand for dwellings, and Milwaukee is putting up a large number of flat buildings. The advance in the cost of labor and materials has not in the opinion of those competent to judge of the situation appreciably interfered with the building business.

For the first six months of 1903 there were 1359 permits issued for building improvements, aggregating an estimated cost of $4,305,318. These figures compare with 1070 permits for building improvements, costing $2,705,072 in the corresponding six months of last year.

New Bedford, Mass.

Figures issued from the office of the Inspector of Buildings show that for the first six months of the present year there was a notable increase in the number of new dwellings, as compared with the corresponding period of last year. The entire number of permits granted was 306, calling for building improvements estimated to cost $963,750. The number of permits for new dwellings was 137, estimated to cost $425,000. There were five permits for buildings for manufacturing and business purposes, four for buildings for religious and charitable purposes, and 50 permits for miscellaneous structures. The number of permits granted during the first six months of 1902 was 267, covering improvements estimated to cost $1,293,192. Of these 81 permits were for new buildings estimated to cost $219,300. The aggregate last year was greatly swelled by the Butler mill and the Whitman mill addition.

New Orleans, La.

A considerable degree of activity prevails among architects and builders in the city, the monthly report of the Mechanics', Dealers' and Lumbermen's Exchange showing an increase for June of 40 per cent. in the building improvements as compared with the same month of last year. The percentage of increase in the value of the improvements is of the same highly gratifying character. There are at present in contemplation a new schoolhouse to be erected for the Jewish Widows' and Orphans' Association; a new cotton mill to be erected in the Sixth District and plans have been drawn for additions to the old mill, all the work being designed by Favrot & Livandias, architects, of that city.

Pittsburgh, Pa.

The Builders' Exchange and the Builders' League of the city have applied for a charter for a corporation, which will include both associations, and the court has set July 25 as the date for a hearing. The style of the new organization is to be the Builders' Exchange League of Pittsburgh, and the by-laws call for a president, a secretary and treasurer, who with four representatives of the Master Builders' Association and two representatives from all other associations holding membership will constitute the Board of Directors. General meetings are to be held the first Wednesday of January, April, July and October, but should any of these fall on a legal holiday the meeting will be held on the following day. Any association or organization whose business of its members relates to contracting, manufacturing and dealing in material for the construction of buildings may become members of the corporation, as well as persons or firms having no association of their trade.

The Builders' League will move its headquarters to the Builders' Exchange rooms at 409 Market street, and is to take active measures toward organizing an international body of master builders, which, it is hoped, will be in shape to begin business by the first of the coming year.

The first annual banquet of the Master Builders' Association was held in the Union Club on Thursday evening, June 25, covers being laid for 125 guests. The early portion of the evening was devoted to a consideration of a choice *menu*, served under the personal direction of H. F. Krafts, manager of the club. The toastmaster of the evening was H. R. Rose, president of the Builders' League, and in a pleasing introductory address George W. Miller was called on to present on behalf of the association a gold watch charm and chain to Captain Thomas J. Hamilton, who for the past 17 years has served the society as secretary, but who has recently resigned his position. William T. Powell, president of the Master Builders' Association, was then called upon and spoke of the organization, his remarks commanding the closest attention on the part of those present. The toast, "The Relation of Employer and Employee," was responded to by D. F. Crawford, while Adam Wilson, senior member of A. & S. Wilson Company, told of some of the difficulties with which the master builder has to contend in his daily experience. One of the most humorous speeches of the evening was made by John H. Heisch, whose toast was "Sociability," he being followed by W. H. Stevenson, who told of the trials and tribulations of the "walking delegate." George Hogg of Braddock offered some interesting comments in responding to the toast, entitled "A Few Remarks." The banquet was a most enjoyable affair in every way, and we understand that it is to be an annual event hereafter.

The report of the Allegheny Bureau of Building Inspection for June shows a greater volume of operations than for a similar period in many years. There were 65 permits issued for building improvements, estimated to cost $256,000. Of the permits issued, 46 call for the erection of frame and 13 of brick dwellings. There were five permits for brick veneer houses and 23 for additions to or alterations in old buildings.

Portland, Ore.

The ending of the big strike has caused a radical improvement in building matters in Portland. Construction upon the large buildings, which had been suspended for weeks, began again about June 1. Now that lumber is being delivered freely construction of frame buildings has taken a fresh start, and workmen can now be seen upon buildings which have not progressed a foot for many weeks previous. Brick and paint are also available once more. The scarcity of labor is the most serious problem now before the builders. Many workmen left during the strike for San Francisco and elsewhere, where building was active, and it will be many weeks before the normal supply of labor is to be had. On the downtown structures especially work is now being pushed with vigor, as tenants are anxiously waiting for the chance to move in. Some of the buildings should have been finished in the fall, and the tenants had made arrangements to vacate their old quarters. In projected and new buildings, modern residences and flats constitute the bulk of the work.

San Francisco, Cal.

Construction work for the first half of 1903, in spite of high wages and advanced cost of material, which is said to have caused the postponement of much building of the larger sort, compares favorably with the corresponding period of last year. For the first six months of this year the contracts numbered 786, amounting to a total of $7,144,220, against 800, amounting to $6,090,660, in the first half of 1902. For the past six months the number and amount of the building contracts have been as follows, the light reports for the two opening months being due to the strike of the bricklayers and hod carriers, which then prevailed: January, 97 contracts, valued at $889,163; February, 86, valued at $642,645; March, 166, valued at $1,081,983; April, 139, valued at $1,059,172; May, 154, valued at $2,039,326; June, 144, valued at $1,431,931. Total, 786 contracts valued at $7,144,220.

It is noticed that work which was delayed earlier in the year, either because of the strikes or the difficulty in obtaining prompt delivery of structural material from the East, is now being pushed forward with all possible speed. Instances are the new Flood Building and the Italian-American Bank. Large capital is, however, holding back from construction in the hope that next season the cost of building will be less than at present, and the offices of many architects are less busy than was the case 12 months ago. A fair amount of new building is announced for midsummer. An apartment house of 100 rooms is to be built by John Wilson on the southwest corner of Pacific avenue and Broderick street, at the cost of $75,000. Each apartment will consist of living, dining and bed rooms, a kitchen and a bathroom. The basement will contain recreation and billiard rooms, &c., and a special dumb waiter will run from the basement to each of the apartments. Henry Kahn intends to add a story of 68 rooms to the former Mercantile Library Building, on the northeast corner of Van Ness and Golden Gate avenues, When completed the building will contain 125 offices.

St. Louis, Mo.

Building operations in the city continue to be of fair volume, although they have undoubtedly been curtailed to some extent on account of the high prices of labor and materials. There is no notable change in the situation as compared with a month or two ago, but work is going steadily forward on the $1,000,000 hotel, for which a permit was taken out in April, and on a couple of mercantile buildings, estimated to cost in the neighborhood of $900,000. The months of May and June this year witnessed a decided falling off, as compared with the same months last year, in the amount of building in progress, although the total for the first six months makes a very gratifying comparison with the figures for the corresponding period of 1902. In June of that year the value of the building improvements contemplated was $1,614,902, while for June of the present year the estimated cost of the improvements for which permits were issued is given as $747,660.

Taking the figures of Commissioner of Public Buildings G. U. Heinburger, we find that for the first six months of the current year there were 553 permits issued for new brick structures, estimated to cost $6,833,614, and 765 permits issued for new frame buildings, to cost $233,814. Figuring in the additions, repairs and alterations to frame and brick structures, brings the total estimated outlay for the six months to $7,848,910. For the first six months of 1902 there were 646 permits issued for new brick work, estimated to cost $5,395,897, and 725 permits for new frame buildings, costing $231,746.50, which, with the additions, repairs and alterations effected, makes the total $6,531,439.50.

Note.

Papers incorporating the Terre Haute Builders' Exchange were recently filed with the Secretary of State of Indiana. The directors given are William Alder, Edward D. Chadwick, Andy J. Gallagher, Charles Miller, Richard D. Roberts, A. Nicholas Smith, Fred. A. Arleth, Samuel L. Fenner, Charles Hoff, John Morrison, Abram W. Ravell, William H. Barr, August Fromme, Ross McDonald, Thatcher A. Parker, and Ewald E. Reiman.

HEATING AND VENTILATING AN OFFICE BUILDING.

THE subject indicated by the above title is one of never ending interest in these progressive days, and the particulars which are here presented relative to the heating and ventilating of a two-story and basement office building recently erected by a manufacturing concern in Detroit, Mich., are likely to prove of suggestive value to the architect and engineer, who are frequently called upon to design work of a similar nature. The building is faced with standard size paving brick in various shades of brown, laid in dark mortar and with Flemish bond. The trimmings are of buff Bedford limestone, producing a very pleasing and effective combination. The windows are of plate glass and have been arranged to give the best possible lighting effect, especially in the drafting department. The first floor, Fig. 1, is occupied entirely by the different commercial departments, while the second floor is used by the engineering and drafting departments. The basement is used for the storage of catalogues, letter files, &c. A small building on the roof is the blue print and dark room, being located in that position to secure the best light for sun printing.

The interior finish of the building is of rich design and pleasing effect. The first story is finished in Flemish oak with natural oak floor. The second story is finished in stained Louisiana cypress with maple floor. The decoration of the library and consultation room on the first floor is quite elaborate, although in keeping with the general design of the building. It is finished in Flemish oak, the floor being of dark polished oak. The 6-foot paneled wainscoting, decorative frieze and wood cornice give a very rich and attractive finish to the room. The furniture is of dark oak.

The main interest in the equipment of this building is in the mechanical system of heating and ventilating. As the manufacture of heating and ventilating apparatus forms a large part of the business of the concern, the American Blower Company, this part of the office equipment naturally received due attention. The apparatus is located at one side of the basement, as shown on the plan, Fig. 2. The fresh air enters the building through the basement window F and by means of the fan A is drawn over a coil of pipes, E, called the tempering coil. The steam pipes in this tempering coil are just sufficient in number and length to heat the volume of entering air to a temperature of 65 or 70 degrees F. The fresh air is then drawn into the fan and forced over another heater, D. This is the main heater and is designed to heat the air to about 140 degrees. Beyond the heater is located a large brick chamber, G, called the plenum chamber. This serves as a reservoir for the heated air, and from this chamber the air is conveyed by galvanized iron pipes, H, to the various offices. Under the main heater D is a passage or by-pass, which permits a part of the air from the fan to pass under the main heater coil and into the plenum chamber. This passes into the lower section of the plenum chamber, which is separated from the upper part. Thus the plenum chamber is divided into two parts, as shown by Fig. 3, the upper chamber containing hot air at approximately 140 degrees and the lower section tempered air at 70 degrees. As shown by this drawing, each individual pipe leading off to the offices above has two connections to this plenum chamber, one branch to the upper section and another to the lower. In each main where the pipe divides into these two sections there is located a set of double swinging dampers or mixing dampers. Each set of these dampers is controlled automatically by a diaphragm valve, shown on the outside of the pipe. These automatic valves are part of a system of automatic heat control, which was furnished by the Johnson Electric Service Company of Milwaukee, Wis. These valves are operated by compressed air, which is supplied by a small air compressor located in the basement. This compressor works by city water pressure and delivers air at about 15 pounds pressure.

The system of temperature regulation is as perfect in operation as it is simple in principle. In each office is located a thermostat which can be set to control the room temperature at any desired point. These thermostats work upon the principle of the unequal expansion and contraction of brass and steel. They are all connected by head pipes, of about ⅛-inch bore, with their respective diaphragm valves. On the expansion or contraction of the parts of the thermostat air pressure is admitted or cut off from the diaphragm valve and the mixing dampers are swung one way or the other, as the case may be. It will be noted that these mixing dampers in swinging do not cut off the flow of air, but simply vary the proportion of hot and tempered air as controlled by the thermostat to maintain a constant temperature in the room. Thus a constant flow of pure air of the proper temperature is maintained at all times. Under the tempering coil there is also a by-pass similar to the one under the main heater. This by-pass is fitted

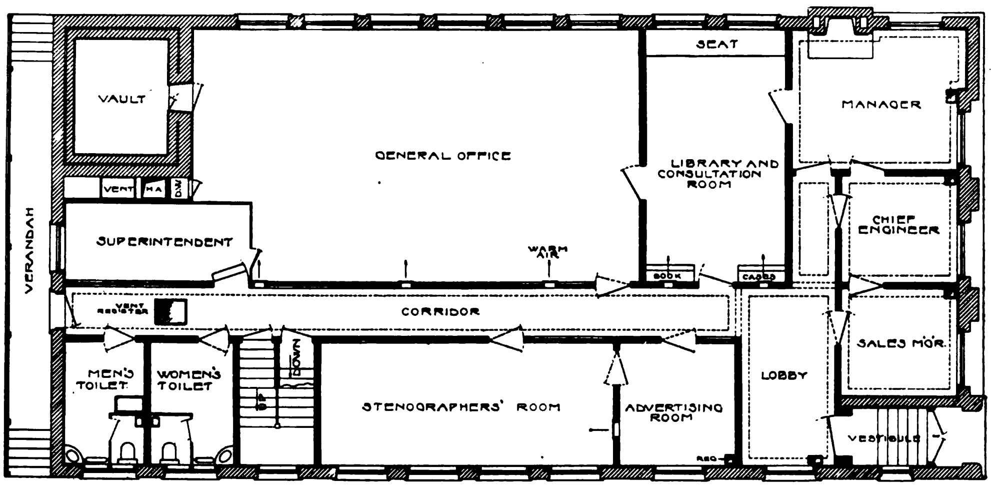


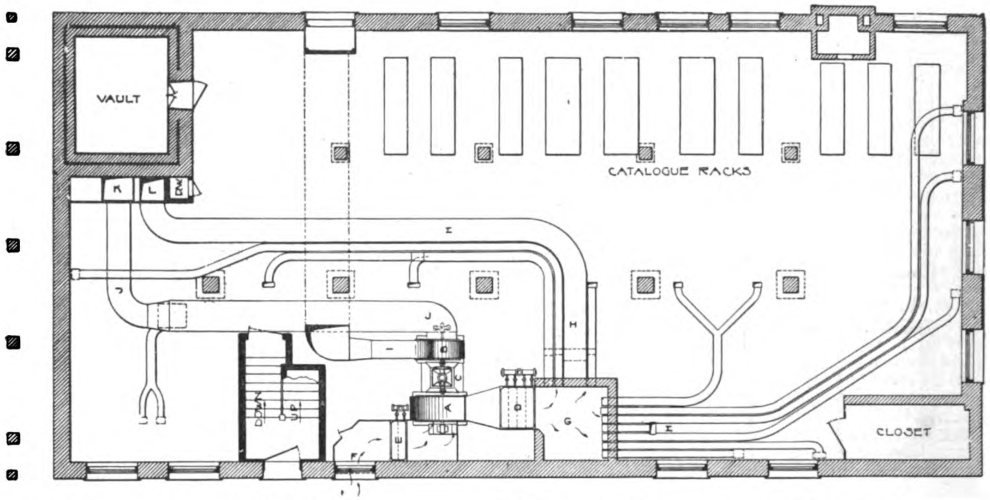
Fig. 1.—Plan of First Floor.

Heating and Ventilating an Office Building.

with a swinging damper, which is controlled by a thermostat placed in the upper part of the plenum chamber. Thus if the air in the plenum chamber becomes too hot the thermostat opens the damper under the tempering coil and allows the entering air to pass under the tempering coil, instead of through it. The air is admitted to each room at a point about 8 feet above the floor. As shown in the cut, the fan is operated by a direct connected vertical engine. This engine is also the company's own make and is specially designed for this class of work.

Another unique feature of this plant is the exhaust fan, which is direct coupled to the same engine which runs the heating fan, and which draws the impure or vitiated air out of the building. Thus while one fan is discharging pure warm air into the building the other fan on the same shaft is drawing out the impure air. This is the main feature of mechanical ventilation which has brought it into such general favor during the last few years for use in public buildings.

In each office on the first floor is located an ornamental register face at the floor line, opening into the corridor which extends through the center of the office. The air is thence drawn down through the large register in the floor at the rear of the corridor and after passing through the exhaust fan is forced outside the building. The air from the drawing room and second-story offices is drawn down through the flue at side of vault.



A. Plenum fan.
B. Exhaust fan
C. Engine.
D. Heater coil.
E. Tempering coil.
F. Fresh air inlet.
G. Plenum chamber.
H. Warm air distributing pipes.
I. Exhaust discharge duct.
J. Exhaust inlet duct.
K. Vent flue.
L. Warm air flue.

Fig. 2.—Basement Plan, Showing Position of Equipment.

Heating and Ventilating an Office Building.

Only one thing remains to be mentioned, and that is the economy of this system. As the heating coils utilize the exhaust steam from the factory engine, which is brought into the basement through an underground conduit, and as the fan engine exhaust is also turned into the heater coil, the cost of operating the system is practically nothing, as only steam that would otherwise be wasted is used, and without back pressure.

The condensation from the heating apparatus is returned to a Webster feed water heater located in the engine room of the factory, by means of the Webster vacuum system, which was furnished by the American Engineering Specialty Company of Chicago. This same system handles all the condensation from two other heating plants located in the factory. The advantage of this vacuum system is that it eliminates the back pressure from the factory engine, when using exhaust steam for heating, and also removes the air from the heating coils and connecting pipes as fast as it accumulates, thus making the heating surface far more effective than it otherwise would be.

Contracts Made by Architects.

A matter of great importance to architects has been decided, not for the first time, in an English court. A Mr. Arber, a well-known English architect, was engaged in the construction of a theater. In the course of the work it was found necessary to add a porch, which had a certain amount of metal work in it. The architect wrote to a firm of metal workers, and received a reply, and in accordance with this correspondence ordered the work done. Later, the metal workers sued the architect for the value of the work furnished on the porch. The judge gave a decision at once in favor of the architect, saying "the sole question was whether it was the intention of the parties that there should be a contract between them." In answering that question he went by the plaintiffs' evidence alone, without paying any attention to that on the other side; and it was obvious, by the testimony of the metal workers themselves, that they knew that Mr. Arber was acting as architect on behalf of some one else; and the evidence contained nothing to show that there was any intention or understanding that he should be considered otherwise than as the architect, or that he should be personally liable. If the plaintiffs wished to know the name of the principal for whom Mr. Arber was acting, it was their business to inquire. In commenting upon this the *American Architect and Building News* points out that this case puts very concisely the view of the law in regard to contracts made by architects in behalf of their clients, a view which, it is needless to say, has been upheld in many decisions; so that architects who order, for their clients, work or materials from people who know them to be architects, acting for other people, need not be at all alarmed by the threats which are often made to hold them personally liable. The claim sometimes made that the architect should say for whom he is acting, if he desires to protect himself from liability, is entirely groundless. It is the dealer's duty to ask about this if he desires to know, not the architect's to inform him; and, unless fraud or collusion between the architect and his client could be proved, it would be practically impossible to enforce any liability on the part of the architect. At the same time, the ordinary practice of architects, of giving all dealers a wide berth who insist on making out their bills to the architect or in other ways attempting to influence him, is a wholesome one, and it may confirm the courage of young and timid architects who fall into the hands of such people to know that their threats cannot be carried into execution.

Geometry for Masons.

Although the simpler operations in preparing blocks of stone for building purposes may be performed by the careful use of the tools usually provided, none of the intricate forms required in the details of architectural construction can be successfully worked out or produced with certainty so as to avoid the clumsy wasting of material without application to the elementary rules of geometry. The square and the straight edge will indeed enable the mason to reduce his blocks to level faces, and to render these parallel or rectangular as desired; but they will not enable him to strike out correct curves, to determine the alterations produced in regular or irregular figures by their transference to planes at various angles.

For these, and indeed nearly all the problems he will be required to solve in working out each portion of the general designs upon the individual block, the mason must refer to the rules of practical geometry, and in proportion to his own practical acquaintance with them will he be able to apply, and if necessary, combine them, so as to arrive at the particular solution he desires. For measuring and laying down angles the mason uses a bevel, says a writer in the *Stone Trades Journal*, which consists simply of two legs or sticks jointed in the manner of a 2-foot rule, but so that each leg may pass freely over or within the other, and thus form obtuse or acute angles with it. They should work rather stiffly or have a clamp screw for fixing the bevel to any desired opening without danger of disturbance. Some bevels are furnished with an arch, on which the degrees of the circle are graduated, and by which any desired angle may be correctly ascertained.

Besides the compass for describing circles the trammel is a useful instrument, by which the mason describes ellipses for arches, &c. This consists of two pieces of wood fixed together at right angles to and crossing each other. These have slits cut nearly throughout their whole length, in which two pins or studs, attached to a separate stick or piece of wood, may be moved along. The studs are capable of adjustment in their relative positions on the piece to which they belong. A pencil or pointer at the other end of this piece will describe true ellipses, the proportion of the axes of which depends on the position of the studs.

Besides the square for setting out right angles up to two feet or three feet in length of side, the long square or level is used in trying long lines. This is provided with a plumb-bob, or weight of lead or brass, &c., suspended by a string for indicating when the upright part of the level is vertical, and the long frame, which is fixed truly at right angles with the upright part, is consequently truly horizontal or level. This instrument is sometimes furnished with a spirit level, by which a horizontal level may be ascertained independently of the plumb-bob.

For testing the uprightness of the work a plumb-bob is used which consists only of the bob or weight suspended by a string from the top of a strip of wood. This strip is of exactly parallel width throughout, and the point of suspense of the bob and the gauge mark below are exactly in a line with each other and equidistant from the edges of the strip.

Particular sectional forms, for which many blocks have to be prepared, are the most readily and truly manipulated by using molds or templates. Zinc is a very suitable material from which to cut these templates. An exact correspondence in form of the surfaces which, when combined, are jointed together and required to coincide, is thus secured, the only thing necessary to secure this being that the mason shall mark the outline of his template or pattern correctly upon the leveled surface of the block and direct his chisel accordingly.

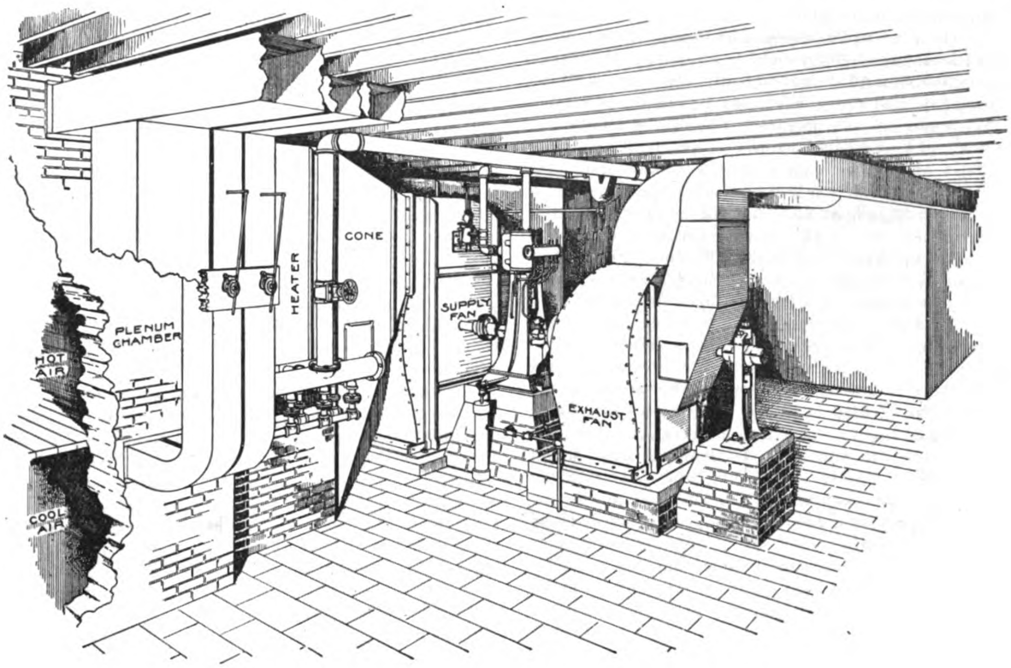


Fig. 3.—View in Basement.

Heating and Ventilating an Office Building.

It is stated that the only log house in England is at Ringwood, in Hampshire. The owner of the house is said to have conceived the idea of building such a residence when at the Chicago Exhibition. The house is built altogether of Oregon pine, and is designed exactly on the lines of an American log house. It was put up for auction some time ago, and during the bidding a gentleman inquired if such a building was not very likely to be burnt down. The auctioneer, however, assured him the wood was so hard it would not burn, and as a matter of fact the house was insured at a very low rate.

ARCHITECTURE FROM A BUSINESS STANDPOINT.

IN commenting upon the significance of the changes which the past quarter of a century has witnessed in the practice of architecture, and whether the younger men who are coming into the profession every year realize the import of the tasks which are to be imposed upon them, a writer in a recent issue of the *Brickbuilder* says:

The architect of the past generation was a man of relatively limited opportunities and the demands upon him were far less than what is now expected of an ordinarily good draftsman. It is very easy to misunderstand the architect's work of to-day and to misinterpret the popular demand, but if there is any one quality which seems to be imperatively required of a successful architect with even ordinary practice it is business ability.

Of course business ability by itself does not mean success any more than does constructive or designing ability, but an architect must be a ruler of men. He, in the very nature of his calling, is obliged to decide quickly and promptly questions involving not merely large amounts of money but principles of justice and equity, and frequently matters which involve very fine law points as well. He must be the business manager for his client, and the thousands of dollars which are disbursed through him must be expended economically, and yet with no false economy, and every cent must be rigidly accounted for. We know of one architect who for a number of years has had an average business of nearly $100,000 per day. That amount of money he has to disburse. He must see that a dollar's worth of work is returned for a dollar's worth of money, and that the accounts are kept straight, and that the work itself is carried forward in a prompt and businesslike manner. Of course an amount of business of this kind is extraordinary, but there are a great many architects whose business has run up to $5000 a day, and to properly care for a business of this sort requires more than ordinary business ability.

This is the very point upon which our present systems of architectural education are weak. Our students are most thoroughly drilled in design, and often in exacting requirements of science. Then their practical experience is usually limited to toiling over a drawing board in an architect's office, where, to be sure, they see tangible results but almost nothing of the business machinery which is so important a factor in the production of these results. Consequently, when the young man starts in business the chances are ten to one that his business training will be wholly inadequate to large and sudden responsibilities. When the emergency arises he will often be found wanting, and it is this fact more than any other single feature which causes real estate men, builders and property owners to be distrustful of architects' figures and methods. There are many exceptions to this list and there are architects who are the keenest and shrewdest of business men, but the fact that they are exceptions shows that the rest are far below them, though it also shows what an architect might be.

So far as we know there has never been any attempt made in the schools to teach the business of architecture. We are not saying that it would be altogether practicable, but that it is desirable cannot be questioned for a moment. We cannot go backward. The scope of the profession has enlarged, and the individuals must enlarge with it or take a back seat. In business habits the builders as a class are far more fitted for their work than the architects. We do not believe this state will continue; methods will crystallize, will become better known, and the architects of future generations will profit by our own failures and our own shortcomings, but in the meantime the architect is at a constant disadvantage. The dreamy idealist who cannot bring his mind to practical dollars and cents is just as far astray as the shrewd, smart, hustling business architect who despises art. Neither is the right sort, but a combination of the two interests is not only imperatively necessary, but it is bound to come about in the course of a very few years. There are too many intelligent men in the profession to-day studying and working hard and thinking of how they can best, most successfully and most economically carry out their business to let the problem stay long unsolved by the great majority; and just as the few are now so well equipped from a business standpoint, so will, in a few years, the profession as a whole rise to the imperative demands for shrewd, hard common sense allied to the creative ability and the constructive, scientific execution.

The lack of good business ability is, to our mind, the most serious shortcoming of the profession to-day and one of which the continuance will entail the gravest dangers. It is perfectly possible to imagine a combination of keen, sensitive, well balanced artistic ability with shrewd, practical, common-sense business methods. Such a combination is extremely rare; but it is the rare combinations which succeed in this world, and the architect who ignores the fact that his art is also a most exacting business is pretty likely one of these days to find himself in with the majority of the unemployed.

LAW IN THE BUILDING TRADE.

OWNER MAY RECOVER DAMAGES WHERE FINAL CERTIFICATE HAS NOT BEEN GIVEN.

A contract for the construction of a building provided that payment should be made in five installments, four as the work progressed and the fifth 15 days after the building was all complete, delivered and accepted, said payment to be made on the certificate of the architects, "said certificate to be final and conclusive that the work done warranted said payments." The contract further provided that the work should be done in strict accordance with the plans and specifications, and that the building should be delivered clean, in good condition and complete, "it being understood that the works shall be at our (contractors') risk until accepted by you or your assigns as a whole." It was held that under such contract the owner was entitled to have the building delivered to him in good condition, completed according to the specifications, and that he was not precluded by certificates given by the architects for partial payments from setting up and proving in recoupment, in an action to recover the final payment, his damages sustained by reason of their failure to deliver it in such condition, whether the defects complained of were in work done before the last of the certificates was given or not, if the final certificate for final payment had not been given.—Blanchard *vs.* Sonnenfield, 116 Fed. Rep., 257.

MECHANICS' LIENS.

A manufacturer shipped material to a contractor on behalf of a local dealer, and it appeared that similar material went into the building. After the contractor absconded the dealer filed a lien for his claim. The owner after notice still had enough of the contract funds to pay the dealer, but paid other claims for which no lien notice had been given. It was held that such dealer's lien for material furnished was good.—Fruden Lumber Co. *vs.* Kinnan, 90 M. W., 515.

PRICE OF EXTRAS WHEN NOT FIXED BY CONTRACT.

Where a building contract is for the entire building at an aggregate price, and the price to be paid for extra work and material is not fixed therein, the cash market value of such work and materials is the measure of value and not the price paid for similar materials and labor under the main contract, which could only be computed by determining the value of the various materials used in the performance of the original contract in connection with the entire contract price.—Board, &c. *vs.* Gibson, 63 N. E., 982.

TIME OF PAYMENT WHEN NOT FIXED BY CONTRACT.

Where parties agreed to furnish all services and materials for placing a heating plant in a building, the materials and labor to be paid for by a certain schedule but no time was fixed for payment, substantial performance of the whole contract is a condition precedent to liability for the whole or any part of the consideration, the fixing of the prices on the different items not amounting to a severance.—Riddell *vs.* Peck-Williamson Heating Co., 69 Pac. Rep., 241.

APARTMENT HOUSE HOT WATER SUPPLY SYSTEM.

FIVE yars ago this system of hot water supply was known only to the few, and that, too, in the large cities of the country, but now, in this twentieth century, landlords find, when endeavoring to rent their apartments, that prospective tenants ask for all improvements, including hot water supply, steam heat, gas range, decorated ceilings, open plumbing, tiled bathrooms, &c. The installation of the hot water system does away with the old coal range and kitchen circulating boiler, as it is generally called, and one can readily understand how much cleaner the kitchen can be kept and how much space gained. Consequently in the city apartment house of to-day we find this system extensively used.

The proper erection of the system is of prime importance, as it is necessary that hot water be always at the faucet ready for use. This can only be accomplished when the circulating or return pipe is used. I am sorry to state, however, that the price obtained for this class of work in New York City, says Irving F. Seward, in a recent issue of *The Metal Worker*, seldom warrants plumbers or steam fitters in including this very necessary return pipe. For this reason I have omitted showing the same in the sketches presented herewith. Suppose we have a contract to install one of these systems, what shall we do? The first step would be to determine how many families occupy the house and the number, or average number, of persons in each family. If three, 25 gallons of water in the storage tank should be provided for each family, but if six a larger amount must be allowed. The character of the building will give a fair idea of the number of its occupants and about how much water will be used. Having determined the right size of storage tank, let us select a heater. We will assume the tank contains 250 gallons of water. We should have a heater capable of heating 300 gallons to a temperature of 180 degrees F. Why so large a heater, you ask? I ask you to remember the wash days. If the capacity of the heater in gallons is equal to that of the tank, what shall we do when all are drawing water for washing purposes? Again, let me explain more fully, if the Roebling Company made the cable for the new East River Bridge "just strong enough" for ordinary purposes, what would happen when the cars became blocked, as will be the case many times? If we stop to think we will select that size of heater and avoid going back to the job to install a larger one.

We now have the tank and heater. The next step is to set the tank. There are various ways of doing this, some preferring to use cast iron stands, some legs of wrought iron riveted on the sides, and others build brick piers or walls and place the tank in a horizontal position upon them. I will not try to describe the methods used as they are too numerous, but will pass on to the connections, where in general nearly all one's trouble lies. The accompanying sketches show correct and incorrect methods of making connections, and the table herewith gives the size of pipes necessary for connecting the heater with the tank. Fig. 1 shows the ordinary tank and heater properly connected, A being the hot water supply pipe to the various fixtures in the house, B the cold water supply pipe, C the return pipe from tank to heater and D the hot water or flow pipe. It will be seen that the same letters are used on all the sketches.

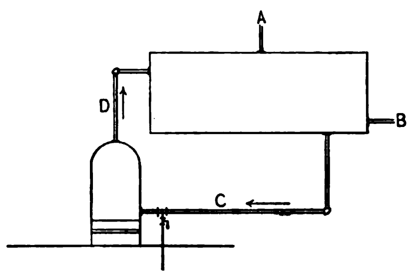


Fig. 1.—A Correct Connection.

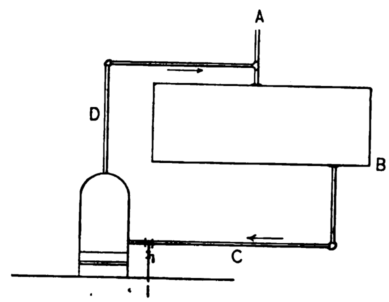


Fig. 2.—A Double Connection.

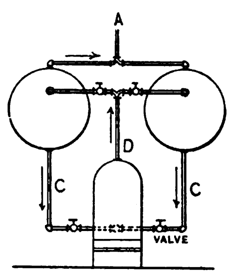


Fig. 3.—A Quick Heating Connection.

SIZE PIPE	TANK CAPACITY - GALLONS				
1¼"	150				
1½"		200	300		
2"			300	400	
2½"				300	500
3"				500	700

Apartment House Hot Water Supply System.

Very often the plumber finds one tank too small for the work and is compelled to use two, connecting them with one heater, and in Fig. 2 the proper connection is given. The gate valves shown with this connection are not absolutely necessary, but with their use should one tank leak it could be shut off and repaired and still not inconvenience the tenants to any great extent. In Fig. 3 a connection is shown that should never be used, as it is good for one purpose only—namely, to get hot water quickly after the tank has been entirely filled with cold water. Fig. 4 shows a connection that is used quite extensively, but the circulation is in one end rather than through the tank, thus taking longer to heat thoroughly than the connection shown in Fig. 1. In Fig. 5 the tank is set vertically and the connections made similar to those found between range and kitchen boiler. This method of connecting is to be recommended, but is seldom used, as the cellar ceilings are generally too low.

Having the tank and heater set and connected, they should be covered with a good nonconducting material, and I know of no better way than to use asbestos cement for the tank, heater and fittings and 1-inch air cell sectional covering for the pipes. This cement can be made to hold by covering the tank with wire netting, which will form an air space and retain the heat in the water. Covering, however, is not essential.

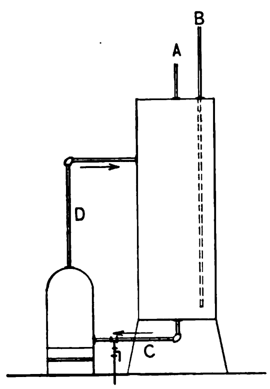


Fig. 5.—Connections to a Vertical Tank.

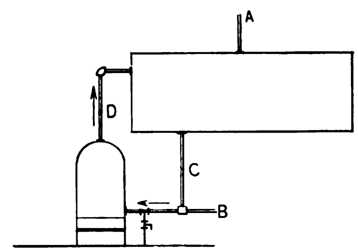


Fig. 4.—A Connection Giving Local Circulation.

Apartment House Hot Water Supply System.

Test of Slate and Vulcanite Roofs.

The question of a fire resisting roof is one which is of more than usual interest to architects and builders, and a short account of some experiments as to what style of roof will best withstand the action of fire may not be out of place at this time. The experiments which were made by the British Fire Prevention Committee, with a view to acquiring data on the subject, began at a temperature of 500 degrees F., gradually increasing to 1500 degrees, followed by the application of a stream of water for three minutes. The superficial area covered by each roof upon which experiments were made was about 100 square feet, the time allowed for construction being about four weeks. Quoting from the report, it may be stated that the slated roof was constructed of deal, the wall plates were 3 x 4½ inches, the rafters 2 x 5 inches, the ridge 1½ x 9 inches, the ceiling joist 2 x 4 inches, the slate battens ¾ x 2 inches, the gutter boards 2½ inches thick and the bearers 1 x 3 inches. The roof was covered with American green slate, 10 x 20 inches in size and 3-16 of an inch thick, with a 2½-inch lap, and each slate was nailed with two zinc nails. The ridge was covered with blue Staffordshire ridging. The laths were sawn spruce ¼ x 1¼ inches.

The vulcanite roof was also of deal, its wall plates being 3 x 4½ inches, the joist 2½ x 7 inches, the boarding 1¼ inches thick and of 4-inch widths, grooved for iron tongues. The hoop iron tongues were ⅞ of an inch wide and the angle fillet 3 x 4½ inches. The vulcanite roof covering consisted of asphalted felt in three thicknesses, laid with broken joints, cemented together with a composition termed "Vulcanite," which was brought to a plastic state by being heated in a kettle and applied to the asphalted felt with a brush. The edges were turned up against the angle fillet and covered with a flashing of No. 14 gauge zinc. The top of the vulcanite roofing was covered with a layer of gravel and sand 2½ inches thick. The laths were sawn spruce ¼ x 1¼ inches.

In the case of each roof the first coat of plaster consisted of coarse stuff composed of lime and sand in the proportion of 1 to 3, mixed with a proportion of hair and a small admixture of plaster of paris in the ratio of 1 to 16. The second coat was of the same material, finished fair, the total thickness of plastering being about 1 inch. After the ceilings were completed a salamander was lighted in the chamber for a day to assist in drying the plaster, after which the roofs were then covered with tarpaulins for 25 days.

When everything was ready for the tests the gas was lighted in the inside chamber in each case, and in 13 minutes the plaster began to fall in patches from the slated roof, half of it falling in 16 minutes. In 42 minutes after the gas was lighted the first slate fell, followed by others in rapid succession, and in 48 minutes the roof collapsed. In one hour from the beginning of the test in each case the gas was extinguished and the test closed.

In the case of the vulcanite roof it was 40 minutes before the plaster began to fall, and 54 minutes before the underside of the flat surface was a sheet of flame.

Observations on the outside of the slate roof showed smoke issuing from the under cover flashing of the gutter one minute after the gas was lighted, and in 5 minutes it was issuing through the joints of the slating. In 19 minutes the smoke became so dense that the slates could be seen only at intervals, many being cracked and broken; in 27 minutes from the beginning of the test flames were visible, and in 46 minutes the rafters began to fall.

In the case of the vulcanite roof it was 27 minutes before any smoke was visible, and then only slight, and ten minutes later it was issuing from under the flashing all around, while one minute before the test closed the smoke was dense and continuous.

Two minutes after the test closed water was applied and turned off in three minutes. The same day observations showed the slated roof to have been entirely consumed, only the charred remains of the wall plates being in position. In the case of the vulcanite roof it was sufficiently sound to be walked and jumped upon, the fire not having eaten through it. The gravel and sand were cleared off for about a square yard and the vulcanite covering removed. This was found soft and pliable but otherwise unaffected by the fire. The top of the boarding was also clean, and a portion being cut out the underside was found burned through to the iron tongue, except where it passed through the wooden joist. The next day no plastering remained in position and the joists of the flat surface were reduced to a size 1⅝ x 6 inches and the boarding to ⅜ inch.

A Skyscraper in Miniature.

An office building which will take rank as occupying the smallest area, considering its hight, of any ever constructed is now being designed for the northeast corner of Exchange place and New street, New York City. The idea is to improve this plot with an 18-story structure of the French renaissance type of architecture, the treatment of the building to be as free and open as possible. It will have a frontage on New street of 46 feet and on Exchange place of 26 feet, and will be the smallest skyscraper as regards area covered in the city. The first story above the street level will be of granite, with a column portico on the New street side, where the entrance to the building is to be situated. One of the noticeable features will be a French mansard roof of copper. By reason of the exceptional light facilities which it will enjoy, it will be known as the Daylight Building. The plans are now being prepared by A. W. Brunner of this city, for William F. Havemeyer and Frank W. Savin, who are the owners of the two small buildings now occupying the site.

Attitude of Employers and Labor Unions Toward Trade Education.

One of the most interesting portions of the volume on "Trade and Technical Education," recently issued by Carroll D. Wright, United States Commissioner of Labor, is the chapter devoted to the attitude of employers of labor and labor unions toward trade education. The opinions are presented, in a condensed and summarized form, of employing proprietors of establishments in a number of leading industries, of graduates of trade and technical schools, and of officers and members of labor unions, as gathered in direct personal communication with responsible representatives of the various interests by agents of the Federal Labor Bureau.

As would naturally be inferred, the attitude of the employers and that of labor unions toward trade schools differed essentially, the former class generally favoring these institutions, while the unions, in most cases, are opposed to them. This is not an invariable rule, however, for the unions in some trades are shown to be not only tolerant of but even favorable to this form of trade education, provided that it is offered as a means to an end, that is to supplement, the knowledge gained by the young workman in his daily work in the shop, and not as the end itself—that is, with the view of turning out a finished workman. It will be of interest to our readers to briefly cite the views of persons connected with some of the trades represented by *Carpentry and Building*, as they are given in the Labor Commissioner's report.

Views of Employers.

The trade schools at present in operation cater most largely to the building trades; therefore, the opinions of the employers in these trades are of importance. The necessity of having a ready supply of first-class workmen is perhaps nowhere more important than in certain trades of the building industry, and any system of instruction that holds promise of increasing the general efficiency of the workman usually meets with cordial support from employers in these trades. The rate of wages in building trades is usually regulated by the labor unions, but in some places, it is stated, the mechanics who have had the advantage of trade school instruction receive higher remuneration and are also given steadier employment than those who lack such training. There is considerable harmony of opinion among the employers in the building trades regarding the need of more adequate facilities for training the workmen engaged in the various branches of the industry. But it is thought that little advance will be made unless the workmen themselves will take more interest in the subject. In the plumbing trade especially the employers express themselves as experiencing great difficulty in inducing their workmen to attend the evening trade schools.

Regarding the comparative merits of shop training and of trade school or technical training, it is generally agreed among the employers that the trade school alone cannot make a first-class mechanic, as the usual period of instruction in such schools does not admit of sufficient practical work to enable the student to acquire that skill and dexterity which are essential. The best results are obtained when shop training is supplemented by such technical training as is given in the evening trade schools. This system enables the student to apply the principles he is studying to the conditions and difficulties encountered in his daily work, and makes him have a better appreciation of their value, with the consequence that he takes more interest in his studies and in his work. An employer of many years' experience says:

"I have employed several hundred mechanics since I have been in business, and my experience shows that the men who have attended trade schools become better mechanics than those who do not. The man who learns his trade in the ordinary way can be a good mechanic up to a certain point—that is, he can do good work and can follow instructions and map out a simple job. But when it comes to the more difficult tasks and to the work of supervision, he is not equal to the man who has supplemented his shop work with a course in a trade school. The young man who learns a trade in the ordinary way merely follows the journeyman with whom he is working, learning just what the journeyman sees fit to let him learn and no more. In some trades he is advanced or held back at the will of the journeyman, and unless the latter is personally interested in his success, or has a special liking for him, it is seldom that he is told why the work is done thus and so. The technical points are not explained to him, and consequently he is left to take up the trade as best he can. On the other hand, the young man who goes to the trade school is afforded every opportunity to learn all parts of his trade. He is instructed how to do his work according to the most modern methods and is told why it is best, or necessary, to perform his task in a particular manner. He obtains a knowledge of drawing, which is helpful in his trade, and he must attend lectures on the theory and practice of the subject, covering the scientific principles, building regulations and sanitary laws which govern his trade. It is the possession of this knowledge that makes the trade school graduate more valuable to his employer and enables him to mount higher in the industrial scale."

The sentiments of the master builders and the master plumbers, as gathered in this report, may be summarized as follows: No man can learn all the requirements of the trades as practiced at the present day unless he devotes more or less of his time to studying the scientific principles and sanitary laws pertaining to the same. The building trades have been greatly benefited and elevated through the efforts of architects and sanitary engineers, but the employers in the industry have met with much difficulty in their efforts to make a corresponding advance in the methods of execution.

Sentiment of Labor Unions.

The labor unions in the plumbing, gas and steam fitting trades are, as a rule, strongly opposed to trade school education as applied to those trades, on the ground that too much time is devoted to theoretical work and too little to that which is practical. They claim that employers prefer the training school graduates because they will work cheaply, and urge that this is a source of trouble to the unions. The unions claim that in the schools the pupils are rushed through the simpler parts, and after completing the course they suppose that they are proficient, but when practical work is taken up outside they learn their mistake. Trade schools, say the unions, can give the boy a good theoretical training, but the trade itself can be learned much better by starting on practical work in the shop.

On the other hand the sheet metal workers' unions, as a whole, hold that trade and technical schools are valuable to workmen, because they give a theoretical training that cannot be gained otherwise. The unions are not opposed to the schools nor to the graduates. On the contrary, the graduates are encouraged to join the unions. In this way the unions are better able to control the trade and the men who work in it. The general opinion of the unions in this trade is that a good education is a benefit to any boy who seeks to enter. While the trade schools cannot teach the boy a trade, so as to make him a skilled mechanic, yet the theoretical and technical knowledge that he obtains in such a school is a great benefit to him when he engages in actual trade work.

The unions in other branches of the building trades regard the trade school question variously. For example, the plasterers consider the trade schools to be of no real value to the workmen in their trade, and the individual members are generally opposed to such schools, on the ground that they are not practical, because they do not teach the entire trade. This, it is said, requires many years' experience in actual work. Some plasterers' unions are favorably disposed to trade schools, but, as a rule, the sentiment is against them.

A somewhat similar position is taken by the pattern makers' unions. While the unions of painters and decorators are in some instances opposed to the trade schools, claiming that they help to flood the market with an inferior class of workmen who work for low wages, yet the unions in more than one locality think them to be of benefit, as they afford an opportunity for the young man to acquire a good theoretical knowledge of the trade.

Generally speaking, the unions of carpenters and joiners have opposed trade schools and the individual members are still usually averse to these institutions. The opinion is expressed among the union officials in this trade that technical schools and schools of design are valuable to the workman, provided he is able to take the instruction they offer. but the trade school—the school which attempts to teach the trades in their entirety—is of little, if any value. It is asserted that the trade school does not and cannot teach a trade, and that it is impossible for the graduate to be a competent workman as the result of his school education alone, actual work at a trade being an absolute necessity for the making of a skilled mechanic. Moreover, they say, a training school cannot turn out a man who can compete with the specialist in any branch of his trade, and the specialist is the man who is now in greatest demand in the carpentry trade.

Ohio Mechanics' Institute.

We have received a copy of the 1903 catalogue of the Ohio Mechanics' Institute of Cincinnati, Ohio, being the seventy-fifth year of that institute. The institution is one of the oldest of its kind in the country, having been founded in 1828. It is located in the center of the business section of the city and occupies a six-story structure, with the exception of the stores on the ground floor, the rent of which in part supplies the income from which the school derives its support. This makes it possible to keep the tuition fees very low. The institute belongs to the public and is managed by a board of directors representing the various manufacturing and commercial interests of the city. It includes a technological high school, conducted during the day, as well as evening classes in mechanical and architectural drawing, manual training and other branches of education, and a special shop course is also provided for students who wish to enter machine shops as apprentices. In the day classes mechanics, steam engineering, drawing and mathematics are taught, and instruction is also provided in chemistry, physics, applied electricity, wood working and metal work. The shops and laboratories are equipped with the latest machinery, apparatus and furnishings, much of which has been specially donated by manufacturers and other generous friends of the institution. The institute makes provision for vacation instruction and carries on a summer school in all the subjects above mentioned. This school opened June 29 and closes August 21. The technological high school opens September 22, and the evening school on October 5.

Master Composition Roofers.

The annual convention of the National Association of Master Composition Roofers was held the latter part of June in Louisville, Ky., and was largely attended. The election of officers for the ensuing year resulted as follows:

President, E. S. Bortell, Philadelphia, Pa.

First Vice-President, J. B. Ohligschlager, Louisville, Ky.

Second Vice-President, J. William Moore, Providence, R. I.

The next meeting of the association will be held in New Orleans, La., in February, 1904.

During their stay in Louisville the delegates were hospitably entertained, and the opinion was generally expressed that no convention in the history of the organization had given more pleasure to the members. Among the entertainments provided was a trolley ride through the city, visiting the Jacob, Eastern and Fountain Ferry parks. At the last named place a banquet was arranged for the guests, which was followed by a unique negro entertainment. After the close of the convention the delegates paid a visit to the Mammoth Cave.

A House on a Hillside.

A unique dwelling occupying a site which is level with the street in front and dropping back abruptly at the rear is one of the features of the August *Delineator*. This unusual location contributes to the architectural style of the house and makes some particular features possible on account of the roomy basement afforded. An expansive disposition of the rooms is carried out, the living rooms being thrown together as a whole. The interior arrangements, as shown in the illustrations, are attractive and artistic throughout.

A NEW steel frame building, covering an area of 86 feet in width by 228 feet in depth, is about being erected by Charles Ross & Son Company, machinists and millwrights, on a site located on Classon avenue, between Park and Myrtle avenues, Brooklyn, N. Y. The new building will be used for a machine shop and will be equipped with the latest improved machine tools.

ONE effect of the recent tie up in building operations in New York City has been to seriously delay operations upon a number of new theaters now in progress. It was expected that all the new playhouses under way would be ready for business at the opening of the regular theatrical season in September. but unless operations are soon resumed it would seem likely that none of the buildings will be ready until several months later, in which case many elaborate plans will go wrong.

ONE of the latest patent office library publications issued by the English Patent Office, Chancery Lane, London, is devoted to a subject list of works on architecture and building construction in the library of the patent office. It is made up of 164 pages and consists of two parts, the first being a general alphabet of subject headings, with entries in chronological order, of the works arranged under these headings, and the second being a key or a summary of these headings shown in class order. The present list is said to comprise 1344 works, representing some 3173 volumes. The catalogue entries relating to these works number 1739 and are distributed under 217 headings and subheadings.

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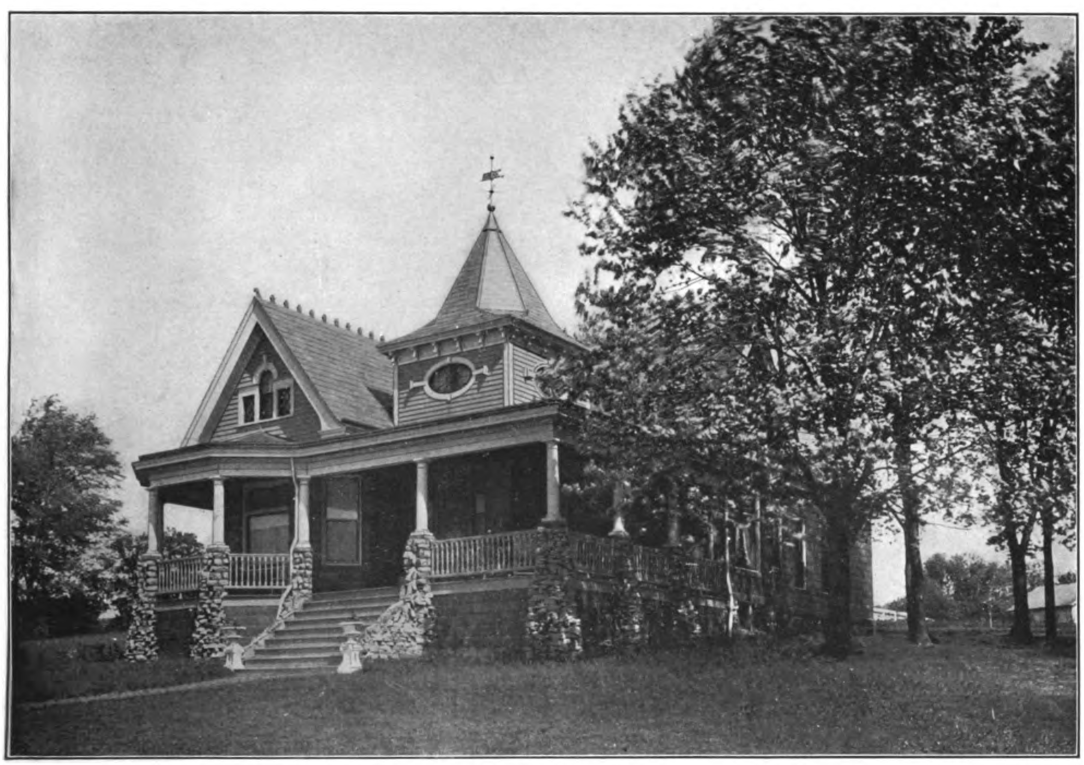

VITRIFIED HOLLOW TILE AND FRAME RESIDENCE OF MR. HENRY SMITH AT NORWOOD, OHIO.

DESIGNED BY THE OWNER.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.
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SEPTEMBER, 1903.

New Armories for New York City.

Some rather interesting additions are to be made to the architecture of New York City, in the shape of new armory buildings for the Seventy-first Regiment at Thirty-fourth street and Fourth avenue and for the Sixty-ninth Regiment on the west side of Lexington avenue, between Twenty-fifth and Twenty-sixth streets. The old armory of the Seventy-first Regiment was entirely destroyed by fire in February of last year, and the new structure which is to be erected will occupy the same site. The work of tearing down the walls of the old building and clearing away the debris is almost finished, and within a very short time it is expected that operations on the new armory will be commenced. According to Clinton & Russell, the architects, the distinguishing feature of the new building will be its huge tower, rising to a hight of 236 feet and surmounted by the copper statue, 9 feet in hight, of an infantryman. It is intimated that the tower is not intended to be simply a mere ornament, but will be utilized as an observatory and for heliograph signals, which it is expected can be read from the most distant portions of the city. The general style of architecture will be Baronial and the walls will be of brick and stone, with granite trimmings. The construction will be fire proof throughout, and there will be four capacious exits, one at each corner of the structure. The drill room on the main floor of the armory will be 190 x 196 feet, and on the same floor will be brigade and regimental headquarters, with separate entrances, while the quarters of the field and staff officers will be on the floor level with the first balcony. On the third or gallery floor will be quarters of the signal corps, a large lecture and assembly room, a drill hall for the corps, and locker rooms. In the basement, the floor of which will be a little above the grade of Thirty-fourth street, will be located the company rooms, the lockers for the rank and file, shower baths, quartermaster's department, storerooms, engine room, library, squad drill rooms, gymnasium and amphitheater. At the extreme east end of the basement will be a double decked rifle range, each deck having six targets, and above the second will be a revolver range. The new armory for the Sixty-ninth Regiment will be four stories, with basement, in hight, the main buiding being 82 feet high, with an arched dome of steel and glass rising 126 feet above the curb line in its center. The building will have a frontage on Lexington avenue of 197½ feet, and a depth varying from 305 to 335 feet. The facades will be of marble and cut stone, and at each end of the building will be large memorial tablets inscribed with the names of the battle fields on which the Sixty-ninth fought during the civil war. The first story will have a lofty drill hall, 187 feet wide and 202 feet long, and about which will be grouped at the front the rooms of the colonel and his staff, as well as the regimental library. On the second floor will be the company rooms, and on the third floor the locker rooms, with a gymnasium 113½ feet long by nearly 43 feet deep. The fourth floor will be fitted with shower baths, lavatories and quarters for the drum corps, band and quartermaster's department. In the basement will be a rifle range, lighted by electricity, a magazine, the mess rooms and large double bowling alleys. The plans for the armory have just been filed with Building Superintendent Thompson, by Hunt & Hunt, the architects selected by the Armory Board, of which Mayor Low is the chairman. It is stated that $600,000 will be the cost of the new structure.

Acetylene Lighting.

The season is fast approaching when, with the longer evenings, artificial means of lighting will be in greater use throughout the country in homes and other buildings. There has been an increasing demand in the smaller towns for gas works or electric lighting plants to furnish the more convenient method of lighting that is enjoyed in the larger cities. The desire for this convenience, moreover, is not confined to the smaller towns, but extends to country residences and farm buildings. Of the many means of artificial illumination that have been produced as the result of man's ingenuity, acetylene lighting has been very popular since its introduction, and this popularity has increased, notwithstanding the drawbacks with which it has been burdened by reason of inferior apparatus, made by those eager to participate in the profits of a promising business, yet without the knowledge or competence necessary to success. As is customary with new or comparatively new luxuries or conveniences, many tradesmen who are looked upon as the natural distributing agents for such goods have neglected to inform themselves about acetylene lighting, piping and apparatus, so that they might push their sale and derive the profits that would result from this branch of trade. The plumbers throughout the country are well adapted to take up this important field of work, and the season is now approaching when their efforts to secure orders for acetylene lighting plants will be more favorably received than earlier in the year. It is a good time to secure catalogues from the manufacturers of acetylene apparatus, and to secure information about the work, so that it can be intelligently taken up. The running of gas piping in old buildings is naturally the work of the plumber, and the sale of chandeliers and gas fixtures is familiar to him. Being thus qualified for the work, no difficulty will be found in mastering the details of acetylene generators and their installation so as to make the success of the plant a foregone conclusion. An experimental plant in the shop will attract attention by the excellence of the light, and a little canvass will be likely to disclose many who are ready to equip their homes, stores, &c., with this illuminating system. Out of town hotels or summer resorts, with several buildings and extensive grounds, are ready purchasers when the quality of the light and the small amount of attention required are compared with their oil lamp equipment. Manufacturers of acetylene generators have prepared literature that will greatly aid those who take up the sale of their goods.

The Local Building Strike.

As we go to press the differences existing between the Building Trades Employers' Association and the various unions appear to be little, if any, nearer a satisfactory settlement than they were a month ago. In the interval several unions have agreed to accept the modified plan of arbitration as proposed by the Employers' Association, and a number of men are at work on various jobs, but nothing like a normal condition has been established in the trade. At a meeting of the employers held on Wednesday, August 12, it was decided to continue the no-compromise policy, and that no one be employed in the trades represented in the new unions formed under the arbitration agreement unless they join these unions. It was further decided that all structural iron workers who are employed must join the proposed new Housesmiths' Union of New York. A statement was made after the meeting to the following effect:

"We have 500 of the iron workers at work, and only need 1000 more. Very few of them are from the Housesmiths' and Bridgemen's Union. The statement of Parks that 90 per cent. of the housesmiths are not working is not true. There are 4500 or more members in the union. About 1500 are working for nonassociation employers. There are many idle housesmiths, and some of them are in bad straits. The employment of 500 iron workers will enable people in many other trades to resume work."

At the present writing, August 15, the following unions have signed the amended plan of arbitration:

Amalgamated Decorators and Painters of New York and Vicinity.
Amalgamated Woodworkers' Local, No. 172.
Bricklayers' Unions of Manhattan and Bronx, Nos. 34, 4, 7, 11, 33, 35, 37, 47.
Brotherhood of Carpenters and Joiners, Manhattan Borough District Council.
Cement Masons' United Union, No. 1.
Compact Labor Club of Marble Cutters' Helpers.
Hexagon Labor Club of Tile Layers' Helpers.
House Shorers' Protective Association.
International Brotherhood of Electrical Workers, Local No. 3.
Marble Machine Workers.
Modelers' League of America.
Mosaic and Encaustic Tile Layers' Union, Local No. 30.
Mosaic Workers' Association.
Plain and Ornamental Operative Plasterers' Society.
Plumbers and Gas Fitters, Local No. 2.
Reliance Labor Club of Marble Cutters and Carvers.
United Portable and Safety Engineers' Association, Local No. 184.
White Stone Association of Marble Polishers and Rubbers.
Wood Carvers' and Modelers' Association, New York.
Wood, Wire and Metal Lathers, Local No. 16.
Wood, Wire and Metal Lathers, Local No. 159.

There remains of the skilled unions which have not signed the Sheet Metal Workers, the Housesmiths, the Stone Setters and the Steam Fitters, yet in all these trades more or less work is at present being done. It is intimated that the reason why these unions have not signed the plan of arbitration is because they had agreements with the employers in their respective trades which they seem to feel should take precedence during the term for which they were made.

The latest move on the part of representatives of the opposing housesmiths is said to have for its object the calling out of the structural iron workers in every part of the country where members of the Iron League are engaged on contracts, but in well informed circles it is not thought this will meet with very much success. In fact, the employers are making such gains as regards men going to work that it is predicted the entire trouble is likely to be practically over in the course of a few weeks.

The General Arbitration Board of the Building Trades Employers' Association was organized at the Building Trades Club on Monday, August 3. Two representatives from each of the unions which up to that time had accepted the joint arbitration agreement were present, as were also representatives of the 17 organizations of the central body of employers. At the meeting Otto M. Eidlitz presided, and Samuel B. Donnelly was appointed secretary. A Committee of Six on Plan of Procedure was appointed, the duties of this committee being to draft plans to govern the presentation of grievances and the method of taking testimony. An Executive Committee was also appointed.

Demolishing 400 Buildings to Make Room for the New Pennsylvania Railroad Station.

Some idea of the amount of work which is involved in preparing the site for the new Pennsylvania Railroad station, to be erected in New York City, may be gathered from the statement that about 400 buildings, formerly sheltering a population of 11,200 people, must be demolished before the actual work of excavating can be commenced. The work of demolition is at present well under way, but, according to C. H. Southard, who has the matter in charge, it will be about a year before all the buildings will be removed and the ground be clear for the subsequent operations, and that it will probably be three years more before the great terminal with its station and connecting tunnels will be ready for travel. Many of the buildings to be torn down are the ordinary three and four story brick dwellings, often with shops on the first floor, while some are quite pretentious brown stone apartment houses. According to Mr. Southard's estimate, these buildings are worth about $4,000,000. It is said that in the buildings are 58,000,000 bricks and 11,000,000 feet of lumber, and to put the bricks and lumber into piles will cost about $170,000.

House Constructed of Hollow Tile.

In connection with the article in the August issue illustrating the residence constructed of vitrified hollow tile, and erected at Norwood, Ohio, for Henry Smith, the address of the concern furnishing the materials was incorrectly stated. It should have read "Louisville Brick & Tile Company, Louisville, Stark County, Ohio."

The National Plaster Manufacturers' Association held their annual convention in Detroit, Mich., on August 3, when the following officers were elected: President, A. T. Dingley, Syracuse, N. Y.; first vice-president, A. H. Lauman, Pittsburgh; second vice-president, L. G. Powell, Toledo, Ohio.

The site at the northeast corner of Fifth avenue and Sixtieth street, New York City, is about to be improved by the erection of a ten-story brick bank and apartment house, which will occupy an area about 50 x 115 feet. The structure will be of marble, terra cotta and brick, and according to the plans of the architect, H. J. Hardenberg, of 10 West Twenty-third street, will cost in the neighborhood of $500,000. The apartment portion of the building will be such as to accommodate ten families, and the bank will be occupied by the Van Norden Trust Company.

After a long controversy the ornamental features of the upper part of the building known as Westminster Chambers in Copley Square, Boston, are about to be removed. Operations have already been commenced, as the work must be done before the first of October. It was on July 25, 1898, that the city filed a bill in equity against the owners of the building, and after fighting the case through the United States Supreme Court, and making appeals to the Legislature which succeeded the erection of the building, the owners have finally been compelled to reduce the hight of the structure to the limitations prescribed by law. This means that 6 feet of the hight must be taken off. The outcome of the controversy is regarded by many as a triumph of law, the ground being taken that if the building was allowed to remain as erected there would have been little or no respect for the building laws on the part of contractors.

At the regular meeting of the Master Builders' Association, held the latter part of July in Passaic, N. J., the following officers were elected for the ensuing year: President, W. A. Bogart; vice-president, T. R. Collins; secretary, Herman Morrell, and treasurer, F. Wentick. At the meeting 28 firms were represented, and it was a decided success in all respects. We understand that a number of other firms have signified their intention of joining the association.

A FRAME HOUSE AT CRANFORD, N. J.

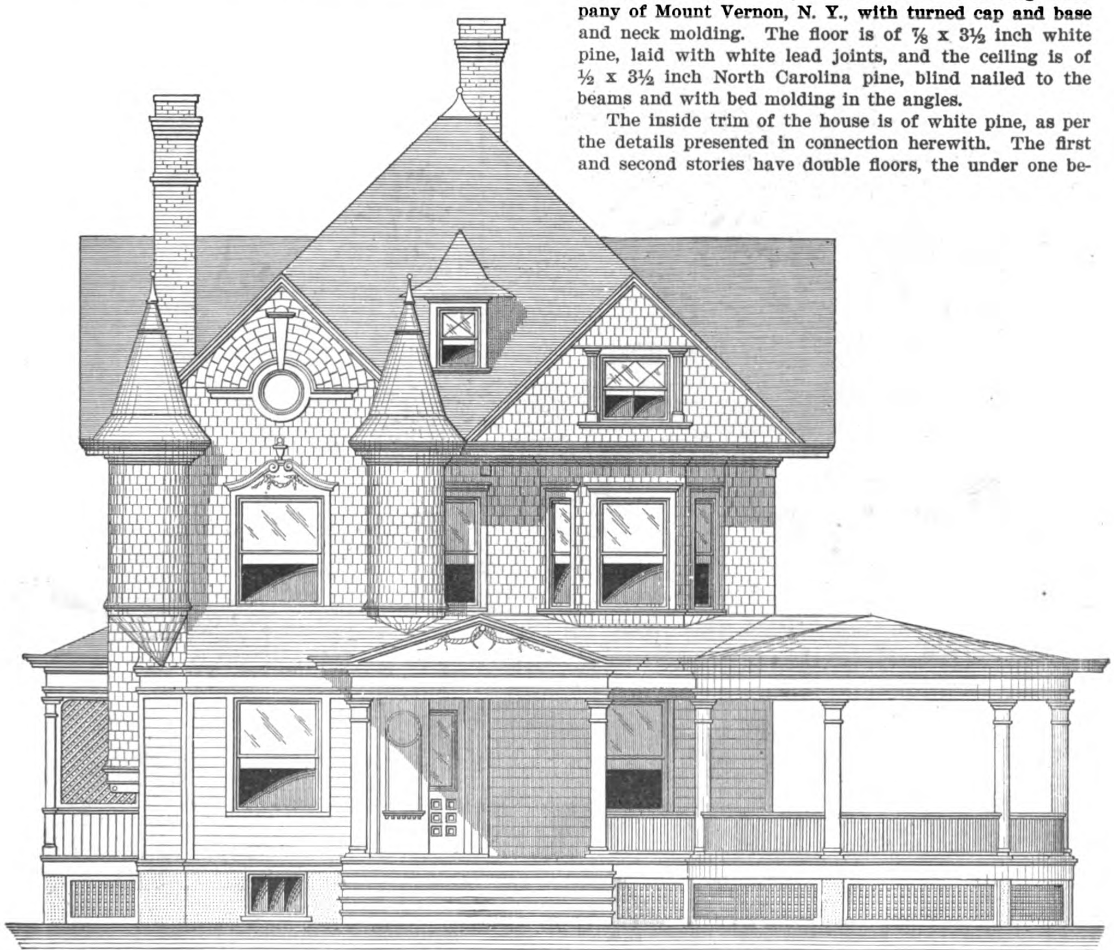
WE take for the subject of our half-tone supplemental plate this month a frame dwelling embodying in its external treatment various features of architectural interest and erected about two years ago in Cranford, N. J., for Thomas A. Sperry, in accordance with plans prepared by J. A. Oakley & Son, architects, of 1201 East Broad street, Elizabeth, N. J. Noticeable features of the exterior are the veranda extending nearly across the front and around the side of the building, and the tower and shingle effects. The elevations and details presented herewith give an idea of the construction employed, while the floor plans show the manner in which the interior space has been arranged.

According to the specifications of the architects, the foundation walls are of brick, plastered on the outside as run up and floated off smooth above the grade line. The house is of balloon frame, all the timbers used being of hemlock. The plates are 2 x 4 inches, doubled, and the sills are 4 x 6 inches, laid flat in mortar. All door openings in excess of 4 feet are trussed, and at the head and side of all door and window openings the studs are doubled. The girders are 6 x 8 inches; the first and second floor joist, 2 x 8 inches; the posts at the corners and angles, 4 x 6 inches; the common rafters, 2 x 6 inches, placed 20 inches on centers; the valley rafters, 2 x 8 inches; the veranda sills, 4 x 10 inches; the ribbon strips, 1 x 6 inches of hard pine; the ties and braces, 4 x 6 inches; the veranda ceiling beams, 2 x 4 inches, tied to the rafters and placed 20 inches on centers; the veranda rafters, 2 x 6 inches; the collar beams, 2 x 4 inches, also placed 20 inches on centers; the partition studs, 2 x 3 inches and 2 x 4 inches, placed 16 inches on centers, as are also the floor joist.

The outside walls of the house are covered with 1 x 9 inch tongued and grooved hemlock sheathing boards, over which is a layer of two-ply building paper, this in turn being covered with 6-inch beveled white pine clapboards for the first story and 18-inch white pine shingles, laid 5½ inches to the weather, for the second story, gables, &c. The roofs are covered with 18-inch red cedar shingles, laid 5½ inches to the weather, all hips being run up "Boston" style. The veranda has 8 x 8 inch staved columns, made by Hartmann Brothers' Mfg. Company of Mount Vernon, N. Y., with turned cap and base and neck molding. The floor is of ⅞ x 3½ inch white pine, laid with white lead joints, and the ceiling is of ½ x 3½ inch North Carolina pine, blind nailed to the beams and with bed molding in the angles.

The inside trim of the house is of white pine, as per the details presented in connection herewith. The first and second stories have double floors, the under one being of 1 x 9 inch hemlock boards, while the finishing floor is of ½ x 2 inch North Carolina comb grained pine, blind nailed, and with a layer of building paper between the two. The doors throughout the house are also white pine, those for the vestibule being glazed with bevel plate glass and hung with three pair of 4 x 4 inch hinges. The sliding doors operate on Lane's patent hangers, made by Lane Brothers Company, 423 to 455 Prospect street, Poughkeepsie, N. Y.

The cellar bottom is covered with 4 inches of cinders and cement, on which is a ½-inch finishing coat of Portland cement and sharp sand in the proportions of one-third of the former to two-thirds of the latter. In the laundry is a set of two of Graham's brown glazed wash



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

Frame House at Cranford, N. J.—J. A. Oakley & Son, Architects, Elizabeth, N. J.

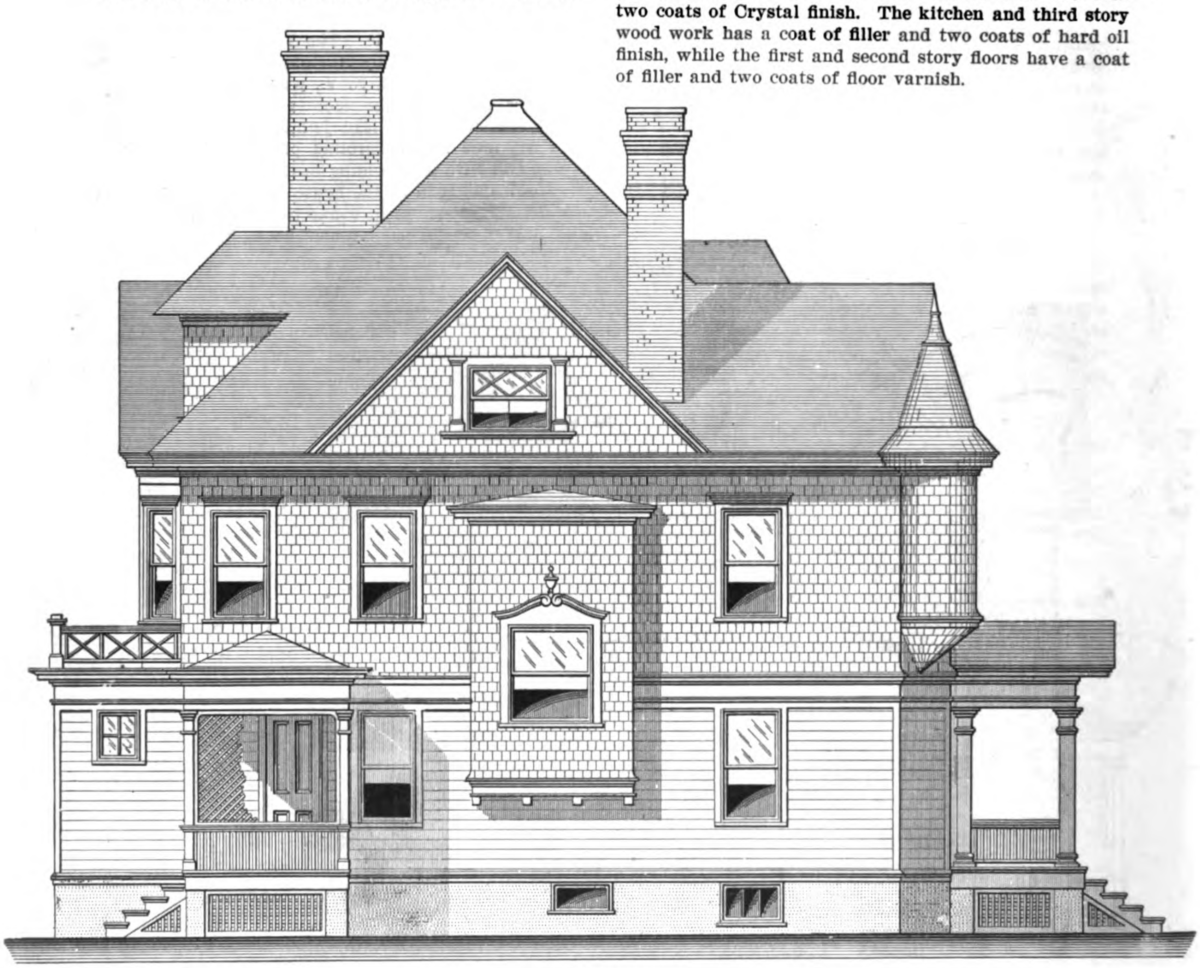
tubs resting on iron stands and supplied with hot and cold water connections. In the kitchen the walls to the hight of 5 feet from the floor are finished with a white coat of Adamant Mfg. Company's No. 3 finish and lime putty, lined off in 6 x 6 inch squares and finished with a neat molded cap. The room is fitted with a 18 x 36 x 6 inch cast iron sink, with hot and cold water connections, a 35-gallon high pressure galvanized iron boiler, and a No. 258 brick set Provident range, made by the Richardson & Boynton Company of 232 to 236 Water street, New York City. In the butler's pantry is a tinned and planished copper sink, with hot and cold water connections, and fitted with nickel plated trimmings.

The walls of the bathroom to a hight of 4 feet are finished in tile laid in Portland cement and sand on metallic lath. There is a molded cap on the wainscot and a raised, decorated 4-inch frieze under the cap. The floor is also of tile, laid on a foundation of concrete composed of cement, small broken stones and sand, which is filled in between the joist. The room is fitted with a Vigilant siphon jet water closet, a Majestic roll rim porcelain lined bathtub made by the Standard Mfg. Company of Pittsburgh, Pa., and a marble wash basin, all fittings being nickel plated.

The heating of the house is by means of a No. 147 New Perfect hot air furnace, made by the Richardson & Boynton Company, and connected with a cold air duct, as shown on the foundation plan. All pipes running in partitions are covered with metal lath, and the sides of the studding are covered with tin. The registers on the first floor are 10 x 12 inches, and those on the second floor 8 x 10 inches, all having borders and japanned.

The house is piped for gas and wired for electric lighting and electric bells in kitchen and at the front door, all being installed in accordance with the rules of the Board of Fire Underwriters. There is a speaking tube from the hall on the second floor to the kitchen.

All outside wood work has two coats of linseed oil and white lead, while the shingle work on the roofs, dormers, gables, &c., has two coats of shingle stain applied after the shingles were put on. The veranda and porch ceilings, as well as the columns, were treated to a coat of filler and two coats of spar varnish. All interior wood work, except the stair rails, kitchen and third story floors, were treated to one coat of white lead and linseed oil, followed by two coats of the same with a proper proportion of Flood & Conklin's "Viter Alba" mixed in to make a first-class white finish. The stair newels, rails and balusters were treated to a coat of filler and then two coats of Crystal finish. The kitchen and third story wood work has a coat of filler and two coats of hard oil finish, while the first and second story floors have a coat of filler and two coats of floor varnish.



Frame House at Cranford, N. J.—Side (Left) Elevation.—Scale, 1/8 Inch to the Foot.

The builder having the contract was M. Byrnes of 430 Westfield avenue, Elizabeth, N. J.

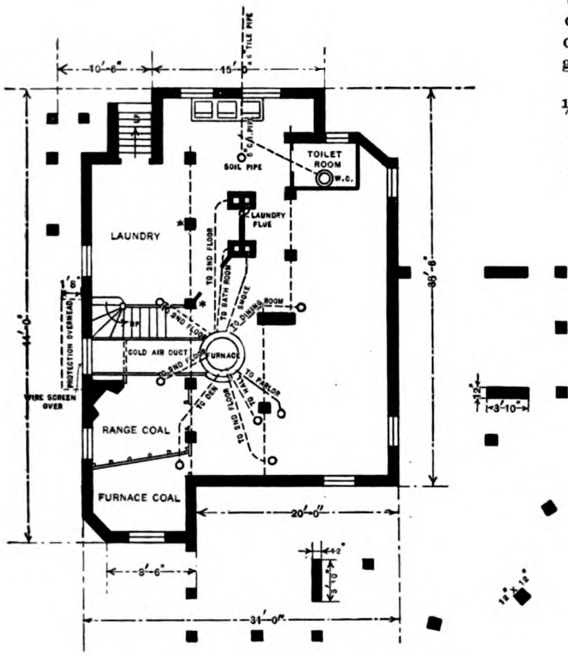
Finishing a Shingle Roof.

A writer in one of our exchanges, discussing the best way, in his opinion, of finishing a shingle roof, says: "I do not know of anything so good as a genuine creosote stain. It does not merely lay on the surface, but it penetrates the shingles and actually stains them. It is far more durable than any oil and pigment stain, which is really no stain at all, but only a thin paint. I would dip the shingles in the creosote stain before they are laid, and then give them an additional coat of the stain after they are on the roof.

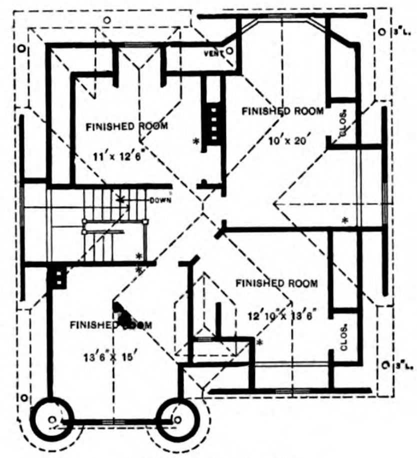
I do not believe in painting a shingle roof, as paint on a roof will form little dams between the shingles, especially near the butts, which will hold water, and they will soon begin to decay. It is worse on the modern sawed shingles than it was on the old split ones.

Various Methods of Hardwood Finish.

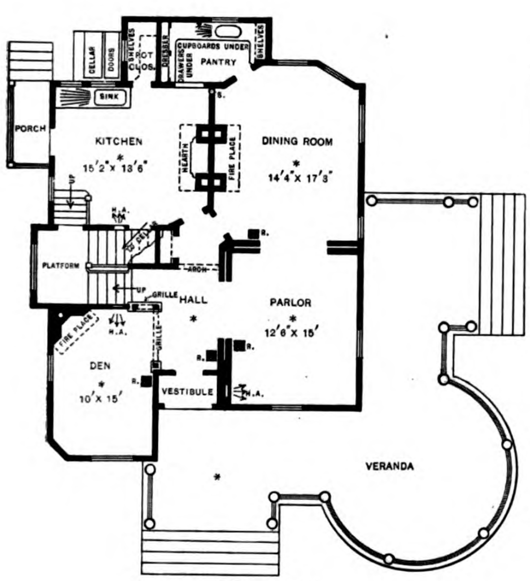
The subject of finishing hard wood is one of never ending interest, and some of the suggestions which were offered by a member of the Ohio State Association of Master House Painters and Decorators at their annual convention in Cleveland, in July last, are worthy of more than passing notice.



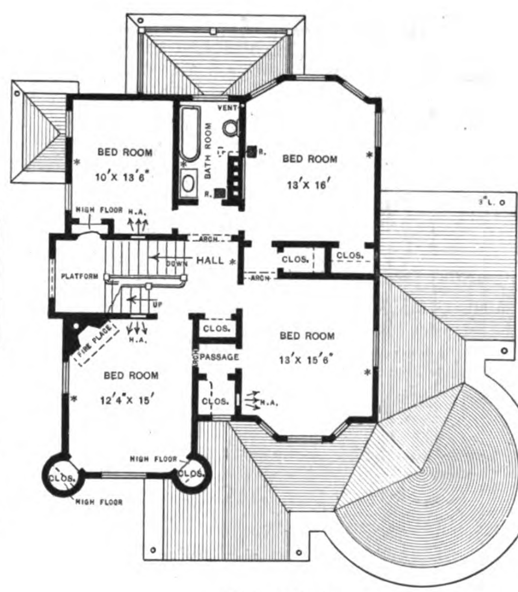
Foundation.



Attic and Roof Plans.



Main Floor.



Second Floor.

Frame House at Cranford, N. J.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

In considering the subject the finishing of oak was first taken up by the author of the paper, who said: A great deal of oak to-day is finished in very dark colors, and I will try to explain the different methods and materials used. For Flemish oak, ½ pound of bichromate of potash, dissolved in 1 gallon of water. Coat wood work. When dry sandpaper down smooth; then coat with best drop black, ground japan, thinned with turpentine. Let stand five minutes and wipe off clean, then coat with pure grain shellac and sandpaper with No. 0 sandpaper; then coat with beeswax, 1 pound to a gallon of turpentine, ¼ pound of drop black mixed in the wax, then wipe off clean with cheese cloth.

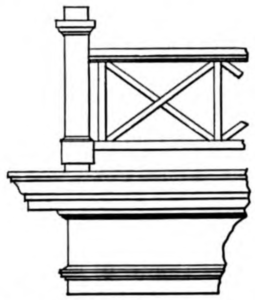
Weathered Oak.—Give wood work one coat of strong ammonia. When dry, sandpaper down smooth and stain it from the following colors: Lamp black, ocher and 2 pounds of silica to a gallon of stain. Wipe off with cheese cloth, then give one coat of pure grain shellac, then sandpaper and give one coat of wax and wipe off clean. If you should desire a brownish shade, put 1 ounce of bichromate of potash and ammonia, or if a greenish shade, put some green and stain.

Verde Finish.—One ounce of nigrocene dissolved in ½ gallon of water. Give wood work one coat; when dry, sandpaper, care to be taken not to rub off edges; then fill with a bright green filler, with some white lead in the filler. When thoroughly dry, give one coat of pure grain shellac and then wax, or it should be finished with three coats of varnish and rubbed. This finish leaves the pores of bright green color, while the rest of the wood is almost black.

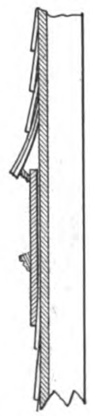
Black Oak.—One ounce of nigrocene to ½ gallon of water. Give wood work one coat, then fill with a black filler, then one coat of shellac and three coats of varnish rubbed with pumice stone and water, then oil and wipe off clean.

Austrian Oak.—Fill with a light antique filler, colored with raw umber. Give two very thin coats of shellac, colored with nigrocene and yellow to the desired shade, then sandpaper down and wax and wipe off clean.

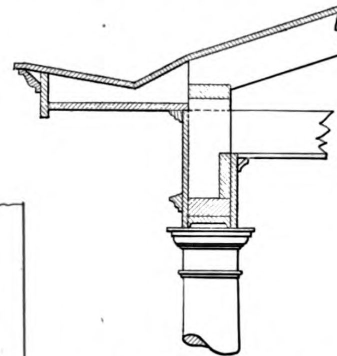
Mahogany.—Antique Mahogany.—Take one-third linseed oil, two-thirds turpentine; coat wood work and wipe off clean. When thoroughly dry, coat with bichromate of potash; then fill with a dark rich filler; then shellac and give three coats of varnish and rub with pumice stone and water, then oil and wipe off clean. If an extra good job is required, give wood work one heavy coat of polishing varnish after being rubbed in water; then rub again



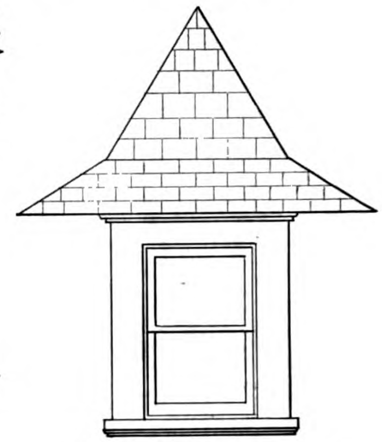
Detail of Cornice of Rear Extension and Rear Porch.—Scale, ⅜ Inch to the Foot.



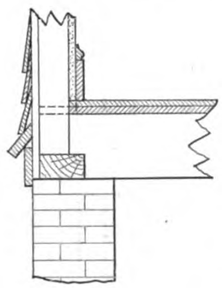
Belt Course.—Scale, ½ Inch to the Foot.



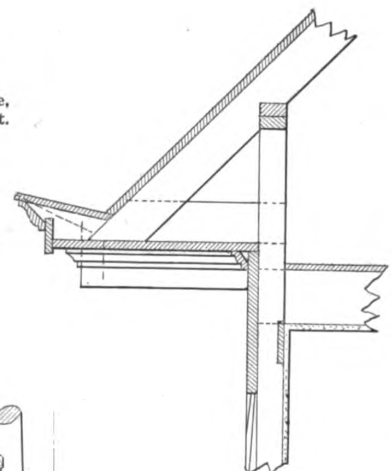
Detail of Veranda Cornice.—Scale, ½ Inch to the Foot.



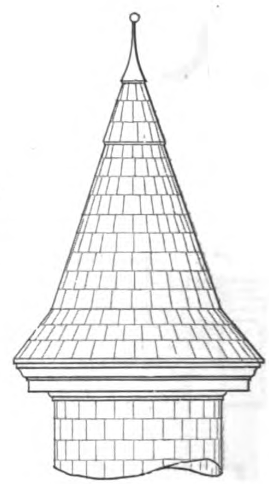
Elevation of Dormer.—Scale, ⅜ Inch to the Foot.



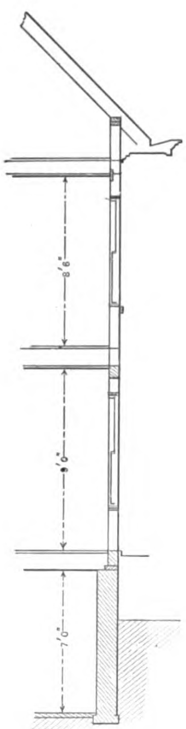
Detail of Water Table.—Scale, ½ Inch to the Foot.



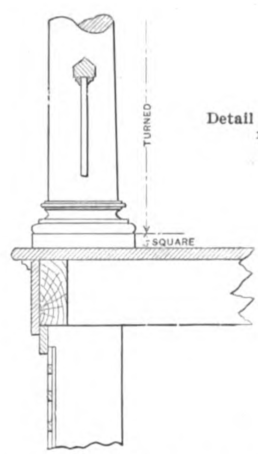
Detail of Main Cornice.—Scale, ½ Inch to the Foot.



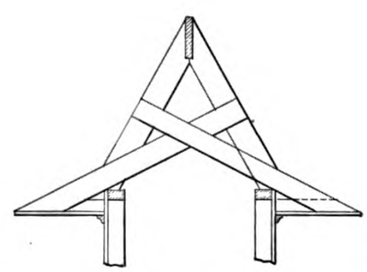
Elevation of One of the Front Towers.—Scale, ¼ Inch to the Foot.



Section of House.—Scale, ⅛ Inch to the Foot.



Details of Veranda Construction at Floor Line.—Scale, ½ Inch to the Foot.



Section of Dormer Window.—Scale, ⅜ Inch to the Foot.

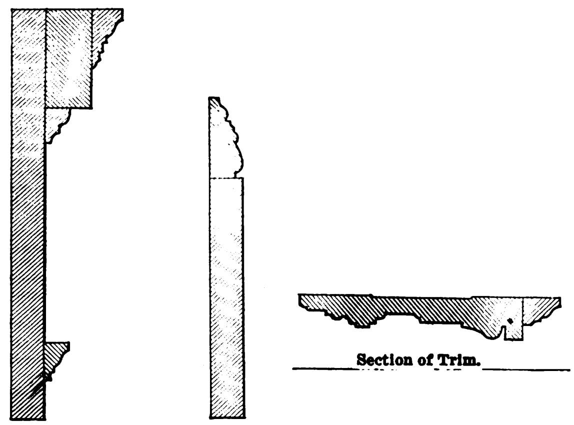
Miscellaneous Constructive Details of Frame House at Cranford, N. J.

in water and polish. In finishing mahogany, some put the bichromate of potash without oiling, but they do not get as good a color. All mahogany should be oiled first, unless you want a very light color, then it should have a thin coat of shellac first.

Birch.—To finish to represent mahogany, coat with a weak solution of bichromate of potash, then stain with rose pink, Vandyke brown and burnt sienna; then shellac, with a little Bismarck brown dissolved in the shellac. This makes a better stain and more lasting than a water stain.

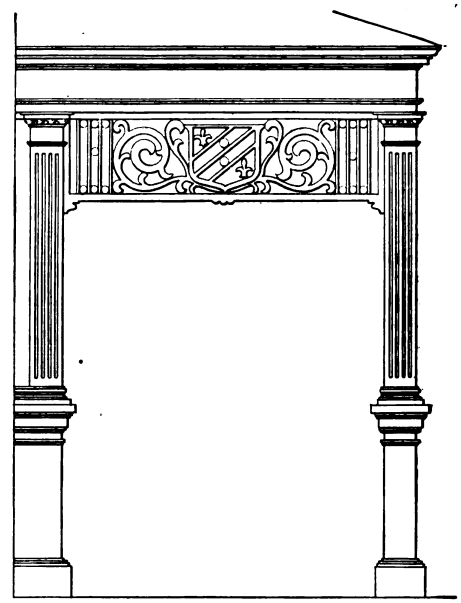
Meeting of Washington Builders.

AT the recent meeting of the Master Builders' Association, held in their rooms in the Corcoran Building, Washington, D. C., various reports of officers were presented for the year, that of the president being a review of the work of the association and giving many interesting facts on the general condition of the building trade, while at the same time offering valuable suggestions in connection with labor troubles. The officers elected for the ensuing year were: President, Samuel J. Prescott; vice-president, James S. Parsons; secretary, George C. Hough, and treasurer, James L. Marshall. These, with Joseph Richardson, William E. Spier and John McGregor, constitute the Board of Directors. An agreement was made on July 2, between the Employers' Association of the Building Trades, Washington, D. C., and the Council of the Allied Building Trades of the Central Labor Union, by which it is hoped that strikes and lockouts will in future be avoided. It is agreed that all grievances arising between employer and employed shall be submitted to a Board of Arbitration, and that pending the consideration of the matter by the board there shall be no suspension of operations on the part of the men. The Board of Arbitration is to be composed of 11 members, each party to the dispute selecting five. The eleventh member, who acts as umpire, will be chosen by the board. A majority vote is to decide all questions.

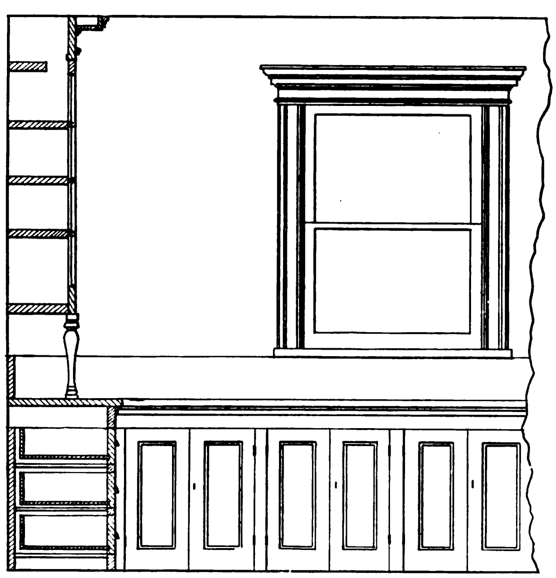


Detail of Head Casing. Base.

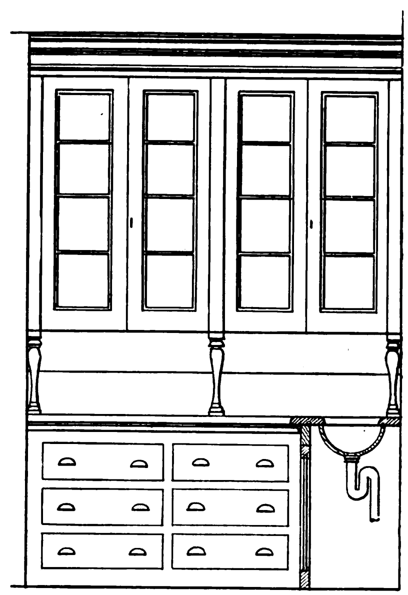
Scale, 3 Inches to the Foot.



Detail of Grille Between Hall and Den.—Scale, ⅜ Inch to the Foot.



View in Pantry Looking Over the Sink and Toward the Window.—Scale, ⅜ Inch to the Foot.



Elevation of Dresser in Pantry.—Scale, ⅜ Inch to the Foot.

Miscellaneous Constructive Details of Frame House at Cranford, N. J.

THE BUILDING DEADLOCK IN NEW YORK.

THE conditions existing in the building trades of New York since the beginning of May, and indeed for some years anterior to that date, illustrate in a very striking way the shifting of the storm center of discontent and unrest from the industries engaged in production to those which may be classified as assembling industries. The reason for this is not difficult to find. In the industries which admit of being carried on in factories and established plants the influence of labor saving and labor performing machinery has been felt in ways very different from those predicted as lately as 25 years ago, when the effect of the introduction of a machine capable of doing the work of a dozen men, for example, seemed inevitably to be the relegation of eleven of that dozen to idleness, with no alternative but to seek new employment on a lower plane of skill and value. Not only has this not happened, but machinery has enormously increased the demand for labor all along the line; and its greater productiveness per unit —the man hour—by reason of the improved tools with which it works, and the fact that what remains for the man to do is that which requires a man's intelligence, has permitted rates of wages to advance to averages which would have been impossible in the days when a man's strength was the measure of his usefulness.

In the establishments in which the highest mechanical development has been reached the rate of wages earned by a man is considered a negligible factor in the equation of economy. He is welcome to as much as he can earn. As long as the investment is profitable, and the output pays interest on the capital represented in plant and machinery, wages count for very little. They may seem excessive, but if the man who demands $10, $20, $30 or it may be $40 for a day's work produces enough and at low enough cost, he may be cheaper at this rate than another man would be at a fifth or a tenth of his average wage. The recognition of this fact has broken up the solidarity of labor, and withdrawn from the influence of the agitators and propounders of false economic doctrines the men upon whom the success of many of the great productive industries chiefly depends. The fact that machinery has rendered it possible for them to put themselves far beyond any advantage which could come to them through dependence upon a union, and that no possible scale of union wages would come anywhere near their plane, since the less skillful and industrious could not attain it, has made the adjustment of labor questions in some of the largest of the productive industries a comparatively easy problem.

The Assembling Industries.

But in the assembling industries, where the opportunity for the employment of machinery in competition with or supplementary to hand labor does not exist, the case is very different. Every part of a building, for example, may be prepared up to a certain point by machinery. The stone may be cut, the bricks made, the iron work rolled, and pretty much everything else entering into construction manufactured to specification, so that the elements will go together like the fragments of a puzzle; but to assemble them is, and apparently must remain, hand work, which can neither be facilitated nor performed by machinery. Hence, the housesmith, the mason, the bricklayer, the carpenter, the painter, the tile layer, the electrician, the pipe fitter, the plumber, and so on through the list, having nothing to expect in the way of other advantage than he can win from day to day in high wages and short hours, lends himself to the plans of the professional agitator naturally enough. He may be said to care absolutely nothing for his employer's interest, and is indifferent what misfortunes may overtake his trade. This is a large country, and local influences are not far reaching for either good or evil. If his business is temporarily paralyzed in one city, there is likely to be an extra demand for his labor somewhere else, where it is just as comfortable to live, and perhaps cheaper. The men brought together temporarily on a great building represent a fortuitous aggregation from a dozen or more trades. They will scatter as soon as the work is finished. The employers in the different branches take men on and lay them off as they have much or little to do. With very few of them have they any personal touch. Such a relation breeds no ties of personal regard on either side, and favors chicanery, conspiracy and sharp dealing on both sides. It is not at all surprising that the building trades have become the main line of fortifications of organized labor, and from present tendencies it seems not at all unlikely that the great and decisive struggle between the employer and the wage earner will be there fought "to a finish."

The conditions existing in New York at the beginning of the present year were especially favorable to just such a struggle as began in May and is now, we trust, rapidly drawing to a close. The employers were divided into two groups or camps—the great contracting companies, who conduct building operations on any scale of magnitude for which opportunity offers, and the individual builders, who undertake contracts whenever the ability to get them coincides with the ability to finance them.

Building by Large Contractors.

Probably half the important buildings in New York are constructed by the large contracting companies, the rest being divided among those who compete for contracts by submitting the most favorable bids the conditions permit. The great concerns who will undertake anything, from a hencoop to a city hall, came into existence when the steel frame revolutionized building operations. They adapted themselves to the new requirements more easily and more completely than the old style builders were able to do, and are in the habit of giving heavy bonds to complete the structures they undertake within the time specified. In many instances the buildings they erect are, in great part, rented before the corner stone is laid. In many of their contracts the strike clause is omitted. The reason for this is that the work they undertake usually occupies very costly ground, and contemplates buildings so operated that the interest account would ruin the owners if the completion of the buildings was delayed. The existence of these companies gave the agents of the trade unions an opportunity which would not have come to them in any other way. To enable the contracting companies to meet their exigent engagements it was necessary they should have good relations with the walking delegates. Such relations were established by liberal payments of money to those in the position to interrupt work by strikes. Agreements were entered into by which these companies were guaranteed all the skilled labor they wanted as they needed it. In consideration of these favors they have employed none but union men, have paid more than union wages, and have had quiet business dealings with the walking delegates constituting the Board of Building Trades as often and on as liberal a scale as the magnitude and profit of their operations warranted.

As might be expected, this policy has set a pace which the smaller operators of the building trades have found it difficult to follow. How long the large contracting companies could have followed it if the smaller individual contractors had been able to see their "raise" is a matter of opinion. They could not do it. In consequence, the exactions of the agents and walking delegates of the unions became more and more onerous. No man who took a building contract, unless prepared to meet such demands as the evidence in the cases which have recently been, and are now, before the courts shows to have been made openly and unblushingly, could even estimate with confidence when he would be permitted to finish it, or whether it would show a fair profit or an overwhelming and ruinous loss. Strikes because of grievances affecting the strikers, and sympathetic strikes because some one else had a grievance, were matters of every day occurrence. How these strikes were settled we are learning from the trials of Parks, Murphy, Carvel and others who have had the misfortune to come within the purview of the District Attorney's office. Then the unions, intoxicated by the exuberance of their opportunity, fell to quarreling among themselves.

Endless annoyance naturally and properly led to the formation of the Building Trades Employers' Association. The situation was characterized by features which were intolerable. The "graft" had been worked to the limit, and the instinct of self-preservation drove the employers together as sheep menaced by wolves group themselves in the position least vulnerable to individual attack. They have at last found the courage to reveal to the public prosecutor some of the abuses of the system of which they have been the silent victims as long as they could stand it. They have also found the courage to demand as the condition precedent to the resumption of building operations the reference of all grievances to a board of arbitration. A very similar issue was raised and settled in the great Chicago lockout of 1900. There the various unions were required to sever their connection with the central governing body, very closely corresponding with the Board of Building Trades in this city.

Care and Finish of Hard Wood Floors.

The finish and care of hard wood or parquette floors has been and is now a source of great trouble and annoyance to housekeepers. In many cases where beautiful floors have been laid, they have been left to be finished by persons who have not troubled themselves with finding out the best method of finishing, and the usual way for such persons to do is to treat them with shellac or varnish, says a writer in one of our exchanges. This is all wrong, as a moment's thought will convince any one that a surface that is constantly walked over needs something different to the coating of gum that is left on the surface after the spirit used in dissolving the shellac or varnish is evaporated. This coating then becomes brittle, and is ground up into minute particles by the nails in the boots and swept away, leaving the wood bare, right where it is most exposed to view.

As a matter of course, the beauty of the floor is soon gone, and instead of being an attractive part of the furnishing, the sanitary consideration very often is about all that keeps one from nailing a carpet over the whole floor. Others use linseed oil, and everybody knows that an oil finish is one of the best methods of finishing wood, but the objection is, that each time the oil is applied it darkens the wood, and in a short time the different kinds of wood are of the same color.

Now the question arises, which is the true and only way of finishing floors properly, and the answer is, by the use of hard wax, which, however, must be so prepared that the trouble of applying it and the stickiness attending ordinary beeswax and turpentine is entirely obviated. The wax is treated with special liquids and made into a preparation.

Among the many different things tried, hard wax was found to be the most satisfactory in its results. It is so simple, that when once the floor has been properly filled and finished with it, any servant can renew and keep the floors fresh and bright as long as the wood lasts, and as it does not materially change the color, the wood always retains its beauty. An application about once a year is all that is necessary, if the floors are rubbed over, when a little dull, with a weighted brush or cloth.

In repolishing old floors that have been in use for a length of time and become dull looking, it is only necessary after they have been cleaned, to rub on a thin coat of the hard wax finish with the brush or cloth, as stated above. If the floors have been varnished and the varnish is worn off in places, as mentioned above, the best way is to have the varnish scraped off, and then a thin coat of the hard wax should be applied and treated as the new wood after it is filled. But if it is inconvenient to have the floor scraped, or the expense too much, the main object being to restore the color in those places which are worn and defaced, the following mixture is recommended: One part linseed oil, one part liquid dryer and two parts turpentine; a cloth should be dampened with this and applied to the worn and defaced places which will have the desired effect. After being wiped off clean, it ought to dry 24 hours, and then polished with the hard wax finish. It is very important never to use the wax over oil that is not thoroughly dry, as the floor would invariably be sticky.

Finally it would be well to mention that hard wood or parquette floors should never be washed with soap and water, as it raises the grain and discolors the wood. After the floors have been properly filled and finished with the hard wax, dirt will not get into the pores, but stays on the surface and consequently can be removed with a brush or cloth, or, if necessary, dampen cloth with a little turpentine. This will take off any stain from the finish.

The Iron Pillar of Delhi.

The famous iron pillar of Delhi, India, is a solid shaft of wrought iron, 16 inches in diameter, and of a length that is variously reported. The total hight above ground is 22 feet, including a capital of 3½ feet. Major G. A. Cunningham, Director-General of the Archæological Survey of India, reported in 1863 that the total length of the pillar is upward of 48 feet, and possibly 60 feet. The lower diameter is 16.4 inches and the upper diameter 13.5 inches. The pillar contains about 80 cubic feet of metal and weighs about 17 tons. The metal was for a long time reputed to be bronze, owing probably to a curious yellowish shade on the upper part. A sample from near the base was analyzed by Dr. Murray Thompson, and found to be pure malleable iron of 7.66 specific gravity. The metal is, of course, charcoal iron, made directly from the ore in small billets, says a writer in a recent issue of *Cassier's Magazine*, but how it was welded up no one can tell, as no record exists of any early method of dealing with great masses of wrought iron. An inscription, roughly cut or punched upon a column, states that Rajah Dhara subdued a people in the Surdhu, named Vahlikos, and obtained with his own arm an undivided sovereignty on the earth for a long period. The date of the inscription has been referred to the third or fourth century after Christ, but on this authorities are at variance, as the style of writing is supposed by some to belong to a later period. According to tradition, the iron pillar was erected by Bilan Deo, the founder of the Tomara dynasty, who was assured by a learned Brahmin that, as a part of the pillar had been driven so deep into the ground that it rested on the head of Vasuki, King of Serpents, who supports the earth, it was now immovable, and that dominion would remain in his family as long as the pillar stood. The rajah, doubting the truth of the Brahmin's statement, ordered the pillar to be dug up, when the foot was found to be wet with the blood of the serpent king. The pillar was again raised, but, owing to the rajah's incredulity, no means could be found to fix it firmly, and it remained loose (dhila) in the ground, and this is said to have been the origin of the name of the ancient city of Delhi.

Closet Ventilation.

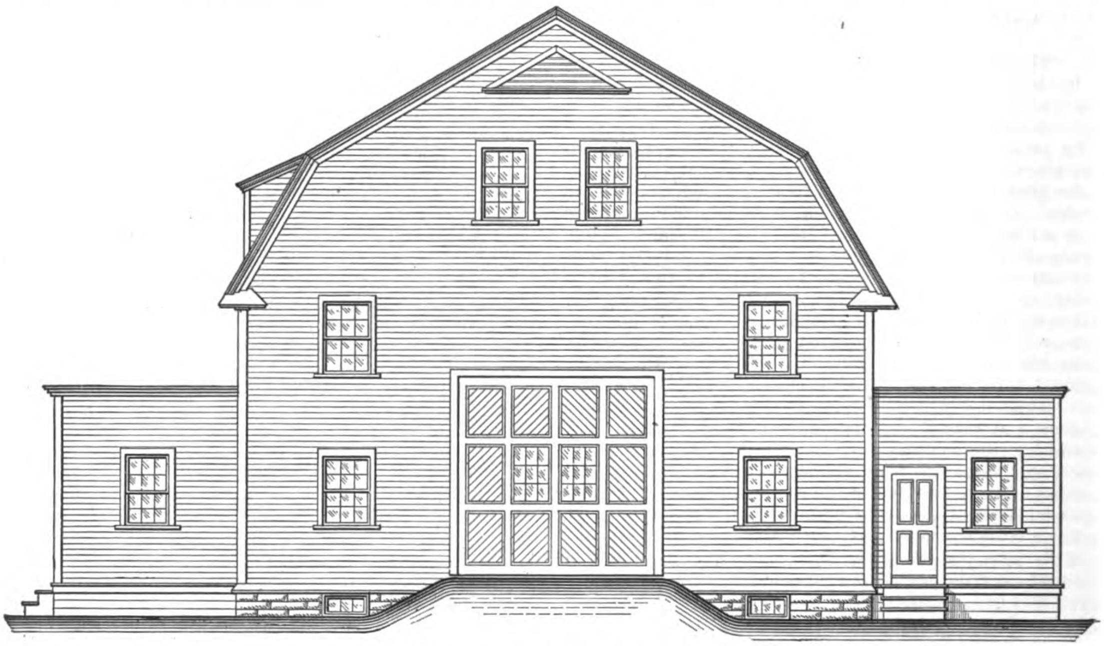
The modern housekeeper, remarks the New York *Evening Post*, has learned that clothes closets need ventilation quite as much as any part of the house. In the best of new houses this point is looked after by the architect, ventilation being introduced into the closets by various simple but efficient means. Where this is not the case, however, the doors should be left open for a time in the morning, quite as carefully as the sleeping rooms are aired. The readiness with which clothing absorbs close odors is realized when the tenement house washerwoman brings home the laundry. All the fried liver of the week's cooking seems sometimes to have been retained in the articles that have got their drying by the tenement kitchen fire. An arrangement in the linen closet of a recently built house is suggestive. In lieu of wide, deep drawers sometimes provided to hold household linen, which are difficult to move when filled, the closet has deep shelves fitted with covers at the sides, which let down. In this way the linen was perfectly protected, and closed in to hold the perfume of the lavender sprinkled over it, and at the same time access to it was easy.

DESIGN FOR A FARM BARN.

THE illustrations which are presented upon this and the pages immediately following relate to a farm barn, embodying many features which may be of suggestive value to those of our readers residing in sections of the country where structures of this kind are in demand. The barn here shown was designed for Milton H. Sears, operating a dairy farm, the interior of the building being especially arranged for convenience, so that work can be easily done and with as little help as possible. Connecting with the carriage room at the front and left is a covered shed not shown in the drawings, which gives direct access to the house of the owner. It will be seen from an inspection of the elevations and details that the building is not heavily timbered, but is strong, and easily and economically constructed. The architect points out that a ventilating cupola on the roof would have added considerably to the appearance of the building, but the item of cost was a prime factor, and the cupola was therefore omitted.

According to the specifications of the architect, John P. Kingston, of 518 Main street, Worcester, Mass., the foundations are of field stone with underpinning of masonry, as indicated in the front elevation. The superstructure is of frame, all joist rafters and girders being placed crowning edge up. All parts of the frame are pinned together with one or more pins and tenons, as long as possible, the braces being well nailed in place. All the framing and dimension timbers are of spruce. The sills of the barn are 6 x 8 inches, and those of the wings 6 x 6 inches, framed together. The first floor girders are 8 x 10 inches, the second floor girders 7 x 8 inches, framed into the posts; the top girders 7 x 7 inches, the plates 6 x 8 inches, sized over the girts; the purlin plates are 6 x 8 inches, the top purlin plates 7 x 7 inches, framed on to the posts; the first floor joists are 3 x 9 and 3 x 8 inches, the posts are 7 x 7 inches, tenoned top and bottom; the posts at the doors are 7 x 5 inches; the wing joist are 2 x 8 inches; the second floor joist for the center bay are 2 x 9 and 3 x 9 inches, projecting out over the girders, as shown in the vertical cross section. The 3 x 9 joist have a ⅝-inch bolt through the post at each end. The second floor joist for the side bays are 2 x 8 inches, well spiked to the studding and girts. The braces are 3 x 4 inches nailed in place, the outside studs are 2 x 5 inches, framed top and bottom; the silo studs are 2 x 8 and 2 x 5 inches, also framed top and bottom; while the wing studs are 2 x 4 inches, nailed at top and bottom. The rafters of the barn are 2 x 6 and 2 x 5 inches; those of the wings are 2 x 7 inches, and the collar beams are 2 x 6 inches, all cut as shown in the details. All joist and studding are placed 18 inches on centers, with rafters and collar beams 24 inches on centers. All floors are bridged once in each space, with 1¼ x 3 inch bridging fastened with two nails on each end.

The outside frame of the building is covered with ⅞-inch hemlock boards, planed on one side and not more than 14 inches wide. The posts below the sills are covered with 1¾-inch matched chestnut plank. Over the sheathing boards is a layer of good building paper, which in turn is covered with 6-inch spruce clapboards, laid not more than 4½ inches to the weather. The roofs are covered with ⅞-inch planed hemlock, laid with broken joints and about 2 inches apart, these being covered with 16-inch cedar shingles laid not more than 4¾ inches to the weather on the top roof, 5 inches to the weather on the steep portions, and 4½ inches to the weather on the wings.



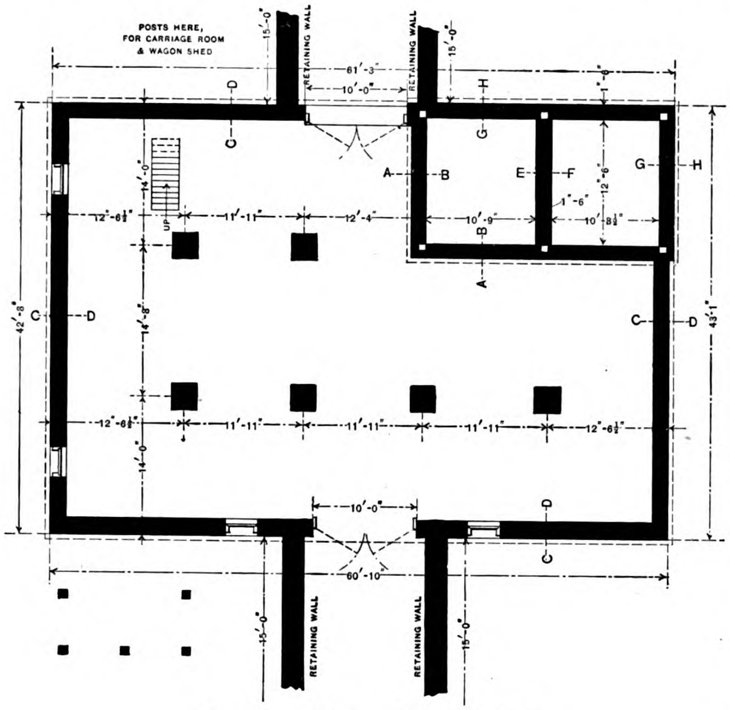
Front Elevation.—Scale, 3-32 Inch to the Foot.

Design For a Farm Barn.—John P. Kingston, Architect, Worcester, Mass.

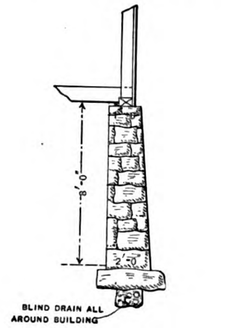
All exterior finish is No. 2 pine, and all sash not otherwise specified are hung with cast iron weights and sash cord. The windows in the stalls where shown swing in at the top with hinges at the bottom, and are covered with wire netting half way up. The two large outside doors are 2¾ inches thick, with chamfered stiles, rails, &c., and sheathed on the back with ¾-inch pine and glass sash, as shown. They are hung to slide at the top. The small door at the cow bay is 1¾ inches thick and hung with three butts. Other outside doors are 1½ inches thick and fitted with glass where shown.

The whole of the first story, except the milk room, has a lining floor of 1⅛-inch planed and matched spruce boards, well nailed to each bearing. The milk room has a lining floor of ⅞-inch matched spruce. The second story has a single floor laid with ⅞-inch matched spruce flooring, not more than 8 inches wide. The ends of the joist of the side bays have a spruce board nailed on the ends to cover down on to the girder. The floor projects-out over the board about ¾ inch. The top floors in the first story are all 1⅛-inch, square edge, planed and jointed spruce flooring, not more than 6 inches wide, laid with running joints. The milk room has a top floor of ⅞-inch spruce, not more than 6 inches wide.

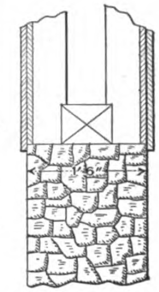
through the floors. The floors of the cow stalls are laid as shown in the details, with a piece over and fastened to the joist in order to raise it up from the floor. The under floor is of 1⅛-inch matched spruce and the top floor is of 2-inch pine. The floor of the lower part con-

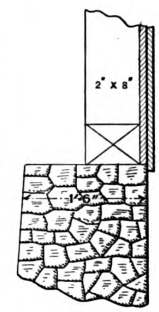


Foundation.—Scale, 1-16 Inch to the Foot.

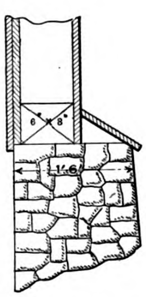


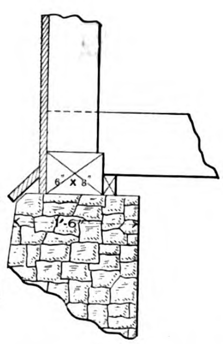
Section through Foundation.—Scale, ⅛ Inch to the Foot.



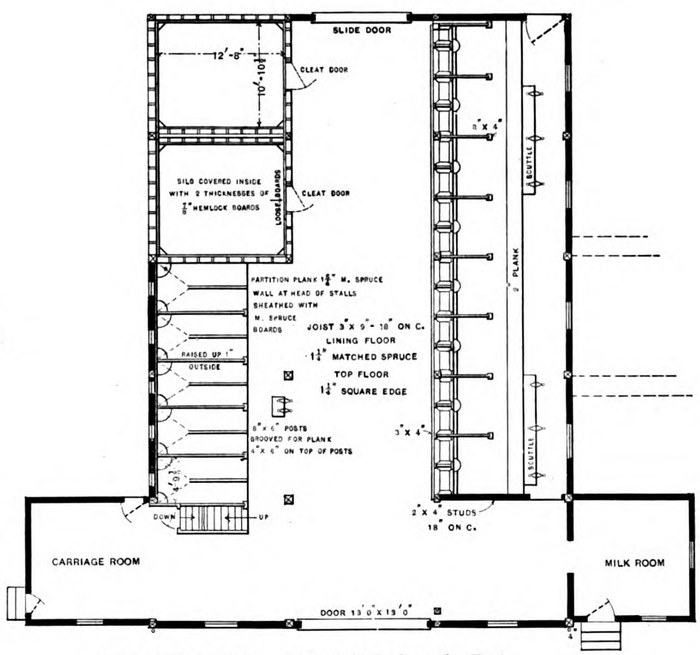


Section of Foundation Plan on Line E F. Section at A B.
Scale, ½ Inch to the Foot.





Section of Foundation Wall on Line G H. Section at C D of Plan and at E of the Sectional Elevation.
Scale, ½ Inch to the Foot.



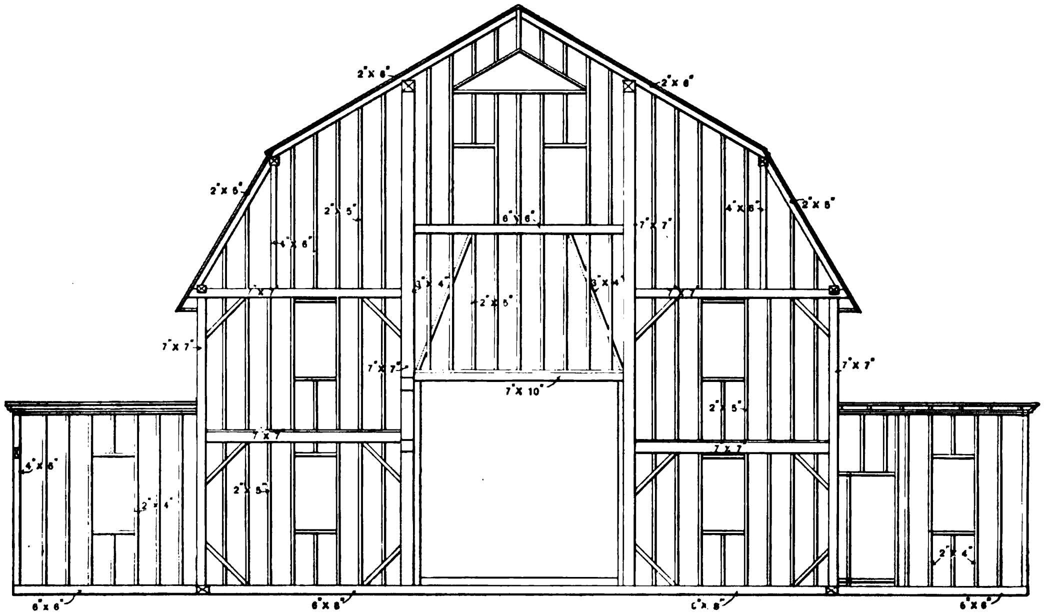
Plan of Main Floor.—Scale, 1-16 Inch to the Foot.

Design For a Farm Barn.—Plans and Miscellaneous Details.

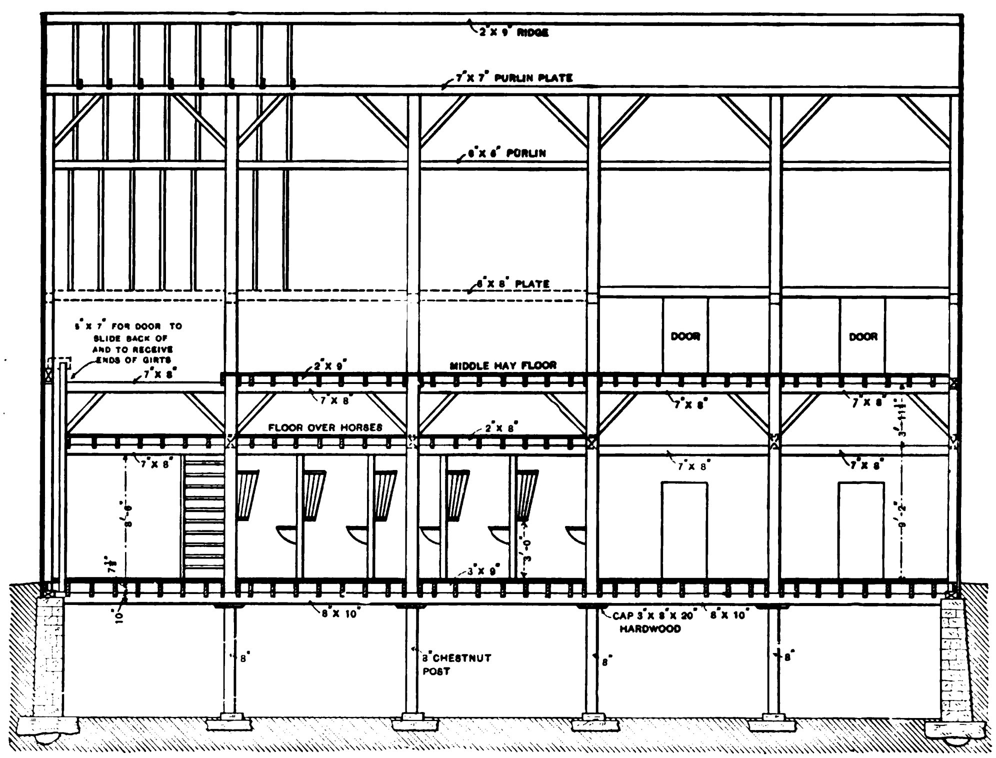
The horse stalls are laid with the two 1⅛-inch floors, as in the other parts, and in addition have a top floor of 2-inch spruce plank laid with the outside and head of the stall ⅞-inch higher than the center, with an open space 2 inches wide in the center. The plank runs from the outside to the open space, under which holes are bored

sists of a single 2-inch spruce plank. The floor toward the outside has a piece on top of the joist to raise the floor up 3 or 4 inches, as shown. It has a 1⅛-inch matched spruce lining and a 1⅛-inch square edge spruce top floor. The traps to raise up are of 2¼-inch hard wood, hung with three heavy hinges. The floors in the feed boxes have two thicknesses of spruce, the same as the other floors, and are raised up about 4 inches above where the cows stand.

The horse stalls have 5 x 5 inch square spruce posts, with the corners cut off, grooved to receive the 1¾-inch sheathing to and above the second floor for a distance of about 6 inches. Each feed manger has a 2-inch galvanized iron conductor, with tunnel extending above the floor 2 feet and down to the manger, for the purpose of carrying the feed from the second floor to the manger.



Framing of Front Elevation.—Scale, 3-32 Inch to the Foot.



Vertical Longitudinal Section.—Scale, 3-32 Inch to the Foot..

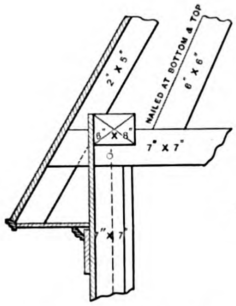
Design For a Farm Barn.

spruce plank, matched and planed. The partitions are 5 feet high and are slanted off toward the head of the stalls with a piece of 2 x 3 nailed on the ends. Each stall has a corner hay rack and a manger of W. S. Snow's make. The bottom of the rack is 3 feet from the floor. The space from the top of the rack is closed in with narrow

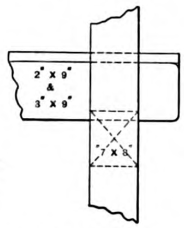
The cow stalls are fitted with posts 3 x 4 inches and grooved for the partition plank, which are of 1¾-inch matched spruce, the partition being 4 feet high and about 5 feet long, with 4 x 6 on top of the posts. The middle post between the large ones is 3 x 4 inches, and extends up to the girder, being grooved for the end of the plank.

The 3 x 4 shown along the posts in front of the cows is bolted to 7 x 7 and 3 x 4 inch posts with a ½ x 7 inch lag screw. The boarding in front is of ⅞-inch matched spruce, put on vertically and well nailed top and bottom. The stanchions are of 2¼-inch round hard pine, set in the floor at the bottom and bolted through the partition at the top.

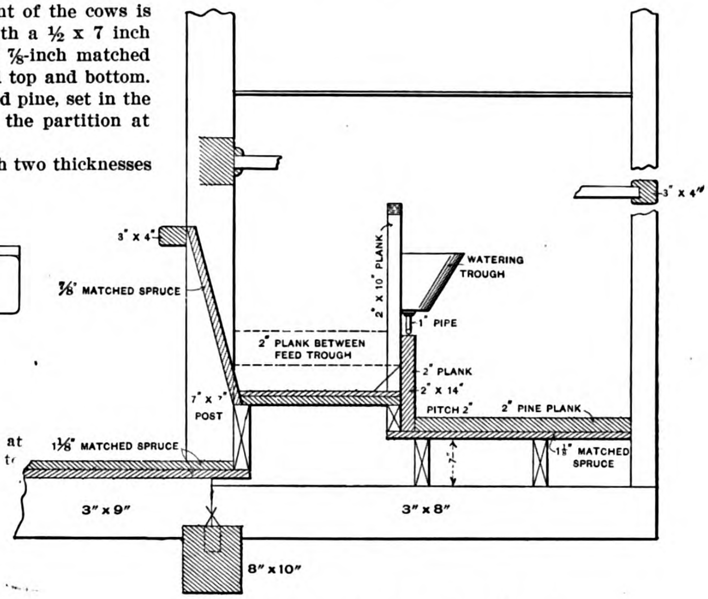
The silos have the inside boarded with two thicknesses



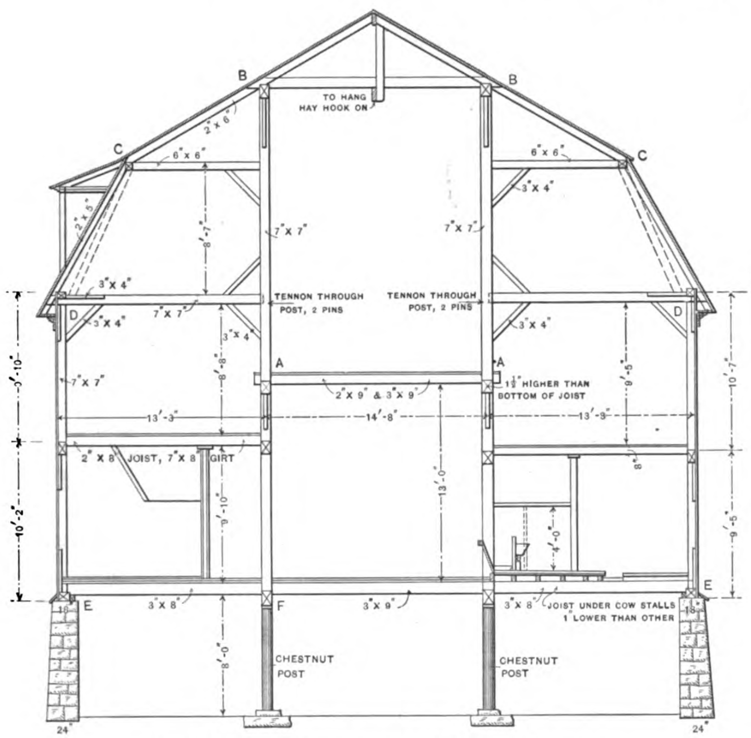
Details of Main Cornice at D. —Scale, ⅜ Inch to the Foot.



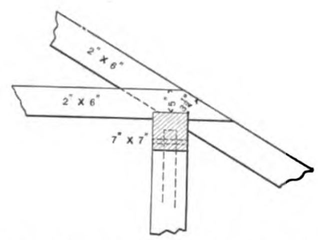
Detail of Elevation at A.—Scale, ½ inch to the Foot.



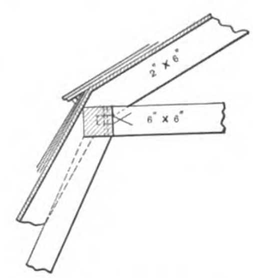
Details of Cattle Floor.—Scale, ½ Inch to the Foot.



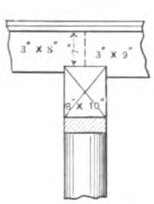
Vertical Cross Section.—Scale, 3-32 Inch to the Foot.



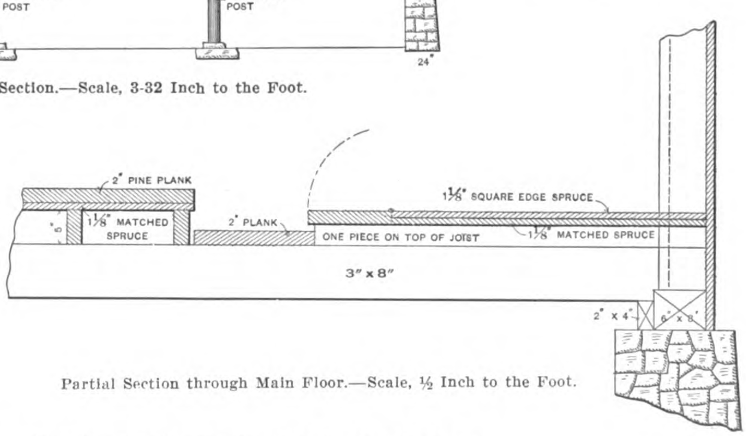
Detail of Joint at B of the Elevation.



Detail at C.
Scale, ⅜ Inch to the Foot.



Detail of Column and Girder Joint at F.—Scale, ⅜ Inch to the Foot.



Partial Section through Main Floor.—Scale, ½ Inch to the Foot.

Miscellaneous Constructive Details of Farm Barn.

of ⅞-inch plain hemlock put on with broken joints. The corner pieces are 6 x 6, cut cornerwise, and extend down over the stone work to the bottom of the silo. There are two thicknesses of loose boards at the openings, inside of the doors, the latter being of ⅞-inch spruce sheathing, with cleats well fastened with cleat nails.

All exterior work is painted with two coats of lead and oil, of colors selected by the owner. All interior doors and sides of doors, including cellar, were treated with two coats of paint.

Removing Paint and Varnish.

In discussing the matter of paint and varnish removers and the methods in vogue for accomplishing work of the character indicated, a writer in a recent issue of the *Painters' Magazine* has the following to say about the paint burner which may interest some of our readers:

In my opionion, the paint burner is the most expensive method of removing paint, and, in many respects, the most unsatisfactory. The heat softens the wood and the scrapers used in removing the paint are apt to dig gouges into the surface that may not be apparent at first, but that show badly after you paint the work. To make a satisfactory job over burned off work, you must use a surface, just as you would with a carriage that has been burned off. In other words, you must fill up the wood with one or two coats of roughstuff and rub it down with pumice stone to a smooth surface, just as you would a coach body. But people won't pay for that kind of work, and, besides that, it needs a good mechanic and one who can be trusted to pay strict attention to his work and not stop to talk to the other workmen. If he lets his thoughts wander and turns round to say something to the man next to him, it's ten chances to one that he will burn a deep scar in the wood that will take a good deal of work and cost a good deal of money to obliterate, if he is fortunate enough not to set the building on fire. When it comes to trying to burn off old paint from weather boards, it is cheaper to tear off the boards and put new siding on than to pay for the removal of the old paint either by the torch or a paint remover.

A method which I have found very satisfactory, specially where it has been found necessary to remove old paint from inside blinds, is to immerse them in a bath strongly impregnated with potash lye. Several years ago I had a big zinc lined tank made for just this kind of work, and it is big enough to put into any ordinary blind. I took 8 pounds of ordinary concentrated potash lye and 16 pails of water, and one of the men, during his spare time, would soak the blinds one by one in the potash solution, this having the effect of softening up the paint, and in time it was eaten away. The man then gave each one a thorough washing, using a whisk broom, so that the water would penetrate every crevice. In eight hours' time the man would have eight pairs of blinds perfectly clean. In order to neutralize the effect of the potash, I used about 50 cents' worth of oxalic acid in a solution which would cover the bottom of the tank to a depth of about 3 inches, and which would just about cover one of the blinds when immersed in it. Then, in order to make doubly sure, I used about a dollar's worth of vinegar as a final bath. In my opinion, it is better to spend a little extra than to run the risk of any alkali being left on the wood to remove the subsequent paint. Of course, the blinds will need sandpapering, but as most of the paint removers have to be washed off, they will raise the grain also.

Some painters seem to think that alkali is one of the worst things that can be used, but there's nothing as effective for taking off paint as potash, except carbolic acid—and, if it were not for the smell, carbolic acid is one of the best paint removers, because it does not require to be neutralized. To clean off the standing finish of a room you have got to have something that you can put on and leave. One advantage of a paste made of potash and lime for cleaning off interior trim is that it does not dry. It absorbs moisture and keeps on working. You have something you can put on in the afternoon and then go away and let it work while you sleep and come back the next morning and scrape off the paint.

One great trouble with most painters is that they are in too much of a hurry and they expect a paint remover to act too quickly. They don't realize that a quick acting paint remover that requires to be scraped off a few minutes after it is put on is really a time waster, since it keeps a man busy watching it, and he can only do a little piece of the work at a time. The paint remover that acts slowly and takes eight or ten hours to soften up the paint clear down to the wood is really a time saver, because the painter can keep right on applying the paint remover till he gets the whole room coated, without stopping every few minutes to scrape, and then go home and come back the next morning to find everything softened up and ready to go right ahead scraping off.

Soft soap would be excellent for the purpose of removing paint, and, besides, it is readily soluble in water. You let a cake of ordinary kitchen soap that has been wet stand on a painted window sill over night, and the next morning you'll find the paint all softened up, and some of it will pull off as you lift up the cake of soap. People often complain that the paint inside their houses will not stay in good condition, and when you come to inquire about it you find that they use strongly alkaline soaps or washing powders, or even those scouring soaps that contain fine silex or glass powders. How can you expect a paint to last when you use an oil solvent, such as all washing soaps are, for the purpose of cleaning it? I had a little experience with one of the much advertised washing powders as a paint solvent the other day. I was doing a little work at my house, and carelessly put my brush away without cleaning out the varnish in which I had been using it. The brush got hard as a rock. So I took a heaping tablespoonful of the golden yellow powder and put it in an old tomato can, which I filled part way with hot water. You could smell the alkali strong. I worked the brush up and down in the hot lather, and in a few minutes it was as clean and soft as a new brush. Yet that's the stuff people wash paint with. I don't wonder painters are so often blamed because their work does not stand when it is cleaned with washing powder like that.

I once cleaned off a piece of board taken from a house over a hundred years old. The paint was fully an eighth of an inch thick. The paint came off all right till I got down to a surface that was red in color—it looked as though it might have been mixed with Venetian red and white lead. It was smooth and hard as glass, and nothing that I could find would touch it. If we could only make such a surfacer now it would give a beautiful surface for enamel work.

Ornamental Metal Work in Dwellings.

If there is one fashion more pronounced than another among the owners of private residences, it seems to be the taste for beautiful iron, bronze and brass work. Somewhere about the modern mansion there must be something ornamental that has been wrought out of metal. Metal grilles are taking the place of wooden ones wherever the extra expense can be met. These never get out of order, and they endure as long as the house itslf. The beauty and harmony of metals as now fashioned by artistic smiths is consistent with their enlarged use of exterior doors and for windows, as well as for choice interior decoration, the latter particularly in business offices. In the form of metal ceilings architects are specifying metal more and more, especially in public edifices, where plaster, paper or plain boards were long the limitations of choice. Such ceilings not only have fire proof qualities, but are susceptible of receiving and expressing elegant forms and designs. Sheet metal work in its various branches has grown into a large industry here in New York, says a writer in a recent issue of the *Record and Guide*, and metal covered wood work is highly appreciated. In general it is a pleasure to note that, however habituated to sordid commercialism the community may be, the claims of beauty are yearly commanding more and more recognition from builders and owners as they learn that beauty pays a large interest on the investment.

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

By Chas. H. Fox.

We shall now explain the method by which the face molds may be developed, as required, in order to give the proper direction to form the springer, which belongs to two adjacent arches taken to spring from one stone, generally termed "a double springer." The arches may be taken to spring from a cap or from the mullion. and in Fig. 66 is given the directing curve divided in B, C, D, &c., to correspond to the number of stones the arch may contain. The tangents to the points in question are shown by B X, C Y and D Z. The plan is given in Fig. 67, in which E C' A' shows the outer face, 3 1 the center and *e c f* the inside face curve. The point O represents the plan center—that is, the center with which the plan curves may be drawn.

The center radial line of the springer is shown in G *g*, and the soffit lines at the springing are represented in A *a* and A' *a'*. We may assume the above projections, together with that of the point X of the tangent of the line 1 *x* of the plan, to have been made to the directions already given for the similar constructions in the preceding chapters. This done, from the points 1, 2, 3, X of the plan, parallel with the center line, produce lines as shown, that of the point X meeting the base line, Fig. 66, in the point X. Now in Fig. 66, parallel with the base line, draw B B', C C', &c. These meet the verticals drawn from the points of the plan in B' C' D'. Joining these with X, Y and Z, the projections respectively of the tangents to the center points 1, 2, &c., of the plan may be obtained. Square with these draw B' *b*, C' *c*, &c., and in like manner may the normals to the points in question be determined. In adopting the method just explained space at the drawing board, together with the time required to draw a number of lines, may be saved, over that of the method as explained in preceding chapters, by means of which the similar constructions may be projected. As in practice the points A, B, C, &c., of the directing curve are too far apart to enable the projections to be obtained in Figs. 68 and 69 of the face molds, through which to trace the developed curves of the soffit—that is, to trace them accurately—we have in *v*, *u*, *t* introduced intermediate points at the directing curve, which, being projected into the opening line of the plan, and then the radials $t_{,}$, *t*, *t'*, &c., drawn, will give in *t'* and $t_{,}$ of the outer and inside curves points to be transferred to the base lines of Figs. 68 and 69; then drawing the ordinates *v*, *v'*, respectively, of the diagrams of the same hight as that of the ordinates *v'*, *v*, &c., of Fig. 66, will give in *v''*, *u''*, &c., additional points through which the curves may be drawn accurately. The inclination of the normals of Fig. 66 may then be transferred to their corresponding positions at the developed diagrams. Set off at the normals the desired width of the arch stones at the face, and the points may be obtained through which to trace the curve of the exterior bounding surface. In these diagrams the width in question is taken equal with that given in B *a* of Fig. 66. Now set off A G A' of Fig. 68 and *a g a'* of Fig. 69, respectively equal with the corresponding lengths of the outer and inside face curves of the plan. At G and *g* erect the center lines G *g* and *g g'* of the face molds of the springer. It may be noted these intersect the normals, that of the outer face mold in the point *h* and that of the inside face mold in the point *j*. This shows that a vertical surface corresponding to that shown in *h g g' j* of Fig. 70 requires to be formed at the second arch stone, the direction for forming this surface, of course, being given in *h g* of the outer and *j g'* of the inside face molds.

In Fig. 70 we have shown at the left side of the diagram an orthographical projection of the arches of this plate and of that first projected in the diagrams of the previous chapter; that is, at the left of the center line is shown the representation of an arch, in which the elements which belong to the exterior bounding surface are assumed to radiate toward the axis of the wall, in the manner the elements of the soffit radiate. The joints are taken as plane surfaces. This causes the joint lines of the concave face to be shorter than that of the convex face, and, as may be seen at the drawing, the arrises, as *c c'*, *d d'*, &c., are not parallel with the horizontal plane

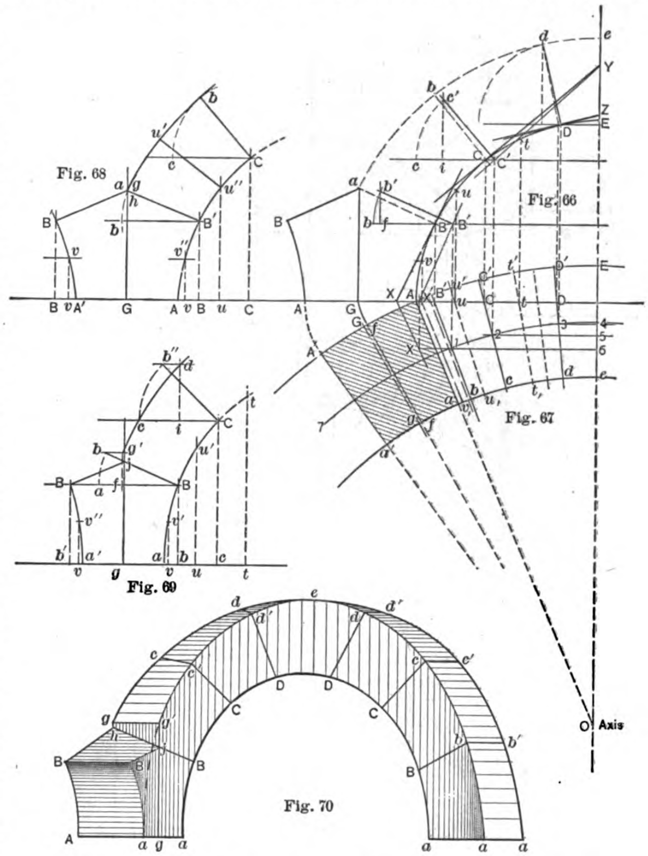


Fig. 66.—Half Elevation of Directing Curve, Developed Tangents and Normals of an Arch in a Circular Wall Having a Double Springer.
Fig. 67.—Half Plan of Fig. 66.
Fig. 68.—Developed Face Molds Which Belong to Convex Surface.
Fig. 69.—Developed Face Molds of Concave Surface.
Fig. 70.—Geometrical Elevation of Arch.

Laying Out Circular Arches in Circular Walls.

—that is, the arrises in question are not level. At the right side of the center is shown the arch projected as described at the later explanations given in Plate 9, in which the concave surface is taken to represent the outer face of the arch, and the arch stones of a uniform width. In this case the joint lines of the convex and concave surfaces are equal, so that the arrises, as *b b'*, *c c'*, &c., are parallel with the horizontal plane. The elements of the exterior surface do not at this form of arch "radiate toward the axis of the wall."

In Figs. 71-73 are shown the elevation and plan, respectively, of an arch in a circular wall, in which the exterior bounding surfaces are taken as vertical and horizontal surfaces.

The directing curve of the soffit (a quadrant) is shown in A C E of Fig 71, B, C, D being the representations of the points at which joints are desired. The tangents to the points are shown in B X, C Y and D Z. The representations of the vertical surfaces which form the exterior joints are shown in F *a*, *b b′*, &c., and the horizontal projections *b a*, *c b′*, &c., are the representation of the surfaces of the beds of the arch stones. This understood, the student may proceed to draw the plan, Fig. 73, and the development, Fig. 72, of the tangents and normals to the points B, C, &c., of Fig. 71, in the manner fully explained for the like operations in the preceding chapters. This done, in Figs. 74 and 75 draw the base lines, and at right angles with them the center lines E E′, E *e*,. Then in Fig. 74 set off E, D. C, &c., equal with the corresponding projections of the convex face curve of the plan. In Fig. 75 set off *e*,, *d*,, *c*,, &c., equal with the corresponding projections of the concave or inside face curve of Fig. 73. Now find the points B′, C′, &c., and through them trace

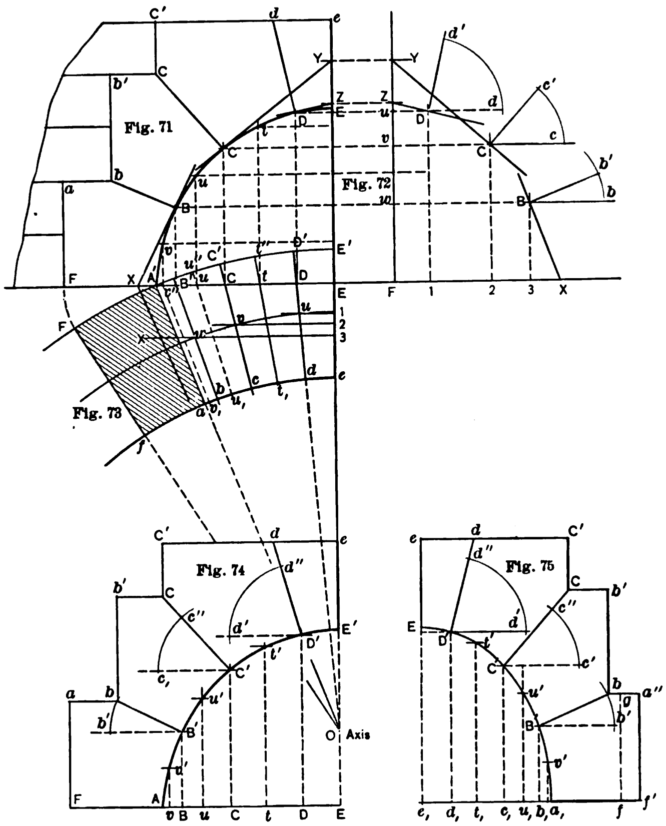


Fig. 71.—Elevation of an Arch in a Circular Wall, the Exterior Bounding Surfaces of Which are Taken as Vertical and Horizontal Surfaces.
Fig. 72.—Development of Tangents and Normals.
Fig. 73.—Half Plan.
Fig. 74.—Developed Molds for Convex Surface.
Fig. 75.—Developed Molds for Concave Surface.

Laying Out Circular Arches in Circular Walls.

the developed curve of the soffit; then transfer the normals in the manner described in the preceding plates for the similar operations. In Fig. 74 set off F *a*, equal to the corresponding hight as given in F *a* of Fig. 71. Through *a*, parallel with the base line, draw *a b*; then at the point given in *b*, parallel with the center line, draw *b b′*, equal in hight to that of *b b′* of Fig. 71; again draw *b′ c* parallel with the base line. In a similar manner to that explained above find the points, *c c′*, *c′ d*, &c., which will complete the diagram.

Now at the plan draw the radial F *f*; then in Fig. 75 set off *f a′*, equal with *a f* of the plan. At *f* erect the vertical, equal with the corresponding vertical *f a* of Fig. 71. Then in the manner described for the similar operation in Fig. 74 draw the horizontal *g b*, and then the vertical *b b′*, &c., which will complete the drawing. The student may notice it is the hights of the several courses which are transferred to the corresponding verticals of the developed drawings in order to obtain the position of the level lines of the beds of the arch stones. The horizontals are drawn to meet the joint lines. The intersections of these give the points at which to erect the verticals.

It may be noted in drawing the projection of the vertical joint to the direction given in *f* of Fig. 75 that a very short bond is obtained in the length *g b* of the top bed. This may be increased at pleasure by simply drawing *f f′* of any desired length, and then erecting the vertical *f′ a″* at *f′* in the manner shown in the diagram.

The Chimney.

One of the commonest things in the world is the chimney; yet, if you should send out to a thousand chimney builders for a definition of the word "chimney" you would not get an answer from 1 per cent. of those who might reply that would evince a master workman's conception of the structure. A large percentage, perhaps 50 per cent.—taking the general range of dwelling house chimneys, church chimneys, &c.—are essentially defective, because they violate the requirements of the following definition: A chimney is a perfect tube, perpendicular in structure, so built as to admit smoke, gases and air at the bottom of the tube only, and permit their escape at the top of the tube and nowhere else.

The following, says a writer in a recent issue of *The Metal Worker*, are some of the violations of the requirements of this rule, where the chimney is built of brick:

1. The brick are porous and are laid so poorly that sufficient air enters the chimney through the brick and mortar joints to destroy the draft.

2. The brick may be good, but laid without being thoroughly bedded in the mortar, and air enough may in this way be admitted through the sides of the chimney to destroy or weaken the draft.

3. The mortar may be poor, and its strength easily destroyed by the sulphur and other injurious fumes and gases of combustion. In my experience I find that about 20 per cent. of chimneys permit sulphurous and other gases to pass through them into the rooms. The rotten egg smell so often found in closets, bedrooms, &c., is due to this. This is mostly due to porous bricks, which seem to invite these gases to hide in their recesses and creep out into the rooms, most of which evil has been charged to the discredit of the furnace.

4. A chimney may be placed on an outside wall, with one 4-inch course between the draft and the weather. Such a chimney, even if ordinarily well constructed, may have its draft greatly impaired by air forced through the wall by wind pressure, which has a decided effect at times.

5. The value of a proportion of cement in the mortar is not as generally understood as it should be.

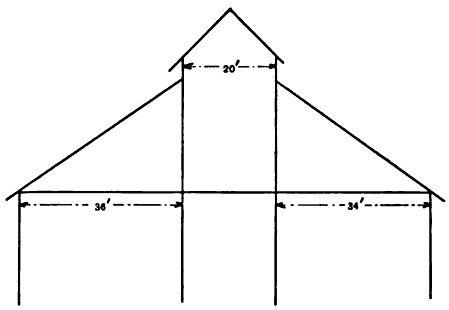
6. Chimneys for dwellings often cause great vexation by being too small, or by becoming a fuel thief when too large. Furnace chimneys should never be less than 12 x 12 inches inside, with a damper of solid construction and simple control for reducing the capacity. The "check damper" in common use is, at a time most needed, a failure. Under certain fire conditions the heat forces its own draft into the chimney and ignores the opening of the check damper—treats it with contempt.

The prolonged deadlock in the carpenters' strike at Rochester, N. Y., together with the high prices of building materials, have caused several important building projects to be indefinitely postponed.

CORRESPONDENCE.

Constructing a Barn Roof.

From D. P. B., *Redford, N. Y.*—Regarding the barn roof of "C. A. B." Petersburg, W. Va., mentioned in the July number of the paper, I would say that there is but one way to properly roof such a building. Having three ridges will prove an endless nuisance. I would use the form of roof outlined in the sketch sent herewith, putting windows in the highest part. I would suggest that no timber heavier than that absolutely necessary be em-

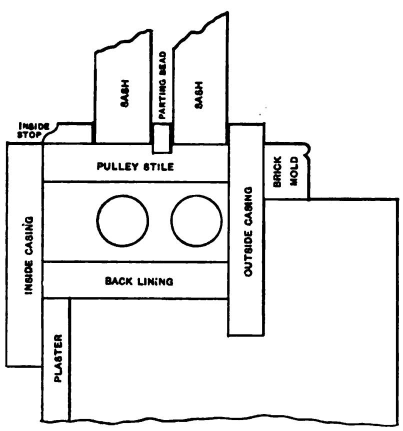


Constructing a Barn Roof.

ployed, so as to avoid useless weight. In my opinion it will be impossible to keep such a barn as that described by the correspondent from badly leaking.

Making Box Window Frames.

From LAZARUS, *Cliff, N. M.*—Box frames are set in this country so as to project ¾ inch inside of the brick work, and the inside casing is made wide enough to cover the entire box and extended on to the plastering at least 1¼ inches. The outside casing is made to extend about ¾ inch on the outside of the frame and is built into the



Making Box Window Frames.

wall, thus holding the frame solid. An idea of the construction suggested will be gained from an examination of the sketches which I send.

Shingling Gables.

From D. P. B., *Redfern, N. Y.*—In the August issue "M. D. H." of Mt. Vernon, Ill., asks for some neat designs of shingled gables, and in reply I would suggest that alternate layers of concave and convex dimension shingles give very attractive results.

Design Wanted for Tower or Belfry for Frame Church.

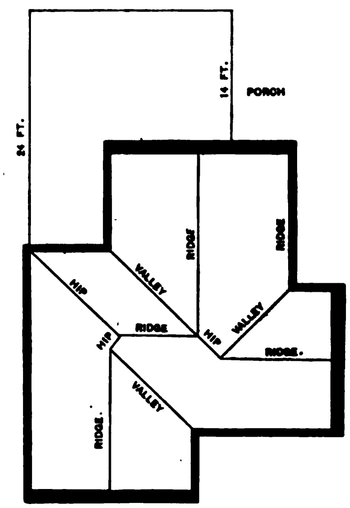
From H. F. H., *New Marion, Ind.*—Will some of the readers of the paper send for publication designs of a tower or belfry suitable for a frame church. I want the framework of the tower to start from the top of the ceiling joist, and would like to have the correspondents who may be disposed to answer the question to give the size of timber of which the frame is constructed and state the weight of the bell it will carry.

What Do Shinglers Use for Staging?

From F. W. S., *Lowell, Mass.*—I think if the "brother chips" would write more about what they like in *Carpentry and Building* it would greatly assist the editor in his good work. The paper has been invaluable to me for the past 20 years, and I have no doubt it has afforded many a hint to other readers during the time which they have been subscribers. I would like to ask one question about shingling, and that is, What do the Western shinglers use for staging? A board with three nails is all I see mentioned in regard to the matter in the correspondence which has been going on for the past few months. The pin in the hatchet is all right. After two days' practice I laid 3000 shingles in eight hours with less work than two of us could lay 4000 with straight edge. The discussion has been worth that much to me.

Roof for Addition to Old House.

From M. H. G., *Lawn Ridge, Ill.*—I send a plan of a house showing by means of dotted lines the new part that is to be added to the present structure. What I wish to know is the way, if any, to roof the new portion without



Roof for Addition to Old House.

destroying the roof on the old part of the house. The structure is only a one-story affair and has been built two years. Will some of the kind readers suggest a scheme to help me out of my difficulty?

Finding Side Bevel of Valley Rafters in Roofs of Unequal Pitch.

From W. A. E., *East Waterford, Maine.*—I have been very much interested in roof framing, by Morris Williams, for I have studied jack rafter craft quite a lot myself. In my opinion this is the best method of framing unequal pitches I have ever seen published, but I think there is a mistake in the side bevel of the short valley rafter at *d"* on page 60 of the March issue of *Carpentry and Building.* It will be much too sharp to fit against the long valley rafter, but may be found where the line *c d"* crosses the line *a z* at *b*, or near enough for all practical purposes. I have framed several roofs of unequal pitch, the last being 12, 24 and 35 inches rise to the foot, and would suggest that the framer lay them out on a scale of 1 inch to the foot at least, and with T-square and drawing board. It is, however, much better to lay them out full size where they are very complicated, especially if there is room. If not, one-quarter of the roof will answer the same purpose in many cases.

Answer.—We submitted the question raised by our correspondent to Morris Williams, who furnishes the following in reply: The correspondent is correct in stating that the bevel shown at *d"* in Fig. 4 of the March issue of the paper is "much too sharp a cut to fit against the side of the long valley." As there shown, it indicates the angle formed by the intersection of the two valleys in the plane of the main roof. If the valleys were placed so that their upper face would be in line with the plane of the main roof the angle at *d″* would fit the short valley against the side of the long valley.

In a roof constructed of iron the bevel would be the correct one to apply to the flange of the valley that would lie in the plane of the main roof, and if timber valleys were "backed" it would be the one required, but as valleys are not "backed," except in cases where the underside of the roof is visible, the usefulness of this angle is restricted to the finding of the correct bevel that is required to apply to the upper face of the jack rafters, in that it locates the two valleys projected into the plane of the main roof. The jack bevel shown at *w* is Fig. 4 of the March issue is found, as there indicated, by drawing a line perpendicular to the ridge to represent the jack until it intersects the line of the long valley. The bevel formed at the intersection is the one required to apply to the upper face of the jack.

The angle at *d″*, as there shown, indicates the angle between the two valleys projected into the main roof.

In Fig. 8 of the March issue the two valleys are shown geometrically constructed into the horizontal plane and the angle *d″* of Fig. 4 is there shown at *m* to form the angle between the two projected valleys. If the point *m* in Fig. 8 is revolved, as shown by the arc, to *d″*, which issue at *z*, and the one that would fit the long valley against the ridge if "backed" is there shown at *b‴*.

Carpenters in general from lack of technical knowledge fail to discriminate between these bevels, and the various books that have been published on roof framing seem also to ignore the distinction. They invariably treat the cuts for hips and valleys "backed," and thereby mislead the carpenter, who always treats his hips and valleys square. In roofs of unequal pitch the variation between the bevels is occasionally so much as to cause the destruction of the timber used if one bevel is applied where the other is called for. It is therefore important to the roof framer to know how in all cases to find both bevels.

Fig. 2 illustrates the nature of the bevels shown in Fig 1. Being a perspective view of the geometrical construction in Fig. 1, it will be easy to understand the why and wherefore of the lines there manipulated. Note the line *c m* in Fig. 2. It is shown drawn square to the side of the short valley and coinciding with the square back of the same, thus showing that the back of the short valley is in line with a plane which has the line *c m* for its horizontal trace, the line *m d″* being its vertical trace, while the line *m a b* will be the X Y—that is, the intersecting line of the co-ordinate planes. It is thus shown that a new plane is constructed to find the bevels for the valleys when dealing with them square

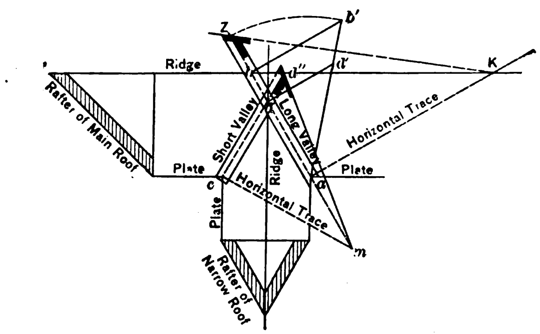


Fig. 1.—Finding Side Bevels of Valley Rafters in Roofs of Unequal Pitch, When the Valley Timbers are not "Backed" to Conform with the Planes of the Intersecting Roofs.

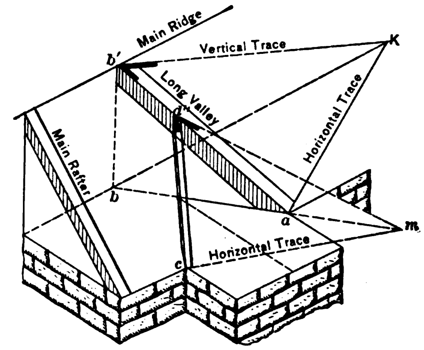


Fig. 2.—A Perspective View of the Method of Construction Shown in Fig. 1, Indicating the Back Faces of the Valleys to be Parallel with a Line Drawn Square to the Plan Lines of the Valleys, Which Occurs Where the Valleys are not "Backed."

Finding Side Bevel of Valley Rafters in Roofs of Unequal Pitch.

is a point in the main roof, it would stand plumb above the point *d*, which represents the intersection of the plan of the two valleys. A careful study of Figs. 4, 8 and 9, in the March issue, will clearly demonstrate the nature of the bevel shown at *d″* in Fig. 4, and that it is simply the angle between the valleys when in their correct position in the main roof. To find the butt bevel to fit the short valley against the long valley when the valleys are not "backed," to conform with the planes of the intersected roofs, proceed as indicated in Fig. 1 of the accompanying diagram. Here let *a b* and *c d* respectively represent the plan lines of the valleys. From the point *b* erect the line *b b′*, making it equal in length to the rise of the main roof. Connect *b′* and *a*, *then the line b′ a* represents the length of the long valley. From the point *d* erect the line *d d′*, cutting the long valley in *d′*. The line *d′ a* will represent the length of the short valley. Now place this length on the plan of the short valley, as shown, from *c* to *d″* and connect *d″* with *m*. The angle formed at *d″* is the one that is to be applied to the short valley to fit it against the side of the long valley. The point *m*, as shown in the diagram, is found at the intersection of a line drawn from *c* square to the plan line of the short valley *c d* and the continuation of the plan line of the long valley *a b*. The same principle is shown in this figure applied to finding the bevel for the long valley to butt against the main ridge.

From *a* draw the line *a k* square to *a b*, the plan line of the long valley. Make *a z* equal the correct length of the long valley, as shown at *a b′*. Connect *z k*, and the bevel at *z* is the one that will fit the long valley against the ridge. This bevel is shown in Fig. 4 of the March backed, and also that their back faces coincide with the oblique surface of the newly constructed plane, while in dealing with the valleys when backed the plane of the roof is the one that will contain the prepared back surface.

The same remarks are applicable to the bevels shown at *b′* in Fig. 2. The horizontal trace of the oblique plane which contains the square back of the long valley is shown to be a square line to the side of the lone valley drawn from *a* to *k*, and its vertical trace the line from *k* to *b′*, while the line representing the plan of the ridge will be the X Y.

In Fig. 3 is presented another view illustrating the nature of the bevel *d″*, shown in Fig. 4 of the March issue. In this view the horizontal trace of the plane which contains the back face of the valleys is shown to be the plate line of the main roof, and therefore the main roof represents the plane which contains the back face of the valleys. The problem solved in this construction is merely the projection of two oblique lines from the plan to the plane of the roof. The angle between the lines thus projected is the angle shown at *d″*, which, as the correspondent states, is much too sharp to fit the short valley against the long valley if the valleys are not "backed." If backed it is the correct one to apply to the short valley to make fit against the side of the long valley. Note the difference between the two bevels, as represented in the two views, also that the one in Fig. 3 represents the angle between the two valleys on the main roof, while the one in Fig. 2 represents the angle required to fit the short valley against the long valley when its square back face is continued in a newly constructed plane which coincides with the back face of the valley.

In Fig. 4 is presented a short method to find the same bevels to apply to the valleys when not "backed." Let *a b* and *c d* respectively represent the plan lines of the valleys. On *b* erect the perpendicular line *b b''*, equal in length to the rise of the long valley. Connect *b'' a*, thus determining the length of the long valley. On *d* erect *d d''* and *d b''* respectively. Connect *b'' c*, thus determining the length of the short valley. At any distance and parallel to the plan line of the short valley draw the dotted line *f b*. On *x* erect the line *x a''*. Now take the length *a'' b''* and place it from *b* to *z*, connecting *z d*, and the bevel thus formed at *d* will fit the short valley to the side of the long valley. It is the same bevel as the one shown at *d''* in Fig. 1, and is to be applied to the valley when its back face is left square.

Again, draw a parallel line at any distance to the plan line of the long valley, as at *g s*. On *n* erect *n w*. Take *w b''* and place it from *s* to *o*. Connecting *o b* the bevel at *b* will fit the long valley against the side of the main ridge, and is the same as the one shown at *z* in Fig. 1.

Although this rule to find the bevels is more of a scheme than a geometrical solution, its simplicity and universality of application is such as to claim for it an important place in the realm of carpentry.

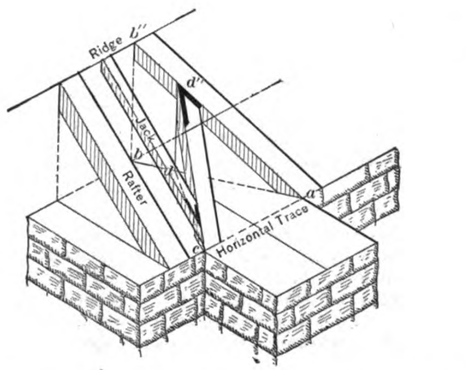


Fig. 3.—A View Showing Bevel *d''* to Represent the Angle Between the Two Valleys, if Placed with Their Back Faces Parallel with the Plate of the Main Roof, Which is the Case Where the Valleys are "Backed."

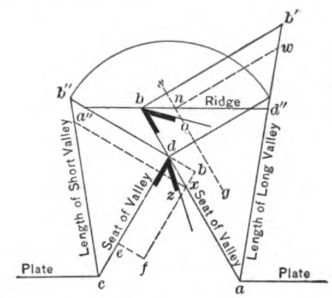


Fig. 4.—A Simple Method of Finding the Side Bevels of Valley or Hip Rafters in Roofs of Equal or Unequal Pitch Where the Same are not "Backed."

Finding Side Bevel of Valley Rafters in Roofs of Unequal Pitch.

Some Comments on Low Cost and Double Houses.

From F. W. S., *Lowell, Mass.*—I am sorry to see the small plans, or rather plans of houses costing from $1200 to $2500. Such houses that builders are requested to furnish are giving way to the larger ones, which would naturally go to the architect. I enjoy looking over the plans which appear from month to month, and have built a number of houses from the published plans, with, of course, slight modifications. I would like to see more two-tenement houses, both flats and double houses, published, which could be built for, say $2000 to $4000; also illustrations of bay windows, dormers, shingled and clapboarded gables, china closets, piazzas, &c.; something different from the ordinary.

The designs of house furniture which have appeared from time to time are very good, and I hope the author will continue the subject.

If the readers desire, I will send for publication a plan of an economically arranged two-tenement house in flats, with each tenement separate, such as takes very well in this part of the country.

Roof Covering for Roundhouse.

From I. E. D., *Atlantic, Iowa.*—If I remember aright a correspondent made inquiry some time ago concerning the best form of roof construction for a roundhouse, and I take the liberty of suggesting slate or tile for such roofs, although their weight necessitates a heavy structure to support them, making the roof rather expensive. I would place on the sheathing thoroughly dried matched pine flooring, and then give it a good heavy coat of paint, consisting of 5 pounds of Venetian red and 1 pound of litharge to 1 gallon of linseed oil, and allow it to dry thoroughly. After the paint is dried a good grade of felt paper should be laid over it. A roof with flat seams can then be put on, using tin plate of a good brand, not more than 14 x 20 in size. This should be well painted on the underside with the same paint that was used on the sheathing, but the paint should be kept well stirred while it is being used.

If these suggestions are followed I think the roof will give as good satisfaction as one made of any other kind of material. Of course it is very necessary that the roof should be put on by a reliable workman. It should be nailed every 4 inches, and should have ½-inch lock at the beams. It should be soldered with about 5½ pounds of solder to the square, using good heavy soldering coppers that will soak the solder in good. I would use for the flux muriatic acid cut with zinc until it will use no more zinc, then further dilute by the use of one-third its bulk in clean soft water. After the roof is completed it should be carefully painted, when it will be found to be less expensive than the heavier roofs, and with care should prove just as durable.

Cost of Cement Construction.

From F. W. S., *Lowell, Mass.*—I would like to ask C. G. Taylor, whose communication on cement construction appears in the August issue of the paper, as to the cost per cubic foot of the cement cellar which he describes.

Putting on a Zinc Roof.

From J. A., *Kansas City, Mo.*—Will some of the readers give me a method for putting on a zinc roof in sheets, the roof having a fall of 1 inch to the foot. I understand that zinc is used in the old country, but I have never seen it used here except as tile or shingles. How can it be fastened without soldering?

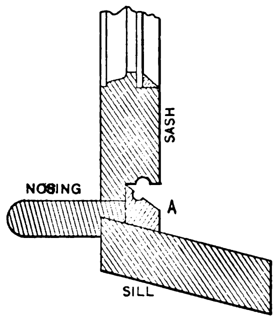
Note.—We submit the above to our readers for such discussion as those familiar with the subject may be disposed to give it. At the same time we would refer our correspondent to some articles which have within the last few years appeared in our columns on zinc roofing. The matter was largely taken from English periodicals, and refers to the methods which obtain in that country for doing the work.

Designs for Picket Fences.

From D. P. B., *Redford, N. Y.*—I notice in the August issue of the paper what "Down South" has to say about picket fences, and that he takes exception to some of my ideas. I would say that in heaving ground it is almost impossible to get deep enough, and in a windy and drifting section a post 2 feet deep will not long stand plumb. The braces used enable one to fill in around the posts from a wagon box, as it is seldom wise to fill in the same dirt, and a gravel pit is often within reach. The bottom rail enables one to joint the base anywhere. A glance will show his post ruined by the gain. His method is the ordinary way here, but it is the most unsatisfactory.

Question in Window Construction.

From C. A. WAGNER, *Port Jervis, N. Y.*—The sketch which I send herewith represents the form of construction I have used on French windows to good advantage. I recommend its use to those interested, as it permits the

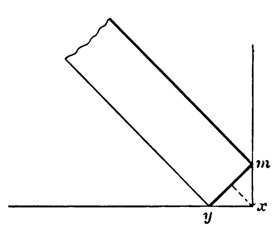


Question in Window Construction.

sash to swing inward and is always in out of the weather. The piece marked A is to have the groove so made that it will allow no water that might get into it to run out. If "J. A. R." used this construction he would change his views, I think, as to outward swinging sash.

Short Method of Backing Hip Rafters.

From F. L. T., *Eureka, Cal.*—I would like to make a suggestion in regard to backing hip rafters, which I do not remember ever having seen in print. Referring to the sketch, Fig. 1, let A B C represent the foot cut on the hip rafter. Measure back from B on-half the thickness of the rafter and measure D M square to B C. Gauge D E parallel to B C, and at the distance D M. Ordinarily we would back off the corner of the rafter from the center of the top side each way down to the line D E. Now my method is to make D E the length of the rafter and not back it at all. If the rafter is placed on a lookout the seat will present the appearance shown in Fig. 2. It will



Short Method of Backing Hip Rafters.—Fig. 1.—Showing Foot of Rafter.

be readily seen from this that the distance *x y* is the hypotenuse of a right angle triangle, the sides of which are one-half the thickness of the rafter. It will be found that *x y* is about 1½ inches for a 2-inch rafter. If now the rafters are notched for an overhang and rest on the plate cutting off the corner of the plate along the line *m y* will crowd the rafter forward and it will be all right. The sheathing will just touch the corner of the rafter and may be nailed without difficulty, while a great deal of labor is saved. It is assumed that the building is square and the roof of the same pitch on both sides of the rafter. A little ingenuity, however, will enable one to extend a very useful principle.

Frost Proof Roof for a Stone Reservoir.

From D. P. B., *Redfern, N. Y.*—In answer to the inquiry of "T. B." in the August number, I would say that the correspondent should cover his reservoir with a double hopper inverted, one fitting on the inside edge of the wall and the other on the outside, leaving an air space at least 6 inches all around. The correspondent should be able to make them of concrete ¾ inch or more in thickness.

How Many Men Should Work on the House?

From R. A. G., *Menlo, Iowa.*—In answer to "Novice" of Zion City, Ill., in the July number as to how many men should work on a house, I would say that he failed to tell us what class of men he is working. If the men were all experienced I should run about ten on the job, but if the men were of the "saw and hatchet" type, picked up on the street corners, I should want only one. Usually I prefer four to six men on a job such as that described by the correspondent, as I mostly work them in pairs—that is, two men together, and do the odd work, bringing up the end and looking after the laying out myself. When I

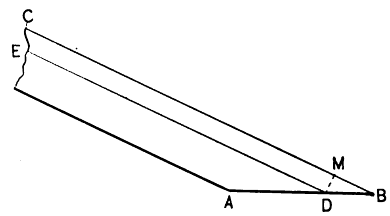
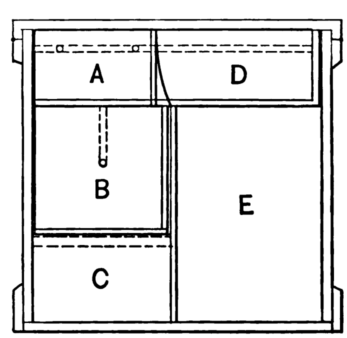


Fig. 2—Appearance of Seat When Rafter is Placed on a Lookout.

have a gang of three or four good men I like one man for roustabout to build scaffolds, carry materials and so on. Last summer I built two ten-room houses with one man of experience besides myself, but I do not like more than six men on a job, although, as I have intimated, I could handle ten good men on a ten-room house.

Plan for a Tool Chest.

From S. H., *Minneapolis, Minn.*—Some time ago, I think in April last, there appeared some comments on tool chest construction. As I am interested in this subject, I beg leave to submit to the readers the plan inclosed herewith. I have used this chest several years and found it entirely satisfactory. It is rather small, measuring, as it does, 34 x 14 x 14 inches inside. Referring to the sketch, A is a tray, partitioned to suit, for chisels, bits, &c., and



Section of Tool Chest, Submitted by "S. H."

slides on hard wood pegs running in the rabbet; B is the hand or shoulder box resting with the ends on cleats. I use a cord in the ends of the box by which to lift and carry it. The section marked C is for levels, bars, axes, &c. D is for saws fastened stationary to the lid, and if 3½ inches deep it will hold six saws, also the steel square put in tongue and blade and fastened to the lid at an angle. The section E can be used for bulky tools, such as jointers, plows, molding planes, &c.

CONSTRUCTING INSIDE FOLDING BLINDS.

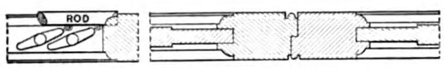
By F. J. GRODAVENT.

IT occasionaly happens that the skillful carpenter or cabinet worker is called upon to construct one or more sets of inside folding blinds, owing, perhaps, to the fact that they are not readily obtainable from the factory, or that they are intended to meet special requirements which renders it as economical on the part of the owner to have them made at the building as it is to have them prepared to order at a distant factory. There are various ways of doing work of the character indicated, and while the experienced mechanic may have well defined ideas on the subject there are others who would find in the construction of a set of inside folding blinds much that would prove perplexing. In the illustrations presented herewith is shown the construction of a set of blinds of this nature, the descriptive text affording perhaps many valuable hints and suggestions to those likely to be called upon to do work of this kind.

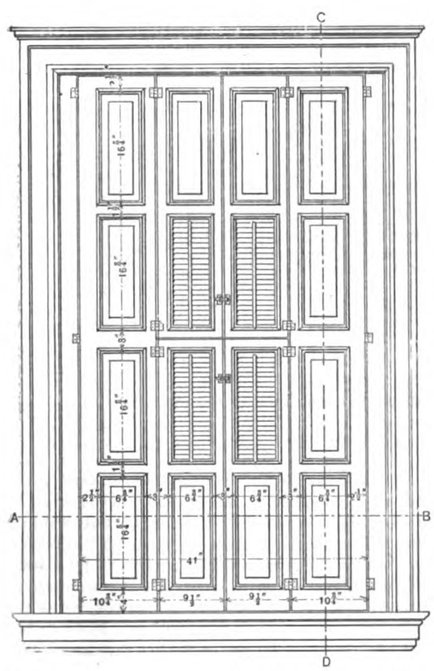
The example is a window of medium weight, with box frame and double hung sash with cords and weights on axle pulleys, as found in a residence having 13-inch brick walls with furrings lathed and plastered. The design represents a four-fold blind with panels and rolling slats in the center panels and blinds partially divided in their length at the meeting rail of the sash in order to regulate the light. The blinds are hung to regular frames having false jambs, head and stool finish and false jambs set back on the frame to give room for the blinds. The window to which they are fitted is a two-light affair, with glass 36 x 36 inches. It will be noticed that the main hanging section is not divided, as, in the opinion of the author, the blinds will work better and will be less likely to interfere at the meeting rail when they are opened and closed. In laying out inside paneled blinds the size of the panels should be regulated by the size of the glass, and the design here presented is worked out accordingly.

I have taken the width of each stile of the sash as 2 inches and the glass as 36 inches wide, thus making the opening on the frame 2 + 36 + 2 inches, or a total width of opening of 40 inches. I lap each hanging section of the blinds ½ inch over the frame opening, thus making the full width of the blinds ½ + 40 + ½ = 41 inches. As the stiles of the sash are 2 inches wide and I lap each hanging section of the blinds ½ inch over the frame, the width the hanging stiles will be 2 + ½ inches, or 2½ inches. As the top rail of the sash is 2 inches and the top of the blinds lap the window frame ½ inch, the top rail of the blinds will be 2½ inches wide, the same as the hanging stiles. The meeting rails of the sash are 1½ inches wide, rabbeted and grooved ¼ inch for the glass top and bottom, leaving 1 inch between the glass in the upper and lower sash, so that the length for the panels in the blinds will be 36 + 1 + 36 inches, or 73 inches, and the width for the panels being the same as the glass, namely, 36 inches, we have for the limits of our panels 36 x 73 inches.

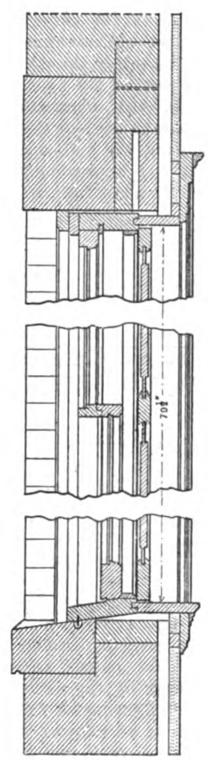
Where inside blinds are used, the stool finish for windows should be grooved into the wood sill, instead of being placed on top, thus giving something for the bottom of the blinds to strike against and keep them straight. This would give a bottom rail of 4 inches on the blinds for the bottom rail, if the sash was 3½ inches wide at the glass, as in the present instance. The thickness of the blinds I make 1⅛ inches. In this design I have allowed 1½ inches as the width of intermediate stiles and provided for 3-16 inch rabbeted joint and bead, mak-



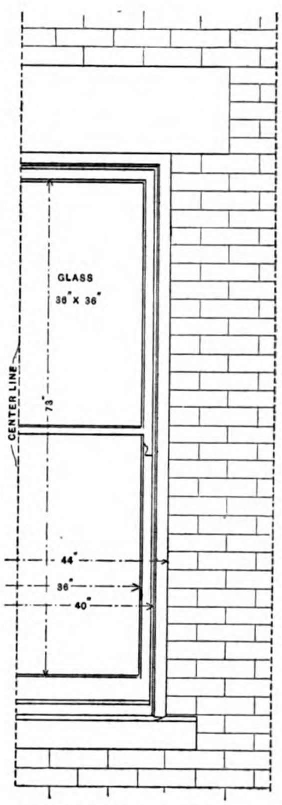
Section of Shutter.—Scale, 3 Inches to the Foot.



Inside Elevation of Window.—Scale, ½ Inch to the Foot.



Vertical Section on Line C D.—Scale, ¾ Inch to the Foot.



Half Outside Elevation.—Scale, ½ Inch to the Foot.

Constructing Inside Folding Blinds.

ing the total width of the two stiles 3 inches. The sizes given for the widths of stiles and rails do not include the molding, which gives an additional width.

Having found the widths of the stiles and rails, the widths and lengths of the panels will be as follows: As the extreme width for the panels and the intermediate stiles has been found to be 36 inches, the same as the width of the glass, and we have three sets of intermediate stiles of 3 inches each, the total allowance for six stiles will be 3 times 3 inches, or 9 inches, which, deducted from the 36 inches, leaves 27 inches as the width for the four panels, and 27 inches, divided by 4, gives 6¾ inches as the width of each panel.

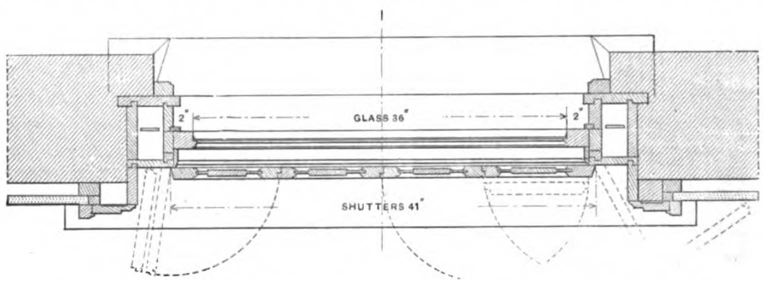
Now, as the extreme hight for the panels and the intermediate rails has been found to be 73 inches, the same length as the two lights of glass and the space between, and we have three sets of rails, one 3 inches and two 1½ inches each, the total allowance for the rails will be 1½ + 3 + 1½ = 6 inches, which, deducted from 73 inches, leaves 67 inches as the length for the panels, and 67 inches, divided by 4, gives 16¾ inches as the length of each panel.

Having found the widths and lengths of the panels, also the widths of the stiles and rails, we can now proceed with our construction. Provide a smoothly dressed rod as long as the blinds and upon this lay off the exact lengths for panels and widths for rails, with a margin of length for fitting when hanging. Locate the mortise for each rail in its proper place, allowing the full size of the rails as figured for the mortise. It is presumed that from the design the proper bill of quantities has been made and the material provided; the strips for stiles and rails having been mill run and grooved and molded to form the panels; the stiles carrying rolling slats grooved only at top and bottom for panels and bored ¾ inch on centers at central openings for the slats. On the same rod can be laid off exact dimensions for widths of panels and stiles, and in running an allowance may be made for rebates and fitting. The rails are to be cut to lengths, allowing for blind tenons after they have been mill run, molded and grooved for panels where required, or left without grooves at panels where rolling slats are to be placed. The stiles having been properly mortised and the rails properly cut, the tenons are formed on a machine coping, the moldings of the rails to member with the moldings on the stiles. The panels are to be made with a raised panel on each side and cut at least 1-16 inch less in length and width than the figures on the drawings, so they will not bind upon the stiles or rails when put together.

The rolling slats are to be set ¾ inch on centers and connected after the sections are put together, with an operating rod secured to each slat with staples.

Each section of the blinds is to be put together separately, well glued and clamped up, and, when set, dressed off smooth to a finish and sandpapered with the grain of the wood. The sections are to be rabbeted 3-16 inch and beaded at the vertical joints. The sections should now be assembled in their regular order on a bench or other convenient elevation, secured together across the top and bottom with strips of wood put on temporarily, and the blind carefully squared and marked for neat width and length, and then cut and fitted for hanging. Put on the hinges or "back flaps," securing the inner sections, after which the entire blind should be hung to the frame before the parts are separated, and then the temporary strips taken off, the inner sections divided at the meeting rail, as shown, or left in their full length, as desired. After this has been done put on the necesary shutter bars and knobs.

The hanging stiles should be dressed on a bevel at the edge to allow the blinds to swing back out of the way. In some cases blinds are secured to the frames with four hinges, instead of three, as shown on the drawings, in which case they would be placed to line with the other hinges on the intermediate sections. The moldings around the panels in the design here shown are worked on the solid stiles, as in my opinion the solid work is best for the general run of inside blinds. If desired, however, separate moldings can be cut around the panels against square stiles and rails.



Horizontal Section on Line A B of the Elevation.—Scale, ¾ Inch to the Foot.

Constructing Inside Folding Blinds.

Learning to Live in the Tropics.

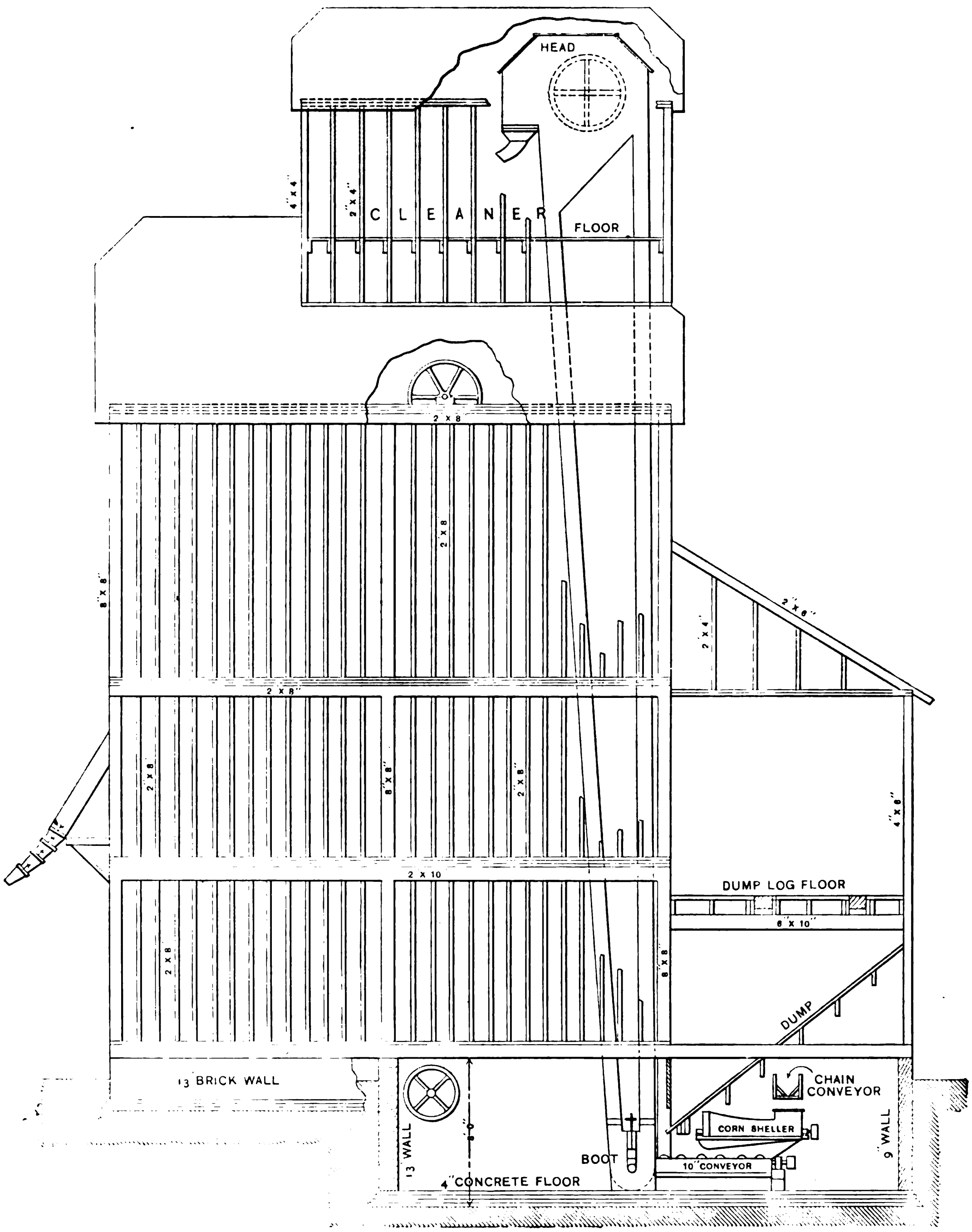
People in Manila learn to live for hot weather conditions, and it is surprising how much can be learned. Americans at home with their all-prevailing rapid transit, solve the question by rushing out after office hours to mountain or seaside. Such sources of relief here are unknown, says the Manila correspondent of the Boston *Herald*. The efforts of the foreign population have long been directed to the study of how to be happy though warm, and they have profited by many native models.

The houses occupied by Americans open up like the deck of a steamboat; everything in the wall space slides in grooves, both above and below the window level. There is no glass in the Philippines, except perhaps in the few most modern of American places; even there it is unfortunate. What corresponds to our window sash is made of translucent shells, each about 2 inches square, and constructed in great frames perhaps 6 by 4 feet; these are slid back and forth in grooves; the wooden shutters of the same size, of which there are fewer, work the same way. In the rainy season the windows have to be closed only on one or at most two sides of the house, and then the light and air come in from the other direction. This arrangement would be hard on the rooms which happened to be on the exposed side, were the interior architecture like that of our zone. But it is not; interior partitions are so planned that every room opens into another. The amount of arranging of slides and shutters to meet the sun of different hours of the day is hardly less than the adjustments of the scene shifter.

The double wall, if it may be so named, is another interesting device; everybody lives on the second story, and that is built out over the sidewalks, to their full width, to give shade to the passer below. This space between the main wall of the house and outer second-story frame produces a piazzalike space about 4 feet wide all around the structure. When the sun is beating on the wall both inner and outer shutters and partitions are closed, giving the occupants of the house the benefit of a double window effect. On the cool side of the house these partitions are correspondingly opened up, and people sit in the space over the sidewalk, where from its peculiar alley-like construction a current of air will start if such a thing is possible. All these devices are of the city houses of the better class, occupied by the few high-class natives and by the foreign residents, Americans, the English, the Germans and the Spaniards.

DESIGN FOR A GRAIN ELEVATOR.

SOME time since one of our correspondents made inquiry through the columns of the paper for designs of a grain elevator, such as would be of service in the Central West, where are located many of the vast wheat and corn fields of the country. In reply to this correspondent we have received from J. H. Meyer of Decatur, Ill., drawings showing a plan, partial elevation and section of a grain elevator which he erected last year at Bruce, Ill., for the B. S. Tyler Grain Company, and which he thinks may be of suggestive value in this connection. In describing the building he states that this style of house has been found to give the greatest satisfaction for a small grain station of any he has ever tried, evidence of this being found in the fact that he has already under construction two more elevators of similar style at other stations. There is no waste room, and the principal object sought, that of cleaning and loading the grain on railroad cars, is done in the most practical manner, and with little expenditure for power. The statement is made that an 18 horse-power Olds gasoline engine is ample to do the work and leave some power to spare. The capacity of the elevator here shown is about 35,000 bushels. It is not intended so much for storage as for purposes of transfer from the wagons of the farmers to the



Partial Elevation and Section of Grain Elevator.—Scale, ⅛ Inch to the Foot.

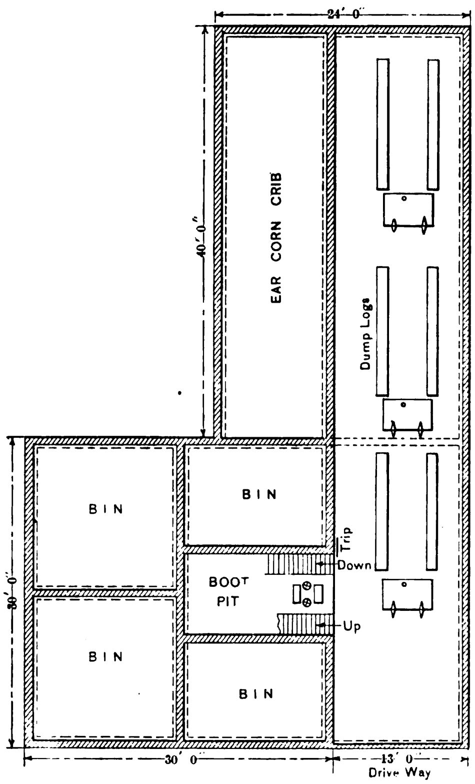
Design For a Grain Elevator.—By J. H. Meyer, Decatur, Ill.

cars. Just at the left of the building, as shown in the elevation, is a siding on which stand the cars to be loaded from the chute, which projects just above the first section.

The main building is 30 x 30 feet in area and 58 feet high. On the opposite side, not shown in the elevation, are two large dump cribs which hold about 20,000 bushels of ear corn or oats. This part is connected to the main building by a chain drag, which delivers to the sheller or boot, as required. The corn crib measures 40 x 24 feet, and is 22 feet high. The driveway is about 12 feet wide. The trap doors are 3 x 4 feet, and the dump logs are 11 feet long and 12 inches wide. The partitions separating the bins are the same thickness as the walls. The dump floor is 12 x 30 feet in area, and is 11 feet 6 inches high.

Preservation of Iron in Concrete.

A writer in one of our foreign exchanges states that in 1890 there was built in Berlin a revetment wall consisting of reinforced concrete slabs between I beam posts



Plan of Main Floor.—Scale, 1-16 Inch to the Foot.

Design For a Grain Elevator.

resting on piles cut off below low water and held horizontally by back stays. The piles are survivals of a previous crib. In the spring of 1901 the Department of Public Works undertook a thorough investigation of the condition of the concrete slabs and the iron imbedded in them, which is reported in a recent issue of the *Zentralblatt der Bauverwaltung*. The reinforcing consists of horizontal ⅝-inch round iron rods, in number depending upon the earth pressure acting on the slabs, and of vertical rods about 3-16 inch in diameter. The vertical and horizontal rods are tied together by wire so as to form a netting.

To investigate the condition of the slabs and the iron imbedded in them, nine slabs were chosen which showed cracks and other injuries, and 12 slabs which had a perfectly good appearance. Thirty-two holes about 10 x 10 inches were chiseled out, completely uncovering the rods, and at all places also where marked injuries were noticed the concrete was removed completely from the rods. The horizontal rods were 0.04 to 0.4 inch, and the vertical rods 0.4 to 1 inch from the faces of the slabs. In an injured slab three horizontal and two vertical rods were uncovered. The greater part of the upper horizontal rod was covered by a thin layer of rust, and the mortar, from the rod to the face, was destroyed. The two lower rods were free of rust. The vertical rods were somewhat rusty at several spots. In another injured slab the uncovered rods, four horizontal and four vertical were all equally rusty.

In a slab, which appeared on the outside to be in perfectly good condition, three horizontal and four vertical rods were uncovered. The two upper rods were rusted the same as in the slab first mentioned, but the lower rod was free of rust. The four vertical rods showed slight rusting at several spots. In another uninjured slab, all the rods uncovered, four horizontal and three vertical, were found to be free of rust.

In a slab in the upper row, the concrete had scaled off for about 4 inches above the bed joint, and short distances each side of the post. The uncovered rods were much coated with rust on the face. In another slab the concrete had cracked off near the lower edge for about 4 inches. A horizontal rod laid 0.2 inch from the face had become loose, and was much rusted on the face. In still another slab, seven horizontal rods became loose because the concrete layer covering them had cracked off. The rods were much rusted. Three other slabs showed the same injuries. The concrete layer, which was only 0.12 inch thick had cracked off and the rods which were laid bare began to rust.

Some conclusions as to the building of reinforced concrete slabs of this type and the arrangement of the imbedded rods may be based on these observations. Rods with incipient rust were found in a relatively great number in injured slabs and in slabs in good condition externally, but destruction of the concrete was found almost invariably only where the rods were near the external face. At such spots, having only a thin protecting layer of cement, it was found that the rod was much rusted on its front only while the rest of the surface remained clean. Apparently the injury to the slabs may have been caused partly by the improper location of the rods, even, when free from rust, and partly by the use of rusted rods. Wherever rods free of rust protected by a good layer of cement of 0.3 to 0.4 inch and more in thickness were uncovered, the slabs showed no injury. It was also observed that the mortar adhered less strongly to the rusty rods than to the rods free of rust. From the latter the mortar had always to be removed by the point of the hammer.

Since the greatest bending stresses take place at the middle of the slab, it will be well to bend the rods so that they will be near the center of thickness at the supports and the requisite distance from the face in the middle. No greater difficulties will be encountered in tamping the concrete than are encountered with straight rods which have to be bent in at the ends because of the flanges of the I beam post.

Rapid Construction Work.

Recent advices from St. Louis are to the effect that the world's record for the construction of exposition buildings has been broken by Charles T. Caldwell, representing Caldwell & Drake of Columbus, Ind. He was sent to St. Louis to superintend the erection of the Agricultural Building, which is said to be the largest of the 114 structures and the greatest building of its kind erected in the history of expositions. It is 1800 feet long and 600 feet wide. The statement is made that in the last week in June Mr. Caldwell raised the first timber, and by July 23, more than 1200 feet of its construction had been completed. It is expected that within 50 days from the time of beginning operations the finished building will be turned over to the exposition management. This remarkable building feat is said to have been in large measure accomplished through the use of a ginpole for hoisting materials as opposed to derricks and travelers, which involve large sums in their construction. The statement is also made that with the ginpole a greatly reduced force of hands was able to accomplish the work.

New Publications

Roof Framing Made Easy. By Owen B. Maginnis. 164 pages. Size, 6 x 8¼ inches. Illustrated with nearly 100 engravings. Bound in board covers. Published by the Industrial Publication Company. Price $1, postpaid.

This is the second edition of a work with which our readers are already more or less familiar, and which will strongly appeal to the carpenter or builder who is desirous of acquiring a knowledge of a comprehensive system of laying out and framing roofs of all kinds. The subject is treated in the language of the practical mechanic, and everything has been made as plain and simple as possible, scientific phrases and confusing terms being entirely eliminated. The matter is comprised in 33 chapters, the headings of which give the reader an idea of the general scope and character of the work.

Practical Treatise on the Steel Square. By Fred. T. Hodgson. In two volumes. Size, 5½ x 8 inches. Uniformly bound in board covers. Published by Frederick J. Drake & Co. Price, $2, postpaid.

This is a practical treatise by a well-known author on the steel square and its application to every day use. The work consists of an exhaustive collection of steel square problems and solutions, both old and new, with many original and useful additions, forming in effect a complete encyclopædia of steel square knowledge, together with a brief history of the square, a description of tables, keys, &c. In his preface the author points out that in the art of building there is no tool in the carpenter's kit which lends itself so readily to a quick solution of the many difficult problems of laying out work as the steel square. It is essential, therefore, that the workman should have a thorough practical knowledge of its capabilities and applications, and it is with a view to aiding him in acquiring this knowledge that the present work has been prepared. The author states that he has drawn from many recent writers on the steel square, both as regards illustrations and descriptions, and in a number of instances he may have repeated the solutions of some problems, showing different methods employed by various readers to reach the same results. Great care has been taken to give not only clear and distinct diagrams and illustrations, but also full descriptive text, so that the reader may intelligently follow the demonstrations.

How Stained Glass Windows Are Made.

Those who follow the mediæval traditions of ecclesiastical window decoration follow in large measure the mediæval methods also, and it is not without interest to those who enjoy the results of their work to know something of the technical side of the craft. As by the old French glaziers, so at the present time, says Harry E. Goodhue, a sucessful master in his art, three drawings are made, the first being drawn more carefully, carrying out detail; the second, a transfer of the outlines of the first, known as the leading drawing, or that upon which the window is finally glazed, and the third, the pattern drawing, another transfer identical with the second. This last is cut up very much as are the patterns for a dress, taking out 1-16 inch as allowance for the core of the lead. Each pattern is tacked down upon drawing No. 2. The glass is then selected and cut to these shapes and placed upon the pattern.

The painting of the glass is the next stage of the window. The pieces of glass to be painted are removed from the second drawing and placed in position upon the cartoon or first drawing, and the lines traced through very carefully, following the original. All the glass then is laid upon a large slab or easel of clear plate glass and fastened to it with drops of melted wax and rosin. This is then placed in an upright position, and an idea is obtained of how the window will finally appear, with the exception that instead of lead the pieces of glass are separated by lines of white light. This "waxing up" of the glass gives an opportunity to change any piece or color that is out of key. After all changes are made, the painted glass is removed and placed in a kiln, where it is fired much as china is fired, the pigment melting into and becoming part of the glass.

The glazing of the window is the next process. The separate pieces are again laid upon drawing No. 2 and bound together with lead. The joints are then soldered on both sides and putty or cement rubbed into every crevice to make the window watertight.

"Pot metal" glass is still used, and in the robe of a figure (we still call it red), instead of using more or less a flat tone of one color, the early French glazier would cut it up into what would appear to the American manufacturer unnecessarily small pieces, and take care to get no two immediately next to each other of the same glass or color. Instead, he would have a bit of dark orange next to a ruby, using yellow reds and purple reds in infinite variety. So that while the robe would be red in effect, this would be accomplished by a dazzling arrangement of different colors.

Principal Causes of Checking of Varnish.

One of the very interesting papers read at the twelfth annual convention of the Ohio State Association of Master House Painters and Decorators, held in Cleveland, in July, was one by J. M. Millard of that city, dealing with the principal causes of the checking of varnish. Among other things the author said: It is a well-known fact that there are various causes for the cracking of varnish, and to enumerate all would extend indefinitely. One of the main reasons for cracking is a brittle foundation and short oil, brittle varnish. A person, when building a house, would not think of placing a weak, crumbling foundation for the superstructure to rest on, and so it is with varnish. It makes no difference how elastic a varnish is used, if spread over a brittle, porous, nonelastic substance for a foundation the result will be unfavorable for the varnish. Why? The varnish has nothing to adhere to, and simply dries on a foundation with no assimilation; hence, when the outer coats of varnish have oxidized, checking commences, having nothing in the undercoats to adhere to, and consequently the varnishes fight the battle alone with the elements with no foundation upon which to stand.

It would be far better to lay the varnish on the bare wood, as the oil that is in the varnish would, to a certain extent, penetrate the pores, thereby having a sure foundation for the adherence of the succeeding coats. A solid and elastic foundation, with a varnish of equally elastic tendencies, will make coatings that will resist the elements of contraction and expansion.

There are numerous other causes for varnishes cracking and checking, such as putting on a coat of varnish over another when the under coat is not sufficiently dry or hard. Varnishing over a too glossy surface without rubbing or removing the gloss will sometimes cause checking of varnish. Varnish that is quick drying put over a slow, elastic drying varnish will cause any amount of trouble, especially fine checks. Strain of varied vibrations in large buildings, especially when newly put up, if observed closely, will cause cracking of a very bad nature in certain parts of the building, especially the door frames and window sills. Severe cold will cause lots of deviltry of cracking or checking, if the varnish has not set properly before the frost sets in. I will say that in the winter time the varnish has to be taken care of, and when applied an even temperature must be looked after, because if the varnish is applied at 70 degrees F., and the heat is then allowed to go down to 20 degrees above zero before properly set, it would not be fair for the varnish, and we could hardly expect not to see some cracking or checking properties.

This matter of severe cold checking varnish calls to my mind the time when I was working at my trade of carriage painting. It was the winter of 1872, which some of the older members will remember was very severe. I had prepared three carriage bodies all done the same way up to the finishing coat, and on the day these jobs were to be finished a very cold wave came up, running 7 degrees below zero. The varnish room was heated by a stove with soft coal, which, under no circumstances, could be kept going longer than midnight. Well, to sum it all up, when the work was examined the next morning the varnish showed fine checks, as well as large oblong cracks.

Plainly speaking, I was the most disgusted painter in town that day. What was the reason, and was the finishing coat of varnish only cracked? To find this out, the varnish was rubbed down to the foundation, and I found the under coats perfect—nothing but the last or finishing coat had cracked. Why did this coat of varnish crack, and no other? My only explanation was that the delicacy of the make of varnish could not resist the severe action caused by frost at a time when the varnish had not properly set; hence, when properly set or tack free, the frost, more brittle than the varnish, contracts, causing the finishing coat to check. The varnish was virtually crystallized, and its vitality gone. The only thing to do was to take the varnish off, and proceed the second time. The more delicate a varnish is, the more it seems the cold weather has a bad effect upon it.

The question may be asked, What is meant by a delicate make of varnish? and also the reason why all the care known to the painter must be taken when applying such a grade of varnish. To answer such a question would be going into the details of varnish making, which does not enter into the subject of this writing, but, suffice it to say, a delicate make of varnish is composed of the highest grade of drying oils and gums of the best, produced by high heats in their composition, with slow setting and drying properties; hence, if great care is not taken with such varnishes before properly setting and drying, trouble generally comes in one form or another. You have all noticed that at times the varnish cracks only in places, especially along the lower panel edges, window sills and such work that lays flat. This is not always the fault of the varnish, but in consequence of too heavy coats being put on, coat after coat, and, therefore, not thoroughly hard, and the last coat must oxidize some time, hence the cracking or checking.

One word might be introduced in this connection, especially the cracking of window sills and front doors, where more cracking is noticed than in any other places. I am confident that if brittle substances, such as shellac, &c., would be left off altogether, and if the painter would apply a sufficiently elastic varnish, made especially for such work, directly on the wood, if soft wood, or over the paste filler if hard wood, there would not be so much complaint about checking on such exposed places as mentioned. The direct rays of the sun draw the life, which is oil, out of a brittle varnish, leaving nothing but the gum to stand the contraction, and not enough oil in its makeup to resist the reaction, hence checking must come very soon.

Oil, good linseed oil, is the life of all high grade varnishes. It is money in the long run to the consumer to use nothing but the best and most carefully made varnishes. Wood that is not seasoned properly will cause anything that is put on it to check or crack, for the reason that the wood must shrink, thereby contracting the varnish with it. It is not my intention to advocate any particular manner of applying varnish, neither is it my intention to advise any particular brands of varnish, but it is a well established fact that the master house painter has to contend with a great many difficulties in order to do a proper and satisfactory piece of work, subject to the restrictions put upon him. "Rush! Get the work done at a given time! Must have this work pushed along; tenants want to move in!" &c., are the cries the master house painter hears at all times, and finally, when the work is completed, the architect or the owner comes along and complains of some of the work that is not quite satisfactory. What excuse has the painter to offer except to say that he ought to have had more time? Then another tendency this hurry up process has is to cause the master house painter to buy quicker drying varnishes, and rushing one coat on top of another too soon, and really sooner than he would if he had more time.

A short oil varnish has a very short life, hence the varnish of its own accord checks or cracks. If the master house painter will see to it that he buys the best of materials adapted for the different kinds of work, allowing himself to be the judge of the materials to buy for the work he does, I feel assured that, as far as the varnish is concerned, he can buy better made goods to-day than ever before. Why? Because it is only a few years ago that varnish was considered a luxury, and to be used only in the homes of the wealthy, but to-day everything is varnished, from floors to attic, in every and all kinds of buildings, consequently the varnish maker has advanced to this extent that he must make varnish the best that gum, oil and turpentine will produce. Varnishes are made to-day that a few years ago would be thought unnecessary.

If the master house painter will buy the best of materials, give the varnish time to harden between coats, and not try, as is sometimes done, to put the varnish on so heavy as to make one coat look like two, use the varnish best adapted to the requirements of different kinds of work, and use that judgment and forethought consistent with good workmanship, I feel confident he will not have to pass many sleepless nights in thought over satisfactory work to be done.

THE Builders' Exchange of Baltimore, Md., has just isued an interesting pamphlet containing much that is of interest and value to the members. It relates to the sixteenth year work of the exchange, and the matter begins with the report of President John H. Short, which was made at the last annual meeting of the organization, held early in June. Following this is a list of officers and directors for the year ending May 31, 1904, the standing committees for the same period, and the names and addresses of the membership of the exchange. In connection with the latter is indicated the particular branch of the building business in which each is engaged.

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FRAME RESIDENCE ERECTED FOR MR. THOMAS A. SPERRY AT CRANFORD, N. J.

J. A. OAKLEY & SON, ARCHITECTS.

SUPPLEMENT CARPENTRY AND BUILDING SEPTEMBER, 1903.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

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

OCTOBER, 1903.

Model Tenements.

That model tenements can be erected and run in American cities on a remunerative basis, while furnishing comfortable and sanitary homes for the poorer classes of the community, has been proved in a number of instances; but no more striking illustration can be offered of the practical results of these substitutes for the crowded rookeries which have heretofore disgraced many large cities than the latest report of the City and Suburban Homes Company of New York City. This company were organized six or seven years ago, and, backed by a number of philanthropic capitalists, began the work of erecting model tenements for the poor and the humbler wage earning classes. The company have issued $1,707,250 of capital stock, and their total assets are now figured at nearly $3,000,000. They have just declared a dividend of 4 per cent., while leaving a large sum for the sinking fund. The report states that the losses which have been met with from vacancies in their apartments have been extremely small, while the total losses from irrecoverable arrears are insignificant, being but $248. In view of the fact that they have 362 separate families as tenants, and that the character of the population in which their buildings are located is notably a shifting one, this showing is remarkably satisfactory. So successful have the company been in managing their own properties that they have recently taken over the management of 699 apartments which belong to other persons or companies. They have a trained corps of workers, sufficient to enable the concern to be an efficient operating landlord. The benefits conferred by the class of housing provided by the company are incalculable, not only from the point of view of comfort, but notably from that of sanitation and morals. Undoubtedly a need exists for the inauguration of similar enterprises in other of our large cities. Every great center of population has some kind of a tenement or slum district where model tenements would be a public benefit. American men of wealth could invest their spare capital in no better way than in providing for the erection and management on honest and common sense lines of model tenements for the wage earning classes.

Government Trade Schools.

With the American occupation of Porto Rico came the requirement that sanitary equipment should be in conformity with that in the United States. This met with a stubborn resistance on the part of the local plumbers, who had arranged the water supply and drain pipes on a very different plan, and were not familiar with American sanitary plumbing, which represents the highest perfection known in this branch of work. Without relinquishing its position that plumbing in future in Porto Rico must conform to the new sanitary requirements in the interest of the public health, the Government prepared to arrange so that the local plumbers could comply with the new exactions. In this commendable step the Government has recognized the invaluable service that is rendered by trade schools, and the Superior Board of Health of San Juan have given permission to the Inspector of Plumbing to open a class for the instruction of the native plumbers in sanitary plumbing arrangement and construction. This solution of the problem has been heartily received by the plumbers of Porto Rico, and applications have been quite generally made for instruction in the class. The important principles and the essential features of modern sanitary construction as applied to the disposal of household waste are not such an intricate science or difficult art but that those who apply themselves at the school of instruction can soon acquire a mastery of all that is necessary. This action on the part of the Government suggests that similar trade schools could be opened with advantage in many large cities for the instruction of those journeymen plumbers who have not acquired such a proficiency and knowledge of their trade as to make their services in demand. The apprenticeship system as it has been operated for several years has not been calculated to equip those who have served their time with that thorough knowledge of how work should be done and the reasons for so doing it that are necessary to make first-class workmen. It is possible that far too many who have entered the journeymen's ranks under the conditions of the apprenticeship system as they have existed are not willing to make or fail to feel the necessity for further effort on their part to provide themselves with the knowledge which employers and their customers have a right to expect from those who insist on being paid workmen's wages. It remains a fact, however, that some such instruction if properly accepted would make many men more nearly worth the pay they receive.

Instruction by Correspondence.

Although instruction by correspondence is of comparatively recent origin, it has already amply demonstrated its importance and usefulness in the educational field. The remarkable growth of this system of instruction, particularly in the last few years, proves that it meets a real want of the people, and a mass of favorable testimony from those who have made practical test of the system, as applied to their individual needs, gives conclusive evidence of the beneficial results of instruction by mail. It is a form of education which undoubtedly has come to stay and which promises to show more development in the next few years than perhaps any other line of educational effort. Some colleges, such as the University of Chicago and the Armour Institute of Technology, have adopted the system as a regular feature of their work, and others have it under serious consideration. When the system was first introduced, it was met with considerable doubt as to the possibility of imparting adequate technical instruction by the correspondence method. But it has had a test fully sufficient to dispose of any such objection. The practical results accomplished by the two leading exponents of the system, the International Correspondence Schools of Scranton, Pa., and the American School of Correspondence of Chicago speak for themselves. Thousands of young mechanics and others, not only in this country but all over the civilized world, have testified to the benefits received through these schools. As showing the wide recognition of the merits of this thoroughly American system, one of the institutions referred to recently made the statement that it had students within a few miles of the Arctic Circle, in the Fiji Islands and in the Falkland Islands off Cape Horn, while in New Zealand alone their pupils numbered over 300. Correspondence schools appeal with special force to the young and ambitious mechanic or tradesman who is already engaged in daily work, the mastery of which, however, he realizes, requires more theoretical and technical knowledge than can be picked up in the course of his shop work. Most young men so situated find it impossible, through the exigencies of their location or their financial and family conditions, to attend any of the existing trade schools or evening technical classes. The correspondence school, however, gives him just what he needs. It enables him to do his studying at home, in his leisure time, and provides him with the scientific and technical knowledge along the line of his trade which is necessary for him to acquire if he aspires to advance to its higher positions. The fact that thousands of young tradesmen all over the country are eagerly appropriating the benefits offered by the correspondence schools proves that the value of this system is becoming fully recognized, at least in the United States.

Technical Education as a Business Builder.

The influence of trade and technical education in developing industries, increasing export business and augmenting the wealth of a country is very clearly illustrated in a report which the British Consul at Stuttgart lately sent to his Government concerning the technical high schools of Germany. There are nine of these schools established and conducted by the Government, and two more are now being established. Besides these State institutions a number of other technical schools are conducted under private management, but are subject to Governmental supervision. These German schools are turning out year by year engineers and scientifically educated workmen, who are building up the industrial interests of their fatherland. The British Consul points out that Germany, through her thorough and widespread system of technical education, has in some respects surpassed within the past 50 years all other nations. The transformation of Germany from a poor agricultural country to one of the first and richest manufacturing and exporting nations is due in large measure to the superior technical training existing in that country. It is clear that only through an efficient and widespread system of trade and technical education, which will be within the reach of all the youth of the country, can any nation, in these progressive times, hope to reach and maintain the highest place in manufactures and in their sale in the markets of the world. Most of the European nations are awakening to this fact, and the movement for trade and technical education is steadily spreading on the other side of the Atlantic. Notwithstanding the leading place in the world's commerce which the immense resources, wealth and energy of the United States have secured for her, she must do her share in the education of her youth along industrial and scientific lines if she is to retain the industrial position she has gained.

PRESS dispatches from San Francisco, under date of September 16, are to the effect that an organization of ten redwood lumber merchants and manufacturers of California has been perfected to handle for the Eastern market the enormous demand for redwood lumber. The organization has a capital of $1,000,000, and the headquarters will be at Los Medanos, Cal.

A New Banking Building.

Another important addition to the architecture of Cedar street, between Nassau and William streets, New York City, which is becoming one of the most interesting blocks in the city, as viewed from the standpoint of the architect and builder, as well as from that of the financier, is the new banking house which the Mutual Life Insurance Company are about to erect for Harvey Fisk & Sons at 62-64 Cedar street. The new structure will be seven stories high, with cellar and basement, and will be of steel skeleton construction, with a marble front which will be ornamented with lions' heads at the sixth story. The architecture will be of the classic style, and the building will cover an area of 47 x 78 feet. The architects are Clinton & Russel, who also designed the structure which is being erected next door for the Home Insurance Company. The main, or first floor of the new structure will be devoted to the banking room, and there will be a large central hall flanged by eight marble covered columns, and the floor will also be of marble. The counting rooms surrounding it will be laid with parquet floors. The upper stories will be devoted to offices, except the top story, where there will be a library, sleeping room for the firm, stenographers' dining room, kitchen and pantry. The vaults and storage rooms will be in the basement, with the heating and ventilating plant in the cellar. It is expected that the building will be ready for occupancy next May.

A Six-Story School House.

What is said to be the first grammar school to be provided with elevators and the first six-story school house to be erected in the city of New York has recently been designed by the official architect and the plans approved by the Board of Education. It will cover an area 75 x 200 feet, will be of the French Renaissance style of architecture, costing in the neighborhood of $400,000. On the first floor there will be offices and reception rooms, as well as a gymnasium, while on the second, third, fourth and fifth floors will be classrooms, 20 to a floor, and on the sixth ten more, besides a workshop, a cooking room and special classrooms. The new school will have, in addition to four huge elevators, each of which will hold 30 pupils, a series of escalators, or moving stairways. Some of the difficulties connected with elevator service in a school house will be overcome by restricting it to the two upper floors and to the larger scholars, the children on the lower floors using the stairs and escalators.

Convention of the American Institute of Architects.

The preliminary notice of the thirty-seventh annual convention of the American Institute of Architects is to the effect that the meeting will be held in Cleveland on October 15, 16 and 17 of the present year. A number of interesting papers are promised upon the school of Rome and its value in the artistic development of the country as well as to the artistic profession. These papers will be illustrated and are expected to form a valuable addition to the literature published by the American Institute of Architects.

WE have received a copy of the proceedings of the thirty-sixth annual convention of the American Institute of Architects, held in the New Willard Hotel, Washington, D. C., on December 11, 12 and 13 of last year. The matter is published by the Board of directors under the direction of the Committee on Education and Publication, the matter having been edited by Glenn Brown, secretary of the institute.

THE sixth annual Congress of Architects will be held in Madrid, Spain, in April, 1904. The quarterly bulletin of the American Institute of Architects for July contains a brief outline of the programme of the sessions and excursions, together with rules of details of the congress.

A FRAME HOUSE AT WINFIELD, IOWA.

WE present in the illustrations which appear upon this and the following pages the plans, elevations and details of a frame house erected a little more than a year ago at Winfield, Iowa, for T. I. Ross, in accordance with drawings prepared by W. S. Wylie & Son of Washington, that State. The half-tone engraving which forms the basis of our supplemental plate will afford the reader an idea of the appearance of the completed structure. Upon the first floor are reception hall, living room, dining room and kitchen, with the main stairs of the combination type rising from near the center of the house. On the second floor are four sleeping rooms and bath room, while in the attic is more or less room for storage, &c.

There is a cellar under the entire house, 7 feet in the clear, and covered with a cement floor. The foundations are of stone, finished above grade with four courses of pitch face work. The sills are of 6 x 8 white pine, and the joist and studding are of hemlock. The house is sheathed with No. 3 white pine shiplap, over which is placed rosin sized paper, this in turn being covered with ½-inch bevel siding. The roof is covered with 6-inch fencing, over which are placed red cedar shingles laid 5 inches to the weather. In the lower story are double floors, with a layer of paper between them. The border of the finished floor is laid with 2¼-inch face white oak boards, quarter sawed. The finish of the house is cypress on the first floor, and yellow pine on the second floor. The contract price of the house was $2370, exclusive of heating and plumbing.

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

A Frame House at Winfield, Iowa.—W. S. Wylie & Son, Architects, Washington, Iowa.

Some New Metropolitan Buildings.

There have recently been filed with the Department of Buildings in New York City plans for an 11 story brick loft structure, to be erected at the corner of Fourth avenue and Twenty-third street, on the site so long occupied by the Young Men's Christian Association building. The plot measures 175 x 38 x 15½ feet, and the estimated cost of the new structure is placed at $400,000. According to the plans of the architects, Clinton & Russell, the façades will be of brick and terra cotta.

Plans have also been filed for a 12 story brick hotel, to occupy the old site of the Sturtevant House at the corner of Broadway and Twenty-ninth street. The plans have been prepared by the same architects as mentioned above, and call for a building having a façade of brick, granite and limestone, the estimated cost being placed at $800,000. The ground area covered is about 106 x 176 feet.

An 11 story fire proof hotel is to be built on the southwest corner of Columbus avenue and Seventieth street, to cost $550,000. It will have a frontage of 100½feet on the avenue and 100 feet on the street. The façades will be of brick, limestone, terra cotta and metal. The plans were prepared by Israels & Harder.

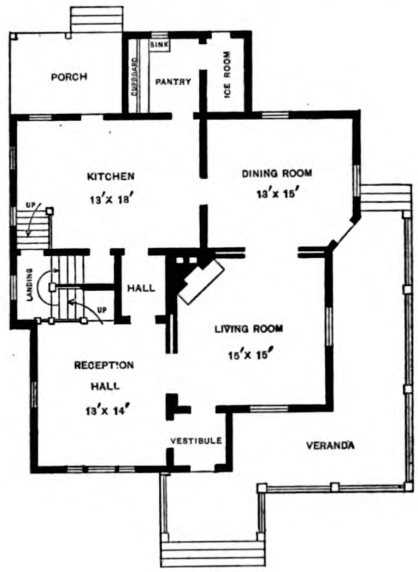
A brick office building is about to be erected at 60-62 Wall street and 63-67 Pine street from plans by Clinton & Russell, and to cost about $1,250,000. The building will be 26 stories high on Pine street and 14 stories high on Wall street, with façade of brick, granite, limestone and terra cotta.

Building in Mexico.

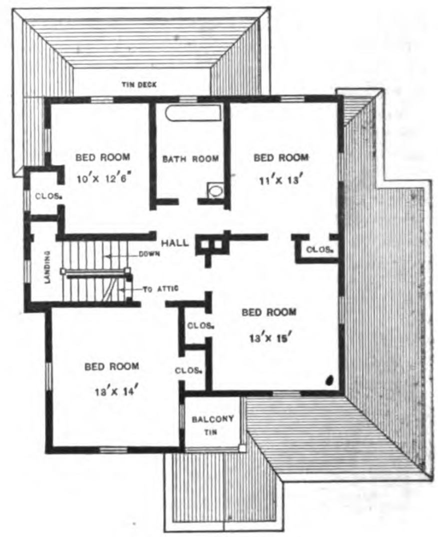
Just at present there is a great deal of activity in the building line in the City of Mexico, yet it is the opinion of those closely identified with the business that the movement for a general improvement of the city by means of imposing modern structures has hardly commenced, says a writer in a recent issue of *Modern Mexico*. There is hardly a section of the city that is not busy in the construction of residences, office buildings and public edifices. The most important of the buildings under construction are those of the Government, to cost approximately $50,000,000. Of these buildings the most noteworthy is the Legislative Palace, the foundations for which have just been started. This building will cost between $15,000,000 and $20,000,000, and will be one of the most beautiful public buildings on the continent when completed. It will be of the Renaissance style of archi-

bounded by Santa Isabel, Cinco de Mayo, Betlemitas and San Andres streets. It is five stories high, being the tallest building in the city.

The hight of other buildings will be regulated by this, it being the purpose of the Government to prevent inartistic contrasts in the architecture of the city through



Main Floor.



Second Floor.

Side (Right) Elevation.—Scale, 1/8 Inch to the Foot.

A Frame House at Winfield, Iowa.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

tecture, and, according to the plans, the ornamental work will be the most elaborate that art can conceive.

Many of the buildings of the Government are now approaching completion. Among these are the Post Office and War and Navy buildings. The former is situated in the most central portion of the city—namely, on the block

the erection of structures which would tend to dwarf into insignificance other buildings. The hight of the post office will be just 22½ m. The municipal government has passed acts prohibiting the erection of buildings higher than this.

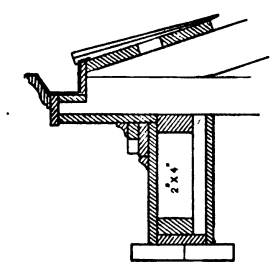
When finished the building for the Department of

War and Navy will have entailed an outlay of $600,000. It is expected that the building will be ready for occupation within two months.

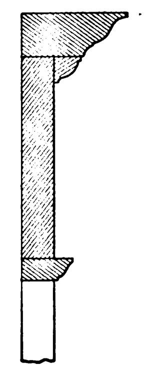
Plans have been drawn for the building of a museum of art for the nation. This will be situated on Avenida Juarez, upon the site of the present hospital of the poor, which has been purchased by the Government. The sum of $5,000,000 will be expended upon the building for the museum. As is the case with some other buildings, the construction of the Museum of Art at an early date depends very largely upon the amount of success attendant upon Mexico's present negotiations for further public loans.

But the great activity in building in the City of Mexico at present is of a private character. There is hardly a city in the United States in which there are as many private buildings being erected as in the City of Mexico. In the new suburbs, such as the Colonia Reforma, Colonia Roma and Colonia Santa Maria, hundreds of residences and hotels are being built. It is not unusual to see foundations being laid for 15 houses on a single block, and from many different points to see 50 buildings in course of erection. All the buildings are of the most substantial and modern classes. Most of them are on the French and American styles, and are of the highest ornamental value to the city.

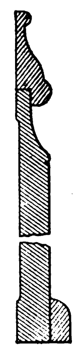
Section of Trim.—Scale, 3 Inches to the Foot.



Detail of Porch Cornice.—Scale, ¾ Inch to the Foot.

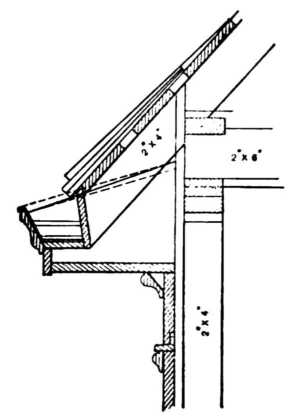


Detail of Head Casing.



Detail of Base.

Scale, 3 Inches to the Foot.



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

Miscellaneous Constructive Details of a Frame House at Winfield, Iowa.

Graining vs. Hard Wood.

At the twelfth annual convention of the Ohio State Association of Master House Painters and Decorators held in Cleveland in July, one of the interesting papers presented was that of J. W. Luthe of the city named, dealing with the subject of "graining." Among other things the author said:

Graining, or imitating hard wood or all kinds of woods, as the grainer is often called upon to do, is a somewhat slow and tedious process, requiring artistic taste, patience and a general knowledge of the grains of the woods, also the various materials and tools used for the work.

The old time graining was generally done with oil color, on account of its low price per yard to the trade and also the simple method of applying the colors and the few tools required.

Oil graining can be made very artistic, but owing to its slow drying and danger from cracking, due to using too much oil, wax, soap, fat graining color, or too heavy a coat of grazing, is not considered the proper process of graining in these advanced times. As most of the graining in to imitate the hard wood, oil graining cannot successfully be used, and for that reason distemper or distemper and oil (called composition graining) is more adaptable, as the colors can be toned and blended to match the hard woods more readily than oil colors, also that there is less danger from cracking of the varnish, and the job can be done much cleaner, no dust settling to the work. The job, if a small one, can be varnished the same day; the only difficulty being that most grainers do not keep their work clean, probably due to poor training or to being slovenly in their work.

Distemper colors can be used for all kinds of graining, oak, ash, butternut, walnut, maple, cherry, rosewood and mahogany; in fact, every known wood, if properly done, will make a fine, artistic job, resembling hard wood more than oil graining and more durable, while with the oil graining only two or three varieties can be grained, and if a standard grade of varnish is used all cracking is avoided.

Grounding in is as important for a good job as the graining or varnishing. Too much cannot be said on that part of the work, as it is often done by an incompetent workman ,the ground being either too oily, ropy, fat or the work is not sandpapered, color not strained and probably the color ten shades off and done with very poor tools. Grainers meet these objectionable circumstances only too often.

The ground for all graining should in all cases be flat, with no oil, except the oil in the lead and colors as ground by the manufacturer, and the grainer should at all times use as little oil as possible for his work. In conclusion let me say, ignorance and haste have ruined not only the graining, but the reputation of the grainer, master painter and varnish maker more than willful dishonesty of the master painter, simply because the painter was determined to finish the job in too short a time, not regarding conditions, such as weather, undercoating, the amount of paint and the various materials that are generally used on the work.

Plan for Amalgamation of Building Trades Unions.

Frank Buchanan, president of the International Association of Bridge and Structural Iron Workers, has announced a plan for the amalgamation of six large building trades organizations. A meeting to perfect the organization is to be held in Indianapolis, Ind., on October 9. The following platform has been suggested:

No demand for increased wages or changed working conditions from the time work on a contract is begun until it is completed.

No demand of any kind without 90 days' notice.

No indorsement of strike of affiliated body unless the same conditions are met by the other body.

General co-operation with the contractor.

Abolish the frequent strike.

Besides the officers of the Structural Iron Workers who will attend the conference, there will be representatives of the United Brotherhood of Carpenters and Joiners, the Bricklayers' and Masons' International Union, the United Association of Plumbers, Gas Fitters, Steam Fitters and Steam Fitters' Helpers, the Brotherhood of Painters, Decorators and Paperhangers and the Building Trade Laborers' International Union.

Washington's New Railroad Station.

The new station which is to be erected in Washington, D. C., for the Baltimore & Ohio Railroad Company will have a frontage on the north side of Massachusetts avenue and will cost something over $4,000,000. In preparing the plans for this great union station the comprehensive idea of beautifying Washington was duly considered. Its style, the material used in its construction, its location and environment were to conform to the consistent purpose of ornamentation as well as use. To insure this designs from the most eminent architects in the country were invited, the fortunate competitor being D. H. Burnham of Chicago and New York, whose admirable creations at the Columbian World's Fair in Chicago in 1893 elicited praise from visitors from all parts of the globe. Romanesque in style, it will be constructed of white marble, imposing in its massive simplicity, yet sufficiently ornate to rob it of severity in aspect. Of such magnitude are the contemplated improvements that it was deemed necessary a division of the work should be made. The principal feature will, of course, be the station itself, which will be built under the direct supervision of the designing architect. Not only will the building be under his direction, but the grounds which are to form a part of the ornate landscape effect surrounding it. The central portion of the front of the building will rise to a hight of 90 feet on masonry, being pierced by three main doorways, each 60 feet high and 44 feet wide. The axis of the station and train shed extends 751 1-3 feet, and there will be space for 30 tracks. The approaches to the station will probably cost over $10,000,000 additional, so that when the work is finished Washington will have probably the finest railroad terminal in the world.

Reading Architects' Drawings.

In previous issues we have referred to the desirability of every ambitious mechanic in the building trades who desires to make rapid progress in his chosen calling of acquiring a ready familiarity with architects' drawings and the ability to understand all that they are intended to convey. A writer in one of our exchanges in discussing this subject suggests that in order to understand architects' plans the first thing is to ascertain the scale to which the plan is drawn.

It will be quite correct to state that the principal and most common scales used are 2 feet to 1 inch, or ½ inch equals 1 foot; 4 feet to 1 inch, or ¼ inch equals 1 foot. Of course it is obvious to any one that the above scales can also be rendered one twenty-fourth, one forty-eighth and one ninety-sixth full size; but the first expressions are the most common. Knowing what the scale is, there should not be any difficulty on the part of readers to measure up the thickness of walls, hight of stories, &c.

The next thing to know is the standard colors by which each material is represented. The mechanic or general foreman should consult his specifications, and not trust entirely to the colorings of his drawings, as differences occur. The general colors are:

Concrete.—Generally neutral tint, or blue with black dots.

Lead Work.—Light gray.

The above names are not the technical ones for the different colors, but this article is written for the "learning," not the "learned."

We next come to the different plans, &c., of the building.

The general drawings supplied on a contract are:

1. *Block Plan.*—This shows to a small scale the position of the building with respect to other buildings, &c., and frequently also is used as a drainage plan. From this plan the foreman in charge of the works is able to set out the position of his building. Now, this measurement is, of course, to the finished line of brick work, and the foreman will have to allow for his footings and concrete foundations.

2. *Ground Plan.*—From this plan, together with reference to the section, he will be able to set out his various walls with the widths and thicknesses thereof, and the concrete foundations, the position of the walls giving the size of the various rooms. The widths of the various door and window openings are also obtained from this plan. If the jambs of the doors have not reveals, they are lined, and have not, as a rule, solid frames.

3. *Plans of Upper Floors.*—These plans give similar information to the last mentioned.

4. *Sections.*—These are very important, and this is where the stumbling block occurs to many mechanics. A section is an imaginary line taken vertically through any portion of a building, and, strictly speaking, only requires that portion of the building to be shown which the section line cuts; but to make things more explicit, a "sectional elevation" is nearly always given. This latter differs from the former, inasmuch as the latter gives the elevation of everything seen beyond the "line of section." To make this clearer, we may give a simple illustration: Take a square box and cut it vertically into two parts. Now, to illustrate a section of same the simple outline with the thickness of the material need only be shown; but, supposing a sectional elevation is required, then, if any openings were in the side of the box, these openings would have to be shown in their proper positions. You will now see how valuable a sectional elevation is. It not only gives you the measurements of anything on the line of section, but also the measurements of anything seen beyond, such as doors, &c.

5. *Elevations.*—The various elevations are shown to give an idea of the completed view of the building, and, together with the sections, give the hights of the various windows, &c., the widths corresponding to those given on the plans. They also give the kind of windows and doors used, and position of rain water pipes, &c.

A Modern Office Building in Mexico.

The contracts have recently been awarded for the erection of the first large modern office building in the City of Mexico, the work to be completed in the spring of 1905 at an estimated cost of something over a million dollars (Mexican), not including the site. The structure, which is for the Mutual Life Insurance Company of New York City, has been designed by architects De Lemos & Cordes, and will be five stories and basement in hight. The front will be of Mexican stone of light color and the design executed in the Renaissance style of architecture. It will front on three streets, the main *façade*, 143 feet in length, being on Avenida del Cinco de Mayo.

The site of the building is one of the finest in the capital, the northerly part of the street block being occupied by the new Post Office building and the opera house will be erected in the immediate vicinity. Large hotels, office blocks and stores surround the new building, which will contain two electric elevators, plumbing, drainage, electric lighting and all fittings corresponding to a first-class office building as erected in New York City. It will be constructed strictly fire proof, and the foundation will be of steel and concrete, of the same description as originally designed by De Lemos & Cordes for the Boker Building in New York City. The hallways will be trimmed with Italian marble and bronze, the floors will be tiled and the stairways will be of iron and marble of Renaissance design.

ONE of the most beautiful effects in regular equipment for electric lighting is produced by the lamps in the Farmers' Deposit National Bank Building at Pittsburgh. This is a 24-story building, and the little electric stars, distributed singly and in clusters throughout the structure, diffuse their light so that by night the building is a vast monument of clear, white radiance—a landmark for miles around. There are over 2500 lamps, with a total illuminating power equal to about 125,000 candles.

IN commenting upon the rates charged by architects for their work, a writer states that in Paris there is a sliding scale for members of the profession. Buildings costing more than $150,000 will pay 4 per cent., those between $125,000 and $150,000 4½ per cent., between $75,000 and $125,000 5 per cent., between $40,000 and $75,000 6 per cent. It is intimated by some architects that such a scale would be an advantage in this country.

DESIGN FOR A WOOD WORKING SHOP.

THE arrangement and construction of a wood working establishment adapted to meet the requirements of those engaged in business in the smaller cities and towns of the country is always of interest to a large class among our readers, and we take pleasure in presenting herewith illustrations of a shop designed by Nelson A. Curtis of Dayton, Ohio. The elevations indicate the general treatment of the exterior, while the floor plans show the position of the various machines, the engine and boiler room, dry kiln, office, wareroom, &c. In presenting the matter, Mr. Curtis says:

The buildings are of brick, the main one being two stories and basement in hight. The lower story has a 16-inch wall, and the second story a 12-inch wall, instead of 2 feet and 16 inches respectively, as shown on the plans and cross section. This at first may appear heavy, but whether a shop be built in a small town or large city the building should be equally strong. Especially is this true in a wood working shop, as there is no class of machinery which receives as rough usage, runs out of balance and tends to shake the walls of a building as that built for working wood. My experience has taught me that a few hundred dollars added to the first cost in strengthening the building will increase the life of it 100 per cent., while at the same time there will be greater satisfaction in turning out the work. Another reason for strength in building is that if at any time an increase in business demands more room, the roof can be raised and an additional story or two can be put on without fear of the lower portion being too weak to sustain the extra weight. I have provided one row of posts running lengthwise of the building in the basement and first floor, only the basement posts and girders are 12 x 12 inches, while those on the first floor are 10 x 10 inches.

The main line shaft is located in the basement, as indicated on the first floor plan, as well as in the cross and longitudinal sections. My reasons for running the line shaft under the floor are that the machinery is belted from below, and it runs steadier by bearing down upon it. The belts are also out of the way, allowing freedom of handling stock, which is not obtained when the machinery is belted from above.

I have endeavored to locate the machinery in the most advantageous manner. Starting at the back end of the shop on the first floor, we have the double surfacer, from which the stuff generally goes to the rip saw, which is conveniently located, and then the material can be laid at the molder or swing cut off saw, from whence it can be carried up the stairs at either end of the room, according to what part of the second floor it goes. The jointer is located on the first floor for squaring up porch posts, balusters, &c., which afterward go to the turning lathe.

An inspection of the second floor plan will show that all sash, door, blind and other stock which requires laying out on the bench at the head of the rear stairway is convenient to the tenoner, mortiser, sticker and relisher, while the door clamp is at the rear of the building furthest from the office and yet handy to the second floor dry kiln, which can be used to warm the stock before driving up. The reader will find on the second floor a variety wood worker and boring machine, which can be used for all gaining, rebating, plowing, jointing and other work which requires to be worked over a cutter head. The rip and cut off saw, as well as the pulley borer, are convenient to the benches where the frames are put together. A triple drum sander for sanding doors, &c., is conveniently located for the purpose.

As the amount of kiln dried lumber used in a planing mill is small, I have not provided a very large dry kiln, yet it is sufficient, I think, for the purpose. For this reason I have placed it inside the main building at the rear, where it is convenient of access when only a board or two is needed.

The foreman's office is located directly over the main office for the sake of convenience, as it permits of ready communication with the foreman when he is wanted. The two doors in the front and the four doors on the side enable material to be loaded without the necessity of carrying it from one end of the shop to the other.

The boiler and engine house is separated from the main building for various reasons. In the first place, the engine is out of the dust and dirt of the shop, which will lengthen its life, and, in the second place, all oils,

Front Elevation, Showing Portion of Engine and Boiler House at the Right.—Scale, 3-32 Inch to the Foot.

Design For a Wood Working Shop.—Submitted by Nelson A. Curtis, Dayton, Ohio.

grease and the like can be kept in tin cans in the engine room and in direct charge of the engineer. The boiler is separated from the engine room by a brick wall, and there is also room for water heater, feed pump, etc. The main drive belt runs from the engine to the countershaft just inside of the basement wall of the main building. The countershaft is put up on two 12 x 12 inch posts, the bottoms of which, as well as the two posts directly in front of them which hold the main line shaft, are set in iron bases, which, in turn, are anchored to their foundations by bolts. The engine for a shop of this size should be of not less than 60 horse-power with a 75 horse-power boiler. The main belt from the engine should be boxed over in order to keep all weather from it and the underground passage for the bottom of the belt should be made wide enough for a man to walk in along the side of the belt.

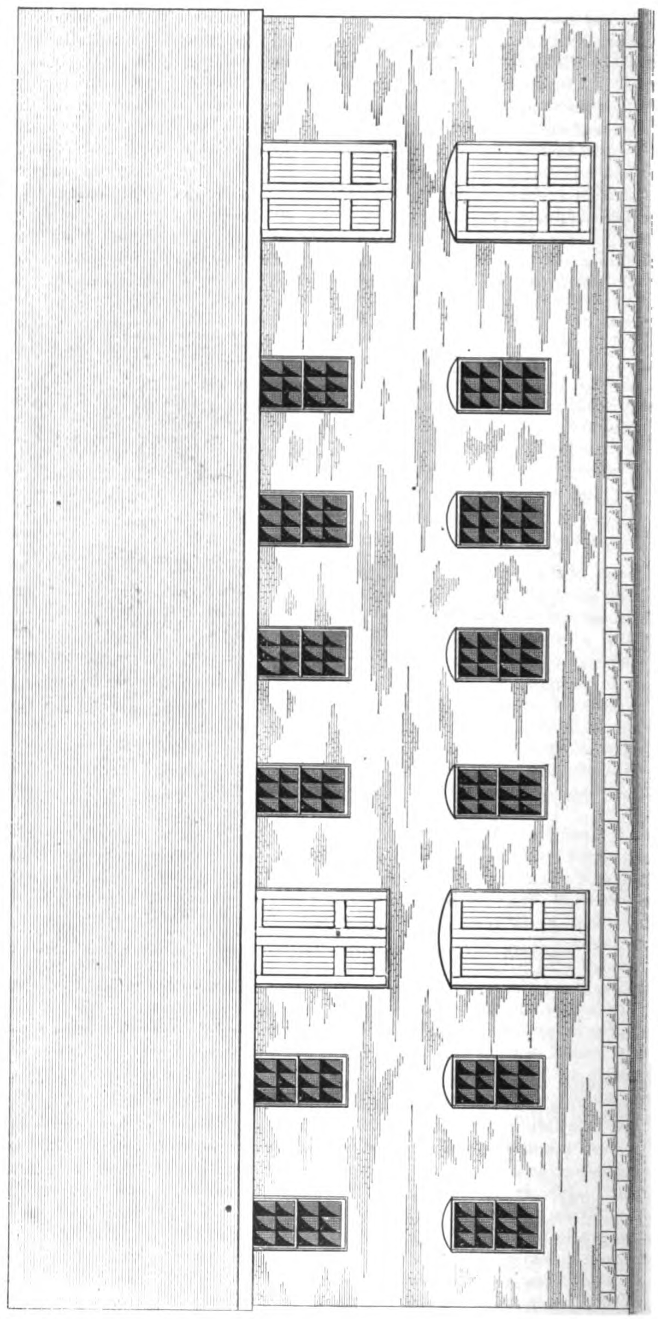
The details presented indicate the manner of framing the roof, which is self supporting.

I prefer hot air for heating, as it is more satisfactory, is perfectly safe, and the insurance is lighter where this method is employed. The heater can be located under the seond floor, close to the dry kiln, and can be supplied from the pipe leading to the dry kiln, thus having but one steam pipe running from the boiler, and keeping all the steam in the rear end of the shop. I have not provided a blower for shavings and sawdust, but this can be arranged to the owner's liking after the building is completed. A system of this kind should be installed in every shop wherever possible, as it will not only pay for itself in a short time, in the saving of labor, but the shop is always kept free from piles of shavings and sawdust, which often hinder the men in their work.

Practical Factory Sanitation.

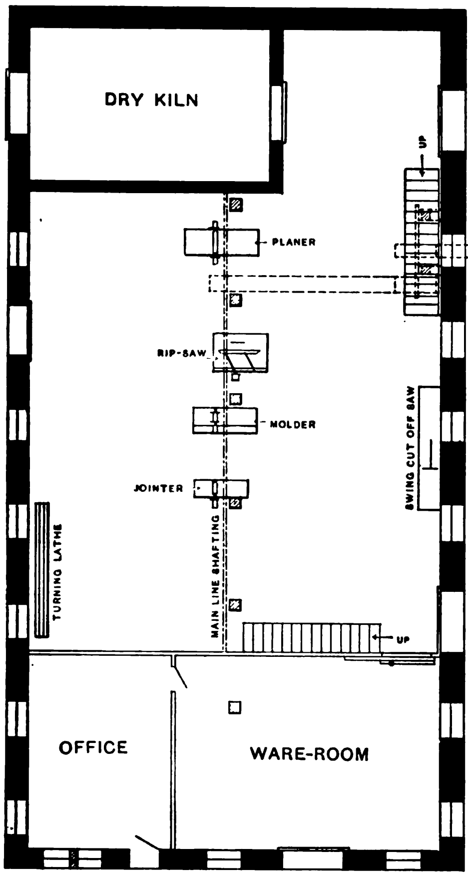
A recent bulletin of the Department of Labor, on "Factory Sanitation and Labor Protection," merits a much wider and more general circulation than the method of distributing Government publications promises to secure for it. While by no means a comprehensive discussion of the subject to which it relates, and touching only a few of the many evils incident to the neglect in workshops of precautions essential to health and comfort of men and women employed therein, it is suggestive and will well repay thoughtful study by every employer of labor. It will make it reasonably evident to the appreciative reader that there is room for a new profession—that of sanitary engineering applied to workshop conditions. It is one which demands the preparation of large experience and an intimate knowledge of industrial conditions. Not only every mechanical trade, but every shop presents problems of its own which, if solved intelligently, must be dealt with with reference to facts as one finds them, with men as their social environment has made them, and with localities according to climate, humidity and whatever must be considered in the judicious selection and development of a manufacturing site.

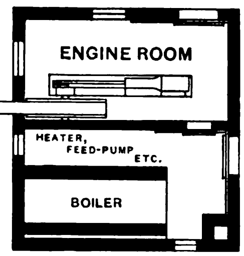
Sucessful workshop sanitation calls for a knowledge of many sciences and practical familiarity with economic conditions. The amateur in such matters is likely to be found an impractical and unsafe adviser. The zeal of the radical reformer needs to be tempered by the discretion which is gained only from experience in dealing with masses of average men who are more likely at first to obstruct than to co-operate with measures designed to conserve health and promote comfort. Often the attainment of satisfactory conditions is possible only by gradual approaches, time being given for the formation of new habits and the gradual raising of the standards of judgment in matters pertaining to comfort and decency. The employer who, impressed with the idea that his workshop conditions are not what they should be, goes too fast and too far in an effort to make them "ideal," is usually disappointed in the outcome, with the result that he abandons further effort, regrets the expense and trouble he has already incurred, and decides that since his work people are too indifferent or too careless to co-operate with him in carrying out his plans for their benefit, he will in future remain content with what they find satis-



Design For a Wood Working Shop.—Side (Right) Elevation.—Scale, 3-32 Inch to the Foot.

factory. This is superimposing one mistake upon another, both of which might have been avoided had he put himself under wise guidance and taken only such steps as would have commanded the co-operation of his work people. A certain amount of pressure is usually necessary to enforce on the part of the indecent a proper respect for the rights of the decent. This cannot be effectively exerted if too many new rules need to be enforced at once. Practical tenement house reform, which we now have in New York for the first time, illustrates the fact that confidence in any form of disinterested benevolence is a plant of slow growth. What is now being accomplished in improving the domiciliary conditions of the poor in New York would probably be impossible if it had not been approached through years of effort, most of it apparently without benefit and destructive of altruistic impulses on the part of the official and the philanthropist.

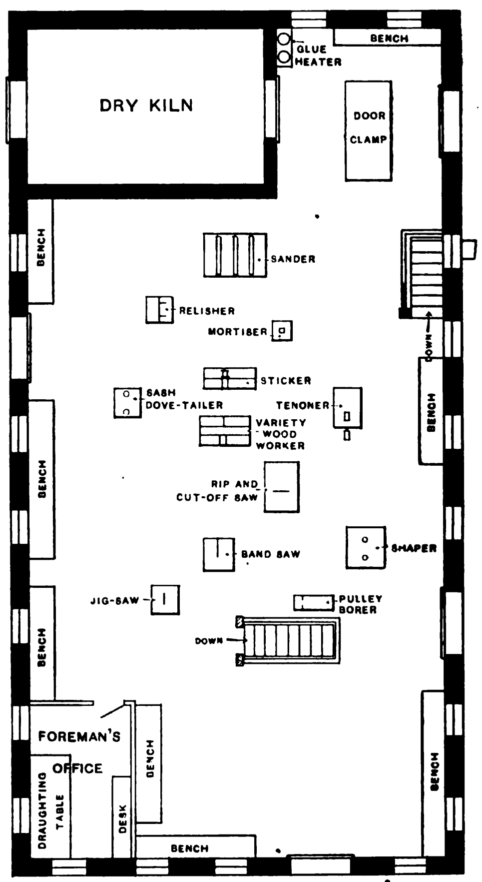




Main Floor.—Scale, 1-16 Inch to the Foot.

It should be remembered, however, that there is nothing altruistic in the creation and maintenance in workshops and factories of conditions favorable to health and comfort. The efficiency of labor employed indoors in monotonous occupations depends very largely upon the minimization of dangerous and uncomfortable conditions. The man who is dull and logy, who must fight to keep himself awake, and whose intelligence is blunted and his strength sapped by continued breathing of a vitiated or poisoned atmosphere, cannot be an efficient workman, and is not cheap even at low wages. Pure air is indispensable to the normal man, and this is not always easy to obtain in crowded neighborhoods, even when "all outdoors" is drawn upon. It depends a good deal upon what stratum of the atmosphere is tapped, so to speak, whether what is had is stimulating and invigorating or depressing and enervating. This is a matter of expert judgment, assisted by chemical and bacteriological analyses. Factory and workshop ventilation presents no great difficulties if undertaken intelligently, but it involves a good many things which must be taken into account, and which, if overlooked or neglected, will destroy the best laid plans. The air vitiated by lung exhalations, by dust and by smoke and fumes must be disposed of before room is given either for fresh air to enter or for it to be of service when it does enter. It is obvious that specific suggestions as to ways and means would be not merely valueless but misleading. Each building, and very often each room in the building, has to be studied as a problem by itself, and dealt with as conditions peculiar to itself and to the occupations conducted within it, its normal population and the character of its occupants may demand. As the rule, factories are so built as to make good ventilation as an afterthought a matter often involving great ingenuity. The employer of labor does not, however, need to consult others as to whether the conditions to which his work people are exposed during working hours are good or bad. He can tell this for himself by walking through the shops and noting not merely his own sensations but what he may see without effort. If led by the instinct of self interest into well directed effort to make the conditions as good as he can, the results will be abundantly and satisfactorily compensatory.

The condition of the floors will usually be found to demand thoughtful attention. Floors which cannot be kept clean, and into which the dirt and grime of years are ground, should be subject to indictment as public nuisances, "dangerous to life and detrimental to health." When such a floor becomes the ceiling of the room below, and every movement over or across it sends its load of



Second Floor.—Scale, 1-16 Inch to the Foot.

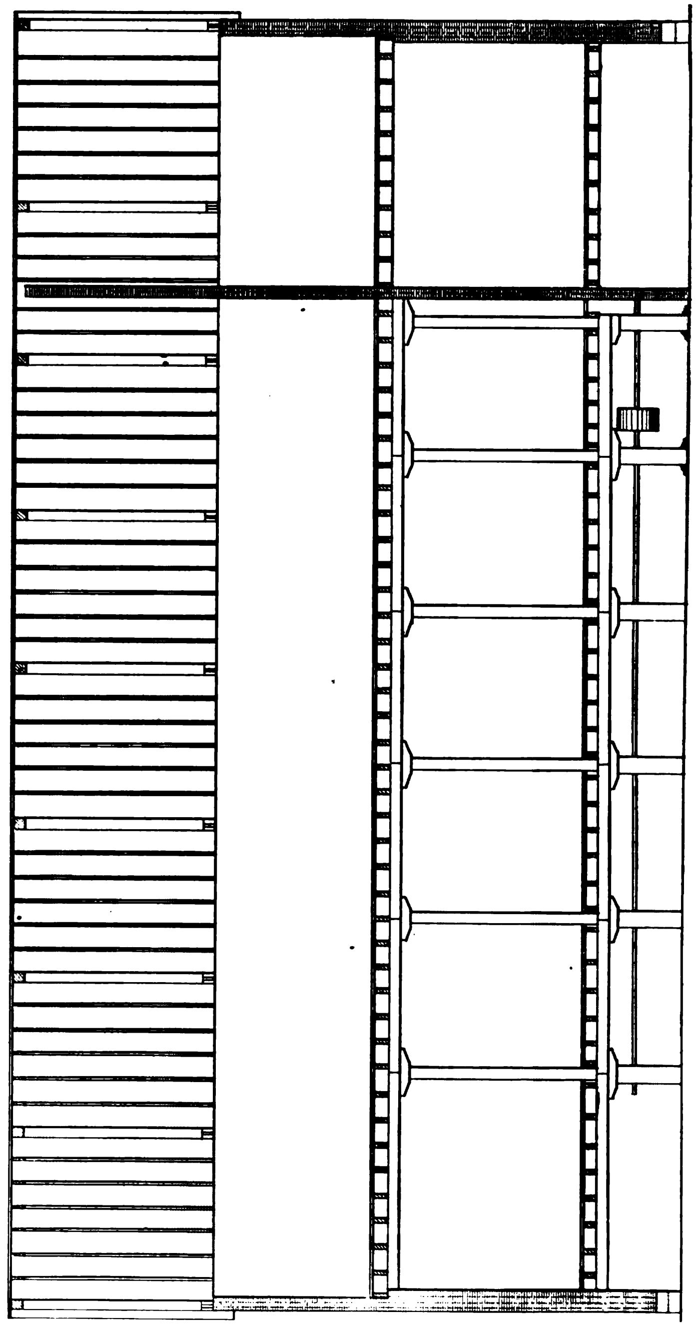
Design For a Wood Working Shop.

dirt sifting down through cracks and knot holes upon those below, the danger is doubled. No material is suitable for a factory floor which cannot be kept clean, and upon which it is not possible to turn the stream from a hose as often as it is necessary. Accumulations of rubbish on floors should be avoided. They are a source of many dangers, and when they are found it is safe to conclude that the shop management is slack. A dirty, littered, dust laden shop cannot possibly be a safe shop to work in, and labor employed therein cannot be utilized to good advantage.

Shop illumination is also of great importance. A dark shop, or one with strong and blinding cross lights and deep shadows, is not one which can be operated to advantage. Comparatively few shops are so well lighted that the illumination could not be improved, especially in cases where the growth of an industry has caused shop buildings, old and new, to form unexpected groupings. Probably nothing pays better than plenty of light of the right kind, and where daylight cannot be depended upon electricity in its later developments is an efficient substitute, costing less than it is worth when needed at all. At this season of the year the question of shop lighting commonly gives very little trouble and is likely to be forgotten; but the fact should be borne in mind that during at least six, and in some cases seven, months out of the twelve, it is a matter of very serious concern, and that the time to provide light is when it is not immediately needed.

Shop heating is a matter worthy of more consideration than it is usually given. Work indoors is rarely done to advantage in a temperature much below 60 degrees F., and the man at the bench who has cold feet and hands is not an efficient mechanic, however faithful to his responsibilities. An artificial temperature maintained above 75 degrees is as unsuitable for sustained industry as one below 60 degrees. Men can and do work in temperatures very much higher than this, but it is in short shifts and calls for the putting forth of supreme effort to accomplish results, which is very different from well directed industry sustained through nine or ten hours. Such matters do not often automatically regulate themselves. A foreman will find it advantageous to keep an eye to the thermometer in the shop under his charge.

Toilet facilities cannot be discussed profitably on broad lines. What may be proper and sufficient depends largely upon the class of labor employed, but in every instance decent and strictly sanitary appliances are found to be more satisfactory than those which revolt and shock workmen not brutalized by habitual contact with them. It may be assumed that if better than average facilities are provided the average man will not take great trouble to preserve them in ideal condition until it is impressed upon him that it is to his interest to do so. This means that the employer who wants his washrooms and toilet rooms to be in a condition permitting inspection at all times must make provision for having them taken care of.



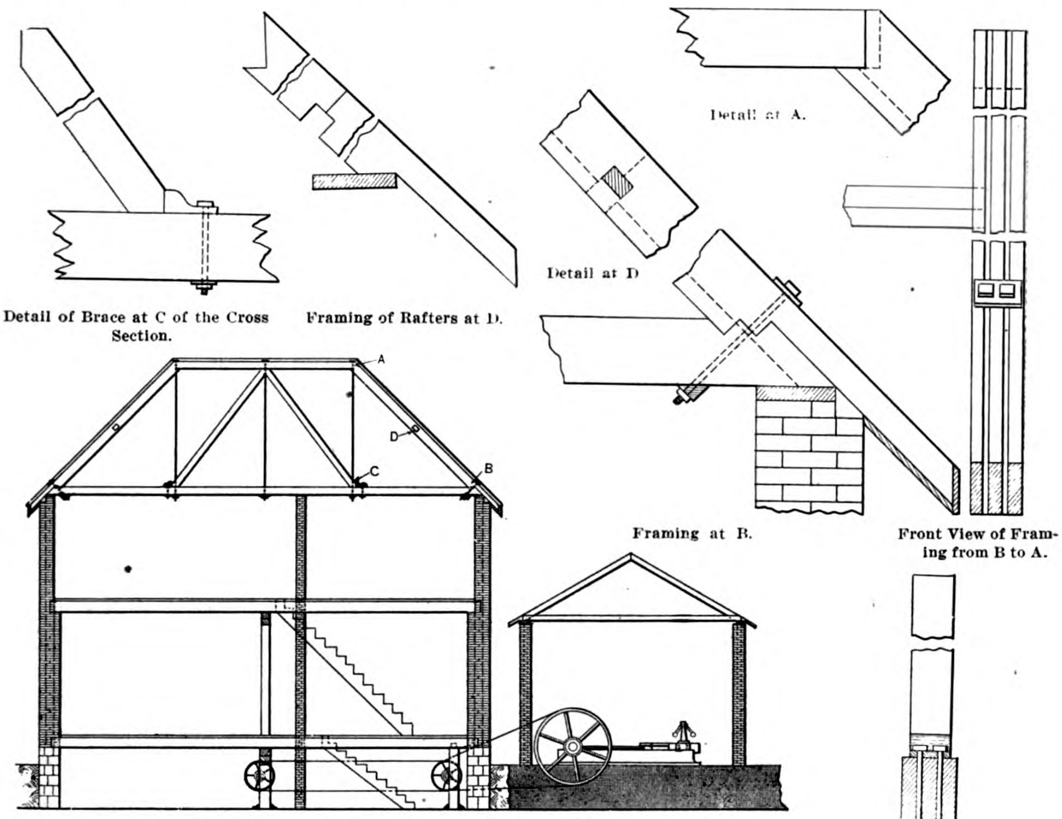
Design For a Wood Working Shop.—Vertical Longitudinal Section through Building.—Scale, 3:32 Inch to the Foot.

Where matters of this kind are intrusted to wisely selected and properly qualified experts much better results are reached than if they have spasmodically engaged the attention of one after another of the official staff, and been neglected in the intervals. The large manufacturing industries are beginning to handle the problems of shop sanitation wisely and comprehensively, but in the smaller shops the conditions usuall found warrant the suggestion that there is room for the new profession of expert in the department of sanitary engineering which deals especially with the problems of the workshop. It is not impossible that in the near future organized labor will take a more intelligent interest in matters affecting the life and health of workmen, and insist under good advice upon the correction of conditions calling for improvement. This would be a wise and beneficent use of the power of organization, and in the hands of intelligent leaders would make for good.

Interesting Example of Concrete in Building Construction.

In connection with the recent erection of a model bridge and construction shop, completed by the Pennsylvania Steel Company, at Steelton, Pa., concrete was employed for a portion of the walls of each of the several buildings. In each case the building was of skeleton steel construction, with the walls of the first story built of brick, while the portion above and extending to the eaves was of concrete. No weight whatever is carried by the walls, as the entire roof and interior loads are supported by the steel frame. An interesting fact in connection with this work is that the concrete portion of the walls is only 2 inches thick, the concrete being reinforced by expanded metal. In doing the work the expanded metal was first placed in position and then stretched. Upon it were placed three coats of cement. The first was mixed in the proportions of 1 of cement to 2 of lime, with sufficient sand to make the mixture of the proper consistency. The second and third coats were 1 of cement and 2 of sand, Mount Holly sand being used in the outside coat to give it a slightly yellow tone. The roofs of the building are of asphalted felt with slag on top. In the shops there are 82 cubic feet of inclosure to 1 square foot of glass and 2½ square feet of floor area to 1 square foot of glass. The office building, 115 x 56 feet in size and three stories and basement in hight, is also of brick and cement stucco of a color in keeping with the other buildings.

All the partitions are of hollow tile, and the heating is done with the Sturtevant hot blast system. In fact, every building is furnished with complete and efficient heating and ventilating outfit. There are eight fan and heater equipments, consisting each of a steam coil heater in connection with a steam engine driven blast wheel. In each case the heater provided is built on patent corrugated cast iron sectional bases, with 1-inch steam pipes set staggered and at the proper distance on centers to obtain the highest efficiency from the heating surfaces without restricting the passage of the air. The sections rest on heavy wrought iron bases with ample provision for contraction and expansion. The fans are inclosed in three-quarter steel plate housings, the lower part of the fan scroll being underground and forming a part of the foundation. A system of galvanized iron pipe distributes the air throughout the buildings, the air being discharged through branch drop connections having outlets near the floor. The ducts are of large size with bends of long radius to reduce the frictional losses to a minimum. Each drop pipe is fitted with a butterfly damper with a counterweight for holding the same open or closed, as may be desired. It is said that the entire opparatus is of sufficient capacity to heat the various buildings to 65 degrees F. in zero weather. Under the conditions of the contract, the heater has to take all the fresh air from out of doors. The apparatus is capable of changing the air in all the buildings every 25 minutes and in the paint shops every 20 minutes.



Vertical Cross Section.—Scale, 1-16 Inch to the Foot.

Miscellaneous Details of Wood Working Shop.—Scale, ½ Inch to the Foot. Front View of Brace at C.

A STRUCTURE which is intended by the builders to centralize the printing and publishing trades is to be erected in West Thirty-eighth street, New York City, extending through to Thirty-seventh street, the site including 12 city lots. The building will be 14 stories in hight, fireproof throughout, and under the sidewalk there will be 12 large vaults. A loading platform for trucks will be one of the features, this being 80 x 40 feet, and fronting on the freight elevators, of which there will be seven, operated by electricity. There will also be two continuous running conveyors on an endless chain. It is said that each elevator will have a capacity of about 20,000 pounds. There will also be four passenger elevators, four waste paper chutes and the building will be fitted with an automatic sprinkling apparatus. We understand that several floors of the building have already been leased from the plans.

Some State Buildings at the St. Louis Fair.

As we go to press some of the State buildings at the coming St. Louis Exposition are rapidly approaching completion, and a few particulars regarding their construction may not be without interest. The first State building to be completed is that of Iowa, this being a two story and attic construction, covering an area 100 x 125 feet and costing $44,000. At each end is a semicircular colonnade portico, two stories high. Promenades surround the building at the ground level, and on the second story level about 55 feet from the ground, the latter expanding into large porches above the semicircular porticos. The main entrance is in the center of the long side, and consists of a classic pediment carried on six large Corinthian columns. In the tympanum of the pediment is the Iowa coat-of-arms, and on the entablature of the pediment is the inscription "Iowa." The rotunda on the first floor is shaped like a Greek cross, and extends up to the top of the cupola, a hight of over 100 feet.

The Washington State Building will be one of the most unique and attractive on what is known as the Plateau of States. It will be four stories in hight, and built entirely of timbers from Washington. Eight huge timbers 24 inches square and 100 feet long rear their lengths into the air in an unbroken piece, meeting in the center and forming the supports, after the fashion of great Indian wigwams. The stories are each smaller than the one below it, and the roof of the final story takes on a pagoda form, giving the structure a Japanese appearance. In this connection it may be interesting to state that the building materials found in the State of Washington will be the basis for a unique display in the Palace of Mines and Metallurgy. In this space a small but ornate structure will be built of brick and stone. It will be 16 feet square and 14 feet high, and just as many varieties of brick, stone and marble from as many sections of the State as can be secured will be included. The blocks of stones will be dressed in different ways to display the materials to best advantage. Some faces will be polished, others will be tooled and others will be left natural. Different varieties of molded brick and different colors and styles of terra cotta will be placed about the top wall. In spaces which may be designated as "blind" windows will be shown the marbles of the State.

The Illinois building will be of architectural beauty, and so located on an elevation as to command a sweeping view of the grounds and buildings. The structure will cost $50,000, while half as much will be used in the furnishings and decorations, making it a magnificent club house for the people of Illinois when visiting the fair.

The site for the Ohio building adjoins the Missouri structure on one side and that of Illinois on the other. The structure will be of staff, finished in ivory tint, while the roof will be of dark gray, and the ridgings, crestings and finals carried out in gold leaf. The structure will be two stories high, and there will be large porches at the north and south ends, the main front of the building facing west. At the main entrance are large columns 3 feet in diameter and 30 feet in hight. Three large doors open into the main rotunda, which is 29 x 54 feet in size, two stories in hight and is finished with a domed ceiling.

Pennsylvania's building fronts on the State esplanade, and is east of the Iowa and south of the Illinois building. The structure is of classic design, constructed of staff and plaster and finished with native woods and marbles. It will cover an area 226 x 105 feet in size. The center of the building is surmounted by a huge square dome, while three bull's-eye windows on each side relieve the roof expanse and admit light to the rotunda. Over the pediment at the front and rear entrances are statues of William Penn, while on the face of the pediments appear the State coat-of-arms. The building is two stories high, and on each end are spacious porches, lending a colonnade effect. Occupying a space of honor in the rotunda will be the Liberty Bell.

The pavilion, which will represent New York State, is patterned after the University of Virginia, which was designed by Thomas Jefferson, during whose administration as President of the United States, the territory comprising the Louisiana Purchase was acquired from France. The building is in the State plaza, is Colonial in design and detail, and is surmounted with a low dome. The land falls off about 25 feet on the easterly end, and it has been taken advantage of by the architect to place a large fountain in the façade of the podium or terrace on which the building stands. This fountain, it is said, typifies the Mississippi River in the form of a river god controlling the sea. Upon entering the structure the visitor finds himself in a large hall 60 feet square, running the full hight, arched and domed in the Roman manner with colonnades around the second story. To the right is a large assembly hall, 50 x 60 feet, while smaller assembly rooms are included in the end of this wing. To the left of the hall are waiting and reading rooms. The whole first floor, however, is as one room, and with its colonnades and arches will present interesting vistas. In the large hall it is proposed to place four large paintings in the lunettes, symbolizing the four original ownerships—the Indians in one, Spanish, French and Americans in the others. The four pendentives will be filled with pictures emblematic of the four original States included in the purchase and their products and manufactures.

The Kentucky building, known as the "New Kentucky Home," will cover an area 136 x 108 feet. The structure is artistic in design, and will be adorned with symbolical groups of sculpture. The furnishings and decorations, as well as all the material used in the construction, will be brought from Kentucky.

The site of the Louisiana pavilion is on the main roadway west of the Missouri building. The historic Cabildo, where the formal treaty was made December 20, 1803, will be faithfully reproduced as the State building. It will not be as the structure stands to-day remodeled, but as it was on the day of the transfer. It will be furnished throughout with the furniture of the time of the eighteenth century. In the room where the transfer was made will be exhibited the treaty between France and the United States, signed by Livingston, Monroe and Marbois. The walls will bear the portraits of Jefferson, Salcedo, Laussat, Wilkinson and Claiborne, besides the signers. Charts from the sixteenth century to the present time will also be shown.

The Oregon building will occupy a site immediately north of the New York State building, and the largest fir tree in the world, it is stated, will supply a portion of the lumber for the structure.

On a commanding site on the Plateau of States Colorado will erect a building of Spanish Renaissance architecture, two stories in hight, yet presenting a massive appearance. Broad steps in the center of the main façade will lead to a veranda that runs nearly the entire length of the structure, and from which visitors may view the exposition grounds by looking through nine large archways. The porch on the second floor is open. A low, square tower rises above the main entrance, and this is surmounted by a low dome.

The site for the Nebraska building faces the Kansas building, and is between those of Oklahoma and Colorado. The structure will cover an area 80 x 100 feet, will cost $15,000, and was designed by Thomas Kimball of Omaha.

San Francisco's New Custom House.

The new custom house which is to be erected in San Francisco, Cal., will be a five-story and basement structure, and is to cost in the neighborhood of $1,440,000. The interior is to contain for each of the Government departments which will be housed within the walls of the structure the following number of rooms or offices: Custom House, 27; Sub-Treasury, 5; branch Post Office, 11; Internal Revenue, 9; Revenue Cutter Service, 3; Lighthouse Department, 12; Harbor Fortifications, 5; Engineers of Rivers and Harbors, 4; Coast Survey, 4; Special Agents, 3; Chinese Bureau, 5; Weather Bureau, 5; Fish Commission, 2; Life Saving Station, 3; Inspectors of Steamers, 4, and for storage an undetermined number. We understand that a number of California architects have been asked to submit plans for the new building, the call being for designs not to exceed in cost the sum stated and to be in the hands of the Government officials in Washington not later than December 6.

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

By Chas. H. Fox.

In the present issue we shall consider the construction of face molds for an arch, the directing curve of which is a semiellipse. In Fig. 76 is shown the plan, A E A' representing the outer curve, 3' 1' the center, and *a' a* the inside face curves of the wall in which the arch may be situated. In this instance A *a* represents the soffit line at the springing, and A A' the opening line of the outer face. This, as before explained, is the plan of the plane which contains the directing curve of the soffit. In Fig. 77 is shown the directing curve. In drawing this the method described in connection with Fig. 13 has been utilized, as by means of the co-ordinate method the tangents to the points B, C, &c., at which joints are desired may be found in a very expeditious manner. Having ascertained at the directing curve the projections, as at B, C, &c., of the points at which joints are desired, draw parallels with the base line B F, C G, &c., to meet the smaller quadrant made use of in projecting the ellipse. Then at the points given in F G, &c., draw the radii F *f*, G *g*, &c. Square with these draw the tangents *f* K, F J, G I, &c. Now joining K, I, J, &c., respectively with the points B, C, D, &c., of the curve of the ellipse, the tangents to the points in question may be obtained.

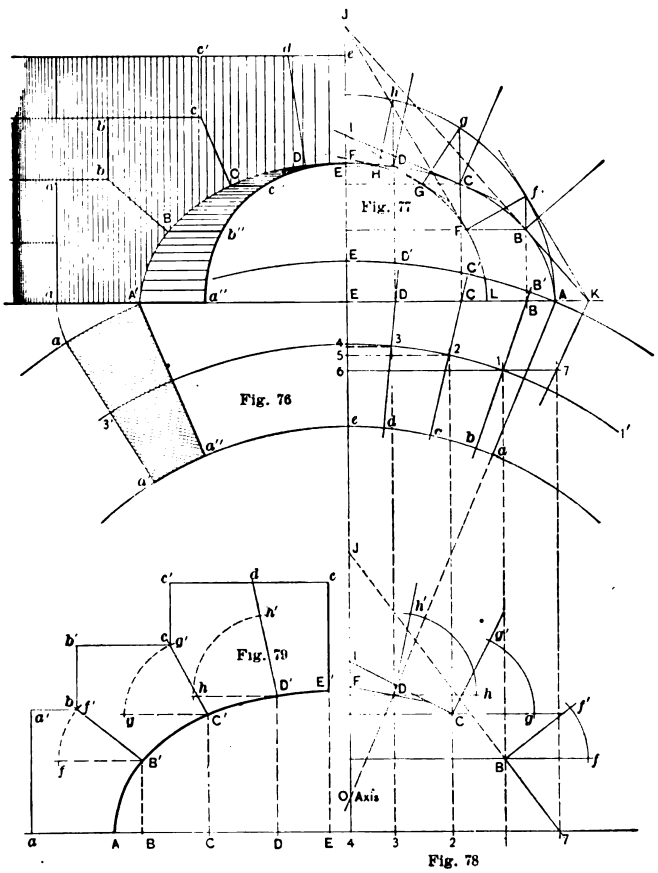


Fig. 76.—Plan of Elliptical Arch.
Fig. 77.—Elevation of Elliptical Arch Showing Face and Soffit. Together with Construction of Tangents and Normals.
Fig. 78.—Diagram Showing Construction of Working Tangents and Normals to Center Points of Soffit Element.
Fig. 79.—Half Section Showing Outside Face Molds.

Circular Arches in Circular Walls.

In order to show to the reader that either the point drawn to meet the base line or that drawn to meet the axis line may be made use of to determine the required projections of the tangents, join the point J of the axis line with B and produce it. If the drawing is correct it will meet the base line in the point K, at which the tangent to the point *f* of the larger quadrant also meets the base line. This shows conclusively that either projection may be employed for the desired purpose of projecting the tangents to the points, as B, C, &c., of the ellipse. In Fig. 78 is shown the projection of the tangents and normals of the center points 1, 2, 3, &c., of the plan. These, together with the developments given in Fig. 79 of the face molds, may be made to the directions already given for the similar constructions in other chapters.

From these and the explanations already given in preceding chapters we think the student will be able to develop the face molds for any radiant arch situated in a cylindrical wall, the elements of which are vertical, that may meet him in actual practice. We will, in a later chapter, show the constructions when the arch may be situated in a "Batir" circular wall.

One of the principal objects is now to show the manner in which the separate stones may be cut from the smallest possible quantity of rough stock, and in the most expeditious manner. In the construction of the diagrams here shown and in the practical application of them, as subsequently indicated, we hope to prove to the readers that we have succeeded in the attainment of this object. It has already been shown that the section of a cylinder when cut by a plane oblique to its axis is an ellipse. In order to develop the necessary templets it is required to cut the circular wall with oblique planes, and it therefore follows that the sections we may obtain will be portions of elliptical curves. As the major axis of the sections in question would be of too great a length to admit of its being made use of in the manner shown in Figs. 21 to 26, we will explain the simple method of developing the required curves by means of "ordinates." In Fig. 80 is the plan of the wall, and in Fig. 81 the directing curve of the soffit. The developed outside face molds are shown in Fig. 82. As full explanations have already been given of the construction of these diagrams a repetition is unnecessary.

To construct the templets we first, in Fig. 82, draw the chord lines B C, C D, &c., and parallel with them the lines *z y*, *y x*, &c., touching the exterior line of the molds. Then parallel with the center line draw *z r*, *y s*, &c., and parallel with the base line draw *y r*, *x s*, &c. The horizontal space occupied by the oblique lines, as *z y*, *x y*, &c., at the outer curve of the plan, is now given in the lengths as *y r*, *x s*, &c., of the horizontals. We may remark that the size of the stone at the outer face, out of which No. 2 or stone adjacent to the springer may be found, is given in that included within the lines B C *y z* B; and that of No. 3 within the lines C D *x y* C, &c. In order to form the stones from the small quantity of stone, as now shown, templets are required to give the proper curvature at drafts, which may be worked at the oblique lines C D and *z y*, &c., of the stones. We may in the construction of one explain the method which applies equally to the construction of each one, and have taken as an example the templet required at the oblique line *v w* of No. 5 stone. In Fig. 80 set off *v u*, equal to the corresponding length as given at the horizontal of Fig. 82, then at any point, as *t*, parallel with a chord line joining *v u* draw *t s*. To make this explanation as clear as possible we have transferred the figure *t s u v* of the plan to corresponding diagram of Fig. 83. This understood, divide *v u* into any number of equal parts, and square with *v u* draw the ordinates, as *c f*, *b e*, &c. Now at any angle set off *v w*, equal to the length of the oblique line *v w* of Fig. 82; join *w u*; then parallel with *w u* draw *c c'*, *b b'* &c.; then square over the ordinates of the templet, as *c' f*, *w' g'*, &c., equal in length to that of the corresponding ordinates of the figure or section first drawn. A curve drawn through the points given in *g'*, *f'*, *e'*, &c., will complete the templet. In a similar manner may the templets as required at each oblique line be developed, as shown in the diagrams, Figs. 84, 85 and 86.

We have in Figs. 87 to 91 shown a simple method by means of which the curvature generally termed by stone cutters the "twist" of the two joint lines, that of the lower bed and that of the upper one, at any one stone may be ascertained. Taking No. 2 of Fig. 82 as an example proceed as follows: First, through B C draw lines parallel with the base line, as shown in H B J and C I; the horizontal space occupied by the stone is now given in H J. This is projected in B' *j* of the plan, transferred to *d j* of Fig. 87. In this diagram the curve may be drawn with the radius made use of in drawing the outer curve line of the plan; then at any point draw H J parallel with

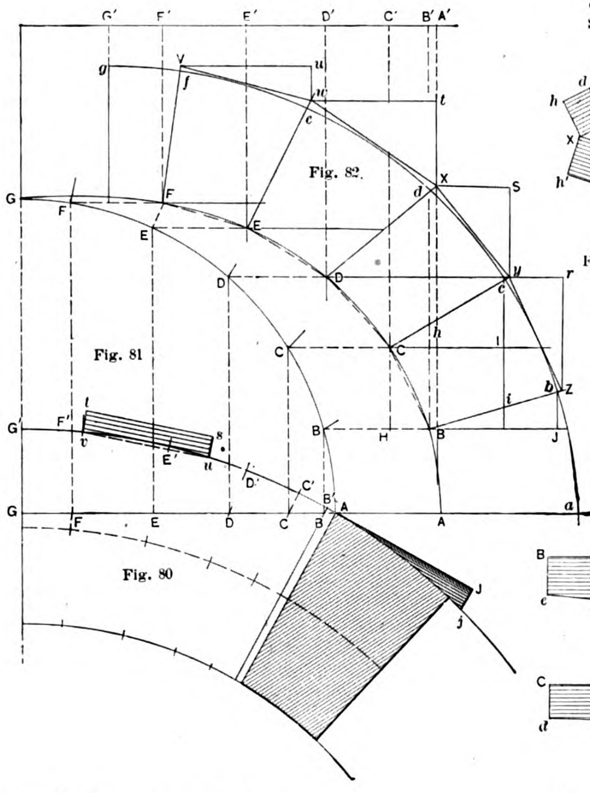


Fig. 80.—Plan of Circular Wall.
Fig. 81.—Elevation of Directing Curve of the Soffit.
Fig. 82.—Developed Outside Face Molds, Showing Size of Convex Face of Arch Stones.

of the ordinates equal to that of the corresponding ordinates of Fig. 88; through the points given in *e*, *a'*, *b'*, &c., bend a flexible strip and trace the curve. In a similar manner may the templet of Fig. 91 be developed from the directions which may be given at the diagram of Fig. 90.

(*To be continued.*)

Moving a Theatre Building.

A most interesting piece of work has recently been consummated in Pittsburgh, where the Grand Opera House building, said to weigh 2496 tons, was raised from

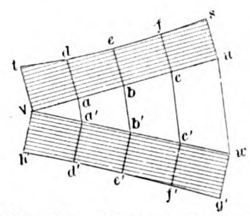


Fig. 83.—Diagram Showing Construction of Template as Required to Work Draft at Oblique Line *v w* of No. 5 Stone.

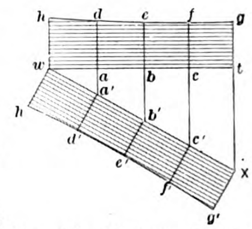


Fig. 84.—Diagram Showing Construction of Template as Required to Work Draft at Oblique Line *w x* of No. 4.

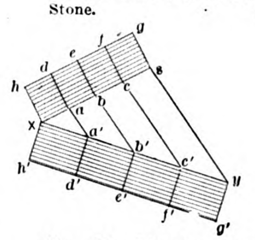


Fig. 85.—Diagram Showing Construction of Template as Required to Work Draft at Oblique Line *x y* of No. 3.

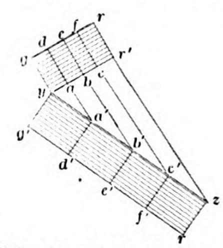
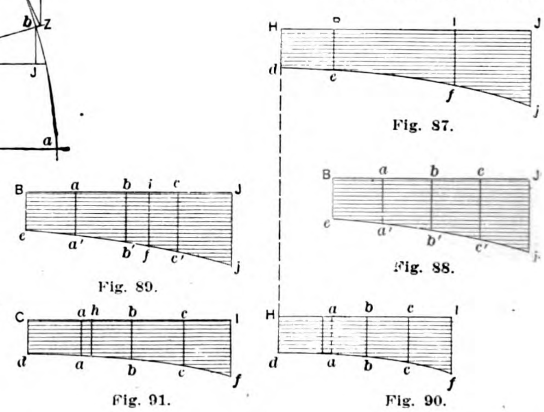


Fig. 86.—Diagram Showing Construction of Template as Required to Work Draft at Oblique Line *y z* of No. 2.



Figs. 87 to 91.—Diagrams Showing Construction of Templates as Required to Get Drafts at Joint Lines *B b*, *C c*, *D d*, and Which Also Give the "Twist" or Differences of Curvature at Lines in Question.

Circular Arches in Circular Walls.

a tangent to the point *d*; setting off *d j* equal with H J of Fig. 82, the horizontal space ocupied by the stone may be projected. Now set off H I and J B respectively equal with the like projections of Fig. 82, and square with H J draw B *e*. The space occupied by the lower joint line is now given in B *e j* J, transferred to Fig. 88. In like manner the space occupied by the upper joint line is given in H I *f d*, transferred to Fig. 90. In Fig. 89 set off B *i* J equal with B *i b* of the joint line of Fig. 82, then divide B J of Fig. 88 and B J of Fig. 89 each into the same number of equal parts. Then in Fig. 89 make the length

its foundation and moved a distance of 22 feet without the slightest injury to any part of it. The work was done in the same general way as that employed in connection with the moving of the Baptist Church in Chicago, an illustration and description of which appeared in these columns at the time. The contractor made use of 900 jacks and 600 steel rollers, the latter being 2¼ inches in diameter. There were also required 100 tons of beams. The moving of the building was necessitated by the widening of Diamond street, and the work was done by a Chicago contractor.

TURNING CLASSIC COLUMNS.

BY C. TOBYANSEN.

THE most important member in house construction, so far as the wood turner is concerned, is the column, and at the present time the 5 x 5 or 6 x 6 column with square ends is being used on the cheapest class of work only. There is a most gratifying appreciation developing of architectural beauty, and the fairly wealthy middle class man who builds himself a home wants one of some pretence architecturally as befits his means and taste; hence the growing demand for the classic column and the consequent need also of the turners' ability of producing this important feature in its true and dignified beauty. It is not always that the turners are furnished with full size working details nor are they needed by the man who understands his business practically and scientifically as it should be known.

In the July issue of the paper there was a chart or key to the different orders of columnal architecture contributed by C. A. Wagner. While excellent, so far as the builder is concerned, it is not quite comprehensive enough for the wood turner. There are some little differences in our charts, but it is not to be understood that the rules given are absolutely inflexible. The examples of ancient art now existing are not all alike by any means, but certain examples have been selected as the more representative of the group. It will be found, however, that authorities still differ as to which are the most representative, and consequently differ as to the proportions of parts, yet these differences are too insignificant to be of any great consequence.

The differences will be perceived by comparing the chart and tables given in Fig. 1, which, be it understood, deal only with details from the standpoint of the wood turner. Perhaps some embryo architect or builder who designs his own work may find them helpful.

In dealing with classic architecture a certain rule or standard of measurement has been adopted based on the semidiameter of the column. It will be perceived then how important a factor is this member, as the hight of pedestal, if any, and entablature, as also their intermediate parts, are determined by it. The semidiameter is termed one module, therefore the diameter consists of two modules. The module is again divided into 30 parts, making the diameter 60 parts. In the tables of the chart "M" stands for modules and "P" for parts. The Ionic and Corinthian columns in the Greek orders are drawn to the same diameter showing the difference in altitude, while the Doric has been drawn to an even altitude with Ionic, showing the extreme sturdiness of this order.

The Roman orders are all drawn to the same altitude, illustrating their respective stürdiness or grace, as the case may be. The distinctive difference between the Corinthian and composite orders is the capital, the latter being a Roman invention and the embodiment of beauty and grace. It consists in a combination of the large Ionic volute in the upper portion and the Acanthus leaves in the lower portion.

Having considered the features of the different orders, and also their altitude as related to the lower diameter

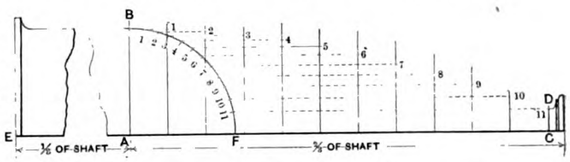
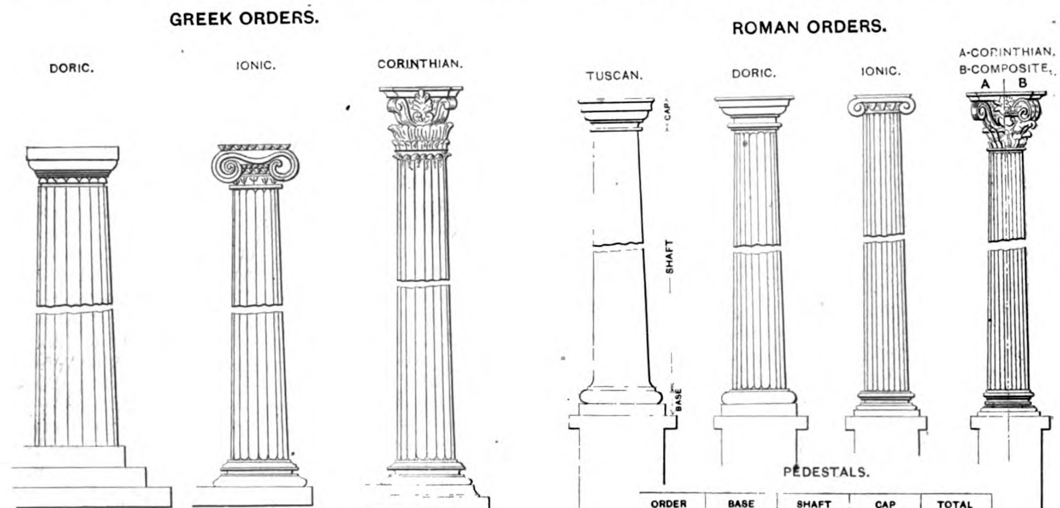


Fig. 2.—Diagram for Obtaining Curvature of Columns.



ORDER	BASE		SHAFT		CAP		TOTAL
	M.	P.	M.	P.	M.	P.	MODULES
DORIC	0	20⅚	10	2¾	0	27¼	11
IONIC	0	23⅚	15	22⅚	1	13½	18
CORINTHIAN	0	22⅓	16	12⅙	2	25½	20

ORDER	BASE		SHAFT		CAP		TOTAL
	M.	P.	M.	P.	M.	P.	MODULES
TUSCAN	1	0	12	0	1	0	14
DORIC	1	0	14	0	1	0	16
IONIC	1	2	16	8	0	20	18
CORINTHIAN COMPOSITE	1	2½	16	17½	2	10	20

Fig. 1.—Chart and Tables Relating to Greek and Roman Columns.

Turning Classic Columns.

of the shaft, we will now turn our attention to the "entasis." The shafts of all the classic orders decrease toward the neck, not by a straight taper, but by a conchoidal curve, and this is called the enthoasis. This is a feature worthy of the wood turners' closest consideration, for on its execution depends whether the column is to be a thing of beauty and a joy—well, not forever, but so long as it withstands the ravages of time, or be an eyesore to the man of cultured taste, and one sees all forms of deformities in this line. Sometimes the shaft is straight or cylindrical from bottom to top, sometimes it tapers like a portion of a cone; and again it is cylindrical two-thirds or more of the distance up, tapering off suddenly and looking like a hunchback, but worst of all perhaps it is one which swells out in the middle like a vertical beer barrel, which possibly is the image the designer or turner had in mind at its conception. Regrettable, is it not, that good and costly material should thus be misused and misshapen for want of a very little knowledge easily obtainable?

The generally accepted rule is one-third straight and two-thirds taper, diminishing one-sixth of the lower diameter or 10 parts of the two modules. Thus, if the diameter is 12 inches, diminish to 10 inches; if 9 inches, diminish to 7½ inches; if 6 inches to 5 inches, and so on. A method of properly obtaining the curvature or entasis is shown in Fig. 2 of the accompanying sketches. Suppose for example E A C to be the center line of the shaft and A B the diameter one-third up, with D C the size at the neck 5 6 of A B. I have purposely made D C very small in the drawing in order to render the process as plain as possible. We now strike the quarter circle A B F, using as the radius one module of course, and then we transfer the point D parallel to the center line, intersecting the circle at 11. We next divide the circle between B and 11 into a certain number of equal parts, as for example, 11, and then divide the center line from A to C, supposed to be equal to two-thirds of the shaft, into a smaller number of equal parts. Erect the vertical lines and bring point 1 on the circle to intersect the first vertical line, marking the intersection. Proceed in a similar manner until each point, on the circle intersects its respective line. A curve through the intersecting points drawn with a flexible strip, or by any convenient means will give the proper entasis.

This is all very good in designing full size details or in making a template for fluting, for example, but the turner who handles the work in the lathe wants a more practical way in which to obtain his needed measurements. This, and some other points on the same subject, will be left for future consideration.

Mediæval Proportions.

Were it known that a particular architect or school of architects had followed secret rules about the proportions of their buildings, we might apply the process of induction with a chance of discovering the rules, says an English writer. We say a chance merely, for besides the imperfection of induction itself, no one can tell that in any particular case the architect may not have been induced to deviate from the rules which his eye and his judgment approved of. The whim of his employer, the remains of former buildings to which he has to adapt his new work, or on whose foundations he has to rear it, and the religious and popular reasons wh!'\ must have influenced in multiform ways the rebuilding and enlargement of sanctuaries such as our cathedrals, and the shapes themselves rendered necessary for the convenience of the service—these disturbing causes might well make induction produce a wrong result. But the investigation becomes far more loose and vague when the induction extends over the works of all architects from the Classic times to the present day, and the assumption is not that a certain rule generally pervaded their works, but that there may possibly have been such a rule. We will not stop to compare such a course of reasoning as this with that employed on modern astronomy; to do so would be purely ridiculous. But taking no higher stand than the induction used on history or the study of language, in which it has been the cause of so many errors and of so much ridicule, it is easy to see that the research is of a far more certain character than this after the rules of proportion in architecture, because there are prevalent habits of human conduct and human speech, the exceptions from which can be accounted for, and the results tested by other circumstances; so that the historian or philologist may, if he exercises due diligence, come to a right conclusion on any subject he investigates for which he has sufficient materials.

AT a meeting of the National Builders' Supply Association in Detroit on August 4 the name was changed from the Interstate Builders' Supply Association, and on August 5 the officials adopted a new constitution and by-laws to accord with the national character of the organization. In his annual address President Kling revied the present conditions in the building supply business, and referred at some length to the relations existing between manufacturers and dealers. During the meeting, which was held in Detroit, a paper was read by R. W. Leslie of Philadelphia on the subject of cement, and another by G. W. Hotchkiss of Chicago on "Associations and Their Benefits." On the afternoon of August 5 the delegates to the meeting went to Star Island, where they had a dinner.

Norman Architecture.

In discussing the above subject, a writer in one of the English building papers says that the Norman era may be stated to be from 1066 to 1154—that is, from the conquest to the death of Stephen. In a general comparison with the other nations of Europe, in that dark age, historians consent that the Normans were eminent, if not superior, with respect to civilization and the arts. In architectural science, as promoted by their religious zeal, they had made a great proficiency, and many grand structures had been raised to embellish their own province before they had gained an absolute establishment in England. Many discordant opinions have been advanced concerning what really constitutes Norman architecture, and it has been confounded with the Saxon by several able antiquaries. But a still greater confusion occurs when the Pointed style, first practiced in this kingdom in the reign of Henry II, is called Norman. The principal discrimination between the Saxon and the Norman appears to be that of much larger dimensions in every part; plain but more lofty vaulting; circular pillars of greater diameter; round arches, and capitals having ornamental carvings much more elaborate and various adapted to them; but a total absence of pediments or pinnacles, which are decidedly peculiar to the Pointed or Gothic style. Among the prelates in the early Norman reigns were found men of consummate skill in architecture, which, aided by their munificence, was applied to the rebuilding of their abbeys. No less than 15 of the 22 English cathedrals still retain considerable parts which are undoubtedly of Norman erection, the several dates of which are ascertained. We have the following enumeration of Norman bishops who were either architects themselves or under whose auspices architecture flourished: Gundulf of Rochester (1077-1107), whose works are seen at Rochester, Canterbury and Peterborough; Mauritius of London (1086-1108) built old St. Paul's Cathedral; Roger of Salisbury (1107-40), the cathedral at Old Sarum; Ernulf of Rochester (1115-25) completed Bishop Gundulf's work there. They were both monks of Bec in Normandy. Alexander of Lincoln (1123-47) rebuilt his cathedral. Henry of Blois, bishop of Winchester (1129-69), a most celebrated architect, built the conventual churches of St. Cross and Rumsey in Hampshire; and lastly, Roger, Archbishop of York (1154-81), where none of his work remains. By these architects the Norman manner was progressively brought to perfection in England, and it will be easily supposed that the improvements made by any of them were adopted in succession.

Refinishing Oak Doors That Are Badly Weather Stained.

In describing the method of refinishing oak doors that are badly weather stained, a writer in *Painting World* says: If possible, take the doors off the hinges and lay them down flat on some trusses or boxes, and remove the old varnish with ammonia or a mixture of two parts strong ammonia and one part of turpentine and benzine, using a stubby brush to get into the cutwork and about moldings. When all the varnish has been removed, dope over stained portions wth a strong oxalic acid solution, and see whether you cannot bleach the wood by that operation. If this will not work, you have to resort to staining. Use raw sienna for light effect, and, after staining, use paste wood filler, colored to match the stain. Then proceed as you would on new work. If the light stain does not hide the weather stains you will be obliged to use a darker stain and darker filler.

OVEREXPOSED blue prints can, in many cases, be restored by immersing them in a bath of weak ammonia, using about two spoonfuls of ammonia to a tumblerful of water. This will cause the print to turn first purple, then pink, and after a time nearly white. When it has reached the pink stage rinse it and immerse in a bath composed of one teaspoonful of hydrochloric acid in one tumblerful of water. The blue color will then return much brighter than before, but this time the lines will be white and clear. Wash thoroughly before drying.

CORRESPONDENCE.

Computing Strains in a Crane Derrick.

From H. G. R., *Joplin, Mo.*—Will you kindly publish in your paper or have Mr. Kidder give a method of computing the strains on the different parts of a crane derrick, as shown in the accompanying sketch, Fig. 1, and say if it would be practicable to build one of the dimensions indicated? The blocks on the boom would be on a carriage and run on the boom. The mast would be set on blocking 25 feet high. There would be four main guys from the top of the mast.

Answer.—We submitted the inquiry of our correspondent to Mr. Kidder, who furnishes the following: In reply to the question above I would say that it is practicable to construct a crane derrick as shown by the correspondent's sketch, provided the framework on which the mast sets is made sufficiently stiff to resist the horizontal thrust at the bottom of the mast, which is quite considerable. It will also be necessary to strengthen the mast by means of the "hog chain," as in Fig. 2. Otherwise the mast would break in two. The strains or stresses in the different parts of the derrick will vary with the position of the carriage on the boom, and will of course be greatest when the load is applied at the outer end of the boom. The derrick must be made strong enough to sustain the load in this position.

The stresses in the different parts may be found as follows:

Stress in boom $= \frac{\text{length } C\ D}{A\ D} \times W$

Stress in $A\ C = \frac{A\ C}{A\ D} \times W$

Stress in $E\ D$ is the same as in the boom.

Thrust, T, at bottom of mast $= \frac{C\ D}{A\ B} \times W$

Stress in $B\ E = \frac{B\ E}{E\ D} \times T$

Stress in $A\ E = \frac{A\ E}{E\ D} \times$ (stress in boom $- T$)

Compression in mast $= W + \frac{B\ D}{D\ E} \times T$

All measurements should be in feet.

APPLICATION.—With the derrick in question, $C\ D = 85$; $A\ D = 30$; $A\ C = 90.15$; $D\ B = 60$; $E\ D$ we will make 5 feet, which will give 60.2 for the length of $B\ E$ and 30.4 for $A\ E$. We will assume W at 1000 pounds.

Then stress in boom $= \frac{85}{30} \times 1000 = 2833$ pounds $=$ stress in $E\ D$.

Stress in $A\ C = \frac{90.15}{30} \times 1000 = 3005$ pounds.

Thrust at $B = T = \frac{85}{90} \times 1000 = 944$ pounds.

Stress in $B\ E = \frac{60.2}{5} \times 944 = 11{,}365$ pounds.

Stress in $A\ E = \frac{30.4}{5} \times (2833 - 944) = 11{,}485$ pounds.

Compression in mast $= 1000 + \frac{60}{5} \times 944 = 12{,}428$ pounds.

The boom and mast and strut $E\ D$ are in compression; the other parts in tension. If W is 2000 pounds all of the stresses will be just twice as large—*i. e.*, the stresses will be in proportion to the load.

If the guy were horizontal the stress in it would be equal to T, provided the guy was in the same plane as the boom.

For an inclined guy the stress will be increased in the proportion that $A\ h$ is greater than $A\ i$, or stress in guy $= \frac{A\ h}{A\ i} + T$, $h\ i$ being vertical.

As the boom carries a traveling carriage it must be strong enough to resist both the compressive stress and the transverse stress, as a beam, when the carriage is half way between any two points of support.

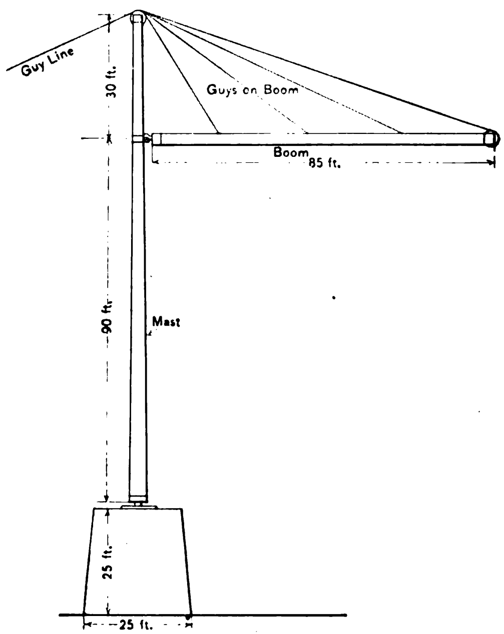


Fig. 1.—Diagram of Derrick Submitted by "H. G. R."

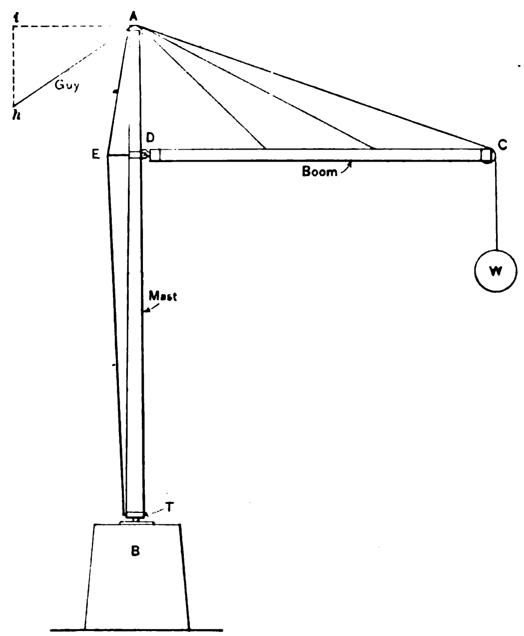


Fig. 2.—Diagram Contributed by Mr. Kidder.

Computing Strains in a Crane Derrick.

Building a Horse Barn.

From S. H., *Minneapolis, Minn.*—It is a long time since we have heard anything from "W. F. C.," Elk River, Minn., whose ideas about barn framing were so thoroughly interesting and instructive. I think others will agree with me that it is about time he made good his promise in the April issue of the paper for 1902. It will be recalled that he there offered to furnish for illustration blue prints of a $2000 horse barn if such would be likely to interest the readers. We are waiting for the drawings to be published, and trust the correspondent will give the matter his early attention.

Portable Derrick for Hoisting Materials.

From L. H. H., *Glenwood, Ill.*—Some time since, if I am not mistaken, a correspondent asked through the columns of the paper for a design of a small derrick for hoisting materials during building construction. As of possible interest to him and others I submit sketches of an extremely convenient apparatus for this purpose. It is a small and very light derrick, Fig. 1, designed by me for use on railroad bridge work. The frame of this derrick is of 2¼ x 3 inch straight white ash, 10 feet long and securely bolted and braced, as indicated in Fig. 2. The winch is made of two pieces of hard wood, 2½ x 5 inches by 16 inches, and one piece of ¾ x ¾ inch bar iron forged, the completed part being shown in Fig. 3. The wood is grooved out to receive the axle, and bands are driven on the ends when the whole may be turned in a lathe, giving the appearance indicated.

The handles are made of ¾ x ⅜ inch tool steel with wooden grips and are fitted to slide into the holes in the ends of the axle, the construction being shown in Fig. 4. The winch is fastened to the frame of the derrick by a bent iron 1½ x ¼ inch, bolted to the under side of the frame, and a ¼-inch round iron pin with a string attached to the end and is used to keep it in place when the strain is off the rope. The construction is indicated in Fig. 5. The upper block used is a home made one, and the lower block is an ordinary double tackle block, the arrangement being clearly indicated in Fig. 6. The upper block hangs to a ¾-inch bolt run through the top of the derrick, and it will be noticed that the hoisting line may be put on the winch and taken off without beginning at either end of the line, this being accomplished by drawing out the pin shown attached to the string in Fig. 5 and removing the winch. We use ¾-inch manila line on this derrick, which is found amply strong for handling pine timbers up to 8 x 16 inches in cross section and 28 feet in length. Three turns around the winch will hoist anything up to the capacity of the machine when the rope is dry. I once lifted a white oak stick 14 x 18 inches by 27 feet with this derrick. It will be found convenient to set up on a roof, an upper floor, a bridge, or a push car, and can be carried to any place full rigged by two men.

For raising buildings we framed a derrick 33 feet high of 3 x 4 inch clear, dry, straight grained pine, using practically the same rigging as described for the 10-foot derrick. With this we have handled all the timbers for a manufacturing plant that now covers 157,000 feet of floor space, with posts 10 x 10 inches in cross section and 26 and 28 feet in length. This derrick is in use in some way nearly every day, while a heavy iron hoisting crab that cost over $100 lies idle month in and month out. We attach a ½-inch line to the top of the derrick to hold it from falling backward. The appearance of the derrick is shown in Fig. 7, while in Fig. 8 is shown the steel grab hook for lifting timber. We have hoisted hundreds of tons of timber with such a hook and have never had an accident. It might be interesting if some of the other readers would discribe the style of portable derrick which they use for similar purposes.

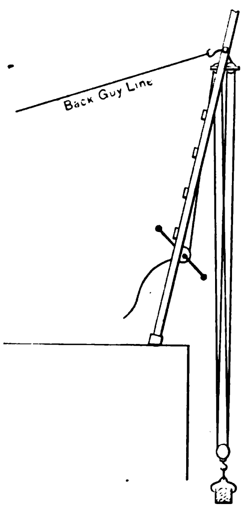


Fig. 1.—Side View of Apparatus.

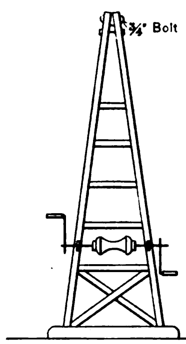


Fig. 2.—Showing Style of Frame.

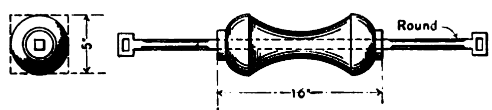


Fig. 3.—Side and End Views of Winch.

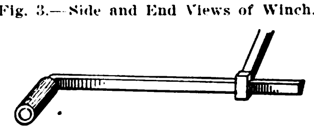


Fig. 4.—One of the Handles.

Portable Derrick For Hoisting Materials.

Should Outside Work Be Primed as Soon as Finished?

From D. P. B., *Redford, N. Y.*—Referring to the inquiry of "W. A. K." in the July issue of the paper, I would say that it would be better to allow all outside work to stand a few days at least. Casings and corner boards should be painted on the edges before clapboarding. The acid and water in the wood often ruins paint years after it is put on.

Making Box Window Frames.

From Lazarus, *Cliff, New Mexico.*—Referring to my communication in the September issue of the paper on "Box Frames," I failed to state that this method—that is, setting the frame ¾ inch inside of the brick work, applies to 8-inch walls only. On thicker walls the frames are set so that the projection of the outside casing into the brick work comes between the outside course and the one immediately back of it, the brick being clipped to admit it.

Designs of Rustic Houses Wanted.

From G. M., *Princeton, N. J.*—I would like very much if some of the architectural friends of the paper would furnish designs and start a discussion of rustic houses, showing by means of elevations and floor plans the appearance of the work and the internal arrangement of the buildings. Perhaps some of the readers from the neighborhood of Tuxedo Park could help me out, as I hear so much about that place and of the beautiful country homes which are there to be found. By "rustic" I mean houses in which the walls are built of mountain rock or field stone. Some time ago there was published a design of this type, it being used as the basis of one of the supplemental plates. I think the house was located in Overbrook, Pa.

I would also like to have some of the readers furnish sketches of a good fire place of the rustic order, as I have no doubt that the subject would prove interesting to others besides myself.

What Constitutes an Average Day's Work for a Carpenter.

From W. N. H., *Newport, R. I.*—I have been very much interested in the controversy and amused by some of the answers presented in connection with the amount of work the average carpenter is supposed to be able to execute in a day. I find there are a number of "doubting Thomases" among the craft, but I think a man can fit and hang 15 doors in 10 hours if he will try this method. First, have the tools in good order, for dull tools make slow work. Next get a board ⅞ x 3 inches for a door holder, having a notch cut in it equal in width to the thickness of the door and the piece long enough so as to fit tightly between the jambs. The idea of using this form of holder instead of a horse is that it is out of the way and is easily made and handled. Next have a straight edge the length of the door, and be sure to have a Stanley butt gauge. It is, of course, assumed that the jambs are straight and square and that they have been set by a competent man. Joint the hanging edge first and joint it nearly square. Fit it to the straight edge, cut in the butts and that edge of the door is finished. Next get the width of the opening, in doing which I use a slide rule, as I find it very handy. Allow for the two joints marked at the top and bottom, jack plane down to the marks and make straight and bevel enough to pass by the jambs. When this has been done that edge is finished. Square the top of the door in the opening; mark the butts and at the same time mark on the door the thickness of the threshold. Cut the butts in the jamb, saw off the bottom of the door and hang. Note the time it takes to do this and you will be surprised. The great trouble with most men is that they handle the door too much—that is, they will joint one edge and then try it to the jamb. It may be hollow or rounding; then take off two or three more shavings and try again. That is what takes the time. Now you will find it is labor saved if you fit your door to the straight edge. Another thing I have noticed, and that is when a man joints the hanging edge beveling, there is likely to be trouble, for usually there is too much joint, and that makes another handling, for the butts have to let into the wood more and below the surface. The result is anything but a fine job.

I would particularly mention that I am greatly interested in *Carpentry and Building*, having taken it now since 1882. It is the most instructive carpenter's paper published, and I have recommended it to every carpenter with whom I have worked and I hope they have profited by it.

From E. L., *Safford, Ariz.*—I have read with interest time and again the question, "What Constitutes a Day's Work for a Carpenter?" To begin with, I would say that out here in Arizona and on the Pacific Coast carpenters do not lay shingles, except in such instances where none of the professional shinglers can be had. As a matter of fact I have had a good shingler who could put on from 7000 to 10,000 per day on a one-third pitch roof, and in less than ten hours at that, but it must be taken into consideration that they were redwood shingles, the average width of which is about 8 to 10 inches. Then again the wood is soft and we used 3d fine nails, which can be driven in with one lick of the hatchet. Another point to be considered is that the shingles were California count, which means 800 to the thousand—that is the way they have it in California—200 in a bunch and four bunches to the thousand. I have seen that 20-a-door-a-day racket in nine hours, but the doors did not fit, nor were the hinges right. Rim locks were used, and even they needed touching up. In the matter of flooring, any carpenter out here must put down at least 5 squares in eight hours, but it is necessary to consider also that this flooring comes in all lengths. There is no cutting, only nailing—except to be a piece is too long—or if the room is over 30 feet, long, certainly we have to make a joint, but this is all.

I have been at the trade now 23 years, and to-day I know less how much a man should do in a day than I did 15 years ago. Varying conditions change the amount of work that a man can do, much depending on whether the building is one or two stories in hight, whether it is zero weather, or 140 degrees in the sun. In neither of these extreme temperatures can a man do very much work. I have had as good mechanics working for me as anybody could possibly get, and they would turn out their quota of regular work, still the cost of the labor would exceed all allowances made in figuring up a building. There are little odds and ends in every building for which no contractor figures enough, especially carpenters, and the average mechanic figures out how much he has done that day, and before night he will slacken his pace to such an extent that he will fall a little below the average, omitting besides a few little but very important items which have to be done afterward at a greater cost. A few weeks ago I quit the business for the very reason that it is the most unprofitable one a person can go into. The average pay which the journeyman expects from the contractor is, as a rule, about double what he would get from the owner if paid according to his work, like the contractor. Let the unions adopt a scale of work, similar to their scale of wages, and then probably we will know what constitutes a day's work.

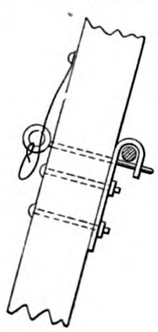


Fig. 5.—Showing Manner of Fastening Winch to Frame.

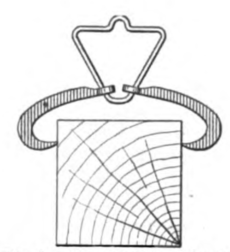


Fig. 8.—The Steel Grab Hook.

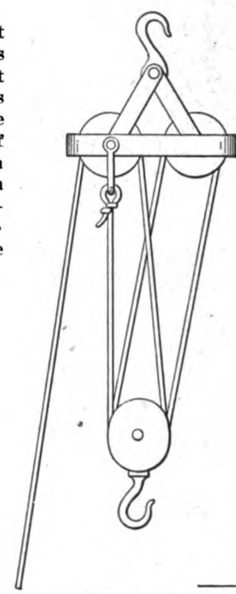


Fig. 6.—The Arrangement of the Blocks.

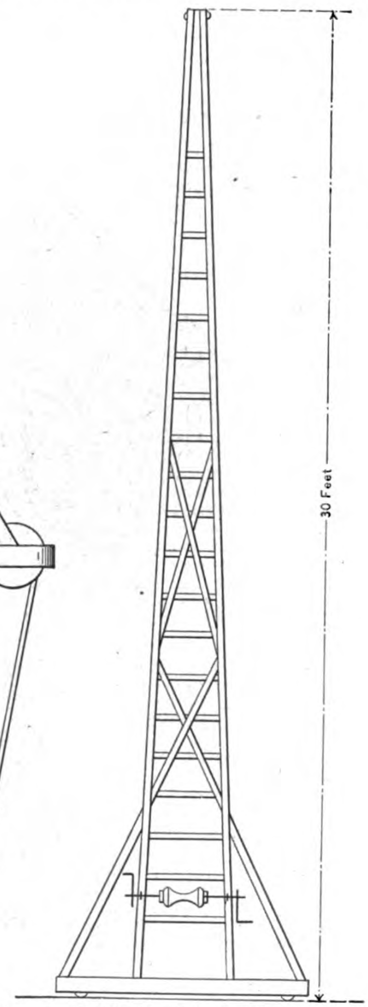


Fig. 7.—General Appearance of the Derrick.

Portable Derrick For Hoisting Materials.

Metallic Shingles for Towers and Conical Roofs.

From F. T. C., *Pittsburgh, Pa.*—Is a special metallic shingle required for roofing steeples, towers and conical roofs? Is there any special method of applying shingles? We should be glad to have some practical instructions on such work.

Staging Bracket for Shingling a Roof.

From S. F. B., *Wellington, Ohio.*—Referring to the description of the staging bracket in my communication which appeared on page 215 of the August issue of the paper, I should have stated that the bracket can be made of tire steel by any blacksmith who is able to make a weld or drill a hole. Any carpenter who wants a bracket of this kind can have it made at home by the local blacksmith at small expense, and if the Lowell man will try it he will ask for nothing better.

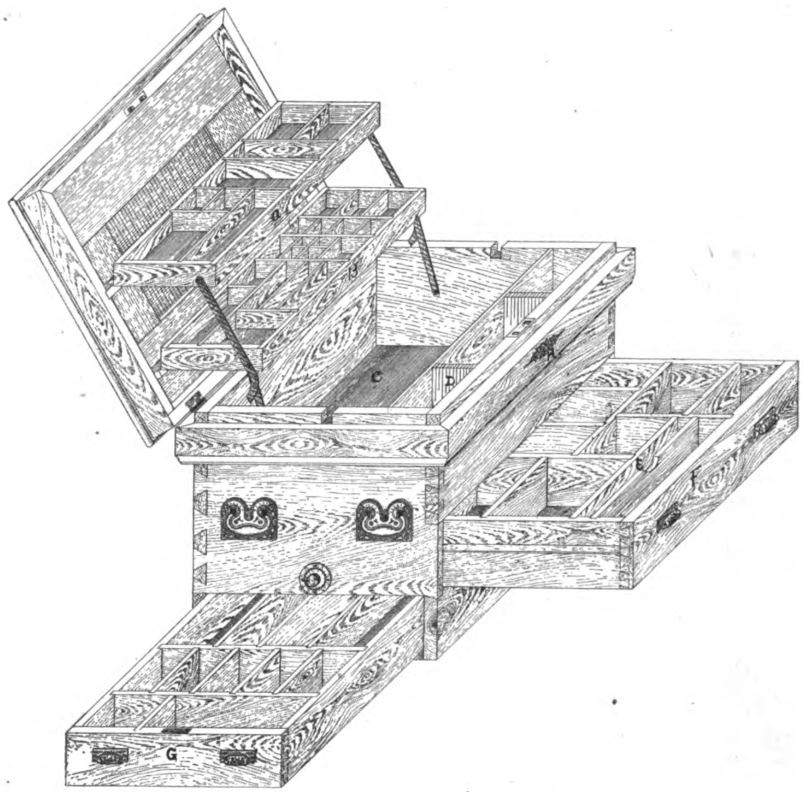
From LAZARUS, *Cliff, New Mexico.*—Replying to "F. W. S." of Lowell, Mass., I would say that the method employed in this part of the country almost exclusively by shinglers for staging is to take a 2 x 4 of the required length for the run of the courses and nail a shingle about every 6 feet of its length, lapping about 1 inch on the edge of the scantling. These are nailed on the lower edge of the stuff, pointing down the roof. This done the 2 x 4 is then turned over and nailed above the line of the next course. This makes an effective staging, and when the work is completed and the supporting shingles sawed off there are no evidences of any kind remaining. The supports, however, must be nailed so as to lap under course sufficiently and be shingled in as a part of the course.

From D. P. B., *Redford, N. Y.*—Answering the inquiry of "F. W. S." in a recent issue, I will state that I never used shingling staging in the West of anything but 2 x 4 with shingles tacked to the under side, butts up and tacked to the roof. On one building I used boards, but the roof was of Gothic pitch. I never saw anything used but 2 x 4, and I have worked from Kansas to North Dakota.

It might be interesting to some of the readers to learn of a cement sill which I recently constructed in a driveway of a barn. It was 20 feet long, 1 foot thick and 2 feet wide, and was on top of a stone wall running through the ends of the sleepers and fastening them all in. It was entirely of cement and very coarse sand. I used Portland cement in about the proportions of 1 to 6. By constructing the sill in this way it permits filling up to the bottom of the floor to drive in.

Construction of Tool Chests.

From W. S., *Walcott, Iowa.*—I notice that once in a while some one is interested in the construction of tool chests. So it has occurred to me to send a sketch of the one which I have used for a good many years and which has given perfect satisfaction. In the isometrical view A and B are lever trays for small articles, which fold automatically under the lid. The portion C is for planes and other bulky tools; D is a saw rack, E is for the level and F is a drawer for small tools, such as chisels and others too numerous to mention. The drawer G, which comes out at the end of the box, is also for all kinds of small tools. To my mind there is a great advantage in this tool box over others. When it is open any tool desired is immediately accessible, as there is no necessity of emptying the entire box before you can get what you want. Just open the box and take it out, as everything is on top. The trays and drawers can be arranged to suit the tools or maker. I might state that I have made several improvements in this chest since the drawing which I send was made. I have only one combination lock, and that is at H, the drawers being locked by a spring shutter in one corner, which locks and unlocks by opening and closing the lid.



Isometrical View of Tool Chest Used by "W. S."

Constructing a Concrete Cellar.

From W. H., *Chicago, Ill.*—In the August issue of the paper there was an interesting article by C. G. Taylor, describing a concrete cellar. I would like to inquire through the columns of the paper what kind of walls were built on the concrete, whether brick, stone or frame, and also what provision was made for the first-floor joist.

WHAT BUILDERS ARE DOING.

REPORTS which have recently come to hand from leading centers of the country indicate a fair degree of activity in the building line, some sections showing gains as compared with the corresponding period a year ago, while others show more or less of a shrinkage in operations under way. The latter condition is undoubtedly due in large measure to the labor disturbances which have occurred, and also to the high prices of building materials, which have tended to postpone improvements contemplated earlier in the season, and in some instances projects have entirely been abandoned, at least for the present. A notable feature in some of the more important cities is the apparent dirth of rentable dwelling houses and flats, owing to the fact that the construction of these classes of buildings has not kept pace with the increase in population.

Chicago, Ill.

The month of August was somewhat more quiet in building circles than during the corresponding month of last year, although the amount of work under way reached a fair volume in the aggregate. The falling off in the amount of work is said to be due, in a large measure, to the agitation in labor circles other than the building trades, and to the high prices of materials and the cost of labor. During August 538 permits were taken out for buildings, having a frontage of 12,992 feet and costing $2,497,350, as against 517 permits for buildings, having a frontage of 15,696 feet and costing $2,816,500. There is a feeling among architects, builders and real estate men that the erection of dwellings and apartments has not kept pace with the increase in population, and that as a consequence rentals are likely to show an advance between this time and next May. This, however, seems to be no exceptional case, as the same remarks would apply to a number of cities, more particularly those in the East, and prominent among which may be noted the boroughs comprising Greater New York.

Cleveland, Ohio.

Early in August members of the Builders' Exchange, accompanied by many of their friends and invited guests, enjoyed their eleventh annual outing at St. Clair Flats, the affair being most enjoyable in every way. There were about 250 who boarded the steamer "City of Cleveland" for Detroit, where they were joined by some 50 or 60 members of the Detroit Builders' Exchange and their friends. The Detroit Committee of Arrangements consisted of F. B. Stevens, W. G. Thomas, Albert Albright, Richard Helson, George H. Clippert, and L. K. Mahon, secretary. From the Cleveland boat the excursionists were transferred to the famous "Tashmoo," noted for its great speed. Breakfast was served in the dining room while the boat was speeding through the Detroit River toward Lake St. Clair. The builders were favored with a beautiful day, and in this connection it is interesting to remark that the Cleveland delegation appears to have had fair weather on every one of their excursions. At noon Grande Pointe was reached, where the party went ashore to partake of a bounteous dinner at the hotel at that place. The steamer "Mineral City" had been chartered to carry the excursionists to Tashmoo Park, where the afternoon was passed with games and dancing. The two ball teams represented contractors on the one hand and building material men on the other, the captain of the former being C. L. Briggs and of the latter R. C. Klumpf. The clay pigeon contest was won by the Cleveland team, consisting of F. G. Hogan and Alexander Forester.

From Tashmoo Park the excursionists went to Star Island, where dinner was served at the Star Island House. At 6.30 the excursionists boarded the "Tashmoo" for the return to Detroit. Among the guests were President R. S. Queisser of the Zanesville Builders' Exchange, Owen Tyler of Louisville, as well as a number of dealers in building materials and supplies. The Cleveland delegation left Detroit at 10.30 in the evening for home, after one of the most delightful outings in the history of the exchange. The success of the affair was in a great measure due to the Entertainment Committee of the Cleveland Exchange, consisting of W. B. McAllister, chairman; A. H. Rudolph, A. Brymer, Harry Gillette and F. A. Edmonds.

After many meetings and mature deliberation the Board of Supervision for Public Buildings and Grounds, consisting of D. H. Burnham, chairman; J. M. Carrere and A. W. Brunner, have made their report to the Board of Public Service touching the group plan of the public buildings of the city of Cleveland. The report is an elaborate affair, involving carefully prepared illustrations indicating the suggested manner of grouping the buildings, together with the treatment of their surroundings and approaches, parkways and pleasure grounds. There are bird's-eye views of the city, one looking north and the other looking south; also sections through the Mall and through the Esplanade. In addition there are detailed elevations, plans, &c., followed by a series of photographs of executed work illustrative of various features suggested in the proposed treatment of the landscape work and in the architectural buildings of the city of Cleveland.

Building operations are at present being conducted upon a slightly reduced scale, as compared with this season a year ago, although the falling off in the amount of work in progress is not especially marked. During August there were permits issued for 325 building operations, estimated to cost a trifle over $400,000, while in August of last year permits were issued for 330 operations, estimated to cost $460,000.

Grand Rapids, Mich.

The Building Contractors' Association have just filed articles of incorporation with the Secretary of State, the principal office being located at Grand Rapids. The purposes for which the association is stated to have been formed are "to promote mechanical and industrial interests, to inculcate just and equitable principles of trade, to establish and maintain uniformity in commercial usages by rules and regulations, and to adjust differences and settle disputes between members or between members and others." The Board of Directors consists of George A. Davidson, John Sullivan, John Ackerman, John McNabb and Edwin Owen.

Los Angeles, Cal.

During the month of August 602 permits for building improvements, with a total valuation of $1,127,819, were issued in the city, as compared with 428 permits, valued at $777,712, in August, 1902, and 235 permits, valued at $337,607, in August, 1901. Of the permits issued during August, 1903, 478 were for new buildings, valued at $1,051,176, and 124 were for additions and alterations, valued at $76,643. The records show that the building activity of the month was well distributed over each of the nine wards of the city. Builders anticipate a good volume of work during the remaining months of the year, although the labor question is ever present and may at any time become serious. The demand for new structures seems to be turning more and more toward a substantial class of frame buildings. During August more than one-third of the new work undertaken was for one and two story frame dwellings and flats, there being 35 permits taken out for the construction of flats, estimated to cost $158,820. Only twelve permits were taken out for the construction of new brick buildings, the most important of these being for the construction of a six-story structure to cost $50,000.

Milwaukee, Wis.

A new rule has been recently established by Building Inspector Dunn of Milwaukee, Wis., to the effect that hereafter building permits shall be required for all structures erected by the city, county, State or National governments, the same as for those erected by private persons, firms or corporations. It appears that heretofore all city and county buildings have been erected without regard to the building inspector, and no fees have been paid for the privilege. Inspector Dunn is of the opinion that the ordinance regarding the taking out of permits makes no distinction as to the person or persons erecting the structure.

During August there was a little more life in building circles than in the corresponding period a year ago, the increase being quite appreciable. There were 300 permits issued for building improvements, estimated to cost $478,860, as against 203 permits in August of last year, calling for an estimated expenditure of $382,931.

New Orleans, La.

More or less new work is in progress, and contracts which have recently been placed aggregate a very fair total. The operations are not confined to any one particular class of building, but embrace business structures, factories, dwellings, &c. During the last month the contract for the new mill to be erected by Lames Mills Company was awarded to George J. Glover for $28,500, and the addition for the old was awarded to Cook & Larrie, Mobile, for $8975. A new building to be used as an ash factory is to be erected on Beinville and Bergundy streets, in accordance with plans drawn by Architects Teledona and Wogan. Another building is to be put up on St. Peters and Caliope street by the National Enameling & Stamping Company, from plans drawn by Architects Favorot and Livaudaus of New Orleans.

New York City, N. Y.

During the past month there has been a slow but steady increase in the number of men at work in the various branches of the building trades, and from present indications it will not be long ere a normal condition exists. At the present writing there remains only one skilled trade—the sheet metal workers—the representatives of which have failed to sign the arbitration agreement of the Building Trades Employers' Association. While, generally speaking, the working force throughout the city is slowly increasing, there are conspicuous examples of inactivity, the most notable of which is probably the Hotel Belmont at Forty-second street and Park avenue. According to the permits issued by the Bureau of Buildings from week to week a fair amount of new work is contemplated, although recently it has not approached the volume for the same period of last year. Taking the figures from January up to the time of going to press there were permits issued in the Boroughs of Manhattan and the Bronx to the number of 1281 for improvements estimated to cost $61,824,535, as against 1267 permits for building improvements costing about $73,000,000 for the corresponding period of 1902.

In Brooklyn for the same period there has been a marked increase in the volume of building operations, permits to the number of 2631 having been issued for building improvements costing $16,416,785, while for the corresponding period of last year there were 2108 permits issued for improvements aggregating a cost of $12,282,277. In neither case do the figures cover alterations or repairs.

One of the developments in connection with the building strike in the Borough of Manhattan has been the organization of foremen in the iron trade under the name of the American Society of Supervising Iron Erectors. The officers are President, W. S. McCready; vice-president, W. C. Greenfield; treasurer, Philip V. Shotts, and secretary, A. M. Putnam.

Portland, Ore.

Builders have lost no time on vacations this season, as structures by the score had to be roofed in before the fall rains came, in order that inside work might be prosecuted regardless of the weather. All available carpenters, bricklayers, painters, plasterers and laboring men have been given steady work at good wages. The plumbers struck the last week in August, and if not settled promptly this will be a serious detriment to building. Among the business structures now approaching completion in the central portion of the city are the Drake O'Reilly four-story brick warehouse, on Irving, from Ninth to Tenth; the Cohen brick, at First and Oak streets; the Lowenstein brick, at Eleventh and Morrison; the J. V. Cook brick, on First, between Oak and Pine; the Richards brick, at Park and Alder; the Russell and Blyth brick, at Sixth and Oak; the Jorgenson brick, on Burnside, betwene Third and Fourth; the Holman brick, at Third and Salmon; the brick warehouse of the Honeyman Hardware Company, at Park and Irving. Well along in course of construction are the Stearns brick, at Sixth and Morrison; the B. & O. T. Company brick, at Sixth and Oak; the Reed brick, on Second, between Washington and Alder, and the Runyon flats, at Sixth and Madison.

San Francisco, Cal.

Building operations, according to the report of City Architect W. J. Cuthbertson, show a heavy increase for August over the corresponding month in 1902, but a decrease as compared with July. In August of last year there were filed 278 applications for building improvements, against 381 for August of this year, estimated to cost $1,156,407, and 398 for last July, when the estimated cost was $1,273,245. Construction work is slacking off owing to the disposition on the part of the labor unions to demand higher wages without giving due notice of their intentions, and a scarcity of men in certain branches of the building trades. One effect of this is to induce smaller contractors in many cases to pay wages above the union schedule, in order to hold their workmen to finish jobs on which they are engaged. The cost of material is also high. It is believed that these conditions will continue for several months, or until the bulk of the construction under way nears completion. By that time it is thought the scarcity of men will be less felt, and that there will be a reduction in the cost of material. It would not surprise builders if such should be the case with lumber next winter.

The stone work of the great Flood office building has been proceeding very slowly since the conclusion of the strike. The reasons assigned are that during the strike 30 of the 130 masons left this city, and that the building has reached the point where much of the stone finishing has to be done by hand.

M. Siminoff will build five stores and eleven flats at the corner of Market and Church streets, the building being a three-story frame structure with three stores facing on Market street and two stores fronting on Church street.

Seattle, Wash.

During the first seven months of 1903 permits were issued by the building inspector to the amount of $3,600,474. For the corresponding months of 1902 the value of the permits amounted to $4,130,162. This year the permits issued between January 1 and July 31 were 3841, while the permits issued for the same months in 1902 numbered 3616. While the number of permits issued in both years include alterations, moves, repairs, &c., the greater share is for buildings running from one-story frame to six-story, brick and stone structures. In 1902 there were a greater number of these large buildings erected than in 1903, but this is assigned to the fact that many investors left for the gold fields of Alaska this year, and deals pending prior to their departure have been left over until their return. The class of residence buildings for which permits have been issued this year range in cost from $500 to $600, with the large proportion running from $2000 to $4000.

Tacoma, Wash.

Operations continue active, with a considerable amount of house building and repair work initiated during the first week in September. There is a good demand for five and six room cottages, and builders are working to supply this want. Building permits were issued the first week in September for 15 new residences, of which eight are to cost from $1000 upward. Good progress is being made on the several large buildings being erected in the downtown section, and at least four of them will be completed within the next 30 days or sooner, this number including the Snell Building, the Birmingham Building, the Hyson Apartment Building and the McLean-McMillan Building. The Snell Block, corner of Eleventh and C streets, will be finished in about 20 days. The work remaining yet to be done consists principally of glass fronts, completing the floors and putting in interior finishings. The workmen are getting well along with the expanded metal, cement-concrete floors in the Provident Building, the first two floors being nearly finished.

Costly Saws in Slate Quarries.

Probably the most expensive saws in use anywhere in the world are those in the factories of Pennsylvania where various articles are manufactured of slate, says a recent issue of the Philadelphia *Ledger*. In one of these factories there are 300 horizontal saws, 12 feet in length, each of which is furnished with 75 cutting diamonds, each saw being worth $5000. The slate land which furnishes the materials for these costly saws to work upon was once so little valued that the tract upon which the famous Chapman quarry in Pennsylvania is situated was sold for a pint of whisky. Its subsequent owners have taken millions of dollars from the land. The most valuable slate deposits in the world are found in the central and eastern parts of Pennsylvania. In the neighborhood of the Pennsylvania quarries there are houses whose walls are entirely of slate. The blocks of which they are made are smoothly sawed, and are certainly most substantial. When slate is blasted in the quarries the rough slabs are taken to the shanties of the "splitters." The stone forms naturally in layers, and the "splitter," following the grain or "ribbon" with his large chisel, separates the blocks into strips. Then these strips are passed through a trimming machine, where by the blows of a heavy knife they are cut into rectangular "shingles." Then they are piled up into "squares," ready to be used for roofing purposes. When slate is cut up for use in other ways the procedure differs. The huge horizontal saw, with its scores of diamonds, in the factory is called into play; it is lowered upon one of the blocks of slate by a ratchet at the rate of ¼ inch a minute. The saw would cut through iron or steel at the same rate. The workmen play a stream of water upon the slate to keep it cool, and wash the dust from the cut. After the sawing the block is planed by being moved back and forth by machinery under a firmly fixed chisel. It is afterward polished, much as marble and granite are.

The Master Builders' Association of London, England, have entered into an agreement with the trades unions which provides: "All workmen who are in receipt of full wages and who have been employed for not less than 42 hours shall, on discharge, receive one hour's notice, to be occupied so far as is practicable in grinding tools, with one hour's pay in addition." The rule was made with the object of minimizing the opportunities for strikes and disturbances.

Architects and builders in Salt Lake City, Utah, are interested in a new patent frame for buildings which is being used on some new buildings going up about the city. The upright pieces of these buildings are made entirely of the new frame, which consists of short iron studs. These are fitted together so that an upright piece of any length can be made. The joists rest upon this frame work. The edges of the stud have a row of teeth upon which metal lathing is hung.

DOORS AND DOORWAYS.—IV.

BY FRED. T. HODGSON.

BRONZE and iron were much used in the earlier periods of the Middle Ages in the make-up of doors, and the Cathedral of Rouen still affords several examples of Middle Age doors, in the construction of which iron plays an important part. Some of the doors, however, have been modernized and vulgarized of late, and the hammer of the nineteenth century blacksmith has, in various instances, broken away a piece of work of which Quentin Matsys himself might have been proud. Still, the great door of Rouen retains its character, notwithstanding the coarse coat of paint by which it has been both discolored and disfigured. The joints between the planks, it is true, are no longer to be distinguished; the locks and bolts are battered, but the ring hangs in its place; the circular ornament, for which no one has ever yet found a meaning, is, strange to say, untouched. This door is in itself, says M. Daly, "a lesson in architecture," and certainly nothing can be at the same time more simple and more significant. There are principles we find repeated in the gates and doors and doorways of Chartres, not long ago destroyed by an incendiary; of Florence, Palermo and Perugia, the three last being of richly sculptured marble, in close resemblance with that lately taken from Genoa to South Kensington, London. The singularly high and narrow entrances into the palaces and churches of Anay-le-Franc, the market gates of Brussels and of Berne, the castle doors at Cadaillac and Gaillon, with the more curious gates of Lisbon, suggest much that is remarkable as exemplifying so many fashions of taste, if not so many schools of thought.

In the East, of course, where the word "door" is mentioned it often means no more than a pair of curtains; but taking the term literally, it may still have a number of different applications, as in the Latin gate of Rome, the war gate of Rheims, the gate of France at St. Martin-le-Vinoux, the doors of the hotels Cluny and Sens, and the Mycenean, Ephesian and Nicaean gates. In Turkey we know the "Porte" originally signified the entry to a palace, though it has since become a synonym for the Government of the Ottoman Empire; but these translations from the real to the figurative belong only to the East, and although in a poem "the ivory doors of dreams" may be tolerated, the solid interest of the subject begins with the entrances provided in the past and present times, whether for cathedral or church, palace or prison, Gothic castle or ordinary modern abode. The gate or the door figures largely, as we have said, in the chronicles of both arts and manners in every civilized country. Moreover, a wonderful literature is connected with this sole object, neglected though it be in modern days.

An example of fine work on doors and panelling is shown with details in Figs. 19 and 20. This is taken from the Church of Semor-en-Auxois, France. The stiles and rails of this paneling are 1½ inches thick. The inclosing molding A is curved around a quadrant so as to continue along the verticals, yet the joints are all square and without miters. This inclosing molding is not carried along the cross rail B, which has a slight chamfer stopped near each joint. The lower panels are without closing moldings, but have chamfers, as if to give greater solidity to the lower portion. A cap molding, C, given in profile at C′, is nailed on the face of the upper rail. The wood work is made lighter by perforated panels D set lengthwise in the frieze. The solid panels are only 8 inches wide, including the tongues, and ⅜ inch thick at the edges, but are strengthened by projections representing folded parchment. Note the horizontal section E, made at *e*, and section F, made at *f*. At G is drawn a vertical section of the paneling, at H is the section of cross rail A, and at I is the stopping of the inclosing molding against the cross rail.

We give in Fig. 20 several examples of these modes of strengthening panels by the imitation of folded parchments. The specimen A shows small ornamented rods projecting behind the parchments.

In joinery previous to the fifteenth century, it was often customary, especially in furniture, to cover panels with asses' skin or linen, fastened on the wood with glue or cheese glue. When this wood work became old these coverings must have frequently become loosened in part from the warped wood, causing folds and recurved edges. It is to be presumed that joiners derived from these accidents the idea of a decorative motive and a means of making panels thicker, while leaving their edges and tongues very thin. Hence these panels representing folded parchments that were so much in vogue during the fifteenth and the beginning of the sixteenth centuries.

The mediæval workmen were not merely skillful artisans, but were observers, careful to profit by all that

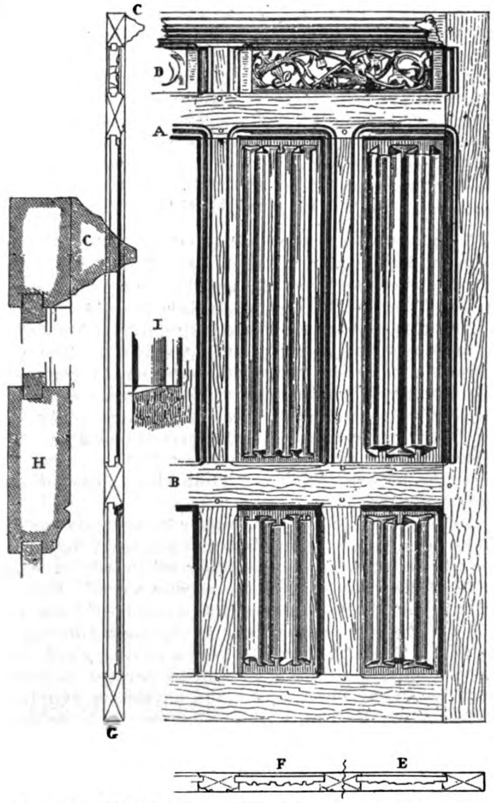


Fig. 19.—Method of Strengthening Panels in Doors, &c.

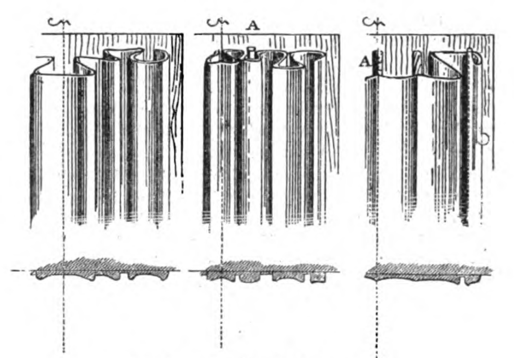


Fig. 20.—Details of the Panels.

Doors and Doorways.—By Fred T. Hodgson.

they chanced to discover. A defect, the effect of time on materials, became for them a motive for perfecting and for decoration. Loving their trade because it was the result of thoughtful labor and not a vague and unexplained tradition of foreign art, they followed their own bent, finding new combinations in the daily observation of the workshop, without borrowing elsewhere forms without meaning to them. Architects long since turned joinery from its true path by desiring to impose on it forms not in accordance with its resources. During the two last centuries, many things have been imitated in wood work, such as stucco, marble, stone, bronze, columns, tapestries, projecting cornices, arches, everything but joinery, and this was done in the name of grand classical art. On the contrary, it seems that classic art consisted in using wood, stone or metal in accordance with the properties peculiar to each one of these materials.

Opening a treatise on joinery of this recent period, what shall we see? How Corinthian columns, arches and intersections of curves, corbels and trumpet vaults are to be constructed of boards and planks, so as to imitate masonry in wood; how to construct doors with wide frames, consoles, and cornices projecting 20 inches; how all this can only be held together by means of angles, straps, screws and glue. Thus, joiners have finished by no longer knowing how to do true joinery, and a few years since some of them commenced to learn again that art, which was practiced 400 years ago with so much taste and skill. But only in Northern countries may be sought joinery worthy the name, and we in America, where wood forms so great a factor in building, have really outrun our European fellow workers in this direction.

(To be continued.)

Portland Cement from Slag.

Portland cement has been made from blast furnace slag for several years in various cement works in Germany, Luxemburg and Belgium, and has yielded very satisfactory results, especially in regard to quality. Negotiations are being carried on with some blast furnace works with a view to the introduction of the slag cement industry into England, Austria and France. In some respects a blast works has a considerable advantage over other Portland cement factories because the motive power for the cement works can be supplied by a blast furnace gas motor with electric transmission, the rubble or waste coke from the blast furnaces can be utilized in the cement kiln, and the principal raw materials—namely, the granulated slag and the limestone—are close at hand. Besides, there are other minor advantages, says Oliver J. D. Hughes, Consul-General at Coburg.

Portland slag cement has also some advantages over natural Portland cement; for, while the yield from the raw materials when the former is used is about 80 per cent., the yield when the ordinary raw materials are used is seldom more than 60 per cent. As the cost of production per ton of raw materials is nearly equal in both cases, a saving of about 20 per cent. in fuel, labor, &c., is effected in the case of slag cement. Besides this, Portland slag cement is more trustworthy and more regular, and its manufacture can be more easily controlled than that of the so-called natural Portland cement, because the principal raw material—namely, the blast furnace slag—is, as a rule, a regular product whose chemical composition is easily controlled; consequently, any alterations which are liable to take place are known beforehand and precautions can accordingly be taken in time. This is not the case when the natural raw materials are used.

Some recent tests with Portland cement from blast-furnace slag, made in the municipal laboratory at Vienna, showed that mortar composed of 3 parts of sand with 1 part of this cement gave the following results:

1. After seven days' hardening.—Tensile strength, 383 pounds per square inch; strength of compression, 3880 pounds per square inch.

2. After twenty-eight days' hardening. — Tensile strength, 551 pounds per square inch; strength of compression, 5411 pounds per square inch.

Lewis and Clark Exposition Buildings.

The plans for the buildings of the Lewis & Clark Exposition, which is to be held in Portland, Ore., next year, are now assuming shape. The report of Superintendent Oscar Huber shows that the main structures will consist of the States Building, Machinery Hall, Festival Hall, Forestry Building and the Lewis & Clark Memorial Building. The States Building, as outlined, will be a structure 440 feet long by 200 feet wide, and is intended to hold the exhibits from all the States participating. A separate annex is to be provided for agricultural and horticultural purposes in case it should become necessary. The architecture is to be of the French Renaissance. The Machinery Hall is to be of the same style and 400 x 100 feet in size. The Festival Hall, or Musical Pavilion, will be of liberal proportions, designed for large gatherings in connection with band concerts, &c. Its acoustic properties will be given special attention. The Forestry Building will be unique in style, and is designed to show the natural timber resources of Oregon. Large logs with the bark undisturbed thereon will form the walls of the building, and huge sawn timbers the beams and girders. Trees will form the pillars supporting the verandas. All the different woods found in the State will be employed in the construction. The other buildings will be appropriate to the purpose for which they are intended.

New Hospital Building.

The plans have just been filed with the Building Department, by Francis R. Allen and Charles Collins of Boston, as architects for the new building to be erected for the Women's Hospital, to replace the old structure at Lexington avenue and Fiftieth street, New York City, the estimated cost being placed at $610,000. The new structure will be six stories and basement in hight and have facades of granite, lime stone and terra cotta. It will have a frontage of 188 feet and a depth of 40 feet, with two wings, each 40 feet wide and 60 feet deep. The building will occupy the 110th street front of a lot 300 x 171 feet, between 109th and 110th streets, east of Amsterdam avenue.

The first floor, in addition to the administration offices, will be devoted to a lecture hall and a chapel; the second floor will be fitted up as a dormitory for the nurses, while the third floor will contain the private wards. Each of the wings of the fourth floor will contain 40 beds, and there will be ten endowed beds in the main building on this floor. The fifth floor will have a clinical ward, with 20 beds, while the sixth floor will be devoted to dormitories and living quarters for the physicians and their attaches of the institution. The basement will be fitted with a museum and a clinic.

Industrial Education in Germany.

Ernest L. Harris, United States commercial agent at Eibenstock, Germany, has furnished to the State Department an elaborate report to the Department of Commerce and Labor on the subject of industrial education in Germany, which shows that intense interest is being taken in that country in this matter. Mr. Harris expresses the opinion that the time is not far distant when the whole German Empire will be thickly dotted with industrial schools similar to those now so popular in Saxony. In that kingdom there are now 287 industrial schools to a population of 4,202,216, or one industrial school to every 14,641 people.

The industrial schools in Germany, taking the Empire as a whole, cover a very wide field, as shown by the following list of trades and industries which are taught in them:

Weaving, finishing, cabinet making, basket making, metal, zinc, jewelry, lace, mechanics, porcelain, engravers, printing, blacksmiths, architects, shipbuilding, spinning, wood carving, masonry, paper, bronze, goldsmith, ivory carving, dress trimmings, brushes, shoemakers, lithographers, firemen, locksmiths, iron, fisheries, dyeing, sculpturing, clock making, sugar, tin, glass, silk, curtains, potters, straw weaving, musical instruments, machine technology, carpenters and painters.

MAKING STAVED COLUMNS.

THE use of staved columns in connection with porches of dwellings and for other purposes has assumed enormous proportions, with their popularity constantly increasing, and it is not surprising that carpenters and builders scattered over the country are curious to learn of the different methods by which they are made. In recent issues of the *Woodworker* some of the readers have been describing the methods employed in the mills where they work of making staved columns, the points brought out being of such suggestive value as to justify us in reprinting the following extracts. One correspondent says:

"We always make at least eight staves for a column, and if they are fluted, one for each member of the fluting. I shape the staves in the straight molder, and as they generally are tapered, it is necessary to run a 'form' of the same taper (reversed) between the stave and the guide, thus working but one side at a time. Of course, any molder man understands all about that. Besides sizing the stave and cutting the required bevel, I cut a V-shaped groove about ½ inch from the edge, to make a shoulder for the hand screws to catch on in a gluing up. The end view of stave is like Fig. 1. It will be noticed there is a square place on each edge of the stave above the line of the circumference of the column. This is made in sawing the stock to size for sticking, as it is unnecessary for the staves to be in contact outside the line of turning, and it saves about ¼ inch in width of stock on each stave in a 10-inch column. The gluing up is simple for a carpenter, and when each one is put together a piece of plank is sawed to fit into each end, when it can be turned as a solid column.

"When large columns are to be fluted the same method in sticking is followed for cutting the required bevel, and then the stave is run through the molder, laid exactly on the center line of a board having parallel straight edges and on which strips have been nailed close to each side of the stave to hold it securely in place, and stuck with cutters ground to cut one-half of the member down on each side of the center line. The end view is like Fig. 2."

Another correspondent shows in Fig. 3 the way to glue up staved columns by means of common hand screws, thumb screws or any kind of a clamp. The blocks A A A are small strips of any kind of wood glued on the staves full length, forming excellent cleats for the screws. It is found best to glue up half a column, then joint the halves on the jointer and glue together as before. Some people may be able to make joints so perfect that they can glue up the whole column at one operation, but, he says, I have never yet been able to make the last stave fit as it should, but find no trouble to make a perfect job if I go only half way. Care must be taken that the staves are of such width that when blocks, A, are in place the pressure of the screws will be as nearly as possible in the middle of the joint, as shown by dotted lines, C C C.

A third method of making the columns is thus described: After cutting out the stock it goes to the buzz planer and is straightened two ways, next through the pony planer and brought to thickness, thence to saw and sized (tapered if for taper column), then to the buzz planer to be beveled and grooved at one operation, then to veneer press and glued up with an appliance, as shown in Fig. 4.

I use the above machines because they are the handiest for the purpose in our shop, but should use the molder if it had time to do the work when wanted, as it would save three handlings of the work. We fit in blocks, as shown, for lathe centers.

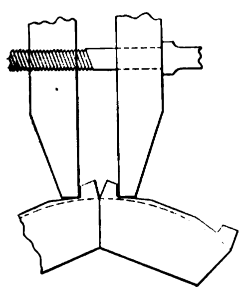


Fig. 1.—End View of Stave Showing Hand Screws in Place.

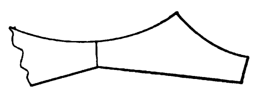


Fig. 2.—Style of Fluting.

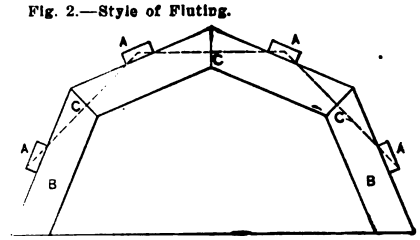


Fig. 3.—A Method of Gluing Up by Means of Hand Screws or Clamps.

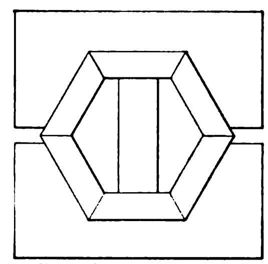


Fig. 4.—Appliance for Gluing Up as Described in the Third Method of Making the Columns.

Making Staved Columns.

New Publications.

Architects' Directory and Specification Index for 1903-1904. 144 pages. 7 x 10 inches in size. Bound in heavy board covers. Published annually by William T. Comstock. Price, $2, net, postpaid.

This is the fifth edition of the Architects' Directory issued annually by the publisher named, but is now presented in much larger and more complete form than heretofore, many features of information having been added, which are likely to be of unusual interest and value to architects, builders and others. The work contains 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, in addition to which are the names of the officers and locations of the different architectural associations in the United States. The matter has been prepared with a great deal of care and attention in order to secure accuracy both in names and location. There is also a brief Specification Index of prominent dealers and manufacturers of building materials and appliances, all of which will be found especially useful in this connection. One feature, which will doubtless be greatly appreciated by those desirous of addressing envelopes from the list, is the large, clear type in which the names are given.

Hand Book of the National Fire Proofing Company of Pittsburgh, Pa., edited and compiled by Henry L. Hinton, engineer; size, 5 x 7¼ inches. Bound in leather covers in pocketbook form. Published by the company. Price, $3, postpaid.

This is in effect an abridged edition of the catalogue of the National Fire Proofing Company, and consists of a collection of pages printed from the electrotype plates made for an unabridged edition of a forthcoming work which will be in eight divisions, only four of which, however, are represented, and that only in part by the pages contained within the covers of the book under review. The object of the final work, aside from serving as a more complete catalogue than the present book of the product of all the different wares of the company in so far as the product relates to the fire proofing materials turned out by them and to the fire proof construction work executed by them, is to afford the architect, the engineer, the builder, the insurance underwriter and all others interested, reliable information concerning the fire proofing of buildings by means of the various materials and methods in common use to-day, but more particularly by the use of the material known as porous terra cotta. The scattered pages selected from the unabridged volume, yet to be issued, are put forth to meet an immediate pressing want of the company as a general catalogue for most of its work and with the hope that as a representative of the forthcoming work of wide scope, it will be received with sufficient interest to command the attention of those versed in its subject matter.

As already stated, the complete work will consist of eight divisions, the first of which has to do with fire proofing, its history, its special qualities, its manufacture, &c.; these points being covered in a series of articles on various phases of the subject by recognized authorities, architects, engineers, mathematicians, geologists and terra cotta manufacturers.

The second division of the work describes the material —that is, the blocks as they come from the factory—showing the various sections by themselves and as arranged in the floor, the roof, the hanging ceiling, the partition, &c., as built about the column and the girder and in connection with the wall, illustrated by a complete set of colored sectional drawings.

The third section deals with safe loads for arches of all sizes at all practical spans, these tables being illustrated by numerous diagrams.

In the fourth division the properties of the blocks, construction work, &c., are considered, accompanied by valuable tables.

In the fifth division will be presented a series of tables giving for the live loads commonly specified by architects for floors designed for various uses, such, for example, as for dwelling houses, churches, storehouses, &c., the full details of fire proof floor construction in connection with the use of all the different sizes of standard section steel I-beams, and showing in this way the most economical steel I-beams to be used in connection with the various sizes of arch blocks and a covering of concrete in connection therewith of the least practical thickness, thus joined with the ordinary plaster ceiling and the wood flooring which is commonly specified. This series consists of ten tables, furnishing the architect with all the data necessary for drawing up specifications for a model hollow terra cotta fire proof floor of any special character or required thickness and strength.

Division 6 deals with the setting of arches. Here tables are presented, giving for arches of all sizes the combination of blocks for setting flat arches of all spans in the side, end and combination methods of construction. Also tables giving the best uniform length of blocks and the nearest practical batter approximating the true batter within ½ inch for 6, 8 and 10 inch segmental arches of various rises and spans. The former tables will be found a great aid to the builder in setting arches, for they enable him to use the various blocks exactly as regulated for use in making the combination for the various spans just as the material is shipped to him from the factory.

In the seventh division the subject of steel framing is considered. The information here presented is of such a nature and so arranged as to be applied in connection with the building law requirements of the principal large cities throughout the country.

In the final division of the completed work are to be found tables for finding the cost in tons of any article used in quantity in building construction, tables giving the weight and special properties of mortar and concrete as variously made and treated, and the other materials used in fire proof construction; that for terra cotta being selected from information given in full in other divisions of the work. There are also other new and useful building construction tables, which have been specially compiled for this work.

In connection with the diagrams and tables are to be found full explanatory text, showing just how they are used and stating the basis of the calculations. The entire matter has been arranged with the most careful attention to detail, and is the first attempt that has yet been made to consider hollow terra cotta fire proofing sections from the standpoint of the engineer. Special attention is drawn to a new system of floor arch construction designated by Mr. Hinton as the "serrated arch," this being treated at considerable length in the present abridged edition of the work which is not yet entirely ready for the press.

How to Measure Up Wood Work for Buildings. By Owen R. Maginnis. Size, 7½ x 5 inches; 79 pages, 161 illustrations. Published by the Industrial Publication Company. Price, 50 cents.

This little book is designed as a handy guide to builders, carpenters, foremen and wood workers in measuring up wood work for buildings, both in the actual houses and from plans. It describes the simplest and most accurate methods to be followed when figuring work either for frame or brick houses, including window frames and sashes, door jambs, base and trim, wainscoting, doors, house fixtures, transoms and moldings, stairs, balusters and hand rails, and inside and outside blinds, as well as the rough timber for frame buildings. The last chapter is devoted to miscellaneous information, such as nails required in carpenter work, the weight of different kinds of lumber, sizes and weights of windows and doors, and so forth. The work appears to be carefully compiled and doubtless will prove a useful handbook for the carpenter and builder.

Master Stair Builders' Association.

The leading master stair builders of Hudson County, N. J., have recently formed an association for the purpose of better protecting their interests, especially in connection with labor troubles. Meetings are held the first and third Tuesday evenings of every month at the National Assembly Rooms, 642 Newark avenue, Jersey City, N. J. The officers for the ensuing year are: William H. Romel, president; John Bore, vice-president; A. Stanton, secretary, and Charles Clark, treasurer.

In celebration of the formation of the association the members held a dinner on the evening of August 13, covers being laid for 32 members. President Romel admirably filled the position of master of ceremonies, and short speeches were made by the officials and others. The affair was a most enjoyable one, and the new organization starts out under the most promising auspices.

CONTENTS.

FRAME RESIDENCE OF MR. T. I. ROSS, AT WINFIELD, IOWA.

W. S. WYLIE & SON, ARCHITECTS.

SUPPLEMENT CARPENTRY AND BUILDING, OCTOBER, 1903.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

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

NOVEMBER, 1903.

Trade Schools and Labor Unions.

The opening of the various trade schools in the East for their winter's work lends especial interest at this time to the paper by William H. Sayward, the well known secretary of the National Association of Builders, on "The Attitude of Labor Unions Toward Trade Schools," printed in another part of this issue. This paper, which was read before the recent Educational Convention in Boston, aroused considerable interest in both educational and industrial circles, and will well repay perusal by those who are interested in the industrial education of American youth. The fact is notorious that the greatest obstacle to the extension of the trade school movement in this country heretofore has been the opposition to these institutions displayed by the labor unions. The main cause for this opposition is the fear of an overproduction of skilled workmen through their operation. This attitude was formerly shared by the labor organizations in the leading European countries, but Mr. Sayward shows that it has been materially modified abroad in recent years, and that a tendency is now apparent to encourage the trade school, where it follows a policy of training only those who are already engaged in the trades. In the United States, too, while the trades unions, as a class, do not favor the trade school idea, there are indications of a marked and increasing interest in the subject among workmen and their organizations, and many show an inclination, like their European *confrères*, to favor the application of the trade school system in the case of those young men who are already engaged in earning their livelihood at the mechanical trades. In other words, when trade schools confine their efforts to improving the theoretical and technical knowledge of those who have already entered upon a trade and propose casting in their lot with their trade unions, union workmen are disposed to approve of them. Their main contention is that the average American trade school, as at present constituted, is engaged in training and turning out upon the labor market workmen with a smattering of theoretical and practical knowledge, but without the necessary skill in handicraft, which can only be acquired in actual practice in the shop, and that these "half baked" mechanics come into unjust competition with the qualified union workmen. The justice of this objection will be disclaimed by those who have any knowledge of the methods of the leading trade schools in the East. And yet the criticism probably has a sufficient basis of fact to make it worth the while of the advocates and managers of trade schools to try to understand how the question is seen from the union labor viewpoint, and strive to remove the deep rooted prejudice which undeniably exists among labor organizations by demonstrating that the well being of their trades and their future development depend upon the operation of the trade school idea in some form. Mr. Sayward is of the opinion that the only effective solution of the matter is to be found in co-operation between employers and workmen in the conduct and support of trade schools, the object of which will be to produce the best and most skillful workmen, who, through their excellence, will form a real "aristocracy of labor," and that the labor unions should be made up of these workmen, and these only. By this means the union workman would become recognized as the gauge and standard of excellence in his trade, while the "nonunion" man would be the inefficient, poorly trained worker. The idea is worthy of serious consideration, for the subject has an important bearing upon the future industrial welfare of the country.

Unsanitary Skyscrapers.

A leading authority on sanitation, writing recently in a medical journal on the subject of the influence of the modern "skyscraper" on the public health, asserts that its effect has been decidedly unfavorable. He claims investigation has brought out the fact that the eyesight and general health of those who work in the high business buildings of New York City are apt to be seriously impaired through their enforced tenancy, for eight or ten hours a day, of poorly ventilated and badly lighted offices, where they lack the twin health factors of fresh air and sunlight. Where a cluster of huge skyscrapers are massed together in the narrow downtown streets of the city a considerable proportion of the offices, especially in the lower stories, are practically devoid of natural light, and the tenants are compelled to work, year in and year out, over a desk illuminated only by the comparatively dim glow of an electric light. The complaint is made, too, that in the planning of these high structures the important subject of ventilation does not receive the attention it should have, the occasional opening of a door being too often the only means of introducing fresh air into an office. We provide a stated number of cubic feet of fresh air per minute and unlimited quantities of sunlight for the children in our public schools, but, when they have graduated, many of these young people are compelled to work for double the number of hours in offices where these necessities of healthy life are conspicuous through their absence. It would seem that a lack of proper lighting and ventilation, with its attendant deleterious effect upon health, must be added to the fire hazard, the darkening of streets and the other evils for which the modern skyscraper is held responsible.

Increased Use of Architectural Copper.

For a long time copper had been used in the best work of leading architects for roofs and gutters and, later, in the ornamental cornices and other relief decorations of buildings which they designed. When the price of copper began to soar a few years ago the use of copper for such work was practically relinquished, and in many instances fine buildings that would ordinarily have had copper roofs and gutters were equipped with other material. It is noticeable in some of the large cities, where handsome structures have been completed in the last half dozen years, that proper care has not been taken to keep the material in the gutters and roofs painted, and as a result the buildings have been disfigured through leaks. The necessity of replacing such material is now especially confronting the trustees of numerous churches. Inasmuch as the price of sheet copper adapted for this work has again come down to a figure at which its use is economical, owing to its durability, sheet metal workers in many quarters are actively engaged in putting in new copper gutters and supplying new copper finials and ornaments. It is possible that some tradesmen may look upon this necessity on the part of their customers as a blessing, on account of the work it brings; but, in the interest of good reputation, it is well always to do work with such materials as will insure its long continued usefulness. Many visitors to Philadelphia go to Christ Church to sit in the pew occupied by Washington, but another feature of special interest in the structure is pointed out to them in the roof, which was covered with copper more than a hundred years ago and is still in excellent condition. There is every reason why sheet copper should be used on high class buildings, and it is pleasing to note that the price of the material has now reached a point where the enterprising cornice maker, who endeavors to do only the best work, can again exploit its merits with profit to himself and with lasting benefit to his customers.

Programme of Convention of Architects.

As we go to press, the members of the American Institute of Architects are holding their thirty-seventh annual convention at Cleveland, Ohio, with headquarters at the Hollenden Hotel, corner of Superior and Bond streets. The committee having charge of the arrangements consists of Glenn Brown, who is secretary of the Institute, A. W. Brunner, J. R. Marshall and Benjamin S. Hubbell. An idea of the order of proceedings may be gathered from the extracts from the programme which are presented herewith:

Wednesday, October 14.

Meetings of the Board of Directors at 10 a.m.

Thursday, October 15.

Morning Session.

The members of the Institute will meet in the Hollenden Hotel, Cleveland, Ohio, at 9.30 o'clock; will register their names; the president will appoint a Committee of Three on Credentials of Delegates, and at 10 o'clock there will be a short address of welcome by Hon. Tom L. Johnson, after which the president of the Institute, Charles F. McKim, will make brief remarks, when the convention will be declared open for business.

ORDER OF BUSINESS.

1. Report of the Board of Directors.
2. Report of the treasurer and reference to the Auditing Committee.
3. Reports of chapters, a synopsis of which will be read by the secretary.
4. Report of the standing committees.
5. Reports of special committees.

Luncheon served in Banquet Hall at 1 o'clock. Ladies in attendence with members are invited.

Afternoon Session, 2 o'clock.

1. Appointment of five special committees; one to consider and report on the president's address, one to report on recommendations contained in the report of Board of Directors, one on reports of chapters, and one on the Standing Committee's reports, and one on Special Committee's reports.
2. Report of Credential Committee.
3. Reports of committees not reached at morning session.
4. At 2.30 o'clock the Cleveland chapter will take delegates on a drive about the Boulevard.

Evening Session, 8 o'clock.

Papers:

"The Necessity for Trained Men in Future Artistic Productions," by Theo. N. Ely.

"The Advantages of the School of Rome for the Study of Mural Painting," by John La Farge.

"A Few Words on Academic Training in Sculpture," by Augustus St. Gaudens. Illustrated by lantern slides.

Friday, October 16.

Morning Session, 10 o'clock.

1. Reports of special committees not finished at first session.
2. Unfinished business of the previous day.
3. Ballots open for the election of officers and fellows.

Luncheon served in the Banquet Room at 1 o'clock. Ladies in attendance with members are invited.

Afternoon Session, 2 o'clock.

Papers:

"Rome as a Place of Schooling for a Decorative Painter," by E. H. Blashfield. Illustrated by lantern slides.

"The Significance of Rome to the American Architectural Student," by Austin W. Lord.

Evening Session, 8 o'clock.

Banquet by the Cleveland chapter.

Saturday, October 17.

Morning Session.

1. Reports of the four committees appointed at the second session and their consideration.
2. Unfinished business.
3. Miscellaneous business.
4. Ballot closed.

Luncheon at 1 o'clock. Ladies in attendance with members are invited.

Afternoon Session, 2 o'clock.

1. Unfinished business.
2. Report of tellers on election of officers and place of next meeting.

Exhibition, October 15 to 17.

Drawings of the group plan for public buildings in Cleveland. Presented by the Cleveland Group Plan Commission—D. H. Burnham, John M. Carrère, Arnold W. Brunner.

Delegates will be distinguished by a red ribbon, and will occupy seats from the front row as far back as is necessary for their accommodation.

Members of the Institute who are not delegates are entitled to enter all discussions, to offer resolutions and motions, and to vote on a proposition that it is the sense of the meeting.

New Jersey Master Builders' Association.

The master builders of Scotch Plains, Fanwood, Cranford, Roselle and Westfield, N. J., have organized a Master Builders' Association, the object of which is mutual protection. Officers have been elected for the ensuing year as follows:

President, John Wilson of Roselle.

Vice-President, John Waterson of Cranford.

Corresponding Secretary, W. Irving Carpenter of Westfield.

Financial Secretary, Charles H. French of Fanwood.

The Executive Committee is composed of John Goltol, W. F. Jimmerson, H. C. McVoy, Arthur F. Flagg and W. Irving Carpenter, all of Westfield.

President of Architectural League of America.

At the convention of the Architectural League of America, held in St. Louis, Mo., the first week in October, William D. Ittner, Building Commissioner for the Board of Education, and a member of the St. Louis Architectural Club, was elected president for the ensuing year. According to the rules of the league, the St. Louis Architectural Club is empowered to appoint the Executive Board for the ensuing year, and this board when appointed will select the secretary, treasurer and other officers of the national body.

It was voted to hold the 1904 convention in the city of Pittsburgh, but no date was fixed.

The 12-story building which is occupied in large part by the publication offices from which *Carpentry and Building* is issued is about to be enlarged by a 12-story and basement addition, which will occupy the corner plot adjoining the present structure. When the improvements are completed the building will have a total frontage in William street of 130 feet and in Duane street of 59 feet. The cost of the addition is placed at $100,000 and the improvements will be carried out in accordance with drawings prepared by Clinton & Russel, architects of New York City.

At a recent meeting of the State Board of Trade, held at Biddeford, Maine, Secretary Blanding stated that there had been reported in the State of Maine, from January 1 up to the close of September, buildings aggregating in cost $2,315,000, of which about 40 per cent. represented residential work. Operations under way approximated a valuation of a trifle over $5,000,000, while that in prospect was valued at nearly $6,000,000 more.

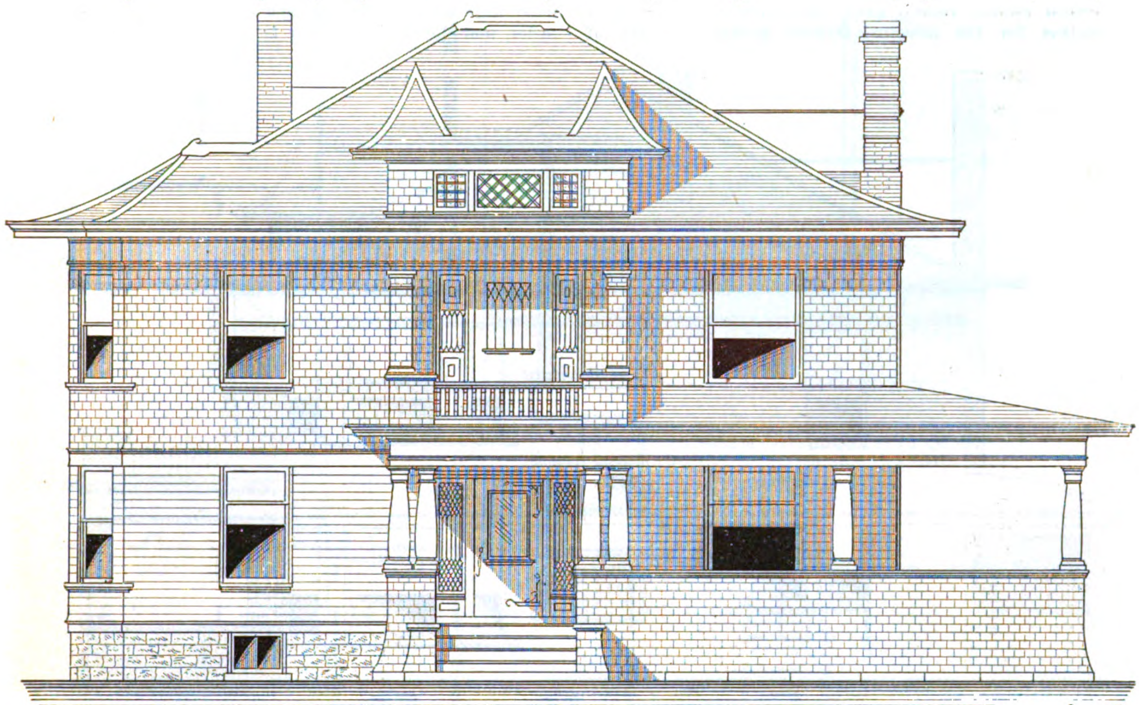
HOUSE AT BOULDER, COLORADO.

WE have taken for the subject of our half-tone supplemental plate this month a frame residence erected not long since at Boulder, Col., for Harry P. Gamble, and give through the medium of the various small pictures an excellent idea of the interior finish. The circular view in the upper left hand corner of the plates affords a glimpse of the dining room, the one at the right shows the stair hall, with its arched effects, while the lower right hand picture represents a cosy corner of the library with its open grate and tile mantel. The small picture at the left of this represents a view in the family chamber on the second floor. The plans indicate a rather unique arrangement of the rooms on the first and second floors, while the exterior view, which forms the central feature of the supplemental plate, shows the appearance of the finished house. It will be seen from the plans that the parlor, reception hall and library occupy the full width of the house at the front, and by opening the sliding doors can be made practically one room should occasion demand it. The stair hall is near the center of the house and directly in the rear of the reception hall. Under the main stairs is a lavatory, while opening out of the stair hall is a cloak room. The dining room is directly in the rear of the library and accessible from the stair hall, communicating with the kitchen by means of the pantry. The kitchen also has direct communication with the stair hall, so there is no necessity of passing through any of the main rooms in order to reach the front door.

The location of the main stairs is such as to land on the second floor practically in the center of the house. Opening out of the second story hall are three sleeping rooms and the den, which occupies a position directly over the reception hall. The bathroom is at the rear of the house, at the left of which is the servants' room, reached by a flight of stairs rising directly from the kitchen.

According to the specifications of the architect local stone was used for the foundation and Oregon lumber for the framing. The outside walls consist of ⅞-inch Mexican boards, over which is a layer of Cabot's insulating quilt, this in turn being covered by siding or clapboards for the first story and shingles for the second story and gables. The shingles were treated to three coats of Cabot's shingle stain. The roof is covered with Oregon shingles, laid 4½ inches to the weather, and treated with two coats of Cabot's Shingle stain of dark moss green. The floors throughout the house are double, the lower ones being ⅞-inch material, while the finished floors throughout, except the hall, are of 2¼-inch face Texas flooring, sandpapered and waxed. The hall floor is of quarter sawed oak, as are also the front stairs, the latter being finished in the natural wood. All other finish is No. 1 Mexican, treated with three coats of enameled paint. The plastering is three-coat work and the painting is three coats linseed oil and white lead. The heating is done by means af a Magee warm air furnace, made by the Magee Furnace Company of Boston, Mass., and the plumbing is of the open type throughout with nickel plated fixtures. Mottled gray brick were used for the fireplaces throughout the house, the shelves being of hard wood. All the windows and doors are screened full size and hung on hinges.

The house here shown was erected in accordance with plans prepared by Watson Vernon, architect, of 1932 Front street, Boulder, Col.



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

House at Boulder, Col.—Watson Vernon, Architect, Same Place.

A Church of Composite Architecture.

The new church which is in process of construction in West 142nd street, New York City, is probably the most elaborate piece of architectural patch work of which the city can at present boast. Its history is somewhat interesting, both on account of the materials of which it is composed and the site which it occupies. It stands on ground that once was a part of the property of Alexander Hamilton, whose residence is now utilized as a school. The walls of the new church are largely composed of the materials of the old Academy of Design, demolished about a year ago to make room for the large extension of the Metropolitan Life Insurance Building at Twenty-third street and Fourth avenue. The tiger striped arches of the windows of the academy have been transferred bodily to the new building, while on the east side of the church and on the 143rd street end are windows and pinnacles that were the architectural features of the temporary east gable of St. Patrick's Cathedral. In addition to this there are in the new church some choice bits of material from the old A. T. Stewart mansion, which occupied a spacious site at the corner of Fifth avenue and Thirty-fourth street. These consist of pieces of marble, which are used in the front and side walls above the first story, and the newel posts from the stairway of that mansion, which flank the main entrance. Some of the steel girders and window frames in the church came from the Catholic Orphan Asylum, which formerly stood at Fiftieth street and Fifth avenue.

Twenty Years' Strike Losses.

The United States Commissioner of Labor, in his sixteenth annual report, gave the following statistics of strikes for the previous 20-year period: Number of strikes, 22,793; ordered by organizations, 14,457; not ordered by organizations, 8326; number of establishments, 117,509; number closed, 77,244; aggregate days closed, 1,549,934; average days closed, 20; days until strikers were re-employed or places filled by others, 2,789,160; average, 23; establishments in which strikes succeeded, 59,638; partly succeeded, 15,925; failed, 42,509; employees' wage loss, $257,863,478; assistance given, $16,174,793; employers' loss, $122,731,121; employed before strikes, 9,779,574; strikers, 4,694,849; thrown out of work, 6,105,694; new employees after strike, 586,557; imported, 214,455.

In a block of handsome houses recently completed uptown in New York City, is one different in an important respect from all those about it, if not from every other house in New York. It is supplied with a thunder room—an apartment so built as to be practically sound proof. The young mistress of this house has a dread of thunder that nothing has ever been able to overcome. So she determined to have a place of retreat in times of storm. The architect who had this unusual commission arranged a room in the center of the house so situated that, with its thick walls, no sound can penetrate to it. To this apartment the timid owner can retreat whenever the thunder roars.

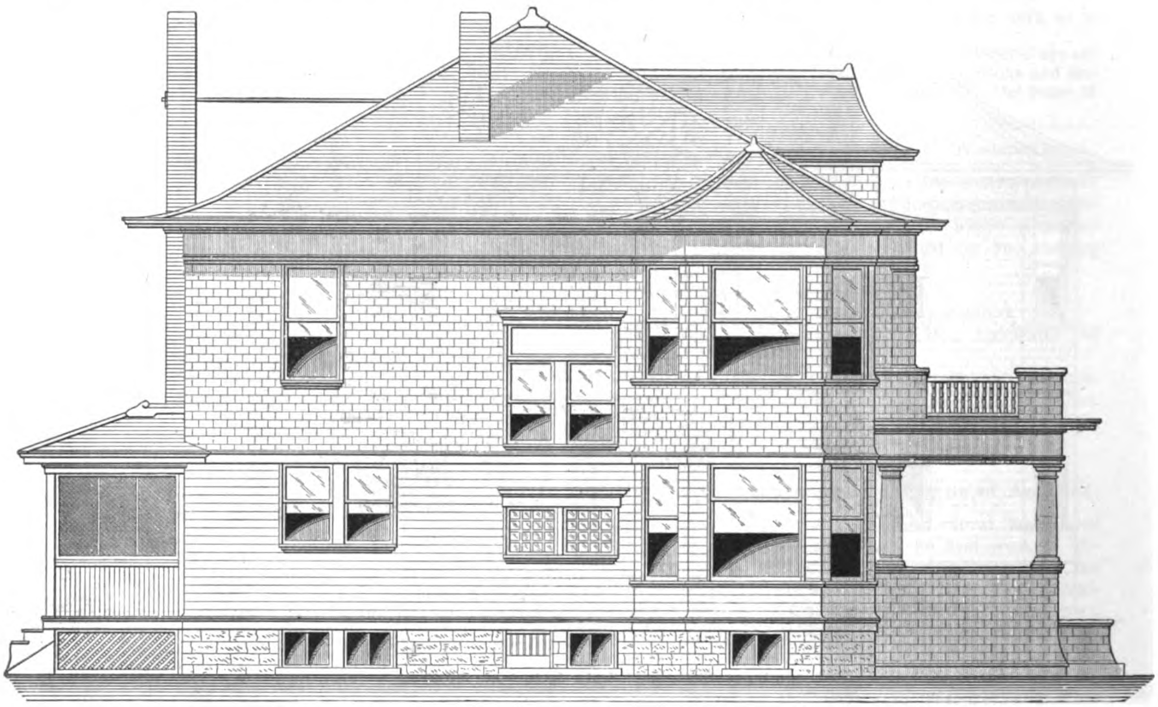
A Wonderfully Carved Old Clock.

A remarkable old clock, which is in a way a masterpiece of English wood carving, was recently on view in an antique furniture shop in this city, where it was known as the "Robin Hood" clock, on account of the main subject of its elaborate carving. It is said to have once stood, as far back at least as 20 years ago, in the hall of the Grosvenor Inn, at Chester, England, to which place it was transferred from the town hall in that old city, for the reason, as alleged, that it was too big to be kept where it was advantageously.

No one in this country has traced the history of the clock beyond the town hall of Chester, but it is probable that the case was made in 1700, the date inscribed upon it. As nothing resembling a duplicate of it is known to exist anywhere, the supposition is that it was made to order, and the original owner is believed to have been a wealthy nobleman, who had a castle or great country house with a hall sufficiently lofty and spacious to accommodate so gigantic a timepiece. The clock case, of black English oak, stands 12½ feet in hight, and is 4 feet deep. Its greatest width is 5 feet at the back and 3 feet at the front. The total weight of the clock is between 2500 and 3000 pounds. It can be taken apart in three pieces. Six men were required to lift the dial part when the works had been taken out of it. The larger two of the four weights weigh more than 100 pounds apiece.

All parts are hand carved. The groundwork of the front and sides represents the fauna and flora of Nottinghamshire, the scene of the exploits of Robin Hood. Occupying the central panel of the front is a figure of that hero, in huntsman's dress, standing beside a deer. His right hand clasps his horn, suspended across his shoulder by a baldric, and his left arm is thrown around the deer's neck. The base of the clock bears at its corners a male figure, crowned, which originally bore a scepter, and a figure of the Madonna. The carving at the back of the base of the clock is that of figures of Satyr-like appearance, with the huntsman's horn.

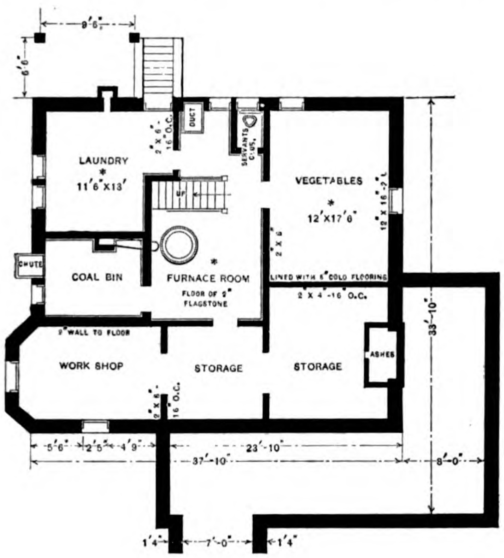
Several inscriptions are carved upon the case, the one



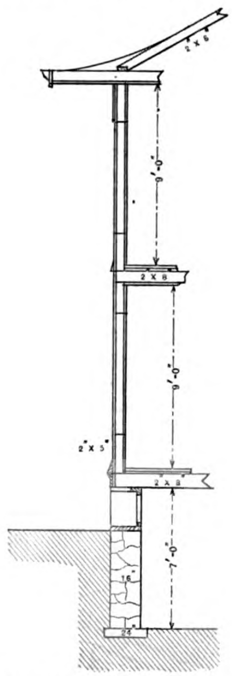
House at Boulder, Col.—Side (Left or West) Elevation.—Scale, ⅛ Inch to the Foot.

beneath the dial section reading, "Lytel John ye noble and ye free Scathlock." The second inscription, beneath the central figure, is "Robyn Hode, Sherwood Prince." In the carved panel in the base of the front is a representation of the upper half of a bearded man, with the left hand resting on the breast. Upon a ribbon above the head is the inscription, "Barnsdale MLCC," and a ribbon under the panel carries the line, "Here shall ye fere no enemie." On the base of the clock, between the two large figures at the corners, is the inscription, "Our Lade is ye trewest wooman that ever founde I me." The general composition of the carving and ornamentation is excellent.

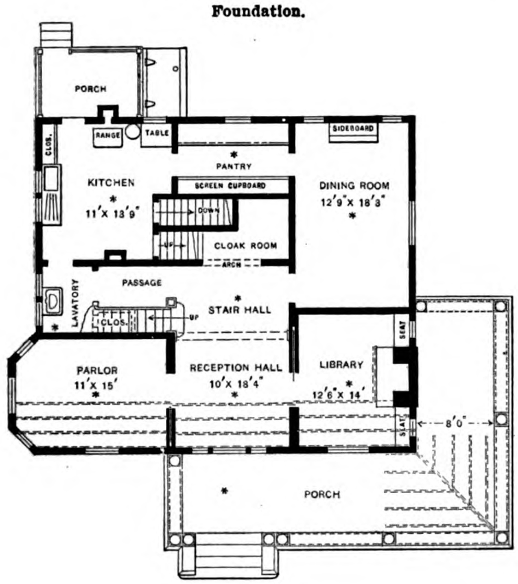
The clock has a carillon of 20 bells, eight main bells forming the chime major, and 12 bells forming the intermediate or chime minor. On the first quarter of the hour the changes are rung on four bells, the 12 bells ringing variations of the change; on the half-hour the changes are rung on eight bells, the intermediate bells ringing variations as before. On the third quarter of the



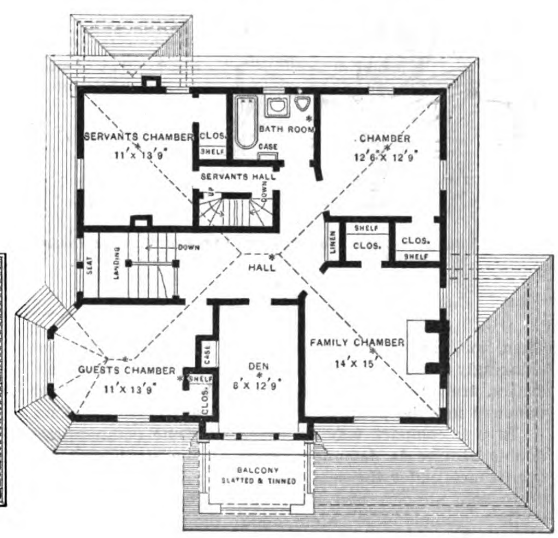
Foundation.



Section.—Scale, ⅛ Inch to the Foot.



First Floor.



Second Floor.

House at Boulder, Col.—Floor Plans.—Scale, 1-16 Inch to the Foot.

As appears from an inscription on the dial, the clock movement was made by "B. Wilkins, Grey Friars, London, A. D. 1748," and it operates the twelve-figured time dial, secondary calendar dials, and dials showing the phases of the sun and the moon. From the date of the works it is evident that the original movement in the case was replaced. The time dial is of silver, with engraved ornamentation, the hour figures being in relief. The faces of the dials of the calendar are in silver and brass, engraved, while the faces of the moon and sun dials are enameled in color.

hour the major chime bells are rung, with three sets of changes; the intermediate bells varying as before in unison; at the hour the bells of the two chimes play one of seven tunes.

The seven tunes are played, one on each of the seven days of the week, all hours of any particular day giving the same tune. The chime and gong movement remain silent from ten o'clock p.m. to eight o'clock the following morning. This can be regulated to cover other hours if desired, or the entire chime and gong system can be silenced.

CABINET WORK FOR THE CARPENTER—STOOLS.*

BY PAUL D. OTTER.

WHILE in more modern times the stool is sought after as the most serviceable piece of furniture upon which a child may employ its nervous energy in swinging and balancing around on all sides, it is also a very comfortable addition to an easy rocker or armchair to rest tired limbs. As an article of furniture it adds much to the various ways a tactful housewife likes to "shift scenes and set pieces" of her rooms to create an entire change. The woman of to-day has little use for the three or five piece suite—that and nothing more—arranged severely about the parlor, as we remember it years ago. Stiffness and unwelcoming formality has given way to an easy, haphazard arrangement of a room's belongings, and with plenty of small furniture easily carried about there is an invitation in every corner to be comfortable, and certainly not to "stand on ceremony."

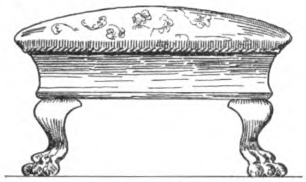


Fig. 1.—A Parlor Seat.

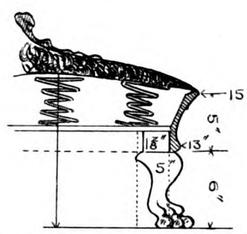


Fig. 2.—Section Showing Construction.

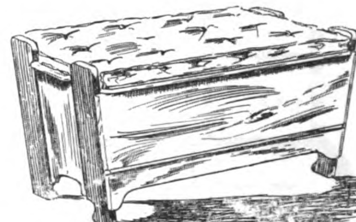


Fig. 3.—A Slipper Stool.—The Legs Stand 1¾ Inches from the Perpendicular at the Bottom.

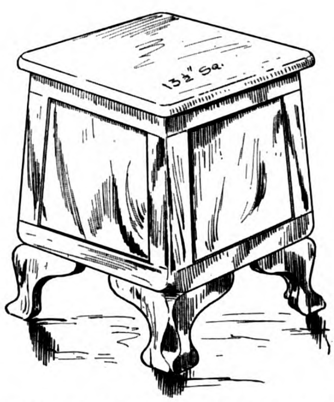


Fig. 6.—Combination Stool and Sewing Stand.

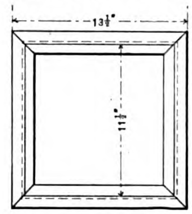


Fig. 7.—Plan of Stand Top and Bottom.

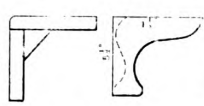


Fig. 8.—Showing Construction of Feet.

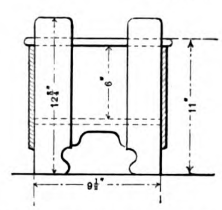


Fig. 5.—End View of Slipper Stool.

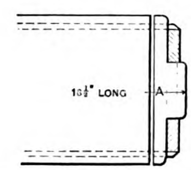


Fig. 4.—Plan of Top of Slipper Stool.

Cabinet Work for the Carpenter.—Stools.

Then, too, the stool or stools about the house helps out amazingly when the young folks have their parties and chairs are at a premium. Even the flower stand or tabouret may be pressed into service on these occasions.

In our compact way of living in some communities double service is demanded even of the stool, and the open space under the seat may just as well be made use of to hold slippers and shoes or for the smoking outfit, while a commonplace stool about the kitchen, used to stand upon in reaching high shelves, may do duty in an inclosed box for a shoe blacking outfit.

In the illustrations presented herewith Fig. 1 represents a handsome parlor piece, with spring upholstered top. The construction is simple, consisting of a 5-inch plain cove molding, mitered at such an angle as to produce quite an overhang at the top edge. Over the square stumps of the carved feet is screwed a ½-inch pine board 9¾ x 11½ inches. This is readily made as an inner construction to which to fit the outer molding, securing this above the board with glued and nailed corner blocks. This board, as seen, is a substantial bottom upon which to secure with staples the five upholstery springs—a spring at each corner and one at the center. From the profile of the foot, shown in Fig. 2, a full size paper pattern may be drawn and cut out. This foot is of built up stock 5 inches square. The heavy sawing will require the services of a band saw, the pattern being marked on the right and left faces of the block. After sawing one side do not throw away the scrap piece, but tack it on temporarily in place with a brad or two. This will be needed to hold up the stock square to the saw, and it also has part of the marking on the other side.

The carving of the foot being very simple, the more rugged the effect, even though it be rough from amateur hands, the greater character will it have in contrast with the carefully smoothed off knee and plain cove above. There would be more carving practiced by the artisan could he appreciate that by carving the slickness of relief work from a powerful die press is not being imitated. It holds in this as in any other work—be yourself. Cut a leaf as it looks, not as a wooden leaf; a lion or bear paw rough and powerful, not smoothed over as though it had been manicured.

To obtain this rough hair-like effect, which shows up so effectively in the after finish, secure first the indentations defining the toes, shown in the cut, by a large sized V-carving tool; then with a ¾-inch gouge, not too quick in curve, proceed to round off the corners. Then cut in again with the V-tool and work off to the desired round, cutting out quite a hole between each upper joint and toe, this throwing a shadow and enhancing the rugged effect. In giving the hair-like surface to these ball-like members press the edge of the gouge against the wood at almost right angles. Proceed to wriggle the edge over the round portions, producing a regular series of slight miscuts, which create an overlaid effect that is very striking.

The illustration, Fig. 2, shows how this stool may be upholstered. The bottom of the springs held in place, the first thing to do is to secure them with stout twine at the top, beginning with the twine tacked or stapled to the inner edge of the molding at the top. Draw it across and with a slipknot secure it to the wire; from here across the spring and with a slipknot secure the other wire, and with a little pressure pull down and nail the end of the twine to the opposite side. In this way bridge over each spring, and where the twines cross secure with a knot. The idea, of course, has been to compress by the twine the four outer springs somewhat more than the middle one, leaving this higher to produce the round effect shown. The superimposed material is placed on a covering of stout muslin stretched over the springs and tacked along the top edge of the molding. Cotton batting is then laid on, and held in place here and there by stitches taken with a long needle. Over this place a little picked hair or moss, then stretch another covering of muslin, conforming the stuffing into an even shape while tacking. The upholstery fabric, or outer covering, may be almost any material strong and pleasing in color, from terry to leather. There are many plain figures of velour which are inexpensive and wear well.

Aside from the sufficient information for construction noted in the illustrations, it might be said of Fig. 3 that the side panels consist of 3-inch material, this being blind nailed to the edge of the end panels, and the corner edges struck well off on a slant with a plane. The effect of setting back the middle panel of the end by using a thinner material is pleasing in the after finish.

The top, or lid under the cushion, made of ⅝-inch stock, is provided with an inserted strip at each end to prevent splitting. On the two corners a dowel pin is glued and sunk, projecting ½ inch, and acts as a hinge, being inserted into corresponding loose holes in the cap piece A of Fig. 4. This requires the lid and two end caps to be placed together over the box and drop between the of the frame edges, and a decided inturn of the lower corner to accentuate the profile.

The interior finish of this stand must be left to feminine fingers. We might venture to say that in fitting up one or more sides heavy pasteboard, cut to size, could be used to advantage upon which to sew the lining selected, and to serve as a firm backing for the various pockets to hold scissors, needle cases, &c. This does away with the objectionable rummage incident to the round work basket, or, like some poor workman's box of tools, all thrown in a heap.

In Figs. 9 and 10 are shown attractive seats for the window and fireside. The construction is evident from an inspection of the pictures and needs but little comment,

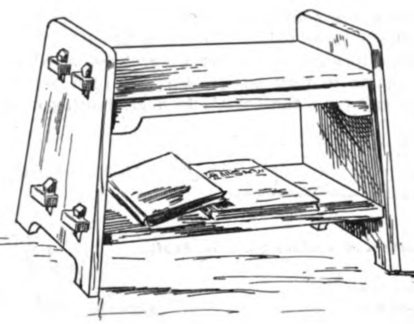


Fig. 9.—A Window Seat.

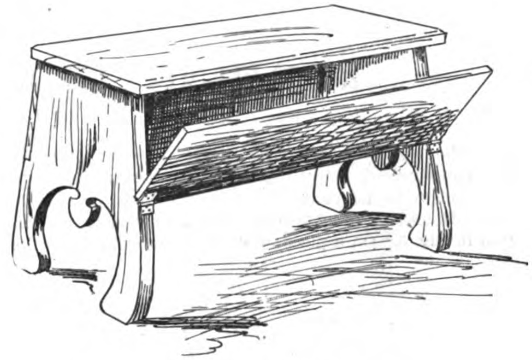


Fig. 11.—Kitchen Stool and Blacking Stand.

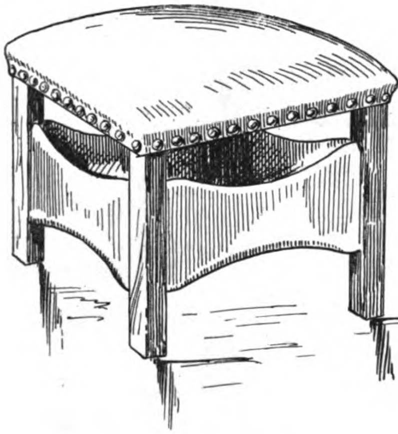


Fig. 10.—A Window Stool.

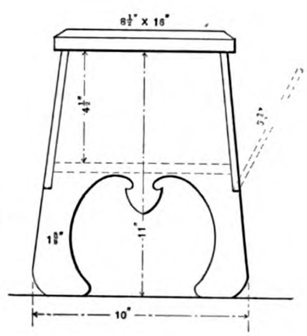


Fig. 12.—An End View of Fig. 11.

Fig. 13.—A Flower Stand.

Cabinet Work for the Carpenter.—Stools.

projected end framing, when the end pieces are bradded onto the edges of the box, glue being used. A stiff paper or tin washer previously slipped over the dowel will prevent the binding of the lid. The cushion to this stool is made up like a bed mattress, and is held to the lid by understraps. In Fig. 5 is shown an end view of the framing.

The stool and sewing stand shown in Figs. 6 and 7 will prove to be very desirable for the housewife, for the hinged side may be snapped down in an instant, covering up all traces of work in the parlor or sitting room should a caller arrive. The construction is simply four paneled frames, mitered at the corners and supported on substantial feet made as indicated in Fig. 8, with the corner edge chamfered along the dotted line. This gives a French leg effect in connection with a slight rounding except that in Fig. 10 any cheap top board may be secured over the posts and heavy upholstery nails, 1 inch apart, used along the edge of the material. The top and bottom edges of the side panels should be turned off with a spokeshave; also the edges of the corner posts struck off. This gives a hand wrought appearance very much desired.

In Figs. 11 and 12 is illustrated a handy stool made up at short notice—one day—to add to the length of a servant girl, who was compelled to use a chair for high pantry shelves. By adding a lower board and dropping the sides on hinges it was made to do double duty as a shoe blacking stand.

The flower stand in Fig. 13 may be brought under the stool class of furniture, many being purchased for either purpose. This one with the projecting pilasters makes it distinctly a flower vase holder. The lower shelf makes an appropriate place for a less spreading plant or for ornamental shelves. The hight to the top of the shelves is 9 and 24 inches, respectively, and their diameters 16 and 14 inches. The pilaster is from material 7¾ x 26 inches, the thickness for all the parts being 1½ inches. Chamfer all edges not less than 3-16 inch. Glue on large flanged turned buttons over countersunk screw holes.

No more appropriate finish could be given the serviceable and movable stool than the prevailing "weathered" tone, wax coated. The gray brown shade in itself harmonizes with almost any interior color arrangement, and the finish is such that no mar or scratch will show, as will be the case with it if it were finished with varnishes, while the dull luster may soon be restored by using a rag wet with sweet oil, allowed to stand a half hour and then polished with a dry cloth.

The foregoing remarks relative to "weathered finish" apply only to furniture made in oak, ash or a wood of that character. To use the stain on birch and other close grained woods a nondescript brown would result. Supposing the article to be treated is oak; the weathered mixture is applied with a brush, allowing it to stay for a few minutes, when the surface is wiped dry. On the following day coat with shellac, and after this is dry rub down with No. 00 sandpaper. Ordinary beeswax is brought to a melted state and applied with a brush, allowing it to stand a half hour before rubbing off the excess with a rag. Start the rubbing across the grain, and finish with a circular movement as a final polish.

TURNING CLASSIC COLUMNS.

By C. Tobyansen.

TO the experienced turner three or four points of measurement, according to the length of the shaft, are sufficient to determine the proper entasis. A simple and rapid method of obtaining this measurement is indicated in Fig. 3. On a piece of suitable material draw the

Having the column roughed down in the lathe, we mark the several points and turn down to the proper size, thus forming a number of grooves, as shown. It now remains to turn off the surplus wood between the grooves and form the entasis in a graduating sweep. It

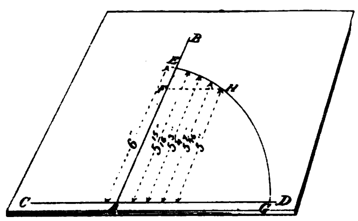


Fig. 3.—Simple Method of Obtaining Measurement for Entasis.

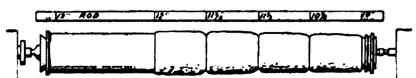


Fig. 4.—Marking Off Diameters of Various Parts of Shaft.

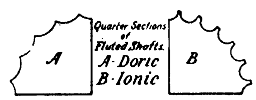


Fig. 5.—Quarter Sections of Fluted Shafts.

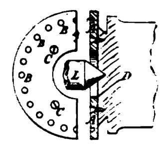


Fig. 7.—Sectional View of Dial and End of Column.

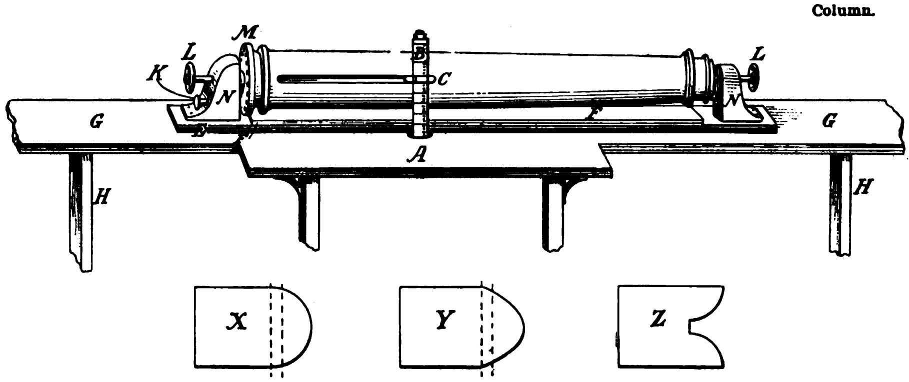


Fig. 6.—Apparatus for Fluting a Column, with Profiles of Some of the Cutters.

Turning Classic Columns.

line C D parallel to the edge, and at a convenient point erect the perpendicular line A B. On this set off the semidiameter of the column, as A E, and also the size at the neck A F, which it will be remembered is five-sixths of A E. Describe the quarter circle E G. Transfer the point F parallel to C D until it intersects the curve at H. Divide the perimeter of the segment E H into three or four equal parts. Vertical lines from C D to these division points will be the lengths of the semidiameters desired. Supposing the diameter of the column to be 12 inches, the sizes on the drawing board will be as follows:

6" — 5 15-16 — 5¾ — 5 7-16 — 5".

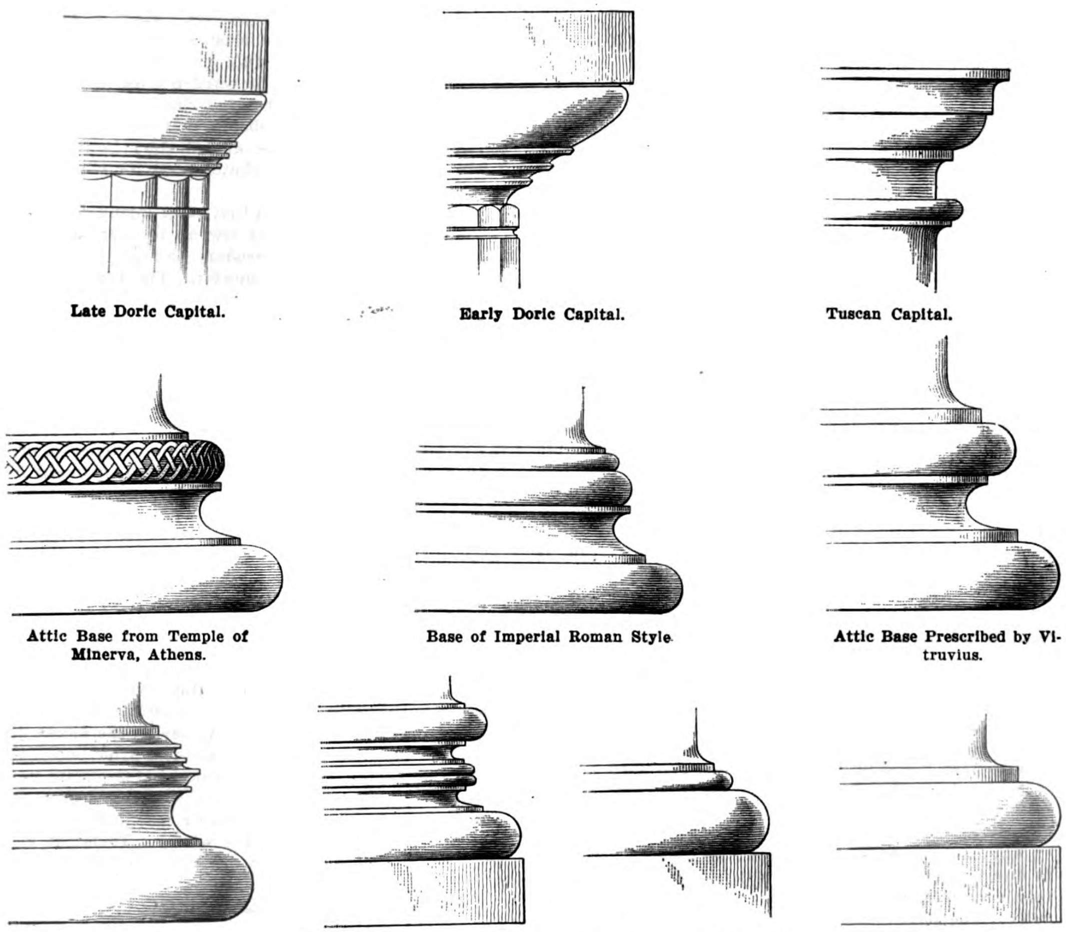
These doubled are our diameters. We now take a rod the length of the shaft, or a little longer, and mark on it one base fillet and the neck members. Mark off the lower third of the shaft and divide the upper two-thirds into four equal parts; then mark off their respective diameters, as shown in Fig. 4.

* Continued from page 267, October issue.

will be found of assistance to put a pencil mark at the bottom of each groove before proceeding to finish down to it, as the mark will stand as a warning that here is a size to be maintained, and further, when the shaft is about all properly reduced it is hard, otherwise, to tell where the original grooves were located. This will all be readily understood by reference to the illustrations. Perhaps we should have said that the length of the shaft proper is from the bottom fillet to that at the astragal or neck molding. Let us add, also, that it takes much less time to do these things than to explain them, as far as obtaining the sizes is concerned. If we have a number of similar columns to turn it will be found convenient after the first one has been finished off with sandpaper to again mark it from the rod, striking pencil marks around it at each point and then lay it down on the bed for reference. With a pair of common calipers the sizes can now be quickly obtained at the proper points from this sample column.

Fluting columns by hand work is a slow and costly process. There are special machines for the work, but it can be well and quickly done on an ordinary shaper or variety molder. In order to do this we will have to rig up something resembling a lathe in which we can turn the column around between two centers. We must also have a dial spaced according to the number of flutes desired and fastened on the end of column, as at M of Fig. 6, where A represents the shaper table; B the mandrel carrying the cutters C between the collars, while G G are extensions fastened to the main table with cleats underneath and sustained by the supports H H. Care must be taken that the main and false tables, or extensions, are in perfect alignment horizontally, or the flutes will be crooked. Referring again to Fig. 6, E is the bed plate represents the lathe center or bolt, and N a face view of half the dial.

As previously mentioned, the flutes must diminish according to the entasis. This is accomplished by bringing the shaft gradually away from the cutters, thus making the cut less deep, but also narrower. This will be readily understood by carefully examining the cutters X and Y in Fig. 6. By grinding the cutter more like the shape shown at Y in the same figure, the cutters will not have to be withdrawn so far in order to obtain the dimension required, and the flute will be more uniform in depth. We can figure out the size of the flute at the bottom, as also its decrease in width. Having ascertained this difference we can measure off on our cutter, allowing, of



Late Doric Capital. Early Doric Capital. Tuscan Capital.

Attic Base from Temple of Minerva, Athens. Base of Imperial Roman Style. Attic Base Prescribed by Vitruvius.

Base of Ionic Order. Base of Corinthian Order. Base from Berunni's Colonnade, Rome. Tuscan Base.

Fig. 8.—Some Examples of Capitals and Bases Taken from Authoritative Sources.

Turning Classic Columns.

on which is firmly mounted the head and tail blocks N M, through which passes the adjustable centers L L. Iron bolts with square heads may be used for this purpose and adjusted with a wrench. At K is shown an adjustable peg, screw or bolt, which engages with the holes or ratchets in the dial, and this when locked must hold the column firmly. Finally, at F is shown the template conforming to the entasis of the column. This may be laid out, according to the diagram for obtaining the curvature as given in the preceding article. Allowance must be made for the tapering of the flutes, of which we will speak presently. The dial, which must be fastened on carefully with regard to the center, has a hole in it large enough to allow the lathe center to pass freely through it and into the column, as indicated in Fig. 7, where A A is a sectional view of the dial, B B the ratchet holes, C C the screws for fastening on to the column D, while L course, for its pitch in the machine, and find out just how far the column is to be brought out from its true line of entasis. We then mark it on our template gradually, attaining the full distance, and shape it accordingly. We now fasten the template on the bed board and put the column in position between centers, lock the peg K into one of the holes on the dial and carefully push the column up against the cutters. It is possible they may need a little adjustment backward or forward, so it is well to closely watch the first flute. When that comes right all the others will come right. When this flute is done we unlock the column and slip the peg into the next hole, then run the next flute and so all around the column.

There are other methods of obtaining this diminishing flute. Some prefer to go over the ground twice, raising the large end of the column a little and running the flutes all around, then lowering the same end and repeating the process. One advantage of this is that no template is required as the shaft is run directly against the collar. Another way is to use a cutter similar to that indicated at Z in Fig. 6. This will cut the half of two flutes, leaving a fillet of even width between them, the shaft being run against the column. This latter method might prove very satisfactory, but I have never had the opportunity of testing it personally.

The width of the plate may be found as follows: Taking the diameter as 12 inches, we multiply with 3, obtaining the approximate perimeter or circumference, which is 36 inches. This divided by 24, the number of flutes, will give $\frac{36}{24} = 1\frac{1}{2}$, 12-8. Taking ⅜ for the fillet, we have 9-8 for the flute. We now want the width at the neck. Applying the rule of 3, we have

$$\frac{9 \times 10}{12} = \frac{90}{12} = \frac{7\frac{1}{2}}{8} = 7^1/_{16}$$

a difference of 3-16.

We have heretofore considered the general rules only as regards sizes and entasis. Now let us consider some exceptions. One case, as to dimension of shaft, is the early Greek-Doric column. This belongs to the most massive development of Greek architecture, and the columns were designed to support the exceedingly heavy entablature. The whole hight of the column is only four or five times the lower diameter and the shaft diminishes as much as one-third of this, while the echinus of the capital flares out widely at a very acute angle to the horizontal. But the columnar construction grew slenderer as the centuries rolled on, until the size now conforms closely to the rules given.

Again, as an exception, the diameter of any order may be larger a distance up the shaft, diminishing toward the bottom base and neck. One authority states that this form of entasis should attain its largest diameter three-sevenths of the distance up the shaft. In our opinion it looks better one-third up, giving a more graceful sweep toward the neck. In interior decoration this style is often very effective, but the swell should never be excessive, as it is easily turned from delicate grace of outline into debasing clumsiness. It should hardly exceed five parts of the diameter.

This swelled entasis also forms an effective expedient when the material in hand is too scant to give the shaft its proper dimensions, which is so often the case with lumber as sawed nowadays. The apophyge at the base fillet will necessarily further reduce its size. It is well then to keep the stuff at full thickness one-third up and decrease each way. This gives the shaft a sense of fullness that goes a long way toward overcoming the deficiency in size.

The bases show the greatest degree of variation, both in size and form, and appear with the ancients to have been a subject more of individual taste than of confirmed rules. The bases shown in the various illustrations of Fig. 8 are selected from Sturgis' "Dictionary of Architecture," except those of the Temple of Minerva, which are taken from Rosengarten's "Hand Book of Architectural Styles."

The base of the Ionic order from the Erechtheus, Athens, is considered characteristic of this order, because of the horizontal flutings of the upper torus. The attic base from the Temple of Minerva is one of very frequent occurrence. The upper torus is carved in a peculiar interlacing and is claimed by some one to symbolize a woman's girdle of those days, while the flutings of the shaft were suggestive of the folds of her robe. The same writer, Vitruvius, I think, voices the sentiment that the slender Ionic column was symbolic of the female form as contrasted with the stern Doric, the male. The base, however, is often uncarved. About the Attic base, as shown in our illustrations, he gives the dimensions in hight as one-third of the lower diameter. One-fourth of this is given to the upper torus and the remainder is equally divided between the lower torus and the cavetto with its fillets. Which is to say that if the diameter is 12 inches the whole hight, leaving the plinth out of consideration, will be 4 inches, the upper torus 1 inch, the lower torus 1½ inches and the cavetto with fillets the same. It will be perceived that a line dropped vertically from the upper torus of the base will meet the edge of the lower fillet of the scotia or cavetto, thus giving a rule for the extension of bases. The illustrations of Doric capitals presented in Fig. 8 are from Tarbell's work on Greek art.

The Greek Doric column has 20 flutes, which meet in a sharp edge called arris, all as shown in Fig. 5. The balance of the classic columns have 24 flutes parted by annulets or fillets, and were consequently narrower, but at the same time deeper.

Bricklaying in Winter.

The press of this country, says Consul N. Mahin, writing from Nottingham under date of August 8, is calling attention to what is here, at least, a new method of overcoming the obstacle to building operations in winter due to frost. It is averred that in Sweden brick laying is now carried on without interruption during the long and severe winters. It is probable that the method that makes this possible may be an old story in the United States, but I submit a description of it for what it may be worth.

It has been demonstrated that brick laying can be carried on in a temperature as low as 16 degrees F. For lower temperatures it is necessary to heat the sand and water used in making the mortar. The heating of the water is easily accomplished, and for the sand the common arrangement consists of a circular iron tube 18 to 24 inches in diameter and 6 to 8 feet long. This is closed at one end with bricks or an iron plate. On the top at this end there is a chimney 8 to 10 feet high and 5 to 6 inches in diameter. The fuel, which is generally refuse wood from the building under erection, is fed in at the open or partly open end of the cylinder. This cylinder is often formed of an old boiler tube or of a piece of an old iron chimney. For burning coal, special grate and chimney arrangements would be necessary, but in no case need they be elaborate or expensive. After placing this cylinder on the ground the sand is heaped on and around it to a depth of 18 to 24 inches and allowed to remain till it gets hot, when it is taken away from where it is hottest and replaced by fresh sand. The mortar should be made in a room where the temperature is kept well above freezing point, and regulated according to the frost to be counteracted. Generally this room is made by roughly boarding in a part of the scaffolding, simplicity and cheapness being desirable. In laying the bricks care should be taken to avoid shifting them after once being set in the mortar, and old or stale mortar should never be used. Fifteen or 20 years ago, where this process is now employed, almost all building was broken off for four or five months during the winter. To-day it is an exception to find it hindered more than a few days or a few weeks annually.

According to one of the daily papers a flat builder in Chicago has contributed his mite to the solution of the servant girl problem. Some months ago the situation there was so tense that men were being secured as house servants to an extent unknown in other cities. This builder has set aside the lower floor of a building having 20 apartments for the servants of all his tenants. This floor is to have nine sleeping rooms, baths and a reception room and library, for the exclusive use of the maids. This is the first attempt, so far as known, to domesticate in city architecture here the servants' hall which cuts so large a figure in English novels.

A typical bank building for a small city is the structure about to be erected at Stockton, Cal., for the San Joaquin Valley Bank. The front of the building will be of sandstone, except from the sidewalk to the base of the columns, a distance of 8 feet, California granite will be used. The structure will be three stories high, and will have a frontage of 50½ feet. The bank rooms will occupy the entire first floor, while the second and third floors will be divided into offices.

CORRESPONDENCE.

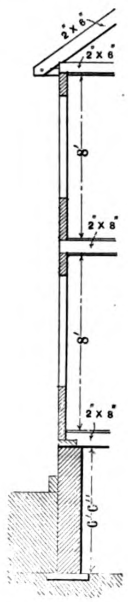
Rule for Setting Windows.

From A. A. C., *Bloomingdale, Ind.*—I would like to ask through the correspondence columns of the paper if there is any rule for setting windows. By this I mean is there any rule for determining at what hight from the floor, and how far from the ceiling the tops and bottoms of the window should be placed?

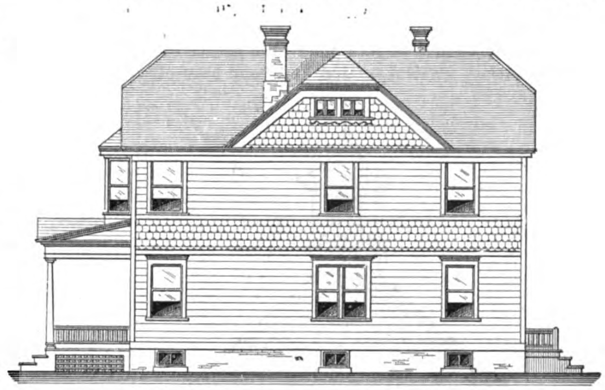
Design for Nine-Room Cottage.

From J. F. LAPE, *Rensselaer, N. Y.*—As being of possible interest to the readers of the paper, I inclose herewith elevations and floor plans of a low cost cottage, which was erected not long ago in the city of Albany.

Front Elevation.—Scale, 1-16 Inch to the Foot.



Section.—Scale, ⅛ Inch to the Foot.



Side (Right) Elevation.—Scale, 1-16 Inch to the Foot.

Design for Nine-Room Cottage.—John F. Lape, Architect.

The foundations are of brick, the frame is balloon, sheathed and covered with weather boards laid 5 inches to the weather. The interior trim is neat and of white wood. The roof is of metal, and the plumbing appropriate for a house of low cost.

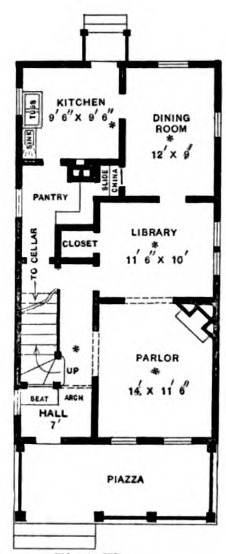
Polishing Cheap Furniture.

From SUBSCRIBER, *Camden, N. J.*—Will some one kindly give me through the columns of the paper a good recipe for putting a high polish on cheap furniture?

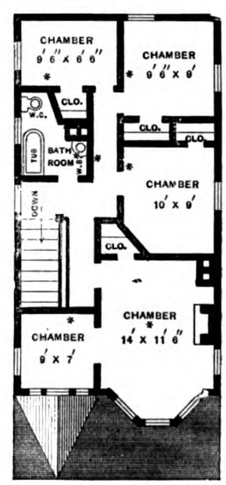
Answer.—We referred the above inquiry to the author of the articles which have been running through the columns under the title of "Cabinet Work for the Carpenter," and he furnishes the following in reply:

We assume that in asking for "a good recipe for putting a high polish on cheap furniture," the correspondent has in mind furniture to be so finished "in the white." However, if he means cheap furniture already finished, over which he desires to obtain a high polish, the work should practically be gone over again. We will consider the work "in the white," as factory people say. In order to secure satisfactory results, the surface of the wood should be carefully sanded over with the grain; all cracks, seams or pin holes, if any, filled with a mixture of glue and fine sawdust, which, when dry, is cut off level and smoothed over with sandpaper. It might be stated before mentioning materials that the best is the cheapest, and considering the fact that we are after a "high polish," it is probably wanted like the smile "that won't come off." Unless such work is carried on extensively, it would be best for the correspondent to ask his supply man for the varnish and oils prepared by a reputable maker, rather than attempt, as in the case of a furniture polish, making up a preparation from some untried formula.

Having secured the stain and filler combined, should the wood be open grain, as in oak, brush over the surface freely and let it stand for half an hour. Then wipe off with a clean cloth, aiming to rub in rather than wipe out of the pores, as the after results depend much on this first filling of the grain. Allow the work to stand a day before treating to a coat of shellac, which is allowed to dry for half a day, when it may be rubbed over with No. 0 sandpaper. With a medium priced first filler varnish coat the work and allow as long as possible to dry, or give it not less than two days to harden. Judgment in this, as in everything, should be used, and plenty of time should be given between coats. After the surface is thoroughly hard rub down with sandpaper, and give a second coat with an equal amount of time to harden before applying the third and final coat of good furniture varnish. This last coat should be allowed to dry not less than five days, when prepare to rub down with pumice stone and water, using a heavy strip or square of felt, dipping it in a saucerful of stiff pumice stone powder and water. This also is an operation the information for which is secured solely by practice. Remove the chalk line deposit with a damp cloth and wipe dry with cheese cloth, after which proceed to go over the work with white waste dampened with a mixture of half and half of benzine and rubbing oil.



First Floor.



Second Floor.

Scale, 1-16 Inch to the Foot.

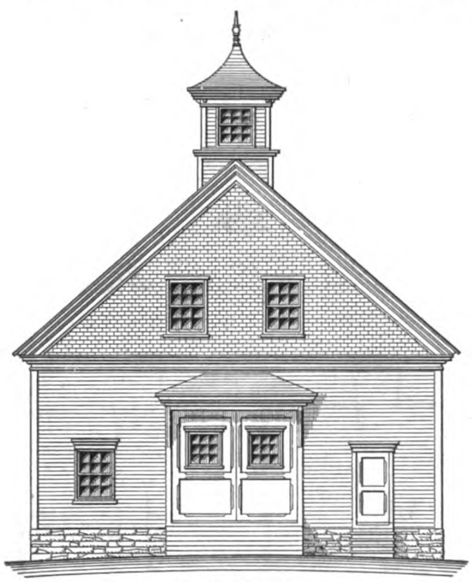
To insure against a roughing up of the surface another day should go by before applying the furniture polish. This may be put on with a rag or cotton waste, rubbing in small circular strokes, and then vigorously widening the movement, finishing with a dry piece of cheese cloth. This method produces a good surface, upon which a high lustre can be maintained for a long time, while at intervals a little sweet oil applied and afterwards vigorously rubbed dry will renew the polish.

We will add a formula for furniture polish, as it is possible that this alone is what the correspondent desires, although the work leading up to it and already described is everything.

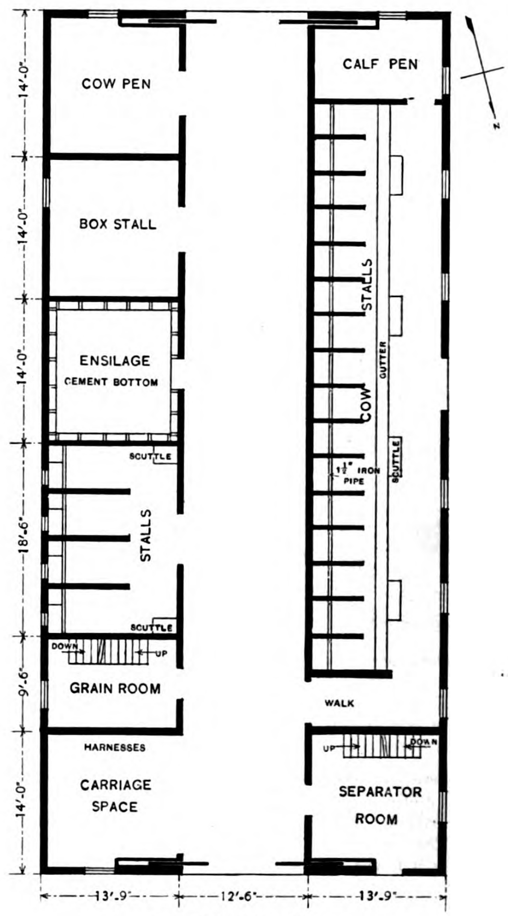
Put ½ ounce of shellac, ½ ounce of gum lac and ¼ ounce of gum sandaroc into a pint of water in a stone bottle or crock. Place near the fire and shake frequently, until dissolved, when it is ready for use. When not expert in using the polish applied to cloth or waste, a rubber or roll made of woolen cloth had better be used, putting on a little polish and adding a few drops of linseed oil. Rub the surface in small spots until a smooth finish is obtained. Complete the work by a sound rubbing with spirits of wine and more of the polish.

Cupola for Barns.

From W. A. Emery, *East Waterford, Maine.*—Some time ago a correspondent asked through the columns of the paper for drawings of a square cupola, and, as I have seen no replies to it, I send blue prints showing a front elevation, vertical section and floor plan of such a



Front Elevation.



Main Floor Plan.

Cupola for Barns.—Scale, 1-16 *Inch to the Foot.*

barn with cupola as we build here in the East. The main walls of the cupola are one-sixth the width of the barn. The first story of the barn is clapboarded and the cupola shingled. The belt course across the front of the barn is designed to break the plainness, and is intended to have a planceer from 4 to 6 inches wide. The hood on the front is a protection to the doors in stormy weather, the projection being about 3½ feet. The small door at the right is convenient to the milk room and separator. The window and small door shown in the front elevation are a trifle out of center in order to give room for the large doors to slide back. The windows in the large doors have a light cap to clear the jamb when they are rolled back, the frame being 2 inches thick.

The cross section through the barn gives a good idea of the construction employed. The trough in front of the cattle is tongued together and the joints well leaded. The scuttles are hung with heavy strap hinges. The purlin plates being well braced, the collar beams at the top will take care of the thrust of the rafters on the main plate. Some builders cut out the purlin to receive the rafters, but it is much better to notch them on, as shown, then it will not weaken the purlin plate, which, in my estimation, cannot be too strong. There should be openings in the overhead scaffold, through which to use the hay fork. In case there is no cellar, we build a shed on the east side for hogs, &c. We build barns here from 36 to 60 feet wide and from 40 to 100 feet long.

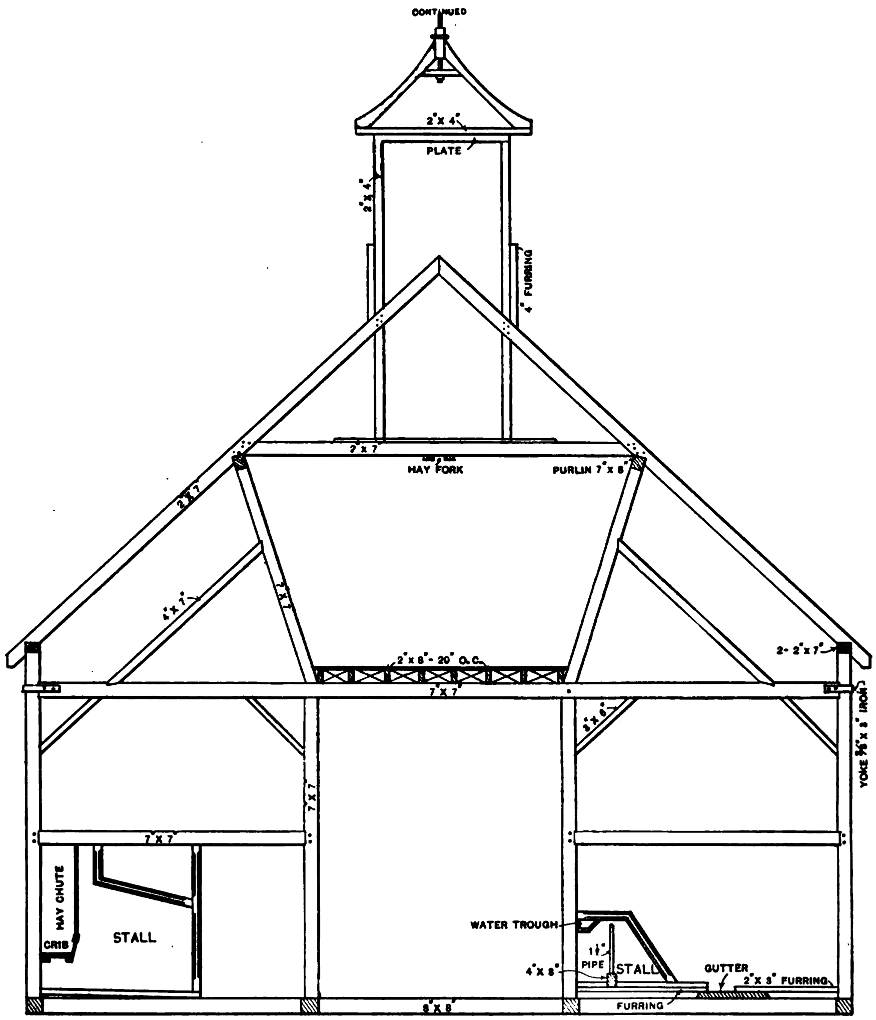
Metallic Shingles for Towers and Conical Roofs.

From Cortright Metal Roofing Company, *Philadelphia, Pa.*—In regard to the inquiry of "F. T. C.," we would say that steeples are usually built in the form of an octagon, and, therefore, no special shingle or tile is required for such work. We have two articles—sheet metal slates and Victoria shingles. Each pattern is made in different sizes, and any of these goods can be laid successfully by any good, intelligent mechanic. In connection with our metal slates or Victoria shingles we furnish a hip covering in different designs for covering the corners or hips. For small towers, which are frequently cone shaped, there are manufacturers who furnish what are known as graduated tiles or shingles. It is necessary that they be cut and adjusted by the workmen in laying as the work progresses. For church spires or steeples, which are intended to last a long time, we believe it would be best to have the slates or shingles made of copper, which material would require no attention, although its first cost is higher than the material generally used in the manufacture of tiles or shingles, which is tin plate, either painted or galvanized.

From Merchant & Co., *Philadelphia, Pa.*—In reply to the correspondence of "F. T. C." of Pittsburgh, Pa., in the issue for October, we would state that a special

metallic shingle is required for roofing round steeples, towers, &c., as the ordinary shingle would have to be cut and fitted, involving about 50 per cent. waste and time consumed in practically making over the shingles. We manufacture a graduated Spanish tile, which is constructed to fit such towers and which can be easily applied under specifications which we send with shipment.

From MONTROSS METAL SHINGLE COMPANY, *Camden, N. J.*—Referring to the letter of "F. T. C." of Pittsburgh, Pa., in the last issue, we beg to say that our Diamond or Gothic tiles are adapted for covering steeples, towers and conical roofs, but no special metallic shingle is required for square or octagon towers, or for any hipped be required in laying slate or wood shingles. A special design of hip or ridge finish is used for metal shingles, and if a hip or ridge finish is employed on a steeple no special skill will be needed for laying metal shingles. The hip or ridge finish should be applied first. This hip or ridge has an overlap, or pocket, to receive the metal shingle. The connection between the shingle and the hip or ridge makes a perfectly tight joint without the use of solder and at a very slight expense as regards labor. If the steeple is conical a special design of tile or shingle will be required. This would have to be made to order, as such tiles or shingles are not carried in stock. The diameter and hight of the steeple would govern the graduation of tiles or shingles required for covering it.



Cupola for Barns.—Vertical Cross Section Through the Building.—Scale, 1/8 Inch to the Foot.

roof. For round towers or circular work a shingle with a lock cannot be used. To apply the tile in a proper manner it is necessary to lay off the tower so that the tiles will diminish in width but not in hight, so that the same number of tiles are used around the top course as the first course. This is done by trimming the sides of each succeeding course to suit the pitch of the tower. There is a special tile manufactured by Merchant & Co. of Philadelphia which they call their Graduated Spanish tile and which does not require any trimming on the roof. It is manufactured especially for conical work.

From the NATIONAL SHEET METAL ROOFING COMPANY, *Jersey City, N. J.*—Referring to the inquiry of "F. T. C." of Pittsburgh, Pa., relative to metal shingles on steeples, we would state that the same general conditions will apply to laying metal shingles on a steeple as would

If your correspondent will communicate with us we will be glad to send him an illustration for applying metal shingles under the conditions he names.

Some Comments on Practical Estimating.

From WANDERING WOOD BUTCHER, *Alexandria, La.*—When I commenced shingling at the rate of 2500 to 3500 per day of 10 hours I had no idea of being outdone, or that the nails driven would be so accurately counted. However, I am well pleased with the interest taken by the wood butchers at large. I think they have all told the truth regarding their observations and experience, and to those who are skeptical I would say that people sometimes judge others by themselves. It seems to me that there exist a lot of contractors or ex-contractors in the country who are disappointed in not getting some reliable data as to estimating by having some one point out the average day's work for a carpenter. Now the average day's work in one section of the United States will not correspond with that of other sections, for various reasons. Materials differ and so do men and the climate. Regarding material I would say that Northern white pine is much easier to work, being softer and lighter, and a man can handle more feet per day than of Southern pine, which is heavy and hard, as is also Pacific Coast material, while there, in addition, the climate is enervating.

I have worked men from all over Europe, except Turkey, ranging from a Cape Breton fisherman to a native son of the Golden West, and from a Manitoba half breed to a Louisiana red bone, with a few cowboys thrown in, and being a close observer of human nature, having sometimes 180 of this human mixture, it will therefore be seen that I was in a position to keenly observe the characteristics of the various men and to pick out those who did the best work. I usually found they were from the Middle, Western and Northwestern States and Territories. They enjoy good climate, good food and good water, all of which go to the making of a good man. I am not a native of any of the above sections referred to and therefore have no reason to think them better only as I have found them in my own personal experience. I found among them the best all around carpenters, who could turn off more work per man than any two men I have met.

Regarding the estimating of carpentry work, I will say that when a young chip the hight of my ambition was to be a contractor and builder. Not having this valuable journal, *Carpentry and Building*, to assist me, I was obliged to fall back on my own resources, such as I had, and the first thing I did was to get a large diary and keep an accurate account of my own work, what I averaged, also the number of men on the job, and noted other points, thereby getting a general estimate of the number of 10 hours put in on the job. Here I secured a basis of calculation that has stood by me ever since. I also kept an account of the weather, which cut no little figure in the amount of work performed. Then I made tables and put them in books as a sort of cipher or code of my own for reference. After three years and having proved to my own satisfaction my ability to bid on work, I went West to grow up with the country. I found it growing very rapidly. Contractors and builders were as thick as wild geese and about as tame regarding their wild estimates. I could come within $5 of the actual cost of labor on an $80 or $100 job and within $25 on large jobs, but what I had so diligently studied and learned about that branch of the building trade debarred me from getting any work except occasionally a job by preference. My bids were always too high, but not always the highest. Scarcely any of the contractors could pay their men without more or less trouble, so I joined a crew of carpenters building depots and I put in three more years studying the "average contractor," with which the country was overrun. Jumping from town to town, where they sprung up around the new railroad stations, nearly every one of them left bills unpaid in every town along the road. I was so thoroughly disgusted with the contractors and builders that it took five years for me to make up my mind to bid on any work, except for some friend who wished to have an estimate made. I still had a hankering for contracting and resolved to try it once more, but with the same results, and I was forced to return to railroad work. What I learned about estimating helped me to better wages and positions, as roads sometimes pass into the hands of receivers and Uncle Sam requires them to get an "A. F. E." (Authority for Expense) before they can make improvements. This calls for an accurate estimate of material and labor, and then after the work is completed the actual cost or job report is made out and compared with the estimated cost, thereby giving the carpenter in charge a chance for compulsory education if he has sense enough to take advantage of it, at the same time being paid a good salary while learning a good lesson. Labor in the building line now costs from two to three times as much more in Louisiana as it did in Minnesota 10 or 15 years ago. It takes some of our carpenters three or four days to do the work of one day in the North, and on an average it takes over two days' time of 10 hours to one day's work, and then we think we are working fast. In order to make a safe estimate one has to figure on about three days for one. I am told by carpenters lately coming from the North that the average is growing less there too on account of men not being paid according to their merits.

I have always wondered why an apparently intelligent carpenter would bid so recklessly on a job of work and continue to do so on 100 or so of jobs, working from 12 to 18 hours a day for five or six years, and not being able to pay his board bills or his men. One would think that after a few failures he would catch onto a rule by which to estimate. If not, why does he not withdraw and leave the business to some one who understands it? It is safe to say that good workmen do not always make good contractors, the whole matter being more good judgment and good management than it is skill. The accurate estimator cannot always impart his methods to some one else, no more than can a man who makes a living by estimating the weight of live stock. A contractor may make a close estimate if he knows what his men can do and they are loyal to him. I once had a crew of men from which I culled all the agitators and dead beats. The good ones I worked for seven years. I now look back to that period as the only good time I ever had as a foreman and also with pleasure to know that many of these men are now holding good positions.

Number of Men to Work on a House.

From D. P. B., *Redford, N. Y.*—Answering "Novice," whose letter appears in the July issue of *Carpentry and Building*, I would say that a good foreman should make his building hustle with three men and himself, if he works; if not, four men. This is a question upon which there is likely to be much difference of opinion, and naturally very much will depend upon the kind of men who are employed on the building.

A Question in Roofing.

From G. T. H., *Lake View, N. J.*—Will some of the readers of *Carpentry and Building* tell me if there is a roof covering which will look as well as shingles on the bottom part of a gambrel roof. I want to put on such a roof, but the laws of this town do not allow shingles to be used, and I do not like the appearance of slate. I would also like to have an expression of opinion from those who have had experience with them as to the lasting and watertight qualities of metal shingles, which I see extensively advertised at the present time. They are not much used around here as there seems to be a prejudice against them.

Should Outside Work Be Primed as Soon as Finished?

From C. A. W., *Port Jervis, N. Y.*—In answer to "D. P. H." of Redford, N. Y., and also to "W. A. K.," I would say that I obtain better results in any class of outside work to prime as soon as put in place, or at least the same day, and not to allow it to stand. It is necessary, however, that the material should be dry. I have always done my priming, or had it done, the same day, and never later than the next and my work shows the results. I always have all outside window fames primed before being placed in the building, and should certainly advise "W. A. K." or any other builder, to do the priming as soon as put on, and by no means to allow any rain or moisture to get on the new work before the paint is applied. If, by any possibility, it should get wet, let the sun shine on it, or at least allow it to be exposed to dry weather for six or eight hours; then prime and the result will be a first-class job.

Method of Making Portland Cement

From E. F., *Montego Bay, Jamaica, British West Indies.*—Will some reader of *Carpentry and Building* give through the columns of the Correspondence Department the precise method of making Portland cement. If any special clay is used for the purpose, will the correspondent please describe it fully, more particularly that of mixing and burning. The grinding process need not be gone into, but a description of the chalk used would be interesting.

Note.—With no intention of anticipating the replies which we trust our practical readers will make to the above request, we would suggest to our Jamaica correspondent that he obtain some good book bearing upon the subject of Portland cement manufacture, as this will give him the information much more fully than could be expected through the medium of a trade paper. Among the more inexpensive works may be mentioned Jameson's "Portland Cement—Its Manufacture and Use," the price of which is $1.50, postpaid.

Putting on Zinc Roofs.

From J. E. B., *Elizabethtown, Pa.*—In answer to the inquiry of "J. A." of Kansas City, Mo., regarding zinc roofs, I consider it my duty to describe the method of laying zinc on roofs, as I helped to do it in the old country, where I learned my trade. The roofs we laid were always of the Mansard style, running off on the four sides. All around the outer edge we nailed galvanized strips, about 4 inches wide, so as to give the roof an extension of 1 inch, as the other 3 inches were on the roof proper. These strips were well fastened with two rows of nails. An idea of the scheme is suggested by Fig. 1 of the accompanying sketches. After this work was done the roof was then ready to lay the zinc. We first put a ½-inch edge on the first sheet, and the others which followed were only lapped and soldered, not seamed. This, however, only applied ao the cross seams or joints. The joints between courses running up and down the roof were made in the following manner: On each long side of the sheet, or course, the edge was turned up 1 inch. Between the courses there was a square strip of wood with the cleats attached by nailing, these being then capped to finish the roof. Fig. 2 gives an idea of the manner in which the work was done. The inward seam of the capping catches the cleat, but they have to be slid in and not pressed down from the top. Fig. 3 shows the appearance of a portion of the finished roof. This style of roofing allows liberally for extension and contraction, which is exceedingly important where zinc is used. If "J. A." cannot fully understand my description, I will cheerfully answer all further questions which he may ask through the Letter Box.

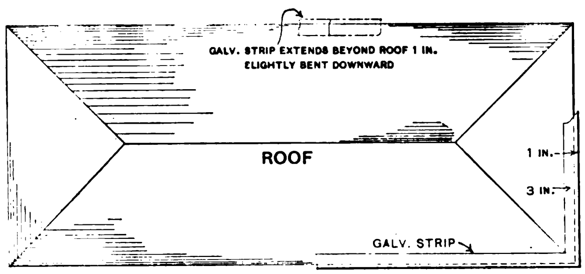


Fig. 1.—Plan of Roof Showing Galvanized Strip Around Outer Edge.

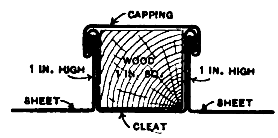


Fig. 2.—Cross Section of Wooden Strip and Cleat.

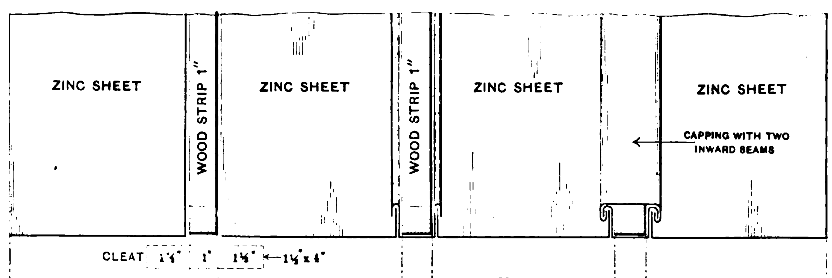


Fig. 3.—Showing Appearance of a Portion of the Finished Roof.

Putting on Zinc Roofs.—Method Described by "J. E. B."

Elevation and Roof Plan Wanted of Cottage for City Lot.

From W. E. B., *Savannah, Ga.*—In the issue of *Carpentry and Building* for January, 1896, page 18, there appeared from the intelligent pen of "W. H. D.," Newburg, N. Y., an article entitled "A Six Room Cottage for a City Lot," showing floor plans very tastily arranged. I would ask the correspondent if he would furnish elevations for these plans, together with a roof plan to show four gables one-third pitch.

Preparing Mortar for Plastering.

From A. R., *London, England.*—In reply to "J. C. B." of Glenwood, Mich., regarding current practice in preparing mortar for plastering, I would suggest that if he is able to get sight of the work by Millar on plastering—he may be able to find it in some of the public libraries—he will, perhaps, find what he wants, as there are pages on mortars. As they make volcanic sand powdered pumice stone, found in large quantities in Germany, into bricks—air dried ones—why not try the applicability of the materials for mortar plaster? They may be found to work well and be worth trying on a small scale, if not on a large one.

Computing the Pressure on Sides and Ends of Coal and Grain Bins.

From C. E. M., *Findlay, Ohio.*—In a recent issue of the paper I noticed a formula for computing the pressure bearing on the sides and ends of a rectangular water tank, which was very interesting to me. I would like now to ask some of the readers to give a formula or rule for computing the pressure or load that will bear on the sides and ends of a coal bin, say 20 feet wide, 140 feet long and 8 feet high. Will the same rule or formula be applicable to a grain bin, and, if not, will the scientific readers give a formula for the weight bearing on the sides and ends of a rectangular bin for small grain, such as wheat or shelled corn?

AMONG the competitive designs for the new public building to be erected at Providence, R. I., were those submitted by four Boston, four Providence and two New York architects. The Committee of Award, numbering five, were unanimous in approving a design which on opening the envelope proved to be that of Clarke & Howe of Providence.

The Lumber Situation,

In commenting recently upon the situation in the lumber trade and the general conditions which prevail therein, E. F. Perry of New York City, secretary of the National Lumber Dealers' Association, is reported to have expressed the following views:

The advance in wages has kept pace with the increase in the price of lumber. When a comparison is made a big difference is apparent. When a few years ago men could be engaged for $20 a month and found, they cannot be hired to-day for less than $30 and $35 a month and found. This, too, in the face of the fact that logs are handled much more rapidly than in other years and that steam is employed whenever possible.

All these things have a bearing on the price situation. Another thing to be considered is, that it costs more to get logs to the mill than formerly. Every year all the logs possible are cut in every timber district. Thus, in most instances, every year sees the timber line drawing away from the mills, which must stick to the streams. Every year it costs more money to get the lumber down. To be sure general prosperity has had something to do with putting lumber at present prices, but present conditions are really the result of a combination of circumstances.

Lumbermen are fast turning to the South. Operators have entered this field so quietly that attention has not been attracted; but the fact is, their interests are scattered through West Virginia, North and South Carolina, Georgia, Tennessee, Mississippi and Louisiana. A very large amount of timber, largely spruce, comes from West Virginia, and the yellow pine of the South has its own growing market. The lumber interests are looking more and more to the South. With the exception of the Northwest, it is the lumbering section of the future.

Organization of Structural Building Trades Alliance.

The movement for an organization to include the national unions of building trades employees, which was started a few months ago, was brought to a focus at the convention in Indianapolis the first week in October, when the Structural Building Trades' Alliance adopted a constitution and elected officers for the ensuing year. We understand that the constitution is made up from the best points in the organic laws of the ten organizations the representatives of which were present at the meeting, and amounts to a declaration of principles, among which are provisions favoring arbitration of all labor disputes; to give sympathetic support to all affiliated trades; to discourage strikes and keep agreements with employers, and "to oppose the formation of rival bodies, demand their complete affiliation and assist only such unions as are affiliated with their respective international unions conforming to the constitution."

The officers elected for the ensuing year were: President, George Gubbins of the Bricklayers' and Masons' International Union, and secretary and treasurer, A. J. Spencer of the Plumbers' and Steam and Gas Fitters' Union. There was also elected the Board of Governors.

THE plans for the new Tiffany Building, to be erected at the corner of Fifth avenue and Thirty-seventh street, New York City, were recently filed with the Department of Buildings by the architects, McKim, Mead & White. The new structure is to be seven stories in hight, with basement and sub-basement, and will have a frontage of a trifle over 117 feet on the avenue and 152 feet on the side street. There will be elaborate *façades* of marble and ornamental cornices at each story supported by rows of engaged columns between the spacious windows. The *façades* will be further ornamented by three sculptured figures of Atlas, one of which will be at the Fifth avenue front and the other two on the side street. The building will be fitted with five passenger elevators, one freight elevator, and the entire cost of construction is placed at $600,000. There will be two large entrances on the avenue and two on the Thirty-seventh street side.

A Mammoth Farm Barn.

One of the largest and finest appointed structures of its kind is the farm barn of William D. Sloane of New York City, which has just been completed at Highlawn, about 2½ miles south of Lenox, Mass. The main body of the structure is 163 feet long by 75 feet wide, and the extreme hight from the basement to the top of the dome is 92 feet. Some idea of the magnitude of the building may be gathered from the statement that 125,000 square feet of rough lumber, 320,000 shingles for the roof, 12,000 square yards of concrete and 35,000 brick were used in its construction. Under the ridge of the main roof within the hay room is a trolley system, the iron track running east and west to the ends of the building. Down to the floor, 65 feet below, descend a series of ropes attached to a patent self acting lock. When the hay is loaded on the wagon it is placed in three separate hay slings which have ingenious automatic catches. When the wagon is in position in the barn, a horse is hitched to one of the hanging ropes, while another rope is attached to the upper sling of the load. The trolley carries the hay to its position in the mow, which, by the way, will hold 700 tons. When the hay is directly over the place intended for it, another rope releases the sling in part and the hay falls to the mow.

In the front of the southwest end of the barn is the dairy, this portion being 42 x 25 feet in size and 1½ stories high. The floors and 4 feet of wainscoting are of concrete, except in the butter room, where white tile is used. The large refrigerator is of glass. The separator is operated by electric power and separates milk by centrifugal action.

There are in the barn 35 patent stalls for cows and cattle and five hospital stalls. Water for the barn is supplied by a steam pump from a spring in a grove on the farm. A tank in the building, holding 15,000 gallons, is always filled.

The structure which has just been completed is designed for cows and sheep only, and it is understood that another building for horses will be shortly erected adjoining the stock barn.

Woods of the Philippine Islands.

The value of the woods in the Philippine Islands to many branches of industry is very great, for they possess qualities unknown to our own. A correspondent of the *Modern Machinist* says that one of them is an exceedingly fine grained tough wood, very useful for tool handles, while another seems to be a cross between wood and iron, for it is very heavy and resistant, so much so that the natives use it for spear heads. It can be readily worked by tools and has a metallic ring. In some cases it is wrought to shape by emery wheels. Another species is a close grained, tough wood, which seems to be a dye wood, for when immersed it stains the water bright yellow for a long distance around it. This wood is also quite heavy, and takes a fine finish. American lumbermen call it "yellow jack." Still another wood is called "Belang" by the natives, and white wood by American lumbermen, but is quite different from our own wood of that name. It can only be worked by very sharp tools, but has a veined surface when finished, and is capable of taking a high polish. The business of preparing these woods for American markets is going forward with dispatch, and it is said to be very profitable.

TRANSVERSE breaking tests of plate glass furnished by several different makers were recently made at the Watertown Arsenal. The thickness of the glass varied from ⅛ to 1 inch, and the span from 8 to 24 inches. The modulus of rupture, which ranged from 2000 to 8000 pounds per square inch, was generally greater with the lesser thicknesses. Of the various kinds of glass tested—rough, ribbed, polished and wired—there was little difference in strength, except that the wired glass showed a little greater strength than the other kinds; the strength was also greater for the "sandwiched rolled" than for the solid rolled wire glass. The strength of glass set in frames was practically double that of the specimens tested transversely.

ATTITUDE OF TRADES UNIONS TOWARD TRADE SCHOOLS.

AT the meeting of the National Educational Association in Boston, in July of the present year, William H. Sayward, secretary of the National Association of Builders, presented the following interesting paper on the subject indicated by the above title:

The paper I am to present for your consideration relates to the attitude of trades unions toward trade schools, rather than to trade schools and workingmen's organizations, as the subject is announced. There are many organizations of workingmen whose purposes do not lead them into any relation whatsoever with trade schools, and I have, therefore, concluded that the contribution desired from me is, first, a statement of fact as to the attitude toward trade schools of those organizations of workmen which distinctly represent the trades affected by the operation of such schools, and, second, such reflections as may be suggested by these facts.

Opposition of Trade Unions.

Trades unions, as a rule, are opposed to the trade school idea; and a summing up of their reasons for this attitude may be expressed as fear of the creation of too large a supply of workmen through the operation of such schools. Many other reasons, more or less superficial, are given, but the real underlying objection is that unrestricted training in the trades will flood the market, which, it is claimed, is already overcrowded. While this, as a general statement of the expressed attitude of trades unions, may be wholly correct, it is likely to be misleading, unless qualified by a statement of certain conditions which examination of the field will show.

In the older communities, notably Austria, Belgium, Germany, Switzerland and France, and even in Great Britain, the attitude of trades unions has been materially modified within recent years, and a tendency is manifested to encourage the trade school, where its operation is restricted to training only those who have taken up some trade as a positive vocation. In these countries, as well as in some other parts of Europe, the continuation school, or schools, for extending the knowledge of the actual workmen and apprentice into the theory and technic of his trade, are not only looked upon with favor by trades unions, but are often established and maintained by them, and, in some cases, even by workingmen's clubs and friendly societies of workingmen, whose membership is general rather than specific.

While, therefore, speaking in a broad sense, trades unions do not look with favor upon the trade school, *per se*, one cannot fail to notice evidences of great and increasing interest among workmen at large, as well as in their organizations, in that application of the trade school idea, which gives opportunity for development in their chosen trade to those who have thrown in their lot with the actual workers, and propose to earn a living in their company. I am inclined to believe that a very appreciable portion of the aversion which trade unionists have manifested toward the trade school is traceable to the unexpressed, but still positively existing, feeling that people who are not willing to be of the working classes seek to gain, through the trade school opportunity, enough knowledge of the trades to enable them to practice them if they choose, and thus encroach upon the preserves of those who must earn their living by the trades. This is probably not a well founded or sensible conclusion; but that the idea has lodgment indicates one of the points which, connected with others, creates ground for opposition in the minds that, perhaps, are by nature, and perhaps through the persistent iteration of the trade union idea have become, essentially jealous. The fact that the wide open trade schools are doubted, while continuation or improvement schools for actual workmen and apprentices are received with increasing favor, would seem to give color to my belief on this point.

Partially Trained Mechanics.

Next to the fundamental objection which I have cited, the most clearly expressed opposition to unrestricted trade school training is that it has a tendency to produce partially trained mechanics, who go out into the community, proffer themselves and are received and employed as full fledged workmen; thus becoming not only competitors of the "underpaid and generally handicapped mechanic," as the unions almost universally claim them to be, but undesirable also for those who employ them, inasmuch as they cannot deliver the skilled service which they profess to be able to deliver. Associated with this second expressed objection is the claim that the attempt to teach trades in their entirety, in a school, is futile; that, therefore, schools which endeavor to do so are of little, if any, real value as far as furnishing mechanics fitted to undertake practical work is concerned.

Another reason given why trade schools are not a benefit is that "employers no longer desire the thoroughly trained all round man, but want only the specialist;" therefore, a trade school, which can at best teach a young man to perform the general operations or manipulations of a trade only fairly well, is of litle real value to him, for he is not fitted to compete with the specialist in any department of that trade. In some of the minor trades, such as cigar making, the objection to trade schools is most strenuous, on the ground that the training in such schools has a tendency to increase child labor.

Then there is always the jealousy, which I think trades unions unconsciously foster, which expresses itself in the belief that trade and technical schools are designed to help the rich and not the poor; to provide opportunity for young men of means who intend to go into manufacturing, or to conduct some business, to secure a technical training in and command of the elemental movements of a trade, rather than to help young men who intend to become real workmen. Many other specific "grievances," to use a common trade union idiom, could be stated, but they are all closely related to the main causes of objection which I have cited.

Trade Schools in America.

Consideration of trade school conditions as existing in the United States, and as existing in Great Britain, in France, Belgium, Germany and Switzerland, will be helpful in demonstrating where diminishment of friction begins. In this country we have comparatively few trade schools, and the best of those have been established by private individuals, who, awakened to a great need, preferred to devote themselves and a portion of their means to meet this need, rather than to await the slow process of public recognition, and then the still slower process of public action.

It is necessary here to call attention to the fact that this discussion does not relate to the technical or manual training school in any respect, but to the trade school proper, the school which purposes so to teach a trade that the student will be fitted to industrially use the trade. The instruction in such schools is made available, to a large extent, in the evening, so that young men at work during the day may take advantage of this opportunity. There are many schools of combined academic and practical character known as manual training and technical schools in this country, both private and public, and to these there is no expressed objection by trades unions, but there are few trade schools pure and simple, and to these unions as a rule, are at present strenuously opposed. The idea and purpose in these schools is to turn out finished mechanics, as far as knowledge of the science and practice of the trades is concerned, it being usually frankly admitted that the graduates will not be commercially equal to skilled workmen in point of speed of execution or adaptability, until they have had sufficient experience with real work to give them these qualities. In practice, however, it turns out that the graduates of these schools have attained fully enough science and just enough practice to fix methods and principles sufficiently to enable them to pass current as skilled workmen, particularly when there is great demand; and they, therefore, seek and obtain the going rate of wages as readily as men who have worked for years at the trade. In these schools of ours there is no attempt, I believe, to restrict the opportunity to those who have chosen a special trade as their vocation, nor to make them distinctly continuation schools, or schools for developing in theory as well as technique, those already entered as apprentices and thus devoted to the trade. These purely trade schools are privately established and managed, and there is no Governmental supervision, either municipal or general. There are, at present, practically no trade schools either wholly or partially supported by the public in any part of the United States.

European Trade Schools.

The industrial school system in foreign countries, whether of semiprivate or of public character, seems to be founded on the presumption that the young man has determined pretty definitely the career into which he expects to enter, and will shape his education accordingly. Therefore, the trade school addresses itself to those who have either already begun as apprentices or are about to do so, or to workmen who desire to make themselves more proficient in one grade or another. It is this generally prevailing attitude in Europe which has disarmed the trades unions of their opposition and presents the distinction to which I wish to draw attention.

The demonstration is narrowed down to this: That when trade schools limit themselves to improving the theoretical, technical and practical knowledge and skill of those who are already entered upon a trade, the trades unions seem to approve and, in many cases, to participate in conducting them. Here, then, seems to be very clearly marked the point at which friction begins to diminish. The next step should be to determine whether this point is well taken by the unions and therefore whether they should be supported in it. It will be readily admitted that any schools for the higher vocations or professions which pretend to turn out at graduation the completely qualified practitioner assume too much, and whether there be any organized opposition to this assumption or any concerted disclaimer set up or not, it still remains true that the graduate is not so received, and he is practically compelled to pass through quite an extended season of severe experience before he is accepted at full value, "going rate of wages," by the community in which he attempts to practice. It apparently needs no union to produce this effect.

The Wide Open Plan Detrimental.

When, however, we consider the mechanical planes of occupation, commonly classed as laborious, we find that the public does not set up, either instinctively or with definite purpose, any such test, and, therefore, organizations in these vocations have addressed themselves to the protection of their class from indiscriminate competition. These organizations have very good ground for their assertion that trade schools tend to demoralize the trades when managed on the "wide open plan"—that is, free to any one who wishes to attend, regardless of whether he is committed to a trade or not, and with no control or supervision set up, within or without, to prevent him from departing from the school, either at the close of the course or at any time, and with a smattering of skill and knowledge pass himself off as a full fledged practitioner. This possibility, which, as I have already indicated, has in practice developed into a probability, is certainly not to be looked upon with complacency, even by the intelligent, though unaffected, observer; therefore, it is not to be wondered at that those most affected should demur, and somewhat strenuously criticize the source from which the possibility springs.

They may well claim that if the learned professions, such as the medical and legal, and sometimes others, are safeguarded with the greatest care, in the skilled trades there should be some method of control which will, at least, guarantee that insufficiently trained workmen shall not be given full standing and full wages, simply because they have passed through, or perhaps only partially through, the courses of a school. But, while this attitude is natural and wholly defensible when viewed from the standpoint of reason and of experience, it is not at all reasonable or wise to condemn the trade school itself. For I think it can be conclusively shown that upon schools of this character the trades, as such, must depend for their own preservation. Therefore, the effort should be not to destroy the trade school or blindly oppose it, but to modify its methods and utilize it as the only available means to regulate and control the output of workmen—which is really the point at issue, as far as trades unions are concerned—and to protect the community as well against the untrained and inexperienced; for, under existing conditions, for some of which the trades unions themselves are to a considerable extent responsible, the public is in some danger of losing altogether the all round artisan—the mechanic skilled and interested in his calling.

Substitute for Apprenticeship.

I have said that the preservation of the trades themselves depends upon the proper development of the trade school idea. This is evident for two reasons: One, the passing of the old method of apprenticeship, and the other, specialization in the trades. There is no probability that the old method will be re-established. Strenuous efforts, it is true, are being made in Germany to preserve the apprenticeship system in those trades for which it is adapted, much legislation having been enacted in this direction in recent years. But, while it is possible under a government as paternal and positive as that of Germany to reinstate even the old guilds with all their power and influence, it is hardly conceivable that, under freer forms of control, employers can be commanded in such matters to the extent that they apparently are in some of the European monarchies, Germany in particular.

Specialization has sought out almost all the trades, even those connected with building, where it has seemed least likely to get a foothold. That these two movements, which may both be classed as commercial movements, threaten the trades, as trades, is beyond question, and, under the commercial demand it seems to be inevitable that the trades will be split up endlessly, so that no one workman will eventually be capable of doing more than a fragmentary portion of a trade. The trade school furnishes the one measure of protection by and through which these separate portions may be kept in one consistent whole, and the relation of the parts so taught and the capacity to combine the parts be so developed that all round men, capable of understanding and executing a whole trade, will not entirely pass out of existence.

A Comprehensive System Necessary.

It behooves the trades unions, as custodians of the interests of the workmen in the trades, to look more deeply into the function of the trade school, and to consider more carefully how much the interests they have in charge depend upon the existence and operation of these schools; and it behooves employers to concern themselves more effectively, to the end that they may reap the benefit which will surely come through wise administration of the trade schools.

It is evident that there are some weaknesses in trade schools as at present developed. I am inclined to think that one of these is indicated in the somewhat crude objections made by trades unions. I am convinced that there should be a comprehensible and effective system established, utilizing the trade school idea, which shall supplant completely the present unsatisfactory condition of floating off on the market an unfinished product, which, if it ever becomes finished, becomes so in spite of conditions, rather than by virtue of or purpose in them. I do not believe for a moment that our privately established trade schools were ever intended, or expected, by their founders to produce too large a supply of mechanics and thus flood the market, or to incite young men to half perfect themselves and then deceive the public; but the function and purpose of the schools were distinctly expressed and intended to be to furnish as systematic and favorable a method of instruction and training as possible to fill a void created by the decay of an old system which, while sufficient in its day and generation, had vanished never to return.

Co-operation.

This function and purpose, to my mind, are more emphatically evidenced year by year, and as this instruction and training can best proceed in conjunction with practice in real work, in which employer and workmen are engaged, I believe that the most complete method of operating that function and realizing that purpose lies, as I conceive it does in all matters affecting labor, in a more complete co-operation between organizations of employers and organizations of workmen. The policy of this co-operation should be to create good workmen, the best, the most skillful, the most complete, and then to have the unions composed of these, and these only. By a policy of this nature, which could only be carried out by a joining of hands of employers and workmen in the management and direction of trade schools with this end in view, the unions would be relieved of the most telling criticism now used against them, and their reason for being would be more firmly established. By this measure the unions would be strengthened by "recognition" in the best sense, inasmuch as they would become the gauge and standard of excellence, and, instead of coercion being necessary as now, to keep the organizations up to that efficiency which numbers are felt to indicate, membership would be eagerly sought, because desired as a sign of selection, and as a safeguard against being herded together, as now, in one mass of good, bad and indifferent. The "nonunion" man would then be the inefficient, the unreliable, the dishonest, the quarrelsome, the disturber, the dissolute and the generally unworthy, and nonunion he would have to remain until he should so reform as to make himself desirable. Then would there be the true line of demarkation between union and nonunion, a natural and proper one—not the artificial and dangerous one which now exists. Unions would then be accepted by all as a clearing house for workmen, as a sure source of supply of trustworthy, efficient and skilled workmen, and not, as now, an aggregation of anything and everything that will simply swell an army, the leaders of which assert that "labor is a force militant," and that "as such its victories are to be achieved." Until this dispensation labor has been supposed to be of the essence of peace and not war, and it has not been until the forces of labor, as demonstrated through cheaply conceived, unrestrained or poorly administered organizations, have been diverted from their true channel, that the world has witnessed the commission of acts, under the impulse of this force, which have been unworthy of humanity, and which have roused the self respecting in all our communities to most determined resistance.

It is my belief that the trade school, properly utilized as suggested, supplemented by further intelligent co-operation of real employers and real workmen, in all affairs of mutual concern, may be, in this field and in this state of danger, one of the greatest of conservators of safety. But these agencies for good must not be left to dilletante exploitation nor to the equal danger of too general usage. Let employers and workmen engage in this service with the glad seriousness of conviction, and hope will succeed despair in all these relations.

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

BY CHAS. H. FOX.

IF the student has carefully worked out the problem described in the preceding issue he will have little, if any, difficulty in mastering the method now to be explained by means of which the joint molds may be developed for any radiant arch which may be situated in a circular wall and the elements of which are vertical, the arch having a clean or "tooled" face. We have taken as an example an arch composed of nine stones, but the same method may be employed irrespective of the number of stones contained in an arch. In the plan, Fig. 93, F A represents the half opening of the arch, and in A B C, &c., of Fig. 92 is shown the directing curve. B′, C′, D′, &c., are the projections of the points Q, P, O, &c., of the center points of the soffit of the plan. The normals to the points in question are represented in the lines B′ b, C′ c, &c., of the diagram. Fig. 94 shows the right section as given at the center line F H of the arch. It is only at this one plane that the surface of the curved face is at right angles with the element of the soffit. However, when as in this case the joint surfaces of the key and of the adjacent stones are so closely situated to the center line, for all practical purposes the right section of Fig. 94 may be taken as the joint mold of the surfaces in question—that is, it will be near enough correct for the purpose of forming the stones. In Fig. 93 is shown the joint mold as required at the bottom joint surface of the springer. The point a′ may be found by taking A as the center and with the required width of the arch stone as the radius cutting the curve of the outer face in a′, drawing the radial a′ I, giving in the figure A a a′ I the horizontal space occupied at the plan by the joint surface in question.

In order to develop the molds of the inclined joint surfaces we have to ascertain at the plan the horizontal space occupied by the surfaces. Take, for example, that of the joint surface of C′ c of Fig. 92. C′ c represents the length of the normal; parallel with the base line draw C′ 2, then parallel with the center line draw c 2. This gives in C′ 2 the length to be transferred to the plan, as shown in C′ 2 of Fig. 93. Drawing the radial 2 r, then C′ c r 2 gives approximately the horizontal space occupied over the plan by the surface of the joint at C′ c. To make the construction as clear as possible the space or figure in question has been transferred to the similar figure of Fig. 95. This understood, square with C c draw the tangent C d, then divide it into any number of equal parts, as shown in C, a, b, &c., and through each point draw lines parallel with C c. Now in Fig. 96 draw C c,

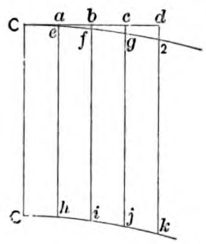


Fig. 95.—Horizontal Space Occupied in the Plan by the Oblique Joint Line C c of Fig. 92.

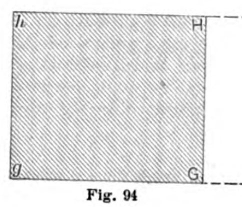


Fig. 94.—Right Section of Joint Surfaces.

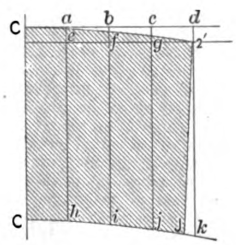


Fig. 96.—Developed Joint Section as Required at the Joint Surface C c.

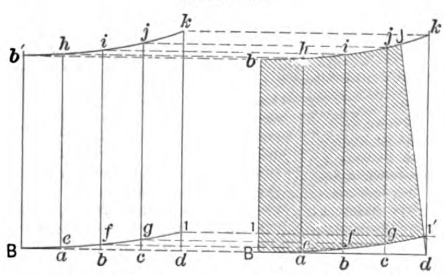


Fig. 97.—Horizontal Space Occupied in Plan by Oblique Joint Line B b of Fig. 92.

Fig. 98.—Developed Joint Section as Required at the Joint Surface B b of Fig. 92.

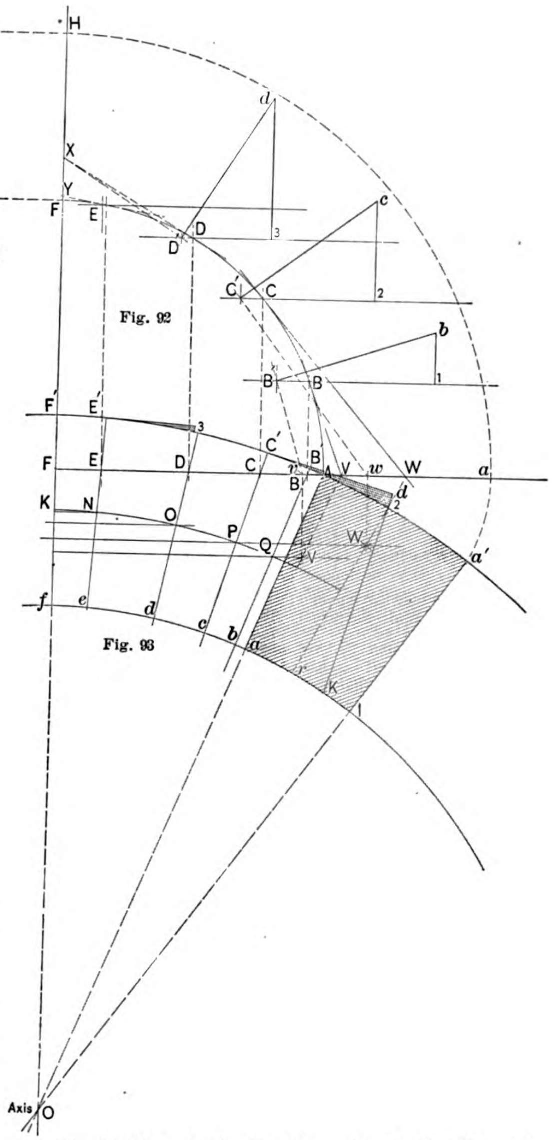


Fig. 92.—Elevation of Directing Curve of Soffit, Together with Working Tangents and Normals of Joint Surfaces.

Fig. 93.—Half Plan of Arch, Together with Joint Section Which Belongs to the Lower Joint Surface of the Springer.

Laying Out Circular Arches in Circular Walls.

and square with it draw C *d*; then make C 2 equal with 2 *d* of Fig. 95; square over 2′ 2; then with C as the center and the length of the normal C′ *c* of Fig. 92 as the radius cut 2 2′ in 2′; then parallel with C C draw *d* 2′ *k*. Now divide C *d* into the same number of equal parts that C *d* of Fig. 95 may be divided into, and from each point draw lines parallel with C *c*. Now set off *a e h*, *b f i*, &c., of Fig. 96 equal to the length of the corresponding ordinates of Fig. 95. Through the points thus obtained trace the curves of the section. Then set off *c* J equal with *c j*, the length of the joint line of the corresponding joint of the inside face molds, and joining 2 *j* the joint section may be completed.

In a similar manner may the remainder of the molds be developed. It may be noted on finding the face curves of the joint sections that the lowest face line is the one

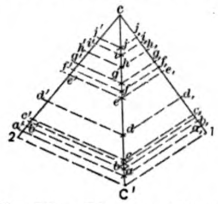


Fig. 101.—Diagram Showing Method by Which the Radial Lines May Be Obtained as Required in the Construction Shown in Figs. 104 to 106.

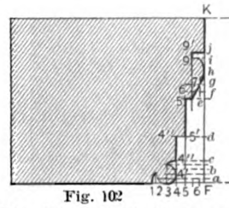


Fig. 102.—Right Section or Section at Center Vertical Plan of Arch.

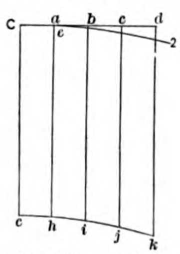


Fig. 103.—Plan of Space Occupied by Joint Surface C *c* of Fig. 99.

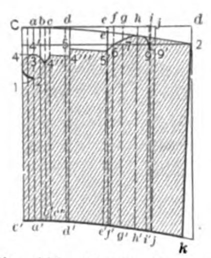


Fig. 104.—Developed Section as Required at the Joint Surface C *c* of Fig. 99.

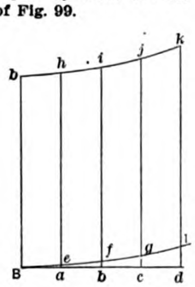


Fig. 105.—Plan of Space Occupied by Joint Surface B *b* of Fig. 99.

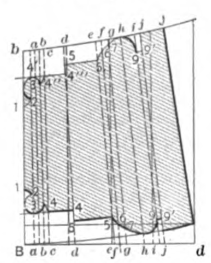


Fig. 106.—Developed Section as Required at the Joint Surface B *b* of Fig. 99, Showing Construction of Same When Arch May Be Molded at Inner and Outer Faces.

Laying Out Circular Arches in Circular Walls.

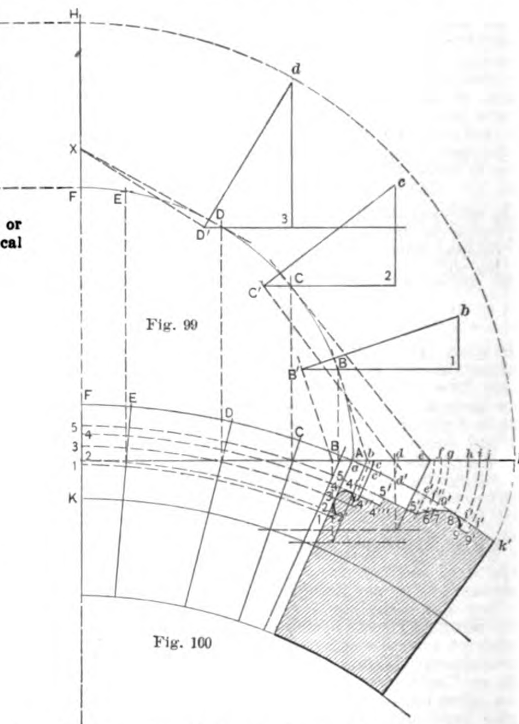


Fig. 99.—Elevation of Directing Curve of Soffit, Together with Tangents and Normals.

Fig. 100.—Half Plan of Arch, Together with Joint Section Which Belongs to the Lower Joint Surface of the Springer.

that contains the greatest portion of the plan curve, the next face line will be flatter—that is, it will contain less curvature than the one below it; and so on as we come nearer to the crown of the arch, at which the face line is a right one, as shown in Fig. 95.

The diagrams Figs. 99 and 100 are a *fac-simile* of the corresponding diagrams shown in Figs. 92 and 93. In Fig. 102 is shown the right section, which of course corresponds to the right section which may be given for an ordinary arch in a plane surface wall.

To develop the joint sections we take firstly as an example that required at the lower bed of the springer, shown in Fig. 100, and in Fig. 102 divide the contour of the section as shown into any number of parts. We may remark here that the greater the number of divisions the curved members may be divided into, as shown in 5, 6, 7, &c., of Fig. 102, the more accurate may the corresponding contour be drawn in the developed sections. Having divided the contour as shown, from each point draw lines, firstly, parallel with the face line K F; then, secondly, at right angles with the face line. Now in Fig. 100 set off A, *b*, *c*, *d*, &c., equal with F, *a*, *b*, *c*, *d*, &c., as given at the face line of Fig. 102. With A as the center rotate each point into the face curve A *k*′ of the plan. From each point thus obtained produce radials indefinitely. Now set off *j*′ 9, *i*′ 9, *g*′ 7, *f*′ 6, &c., equal respectively with that of the corresponding projections of Fig. 102. Through the points given in 9′ 9, 8 7, 6 5″, trace a curve, which will be the contour corresponding to that at the similar letters of reference of Fig. 102. Through the points given in 5″ 4‴ a curve may be drawn with the center with which the curves of the plan may be drawn. Then repeat in 4″, 4′, 3, 2, 1, the operation as at 5″, 6, 7, &c. In this simple manner may the section as required at the lower joint surface of the springer be developed.

To develop the section as required at the oblique joint surfaces, as that of C′ *c* of Fig. 99, we first develop, as in Fig. 104, the contour as for an arch having a clean face, fully explained in the preceding chapter. This done, set off C, *a*, *b*, *c*, *d*, &c., of the face curve equal to the corresponding projections of Fig. 102. Now to find the position of the radials corresponding to *j*′ 9′, &c., drawn on the plan, we set off in Fig. 101, at the line C′ *c*, C′ *a*, *b*, *c*, &c., equal with the corresponding projections of Fig. 102. Then at any angle draw *c* 2, equal to the length of the joint line, as given at the inside face mold for the joint surface in question; join 2 with C′; then parallel with this draw *a*′ *a*, *b*′ *b*, *c*′ *c*, &c. Now in Fig. 104 set off *c*′, *a*′, *b*′, *c*″, &c., equal to the corresponding projections of Fig. 101; then joining *j*′ *j*, *i*′ *i*, *h*′ *h*, &c., the position of the radials may be obtained. At these set off the lengths, as *j* 9′, *i* 9, *g* 7, &c., and in the manner explained for the similar operation in Fig. 100 trace the contour of the section. In this case the curve lines 5′ 5 and 4‴ 4″ are drawn parallel with the face curve C 2.

We may suppose the arch to be molded at the concave face; then making use of the method just explained the section may readily be developed, as shown in Fig. 106, for the joint surface B *b* of Nos. 1 and 2 stones.

WHAT BUILDERS ARE DOING.

THE reports which reach us from the leading centers of the country show that while a fair volume of business in the aggregate is in progress, the showing is not up to that of last year at this season. The points from which emanate the most flattering conditions of affairs are in the West and Northwest, but their figures are more than offset by the heavy shrinkage which has occurred in such cities as Pittsburgh, Chicago, Buffalo, Washington and New York, where labor troubles and the high prices of materials entering into construction have served as a retarding influence upon operations. In many instances projects which were contemplated have been indefinitely postponed, and the opinion prevails among many of the contracting builders in New York City that the outlook for the immediate future is far from encouraging. Statistics of the leading cities of the country for the first nine months of the current year show building operations to have decreased many millions of dollars in value, as compared with the corresponding months of last year.

Buffalo, N. Y.

A fair amount of work is in progress in and about the city, although the operations are not upon the scale of a year ago at this time. Several public buildings, costing about $300,000, are now in process of completion, and a considerable number of houses in the neighborhood of the plant of the Lackawanna Steel Company are being erected. The labor conditions in and about the city have been quite satisfactory, the only strike of any moment during the year having been that of the painters, who were out about three weeks. High prices of material and labor have to some extent retarded operations, but the feeling seems to prevail that if building in the next few years is as active and the labor conditions as peaceful as they have been the past year, Buffalo builders will be much gratified.

According to the figures of Deputy Building Commissioner Rumrill there were issued in September of the present year 139 permits for building improvements, estimated to cost $426,173, as against 347 permits, involving an outlay of $1,077,865, in September of last year. The figures for the first nine months of the current year make a much more favorable showing, there having been in that time 1486 permits issued for buildings costing $4,793,296, while in the first nine months of last year there were 1606 permits issued, calling for an expenditure of $3,932,960. The majority of the work at present under way is made up of new buildings, although more or less is being spent in alterations and additions.

Chicago, Ill.

The tendency toward contraction seems to be making itself manifest in building operations in and about the city, the figures available for September showing a marked decrease as compared with the corresponding month of last year. The work in hand was largely confined to the construction of cottages and low cost apartment houses, the erection of structures for business purposes being only 25 per cent. of the total. During September there were 614 permits issued for building improvements, having a frontage of 16,209 feet and involving an estimated outlay of $2,164,800, while in September of last year 573 permits were issued for building improvements, having a frontage of 16,817 feet and costing $3,517,450.

The totals for the first nine months of the year strikingly illustrate the contraction in building operations which has been going on, although it must be remembered that 1902 was a year of unusual activity in the building line in the city of Chicago, the aggregate for the first nine months, with which current figures compare, being the largest since 1892, when the cost of improvements was placed at $49,605,000, which reflected the unusual operations incident to the World's Fair. These facts should be remembered in making comparisons, and it is also interesting to note that building operations during the first nine months of 1903 exceeded very considerably those of the corresponding period of any year from 1896 to 1900 inclusive. According to the figures available permits were taken out during the first nine months of the current year for the construction of 4590 buildings, having a frontage of 125,698 feet and involving an estimated outlay of $24,625,050, as compared with 4761 permits for building improvements, having a frontage of 143,771 feet and costing $38,473,535, in the first nine months of last year.

It is felt that in large measure the decrease shown the present year in building operations has been due to the prevailing high prices for materials and the increased wage scale of labor. It is probable, however, that strikes and labor controversies were important factors in deterring capitalists from investing in building of any kind. It is said that the new tenement house ordinance comes in for a share of responsibility, and during the month of September, at least, the more stringent money market had some effect in postponing, if not canceling building contracts.

Cincinnati, Ohio.

The condition of the building interests in the city, as compared with this season last year, is regarded as very satisfactory, the volume of operations showing a most gratifying increase. The attitude of labor, has without doubt, curtailed, to some extent, the amount of new business offering during the past two or three months. Prices of building materials may have had a tendency in this direction, but it is felt by architects and builders that the strikes and the high wages demanded by some of the trades have been the greatest restricting influence. Cincinnati is one of the cities of the country which for September show an increase in the amount of building projected and in progress, as compared with the same month last year. There were 226 permits issued for building improvements costing $357,380, as against 200 permits issued in September, 1902, for improvements costing $291,470.

Prospects for the coming year are regarded as very encouraging, and as this is the season when there is a lull before new work for next year is brought out, the contracting builders are very confident that the volume of business will more than hold to the average unless labor agitation prevents.

Detroit, Mich.

Building operations in the city are keeping up fairly well, and the work consists, for the most part, of dwellings and other buildings costing in the neighborhood of $1500 to $2000 each. According to Permit Clerk C. B. Brand there were 289 permits issued in September of the present year, calling for an estimated outlay of $547,200, while in September of last year there were 316 permits issued for building improvements, estimated to cost $539,500.

For the first nine months of 1903 the Department issued 2569 permits for building improvements costing $5,293,500, against 2347 permits for improvements aggregating an outlay of $4,577,700. This, it will be seen, is a gain over last year of 22 permits, the improvements costing $715,800 more than last year.

Los Angeles, Cal.

During September there was a very decided improvement in the volume of building as compared with the same month of last year. There were 633 building permits issued in the city calling for improvements valued at $1,147,965. The figures were made up of permits for 526 new buildings, to cost $1,191,110, and for 107 additions and alterations to cost $56,855. In September, 1902, the number of permits issued was 544, with an aggregate value of $917,545, and in September, 1901, the number of permits were 257, valued at $313,947.

Contractors and architects report that a higher order of buildings are being erected, and that the styles show greater depth and more skill in elaboration than heretofore. The building of first-class flats seems to be gaining steadily in favor, although the erection of these buildings does not seem to put a stop to the building of one and two-story cottages.

Lowell, Mass.

There is comparatively little of moment in the building line to mention and the outlook for the fall and winter is for a season of quietude. Most of the contractors, however, are busy at the present time, but it is with small work and alterations, which while considerable in the aggregate are not individually important. The new coal shed and boiler house for the Merrimac Company, which is of cement construction, is making good progress, and the Custodis Construction Company are building one of their special construction stacks for the Bigelow Carpet Company for their new battery and boilers. The boiler house, which is of brick, is being put up by George H. Staples.

New York City, N. Y.

Since our last issue the building situation in the city has made some progress toward a final settlement of the difficulties which have existed in the building trades, and the hope prevails that ere long matters will assume a more normal condition. There is still a hitch with the stonecutters; but, on the other hand, the steam fitters have signed the arbitration agreement of the Employers' Association. There is a considerable volume of construction which has reached a stage where active work would enable its completion before winter fully sets in, and this would give employment to a large number of men. If severe winter weather is postponed to a late date, and the conditions existing in the various branches of the trade are soon adjusted, the active building season could be considerably prolonged this year in the metropolitan district. The strikes, thus far, have caused a great deal of disaster and suffering, and an early resumption of operations would be hailed with great satisfaction by all interested. There is, however, a disposition among builders and real estate men especially, to maintain more or less of a waiting attitude for the remainder of the year in the hope that by the coming spring not only will the labor situation but also other factors affecting the building industry be very much improved.

One result of the fight which has been in progress has been the announcement on the part of the Plain and Decorative Plasterers' Union that they have decided to dispense with the walking delegate. Hereafter any business to be transacted for the organization will be attended to by the president of the union. Following their course the Sheet Metal Workers' Union took up the matter of walking delegates, and decided to reduce their delegation from five to three.

As might naturally be supposed, in view of the labor situation existing in the city, the amount of new work projected in September shows a falling off as compared with the corresponding period last year. In the boroughs of Manhattan and the Bronx, there were permits issued for 340 building improvements, estimated to cost $4,350,000, as against 331 permits in September, 1902, for building improvements, costing $5,154,000. For the first nine months of the current year there were permits issued for 1368 buildings costing $64,356,360, while for the first nine months of last year there were 1337 permits issued for buildings, involving an estimated outlay of $74,335,347.

In the borough of Brooklyn the showing for the current year is somewhat more favorable than for that of last year, owing no doubt, in some measure, to the activity which has recently prevailed in that city in the erection of dwellings of moderate cost. Since the first of the year there were 2863 permits issued for new buildings, estimated to cost $17,537,785, while in the first nine months of last year there were 2306 permits issued, calling for an estimated outlay of $13,112,000.

Oakland, Cal.

At the present time about 175 buildings are in course of construction in Oakland and the suburban towns of Berkeley and Alameda, the approximate cost being $850,000. Besides these buildings, which are already under way, many others are planned, and a number of foundations are being laid. Altogether, the outlook seems to be better than it was a month ago. In many cases property owners are doing their own building, and it is claimed that there is an improvement both in the class of structures and in the materials used. A large majority of the residence buildings under way are, however, being erected by various real estate companies, and a number of speculative buildings are at present on the market. There seems to be increased demand for residences of the bungalow type, and in the more thickly settled portions of the city flats are coming into favor. Several three-story flats, the first of the kind in Alameda County, are now being put up on Franklin street by O. G. Maguessen.

Philadelphia, Pa.

The Advisory Board of the Master Builders' Exchange of Philadelphia have fixed January 1, 1904, as the day on which systematic warfare by means of lockouts against sympathetic strikes will begin. The Advisory Board represents the 300 members of the Master Builders' Exchange and 1000 subcontractors, whose signatures are on record.

This means that on and after January 1 any sympathetic strikers will have to face a lockout not only of the Employers' Association, but of all of the leading individual employers.

This action is the most important ever undertaken in the structural trades in that city. The Philadelphia employers in this line did $30,000,000 of business in the city limits alone in 1902. This is only a small part of the work controlled by them.

The exchange has recently appointed delegates and alternates to attend the meeting to be held at Scranton, Pa., on January 13 and 14 next, looking to the formation of a City Builders' Exchange.

Pittsburgh, Pa.

The building outlook in the Pittsburgh district is not altogether encouraging at the present time, owing, in large measure, to the stringency in the money market and to the hostile attitude of labor. On October 1 the plumbers went out on strike, as their demand for an increase in wages from $4 to $4.50 for an eight-hour day was refused by the master plumbers. Other strikes of minor importance exist, and are having the effect of postponing building operations to a very large extent. There is more or less of an uneasy feeling and indications now point to a general reduction in wages, which will be effective the first of the year. The paper hangers are paying 65 cents an hour in Pittsburgh, while bricklayers and plasterers receive proportionately high wages. There is, of course, more or less building in progress, and among the large enterprises under way may be mentioned the Nixon & Zimmermann Theater on Sixth avenue, to cost $300,000; a theater on Duquesne Way, to cost $200,000; the Phipps office building on Sixth street, to cost $8000, and the new country club on Beechwood Boulevard, to cost $100,000. H. C. Frick, the well-known capitalist of Pittsburgh, had plans prepared, and some of the contracts let for the building of a mammoth hotel in New York City and to be started this year. On account, however, of the high prices of labor and building materials of all kinds, the work has been indefinitely postponed. The hotel was to have been one of the finest in the United States, and was to have cost upward of $2,000,000. That is only one of several similar large building undertakings that have been postponed.

As indicating the amount of work under way and in contemplation at the present season, as compared with a year ago, it is interesting to scan the figures of the Building Department of the city. The showing for the month of September is one of heavy shrinkage, there having been issued 271 permits for improvements, costing $1,044,190, as against 390 permits for buildings estimated to cost $2,030,679 in September of last year. This is a falling off of almost 50 per cent. Taking the figures for the first nine months of this year, it is found 2717 permits were issued for building improvements, estimated to cost $14,880,541, while in the first nine months of last year there were 3087 permits issued for building improvements, estimated to cost $13,988,683.

Portland, Ore.

Building operations in Portland have been more or less interfered with by plumbers' strike, which lasted throughout the entire month of September. Nevertheless, a good deal of building was done, and preparations are under way for a still greater amount of construction work. Indications are that work will go on without any great falling off during the entire fall. The contract for building the new $90,000 Trinity Church, at Nineteenth and Davis streets, will be let within a few days. Subcontracts have been let for eight residences which are to be built for the American Can Company's employees on Twentieth and Upshur streets by Parrish & Watkins. Other contracts have been let for a number of business blocks and apartment houses ranging in cost from $9000 to $60,000.

Salt Lake City, Utah.

The building trades in Salt Lake City have shown considerable improvement during the last few weeks. There has developed a great demand for business houses as well as for residences, and builders are just beginning to provide the needed structures. Some very large buildings are booked for the near future, among these being the Government improvements at Fort Douglas, which will cost upward of $1,000,000; the new passengers' station of the Oregon Short Line, which will cost approximately $1,000,000, and the new passenger station, shops and yards of the Rio Grande Western which will cost about $750,000. A permit has just been issued for a $25,000 apartment house to be erected on West North Temple street.

San Francisco, Cal.

The total value of the building contracts let in San Francisco during September was $934.938, as compared with a total of $1,113,489 during August. This is the first month in which the building contracts have fallen below $1,000,000 per month this year. Of the total contracts $523,861 were for frame construction work, and $360,303 were for brick construction, while $50,774 were for alterations. The principal contract let during the month were for brick work on the Aronson Building on Third and Mission streets, amounting to $70,000; four contracts on the Sahlein Building, on Bush and Polk streets, amounting to $52,500; three contracts for the extension of the Union Trust Company's Building, on Montgomery street, amounting to $138,675, and the contract for the construction of the Wilson Building, on Pacific avenue, amounting to $36,314.

The records show that the falling off is due to a decrease in the number of large buildings begun, but there has been a greater number of smaller improvements undertaken than during the previous month. Very few plans for construction are being drawn in architects' offices, and as a result of the falling off in building the San Francisco Lumber Exchange has reduced the price of lumber $2 per 1000 feet. Under the new schedule the price of fir or pine, running from 12 to 16 feet, 2 x 3 to 2 x 12 is $17; rough redwood, 1 x 4 x 6, 2 x 4 x 6 and 3 x 4 x 6, running from 12 to 20 feet is $19, and rustic, 1 x 8 or 10, running 16, 18 and 20 feet is $42. A large quantity of Belgian steel has reached port, but no change of price in structural steel is yet announced.

The Metropolitan Improvement Company are now building 45 model workingmen's cottages on Eighth and Harrison streets. Each cottage will consist of four rooms beside a bathroom. They will be light and airy, and will be furnished with electric light, sanitary plumbing, heating, &c. The total cost of the cottages is placed at $125,000. The same company have plans for the erection of a six-story brick building on Third street, which will be used as a model lodging house, somewhat after the plans of the Mills Hotel in New York City.

PROTECTING THE PLUMBING OF SUMMER HOMES.

THE plumbing of many summer homes is as elaborate as the plumbing in the city residences owned by the same people. In many cases the owners seem to take more people. In many cases the owners seem to take more pride in the comfort and appearance of the sanitary appliances in the modern summer residence than they do in the more staid and dignified city house; probably because of the fact that it has not been built so long, and therefore advantage has been taken of the newest and the latest ideas in the plumbers' handicraft.

The fact that the sanitary appliances are intended for use only during the summer should be, and often is, a strong reminder that means should be provided for draining completely every pipe line, trap and fixture, says M. L. Kaiser in a recent issue of *The Metal Worker*. Too often this necessity has been forgotten or disregarded, and the task of preparing the plumbing system for the rigors of winter becomes the more difficult in proportion to the complexity of the layout. Sometimes, too, the effort to provide for the drainage of the pipe lines has resulted in a layout of pipes and valves which requires a skilled plumber to unravel. To be sure, that is one of the things the skilled plumber is trained for, and if the writer were addressing the owners of the dwellings under discussion he would advise them to always call in a plumber to attend to such work.

The traditional Philadelphia lawyer might be as ingenious as he is represented to be, and yet be unable to unravel the mysteries of a plumbing pipe system. To illustrate: A few years ago a family left their summer abode rather unexpectedly, and inasmuch as one of the grown up sons had been the manager of a plumbing establishment and another son was a practicing civil engineer, it was deemed unnecessary to call in a full fledged plumber. The two of them did their best, but apparently had some misgivings, for, after a particularly severe spell of weather, the writer was asked to accompany the "ex-plumber" to the mountain home, "merely to see what will be wanted next spring." The result of the trip was a note book page jotted with memoranda of a number of broken pipes and fixtures, with the assurance that there were some breaks which it would be impossible to locate until the advent of warm weather. Good for the plumber? Yes, but lightning seldom strikes twice in the same place. The plumber now drains the system each autumn, and his professional reputation is at stake.

A number of such instances could be cited, one of which cost a parsimonious old lady $130, because "Mary had seen the plumber do the work so often that she was sure she could do it just as well." Don't worry when you see a man doing his own plumbing; help him along all you can. "Every man his own lawyer, with a fool for a client," applies with equal force to the plumber's craft. But to go back to the subject.

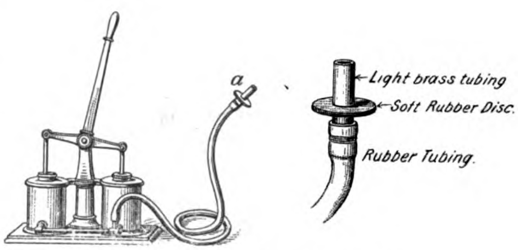


Fig. 2.—Force Pump and Connections.

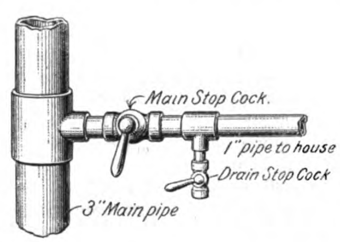


Fig. 1.—The Shut Off and Drain Cocks.

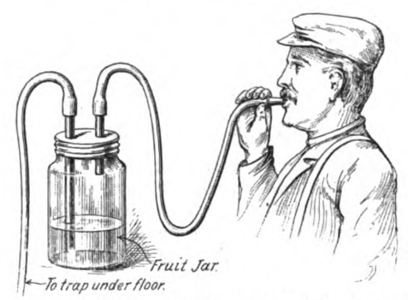


Fig. 3.—Device for Emptying Inaccessible Traps.

Protecting the Plumbing of Summer Homes.

Shall the Boiler Burst or Burn?

It is not good policy to provide summer homes with steam or hot water heating apparatus, but where such installations occur the heating boiler (water or steam) should receive first attention. Great care and judgment must be exercised in draining and drying out such heating apparatus, because if the boiler has been put together with gaskets it may be a toss up as to whether to run the chance of splitting the bottom of the boiler through the freezing of the small quantity of water which remains below the drain cock—which is almost sure to be a trifle above the lowest water pockets—or to risk destroying the gaskets by heating up the dry boiler. "Between the devil and the deep sea," as it were.

While the heating system is draining, with all radiator air cocks open, the plumbing may receive attention. The main shut off for summer residence plumbing should be deep underground, and usually close by the branch from the main. A stop and waste cock is sometimes used, although a better plan is to provide a common round way tee stop for the supply pipe, with a smaller branch and separate stop above and close to the main stop, as shown in Fig. 1, for draining the line. This drain stop should be surrounded with broken stone, to allow the water to run away freely.

Where to Begin Draining the System.

If the main stop referred to controls the supply to the barn, stables or other additional buildings, the fixtures in the highest building of the group should be drained first, to insure against an undesired inflow of water to a partially drained system at a lower level.

The above, of course, has reference to those plumbing systems which are supplied from a general water service. If the system is supplied from a tank placed on a tower, or in a tank room in any of the buildings, the tank must be drained first of all, and no stop valve need be turned off anywhere on the premises. At all low points in the system out of doors the drain cocks should be opened, and, if possible, the plugs of the drain cocks should be loosened and partly raised out of the socket, so that there will be no chance of any water being held in small pockets in the brass, there to freeze and expand the cock.

For the same reason that the highest building of a group should receive first attention, the highest fixtures in a building should be emptied first. The hot and cold faucets of a fixture in the basement, such as a laundry tub, should be opened and all other faucets kept closed. If, now, the faucets are opened and the water closet tank discharged on the top floor, the entire supply line from the top floor to the basement will be siphoned out with sufficient force to empty small pockets which may exist.

To make this the more certain an air pump—such as is used to test gas piping—should now be applied to each faucet in succession, all others remaining closed. It will be necessary to tie up the lever of the ball cock in the water closet tank, as there will be no water in the tank to keep the valve closed. When air passes through the piping freely there need be no fear of there being sufficient water in the pipes to cause bursting. These faucets should be closed, and the same procedure followed at each fixture or group of fixtures, until supply lines are clear.

Where stop cocks occur in horizontal lines of piping or in pockets or low points in the supply piping, the nuts should be loosened from the plugs and the plugs loosened from the socket, enabling any moisture which may drip down at this time, or later, to escape.

The range boiler may, meanwhile, be draining, so that by the time all the supply lines are cleared the water front is ready to receive attention. If there is any doubt about the lower tapping of the water front being at the bottom of the casting, the side connection to the boiler should be disconnected and air pumped through rapidly, forcing the water to spill out of the bottom connection.

Connecting the Air Pump.

To provide means for connecting the air pump to the various faucets and pipes two kinds of connection are used. For the basin faucets and bath cock the open flexible end of a ⅜-inch rubber tubing is sufficient. For larger openings a piece of light brass tubing is slipped into the ⅜-inch rubber tubing, and over the brass tubing butt up against the rubber is placed a soft rubber washer, as shown in Fig. 2, somewhat similar to the top washer of a ¾-inch compression sink bibb, the whole resembling the nipple and guard used on a baby's milk bottle. The small brass tube is inserted in the faucet or pipe, and the rubber guard washer shoved hard against the edges of the opening.

Emptying the Traps.

The supply lines being clear of water the water closet tanks should be sponged dry, and the traps of the various fixtures emptied. There is little difficulty in emptying the traps under wash basins and sinks, as the traps in nearly all cases have plug screws in the bottom. The bath trap is a little harder to get at, being under the floor, but almost invariably in a direct line below the overflow connection or standing waste. By removing the stand pipe from the standing waste, or the overflow pipe, if the tub fittings happen to be of the connected waste and overflow type, a small rubber tube may be inserted down to the water in the trap. Suction at the upper end of the tube may be applied in several ways, the most primitive of which is the simple application of the mouth and lungs.

It is doubtful if such a method is justified by any emergency. The plumber will say that he stops the suction and bites the tube shut before any of the filthy water reaches his mouth. This may be true, but in the desire to take up as much water each time as possible it is easy to apply the suction a little too long and get some of the dirty water in the mouth. Then, too, after using the tube at one trap, the wrong end may inadvertently be inserted in the mouth. Anyway, the tube is almost sure to be pretty dirty at both ends. A simple suction pump of the squirt gun pattern does the work better and quicker.

A Safe Suction Apparatus.

Another method of applying suction is by means of a pint fruit jar, with the zinc top perforated with two holes in which are soldered two gas pillars. With the top screwed on air tight and a small rubber tube slipped over one pillar and leading down into the bath trap, and another rubber tube attached to the other pillar with the further end in the mouth of the operator, as shown in Fig. 3, the suction applied will exhaust the air in the jar, and the water from the trap will take its place. This apparatus, somewhat resembling the Turkish "hookah," or water pipe, is not so good as the suction pump referred to, as it is apt to be exhausting to the operator as well as to the air.

It is important that every vestige of moisture be removed from the water closet bowls, whether they be washouts, washdown siphons, pneumatic siphons, or siphon jets. The latter need special attention, and after removing the water from the bowl and jet knuckle by either of the above methods, a strip of cloth should be inserted in the jet holes and the water squeezed out until the cloth will absorb no more moisture. The water ways and pockets of the particular style of bowl operated on should be studied by the plumber, and if there is doubt on the subject the plumber is justified in removing the closet bowl from the floor, turning it upside down several times to insure its thorough freedom from water.

The question then arises, "Why not remove all closet bowls from their floor and flush connections?" Experience has satisfied the writer that more breakages occur during the removal and resetting of the bowl than from freezing and bursting caused by poorly drained plumbing. While the rubber floor connection may be safely and easily parted, the same cannot be said of the rubber compression joint at the flush pipe connection to the bowl, as the rubber often vulcanizes fast to the brass threads of the coupling nut. Miner's wicking, well toweled, is preferred by some, by reason of the ease of uncoupling the flush connection thus made.

Protecting the Traps with Kerosene.

All of the fixtures and their traps being entirely freed from water the main trap at the front wall should be drained, unless so located that freezing is impossible. Caps should then be placed over the opening at the fresh air inlet and over the vent pipes at the roof, so that birds and small animals shall be effectually excluded.

Some plumbers advocate leaving the traps without any fluid to prevent the free circulation of air through them, arguing that as the entire plumbing system of the summer community is out of use during the winter, there is no danger of contamination where there is no sewage. Such an argument would have more weight if it were not for the fact that the several families making up the community differ widely as to the time of going in the spring and of leaving in the autumn. The cheapest, and, all things considered, perhaps the best fluid to place in the traps to prevent the entrance of sewer air to the house, is common kerosene oil. This liquid is noncorrosive, will not freeze, evaporates very slowly, and if recovered may be used over and over again. Great care must be used, however, to insure the perfect freedom of the oil from water, as a small amount of water settling to the bottom of the jet hole of a siphon jet bowl will be sufficient to split off the bottom of the jet tube, rendering the bowl worthless. Beneath each trap located above the floor should be placed a saucer, or tin, as the oil may in time ooze through or around the trap screw washers, which would be impervious to water. The stain thus made on a white wood floor is almost impossible to remove.

Final Work and Repair Notes.

At the conclusion of operations, after allowing plenty of time for the thorough drainage of the pipe lines, the drain stop cocks should be closed and the screw plugs taken from tees should be replaced, or pieces of sponge may be inserted in the openings instead, so that slugs, beetles, &c., may be effectually excluded.

During the processes thus outlined, note should be taken of anything necessary for placing the sanitary arrangements in first-class condition the following spring. These may consist of missing screws, washers, gaskets, plug chains, seat bumpers, fire clay, cement, putty, leather, rubber, tallow, range repairs, furnace repairs, &c. Such memoranda should be dated and filed away, to be used when opening up the dwelling for the season.

This part of the work is largely dependent for its success upon the thoroughness with which the work of closing has been done, taking care that all union couplings and range connections are made up before turning on the water supply. Throughout the work it should be borne in mind that while the amount of time consumed may possibly call forth the criticism of the owner of the dwelling, the failure to properly drain the fixtures through haste is sure to result in disaster.

Heating and Ventilation of Railroad and Other Shops.

At a recent meeting of the New York Railway Club an interesting discussion took place upon the subject of heating railway shops and other one-story buildings of the same nature. While such buildings are very simple in construction, they are not so simple as might appear in regard to the problem of effectively and efficiently distributing heat and air. On account of the large amount of roof, wall and window surface the loss of heat is very great; and also because of this and the relatively great hight of the building considered as a single room, there is a tendency toward unequal distribution of the heat, the warm air rising to the roof and the cold air flowing to the floor, where it renders the workmen uncomfortable. It is important, then, not only that a sufficient quantity of heat should be delivered to the building, but also that it should be delivered where it will do the most good.

If an attempt is made to supply the heat directly by means of steam or hot water coils the best results are not obtained. The vicinity of the coils is apt to be uncomfortably hot from the heat radiated directly therefrom, while places at a distance are disagreeably cold. The heat transmitted to the air of the room by contact and convection from the coils is largely lost, since the hot air rises vertically and imparts its warmth to the roof and skylights. It is also to be objected to this system of heating that it makes no provision whatever for ventilation, the extended system of steam or water pipes is subject to damage by freezing during the coldest weather, and steam pipes have been shown to be frequently the cause of fire where they came in direct contact with wood or other inflammable materials.

Due principally to the reasons which have been given above, the direct system of heating for work of this character is falling into disfavor, and is being superseded by the fan or hot blast system. The distribution of the air by means of pipes should be so carried out that the lower part of the room is kept at a comfortable temperature, while at the same time no disagreeable drafts are produced. It has been found that by properly proportioning and directing the delivery flues most satisfactory results can be secured. Illustrating this point some very interesting examples were cited, at the meeting mentioned above, by C. H. Gifford of the B. F. Sturtevant Company. He said:

"In the first place, if you desire air or almost any other form of gas or substance at any particular place at any particular time, the best way is to provide a suitable conduit to deliver it there, and I would add, if there is any difficulty, which there may be, by air blowing on an individual workman, it is a simple mechanical detail to rectify it, and if you are unable to predetermine where the men or machines are to be located in a building, you can simply have an adjustable discharge opening from the pipe delivering the air, and if perchance it blows upon some one, there generally is some space near the person to which the air can be directed and therefore cause no inconvenience whatever.

"As an example of what can be accomplished by distribution, I have in mind a machine shop, that of the New York Shipbuilding Company, which as a machine shop is not dissimilar to one designed for railroad work. They have a building which I believe is about 1100 feet long, about 250 feet wide and 82 feet high. The proposition was to heat one-half of this building and leave the balance of it unheated. It was a problem that came to me, and I must say that I was a little feazed at attempting to heat one end and not have any interference from the other end. We, however, conceived the idea that there could be a partition put across the middle of the building about 12 feet high, and we could then bring the heated air down to the zone which it was desired to heat, which was not over 8 feet above the floor, and in that way we could perhaps confine the air in the space and not have very much effect on the rest of the building. It was something of a speculation and rather a bold attempt, when you consider entering into a guarantee which might involve a serious loss; nevertheless it was done.

"The apparatus is arranged under the landing platforms of the gallery which surrounds the shop, so that it is out of the way of the cranes. Pipes are carried along beneath the runway of the cranes, and branches are brought down on the posts and discharge the air toward the floor, the outlet being in the form of a Y, which is adjustable.

"We were very much gratified after the plant was started to find that it performed just as it was expected it would, and it is surprising to note the difference in temperature between the two sides of that partition; it is almost the same as when you pass from the building out of doors. The result is simply due to the fact that the air was brought down and continually pressed down into the space which it was desired to heat."

Further emphasizing the advantages of correct distribution, Mr. Gifford says that it is "possible in some cases to introduce $50 worth of additional distributing pipe to carry the air where it is most needed, so that you can, on account of this, leave out $100 worth of heating apparatus. That is, you can get equal results by using smaller apparatus and less steam."

The adoption of the fan system permits the control of the heating apparatus of the ventilation. During very cold weather, or in the morning when the building is being heated up, the air supply may be drawn from within the building itself, thus effecting a great economy of heat. In some buildings having a very high cubic space per occupant sufficient ventilation during the winter time will be supplied by the leakage of air through doors and crevices about the windows, by transfusion, &c. We quote E. T. Child, also of the Sturtevant Company:

"We have found, therefore, the most satisfactory heating will result from numerous pipes discharging on the outside walls at a point about 6 to 8 feet above and directed toward the floor. These pipes should be located from 25 to 40 feet apart, depending upon the character of the building. This arrangement causes the hot air to be blown downward, whence it spreads on the floor, keeping it warm, before it has a chance to follow its natural tendency and ascend to the roof. Hot air has a very bad faculty of getting up in the trusses, and if you blow the air directly at the floor and get the floor warm, at the same time keeping the outside of the building warm, your problem is practically solved. In the case of an underground duct, it is well to use short outlet pieces which will discharge the air along the walls at the floor.

"At the works of the Fore River Ship & Engine Building Company they have an overhead pipe system with drops on the walls, which was put in according to the regular practice. Later they added 50 per cent. to the building, and are now heating it with the same apparatus. That is, we picked out a fan heater which we considered to be the proper size for that particular building, and it worked in a perfectly satisfactory manner. Later the ship company added 50 per cent. to the length of the building. We extended the piping and carried drops on the walls every 30 feet, blew the air on the floor with ample outlets on the ends, and in the coldest weather the heat of the building, which is 50 per cent. larger than we would care to guarantee with our apparatus, was perfectly satisfactory to them. Their success was entirely attributed to the excellent system of distribution for the air.

"At the shops of the Atchison, Topeka & Santa Fé Railway Company the underground system was adopted and low horizontal outlets were provided, which distribute the air at the floor and along the walls. This is an extremely large shop, the contents being about 4,000,000 or 5,000,000 cubic feet. The shop is heated by four large apparatuses, and the underground ducts extend almost entirely around the building. The pipes are not over 3 feet high, the air being discharged horizontally along the floor, and I understand that the building is very satisfactorily heated.

"The galvanized iron pipe system, with drop pipes on the walls, has been used at the new shops of the

New York, New Haven & Hartford Railroad at Readville, Mass., and with excellent results.

"The following general classification of railway shops may be made: 1. Machine, erecting and car shops; 2, paint shops; 3, roundhouses.

"The second and third require special treatment. Paint shops require to be practically dustless, and consequently the air velocities must be low. The temperature requires to be higher, and it is customary to arrange to circulate the air in a much more thorough manner than in shops of the first class.

"This is done in the Pennsylvania Railroad shops at Altoona by means of ducts and in the New Haven shops, Readville, by a similar overhead system. There has been a great deal of hesitation among railroad men about installing the hot blast apparatus in paint shops. They are afraid of getting their varnish dusty. But I might name a dozen or so paint shops all over the country; for instance, the Boston & Albany shops at Allston and the New Haven shops at Readville, and there are several Western shops, all of which are heated with the hot blast system by a very ample distribution of air. The circulation is brought about by a counter exhaust system, which circulates the air, returning the whole or a part to the apparatus. There are two ways of establishing this return of the air; one by an underground duct system and the other by an overhead galvanized system. In the Pennsylvania Railroad shops at Altoona we have an installation that has been in a dozen years—I think it is one of the first we put in—that was made by returning the air from underground and back to the fans; using very ample distribution of air pipes in the discharge.

"In the Readville shops the air is brought back by means of an overhead galvanized pipe. In this way circulation is kept up in all parts of the room and thereby the paint is dried much more rapidly than it would be by any other system, where the air in the room is practically still."

New Publications.

Reading Architects' Drawings. Size, 5½ x 7¾ inches. 28 pages. Numerous illustrations. Bound in paper covers. Published by David Williams Company, 232 to 238 William street, New York City. Price 25 cents, postpaid.

This little work is of special interest and value to the ambitious young mechanic who is desirous of making progress in whatever branch of the building business he may be engaged. It is generally recognized that the ability to read architects' drawings is a necessary part of his education, more especially if he is at all ambitious and desirous of making a reputation for himself. It is well known that more or less difficulty is experienced by the younger element in the trade in acquiring this particular knowledge, and it was with a view to meeting in some measure the requirements of those who are anxious to acquire the ability to read architects' drawings that a series of articles were presented in *Carpentry and Building*, and afterward issued in book form for better distribution among the trade.

A System of Easy Lettering. By J. Howard Cromwell. Size, 5¾ x 8 inches. 34 pages. Bound in board covers with ornamental side title. Published by Spon & Chamberlain. Price, postpaid, 50 cents.

This is a new edition of a work which will be found of special interest and value to architectural draftsmen and others desirous of acquiring a knowledge of easy lettering. The examples presented are sufficiently varied in character to meet all reasonable requirements, and the printing is such as to bring them out sharp and clear. In his brief prefatory remarks the author suggests that it is only necessary to divide, by pencil lines, any surface one may wish to letter into squares, or parallelograms, as the case may be, and then form the required letters in ink, or paint, and in accordance with the style chosen. After this has been made the pencil lines are erased and the lettering is complete.

In conjunction with the work is a "Supplement to Easy Lettering," by George Martin, consisting of eight alphabets for engineering drawings. These are presented in the same clear style as the other portions of the work, and the whole constitutes a practical guide which the draftsman cannot fail to find exceedingly useful.

Hicks Builders' Guide. By I. P. Hicks. 166 pages. Size, 5 x 7 inches. Illustrated by numerous engravings from original drawings. Bound in cloth. Published by David Williams Company, 232-238 William street, New York City. Price, $1, postpaid.

This well-known work, which has already passed through 15 editions, is now offered to carpenters, contractors and builders in revised and enlarged shape. The fact that it has reached such a large sale is convincing evidence of its popularity and of its value to those for whose edification it was originally prepared. In the sixteenth edition, which is now ready for distribution, particular attention has been given to the section devoted to estimating labor and material, which is amplified and brought up to date. The work as a whole is a comprehensive guide to those engaged in the various branches of the building trades, and in its present shape should prove more valuable than ever before. The matter has been arranged with a great deal of care and with a view to meeting the special requirements of building mechanics, while the numerous illustrations in the way of diagrams, elevations, sections, plans, &c., greatly assist in the elucidation of the problems presented. The book is carefully indexed alphabetically, thus greatly facilitating reference.

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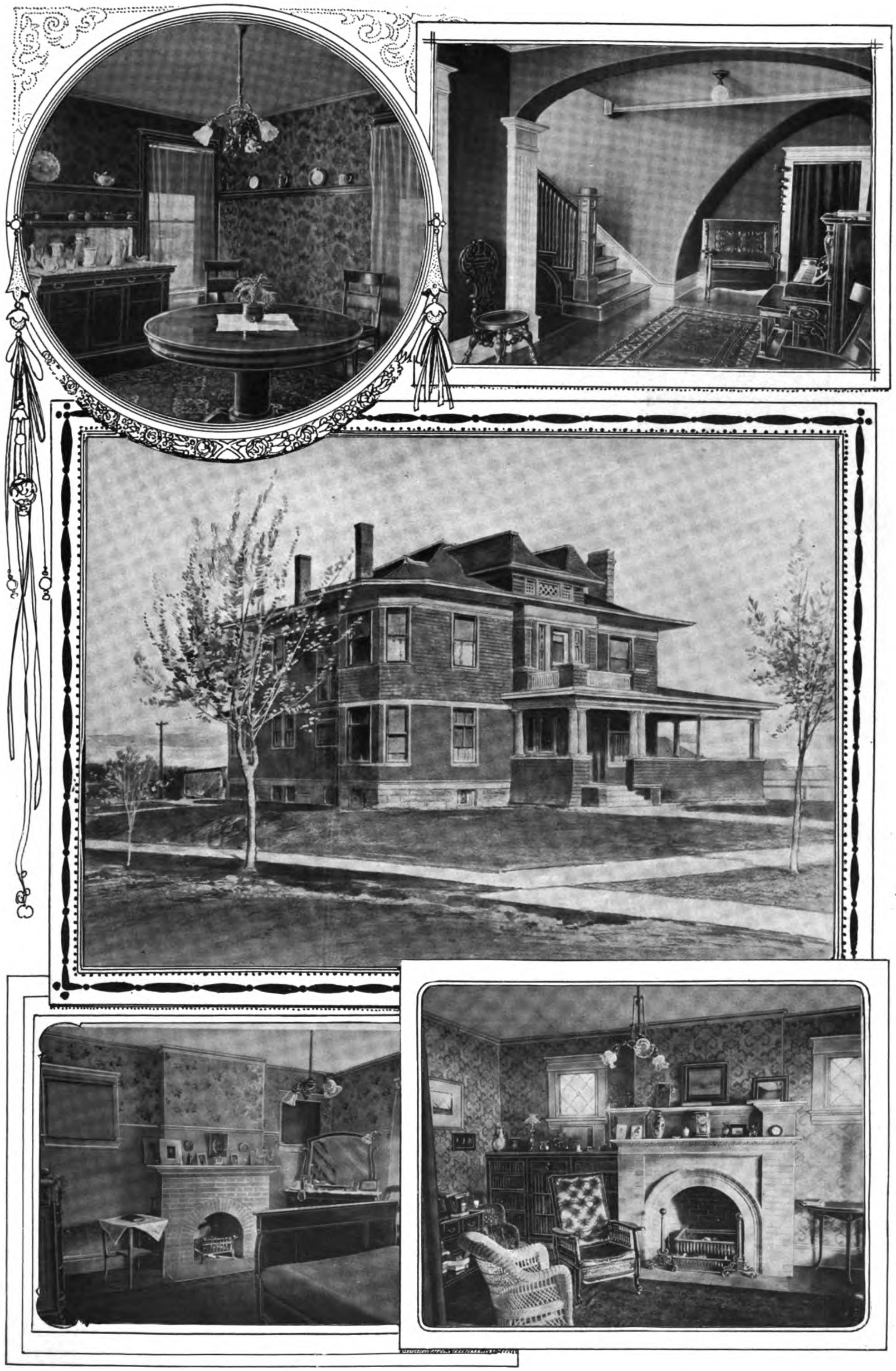
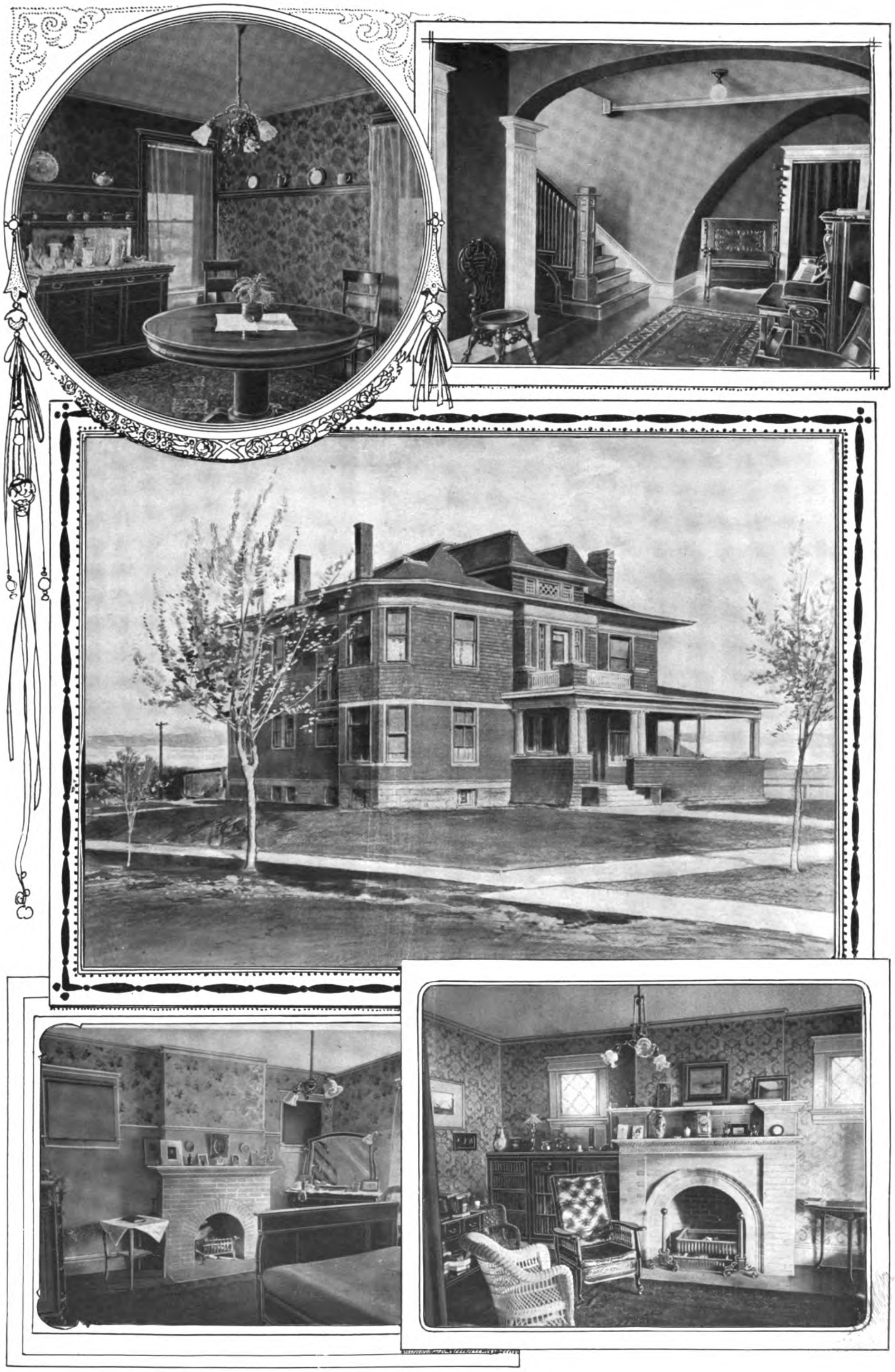


RESIDENCE OF MR. HARRY P. GAMBLE, IN BOULDER, COLORADO.

WATSON VERNON, ARCHITECT.



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CARPENTRY AND BUILDING

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DECEMBER, 1903.

Heating by Electricity.

It has been the custom of the daily press for several years to pay special attention to any attempt to heat buildings by means of electricity. There can be no doubt that the adoption of electricity has been a great convenience in many fields, and it has been used with advantage in many instances where the convenience has been sufficient to warrant the increased cost. Whenever the subject of heating buildings with electricity comes up, however, no preponderating advantages being advanced in favor of that medium, the question of cost must be closely considered. In some cases, where water power has been leased to electrical companies, a portion of the rental has been paid in electricity used for heating buildings conveniently located. In other instances portions of buildings used in connection with trolley car systems have been heated by electricity, where the care of a fire would cost more than the increased cost of electricity over other fuels. Occasionally, too, some building, used as a pleasure resort or for advertising purposes, has been equipped with an electrical heating system, or the residence of some officer of an electrical company is heated with electricity, for reasons not related to economy. Progress has been shown in the construction of electrical radiators, so that a radiator may be used here and there in some establishments that could by no means bear the expense of being heated throughout with electrical radiators. As yet the cost of producing electricity has not been brought down to a point where it can compete with coal burning heating apparatus. In fact, the exhaust steam from plants generating electricity can be, and is, used for heating water to be circulated through apparatus in the houses and buildings to be heated, with decided benefit to all concerned. Such a method of heating is an indirect result of the electrical plant and can be successfully used in competition with coal burning apparatus, while freeing the occupants from the annoyance of handling coal and ashes and caring for the fire. While the electrical heating of buildings is undoubtedly approaching, the medium is not yet available for general, or even occasional, use in competition with coal burning apparatus on economical grounds.

Conveniences of the Modern Flat.

The increasing popularity of flat life in our cities is very marked, and whereas a few years ago the system prevailed only in New York and a few of the larger cities, it has now spread to communities in which it was formerly quite unknown. Whether the growth of this modern style of living is an unmixed benefit is open to doubt, especially from the point of view of family life. But its convenience and economy are not to be questioned. The demand for apartments in New York City this last fall, according to real estate men and agents, was unprecedented, and far exceeded the supply. The reason is found largely, no doubt, in the fact that while the population of the city has been rapidly growing there has been a heavy falling off in the number of flat buildings erected the past year or two, creating in a sense a scarcity of accommodations of this nature. The reason flat life is in a sense becoming more popular is due to the many conveniences offered. For example, a young couple or a small family, who go to housekeeping on limited means, find in the present day flat well equipped apartments in which nearly every modern convenience is provided at a cost which is more economical than hiring a separate house. In most of the better kind of New York City flats built within the past few years the tenant is furnished with gas range and warming closet, stationary tubs, refrigerator, window shades, screens, built-in china closets, folding table in the kitchen and other desirable accessories and furnishings which would formerly have had to be purchased. Steam or hot water heating and a constant supply of hot water from a central heating system are quite commonly furnished. So that, although paying, perhaps, a slightly higher sum than was paid for apartments of former years, the ultimate cost is not greater, while the comfort and convenience secured are immeasurably superior. The saving of steps to the housekeeper and the satisfaction of being able to lock up the apartment at any time and go away for a few hours or days at a time without the necessity of elaborate preparations for the care of the home during the absence of the tenants make the attractions of flat life very intelligible. It seems inevitable that this way of living will become more and more common in all our cities. As to its effect upon future generations, that, as Kipling would say, is "another story."

A Phase of Union Labor.*

The conviction, for the second time, of Sam Parks, the notorious walking delegate of the Housesmiths' and Bridgemen's Union of New York City, on a charge of extortion, should be a cause of satisfaction to union labor men, as removing from influence in their councils one who has done more to discredit trade unionism in the public estimation than almost any other so-called labor leader. The harm done by Parks and his supporters in holding up the building industry in New York City for a whole season is incalculable. Not only has immense loss been inflicted upon capital and serious inconvenience upon a large portion of the community, but widespread suffering has been brought on workingmen and those depending upon them, through loss of a whole season's wages, a loss which is practically irretrievable. Many a mechanic's family will feel the pinch of want this winter, as a result of the mistaken loyalty which led the family's bread winner to obey the behests of a corrupt and overbearing leader. The baneful influence of Parks and his methods has been very widespread. The tie up of building operations has affected many industries more or less directly connected with the building trades. The steel industry, for example, has been hard hit by the restriction in the consumption of structural material, and from that great interest down to the small storekeepers, who depended upon the earnings of the workingmen for their trade, the effect is felt with more or less severity. But while Parks himself, as a factor in the situation, may be considered as eliminated, it is to be feared that there is still some survival of the Parks spirit which will need to be suppressed before public confidence can be given in full measure to organized labor. There is no doubt that public opinion is fast turning from that phase of union labor which is represented by unjustifiable strikes, accompanied by intimidation and the spirit of proscription which denies the right to work to a nonunion man. The formation of leagues of employers to protect themselves against some of the exorbitant and unreasonable demands of union labor ought to be sufficient warning to the leaders that the time for force and intimidation is passing away. Moreover, they should remember that the present era of prosperity and full employment of labor cannot last indefinitely, and that such times as have been experienced in the past must, in the nature of things, come again, when employment is scarce and the unemployed are many, and when the question with the workingman will be that of work rather than of membership in a union.

Convention of Ohio State Association of Builders' Exchanges.

The third annual convention of the Ohio State Association of Builders' Exchanges was held at Zanesville, Ohio, on October 28 and 29, there being present delegates to the number of about 150, representing exchanges in Cleveland, Toledo, Columbus, Youngstown, Newark, Zanesville, and other cities of the State. The sessions were held in the rooms of the Zanesville Exchange in the People's Savings Bank Building.

The first session was called to order on the morning of October 28 by President F. O. Schoedinger of Columbus. The time was occupied with the presentation of reports of officers, including the president's annual address, followed by a paper prepared by Attorney Charles J. Pretzman of Columbus, on "Some Plain Facts About Liens." The afternoon of that day was given over to sight seeing and to a boat ride on the Muskingum River, while in the evening a symposium was held at the Masonic Temple, at which the different exchanges reported on "What We Are Doing." A feature of the evening was a ball given in honor of the officers.

The opening session on the second day was devoted almost exclusively to the consideration of the labor situation throughout the State. Papers bearing on the relation of employer and employee were read by several of those present. Mayor Robert H. Jeffrey of Columbus spoke on "The Ideal Employer and the Ideal Employee." F. H. Weeks of Akron, vice-president of the Akron Employers' Association, discussed "The Need of Employers' Organizations to Handle Labor Matters," while William H. Hunt, president of the Cleveland Builders' Exchange and vice-president of the Cleveland Branch of the National Civic Federation, presented some very interesting thoughts on "The Civic Federation in Cleveland." The discussion on this subject brought out many points which were of special value and interest to the building trades in the State. Addresses were also made by J. H. Evans of Zanesville on "The Water Ways of Ohio and Their Relation to the Builders and Buildings," and by Fred. Weadon of Columbus on "The New Building Laws Being Framed for Ohio Cities."

The officers elected for the ensuing year were:

President, F. H. Weeks, Akron, Ohio.

First Vice-President, R. L. Queisser, Zanesville, Ohio.

Second Vice-President, R. S. Watson, Columbus, Ohio.

Third Vice-President, William H. Hattersley, Toledo, Ohio.

Secretary-Treasurer, Edward A. Roberts, Cleveland, Ohio.

The following resolutions were adopted by the convention on the labor question:

The Ohio State Association of Builders' Exchanges, realizing the serious effects upon the building industry of the State from constantly recurring labor troubles, declares as follows:

This association reaffirms and adopts as its fixed policy the principles of the National Association of Builders "that absolute personal independence of the individual to work or not to work, to employ or not to employ, is a fundamental principle which should never be questioned or assailed; that upon it depends the security of our whole social fabric and business prosperity, and that employers and workmen should be equally interested in its defense and preservation."

In addition to the foregoing we assert the right of individual trades to deal directly with their workmen upon the question of wages and other conditions of employment without interference or dictation from any individuals or organizations not directly parties to this agreement.

No person should be refused employment, or in any way discriminated against on account of membership or nonmembership in any labor organization, and there should be no discrimination against or interference with any employee who is not a member of a labor organization by members of such organizations.

While this association is not opposed to organizations of labor along legitimate lines, it is decidedly opposed to the boycott, the sympathetic strike, and any and all forms of personal intimidation.

This association declares its opposition to the restriction of the opportunities for young men to learn a trade, the rules of apprenticeship being in some of the trades now almost prohibitive, and reducing to an unwarranted extent the supply of skilled craftsmen.

Residence in the "Mission" Style of Architecture.

(With Supplemental Plate.)

A feature of the current issue of the paper which is likely to interest many readers, more especially among the architectural fraternity, is the striking example of the prevailing tendency in exterior treatment for residences on the Pacific Coast which forms the basis of one of our half-tone plates. It is known as the "Mission" style, and offers opportunity for the exercise of the skill of the architect in an unusual degree.

The residence which we show is situated in West Lake Park, Los Angeles, Cal., and is a fair example of a type of architecture which is now very much used in that section. The house was designed by E. Neisser, architect, of 253 South Broadway, Los Angeles.

An interesting example of portable building construction is the church or chapel which has just been completed by the New York Presbytery at the corner of Home street and Intervale avenue, in the Borough of the Bronx, Greater New York. The building is 55 feet in length, 25 feet in width and 20 feet in hight, and is said to have a capacity for seating about 200 people. The roof is made of asbestos and the building of yellow pine. Its different sections are firmly bolted together, there being neither nail nor screw in its construction. We understand that the reason a portable structure was erected, instead of a permanent one, was due to the fact that the Church Committee does not hold title to the land upon which the building stands and could not find any other site in a vicinity so favorable for the planting of its new mission work.

THE United States Civil Service Commission at Washington, D. C., announces that on December 9 and 10 of the present year an examination will be held in the principal cities of the country to secure eligibles from each to fill a vacancy in the position of architectural draftsman in the Philippine service, at $1400 per annum, and other similar vacancies as they may occur in that service. The examination will deal with building materials and construction, free hand drawing and projections, architectural drawing and architectural training and experience.

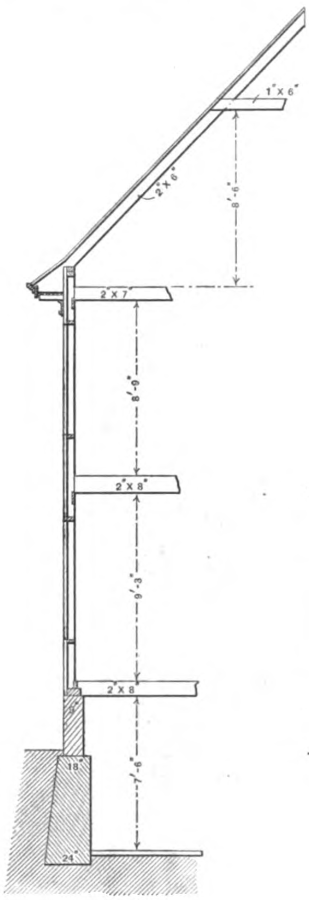
THE new buildings which are to be erected for the William Smith College for Women, at Geneva, N. Y., will consist of three four-story structures of steel frame construction, with pressed brick and granite facings; an administration building; an educational building, and a residence pavilion, all to cost $310,000. The contract for the work has recently been awarded to S. H. Woodruff, contracting architect, of Buffalo, N. Y.

AMONG the features of interest at the fair to be held at St. Louis next year will be a reproduction by the Betsey Ross Memorial Association of the house in which the American flag was born, and which still stands in the city of Philadelphia.

A FRAME HOUSE AT WORCESTER, MASS.

We have taken for the subject of one of our half-tone supplemental plates this month a frame residence of nine rooms recently erected on Stoneland Road, Worcester, Mass., for Fred. A. Moore. The plate shows two views of the house, and gives the reader an excellent idea of the external architectural features. Noticeable among the latter is the large veranda, extending entirely across the front of the house and around on the side as far as the bay window of the sitting room. The plans which are here presented show the interior arrangement, while the details indicate the construction employed. On the first floor are parlor, sitting room, dining room and kitchen, connection between the latter being established by means of a commodious pantry. On the second floor are four sleeping rooms, the front one having opening out of it a dressing room. The bathroom is located toward the rear of the house and in such a position that the plumbing fixtures are concentrated. There is one room with closet in the attic, and the remaining portion of the space is floored over, but not finished, providing for at least two more apartments, if desired.

The basement of the house is concreted, and contains laundry with set tubs, a water closet, coal bins and a fruit and vegetable cellar. Access from the outside is secured through a bulkhead. The foundation walls of stone are 24 inches thick at the bottom and 18 inches at the top, laid up dry and flush pointed inside. The underpinning is of brick 9 inches thick from grade to sills. The cellar floor has a foundation of cobblestone and tar, covered with tar concrete 2 inches thick, well rolled. All parts where finished are lathed and plastered with one coat of good plastering mortar. The fire place has tile facings and hearth and iron linings.



Section.

Front Elevation.—Scale, 1/8 Inch to the Foot.

A Frame House at Worcester, Mass.—John P. Kingston, Architect.

The framing and dimension timber is of spruce, the joist being bridged between bearings, also the main partitions. The roof is covered with 7/8-inch hemlock boards laid open, while the side walls are covered with matched spruce boards, on which is placed a good quality of sheathing paper. The first story has 6-inch spruce clapboards laid 4½ inches to the weather, while all of the second story, as well as the dormers, gables, &c., as shown on the elevations, are covered with 16-inch cedar shingles laid 5 inches to the weather. The roof is covered with 16-inch cedar shingles laid 4½ inches to the weather, and those of the piazza roof 4½ inches to the weather. The front veranda and rear porch have floors of hard pine not more than 6 inches wide. All exterior finish is either pine or cypress, and with the clapboards is painted two coats, while the shingles are stained.

The top floor in the front halls of the first and second stories, as well as in the sitting and dining rooms, kitchen, bathroom, rear entrance and pantry is of matched birch flooring 2½ inches wide, blind nailed. The floors in the halls, sitting and dining rooms are treated with a coat of shellac and two coats of wax well rubbed on, while the others have a coat of oil and turpentine followed by a coat of floor finishing varnish. The other top floors in the house are all pine.

The finish in the hall on both floors, the parlor, the sitting and dining rooms, including china closet, and all parts of the stairs, is in even colored cypress with doors to match, being treated with one coat of shellac and two coats of varnish. The second floor and attic are finished in white wood with two coats of paint. The kitchen, pantry and entry are in North Carolina pine, shellaced and varnished.

All plumbing fixtures are finished open and all exposed parts are nickel plated. The house is heated with steam, furnished from a Williams boiler made in Worcester. The house is piped for gas and wired for electric lighting.

The dwelling here shown was erected in accordance with plans and specifications drawn by John P. Kingston, architect, of 518 Main street, Worcester, Mass.

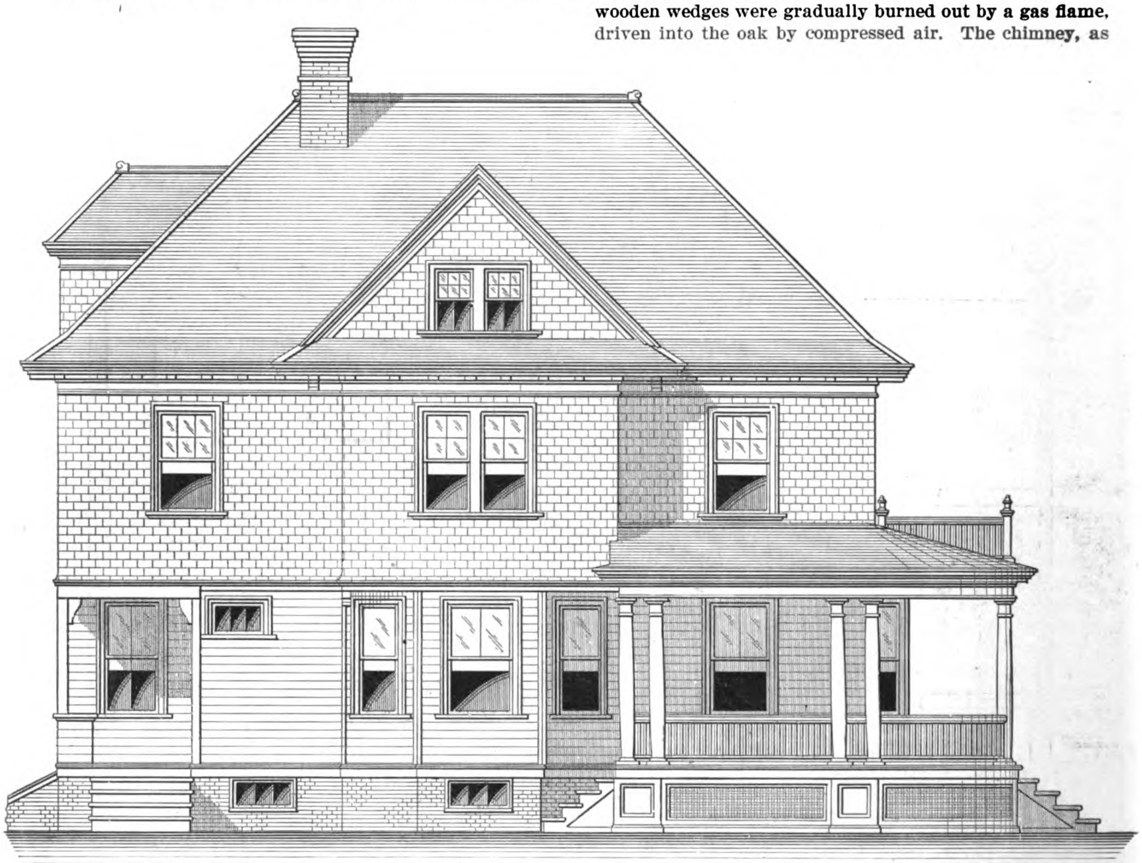
Straightening a Factory Chimney.

The ingenuity of the engineer, with whatever profession he may be identified, is frequently called into play in solving problems of a more or less complicated nature. An instance of this kind occurred a few weeks ago in connection with a chimney 192 feet in hight that was out of plumb by reason of the settling of the foundations, and the problem was to straighten it. The chimney is located at the plant of the Narragansett Brewing Company in Cranston, R. I., and last winter when the foundations were laid it was supposed that the ground was solid. The site of the chimney is near a pond, and it is thought that the action of the water weakened the east side of the foundation. When the chimney was partly built there were signs of settling, and soon after the laying of the last brick the tall column leaned toward the east a distance of nearly 4 feet. No instrument was needed to show that the chimney was badly out of plumb, and it was obvious that in time it would fall, as the soil was clearly incapable of carrying the load.

The company which erected the chimney had no desire to take the responsibility of straightening it, and Joseph H. Gerhard, civil engineer, of Providence, announced his willingness to take the chances of failure. The plan devised by Mr. Gerhard was simple, but patience and judgment were required to carry it to completion, and the results are very creditable to all engaged in the delicate undertaking.

One course of bricks, three-fourths of the way through the chimney, was removed from the west side. Wedges of oak were driven into the space occupied by the bricks. On the east side a bed of concrete 8 feet thick and having an area of 10 x 25 feet, was laid against the foundation. When the earth was removed a strong spring was tapped; the flow of water was at the rate of 10,000 gallons an hour, and the pumps available at short notice were insufficient to keep the excavation dry. Apprehending that the flow of water might further undermine the concrete supporting the chimney, the engineer discontinued effort to divert the flow and proceeded to bury the spring under concrete.

Two holes were cut into the east side of the chimney; and in these holes 20 2-inch steel beams 25 feet long were inserted, the outer ends of the beams, and the leverage was sufficient to tip the chimney toward the west, as the wooden wedges were gradually burned out by a gas flame, driven into the oak by compressed air. The chimney, as the wood was burned away, gradually approached a perpendicular line, the movement averaging about 6 inches a day. When the chimney was straight concrete was filled into the space occupied by the brick and the steel beams were buried in concrete after the removal of the jack screws to protect the metal from corrosion.



A Frame House at Worcester, Mass.—Side (Left) Elevation.—Scale, 1/8 Inch to the Foot.

ACCORDING to current reports, it is the intention of the Tribune Association to erect a 19-story structure on land which they have recently acquired, and they will add nine stories to their present structure, at the corner of Nassau and Spruce streets, New York City. The Tribune Building, as it stands to-day, comprises the original structure erected in 1872 and 1873, and covers an area of a trifle over 4500 square feet with an annex, built in 1881, covering an area of 5895 square feet. The additional land which has been acquired has an area of 6338 square feet, so that the total area of the structure, when the addition is erected, will aggregate 16,757 square feet.

Growth of Brotherhood of Carpenters and Joiners.

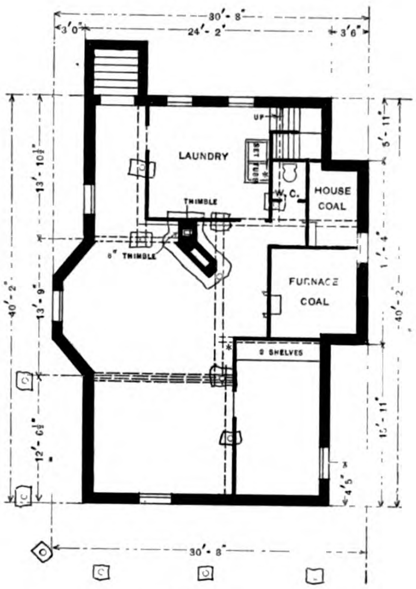
According to the figures contained in a statement issued from the international office, the carpenters' is now the third largest international trades union in point of membership, having 167,229 members. When the Amalgamated Carpenters' Union is included, in accordance with the arrangement going into effect January 1, 1905, and some sort of a combination has been effected with the Wood Workers' International Union, the organization will be the second in point of membership, and may even exceed the United Mine Workers' Union, which has 388,000 members.

From 12 local unions, with a membership of 2042, which met at Chicago in 1881 and formed the International Brotherhood, the carpenters have grown to 1696 local unions, with a total membership on July 1 of the present year of 167,229 members. Of the local unions 59 are composed entirely of shop and mill hands.

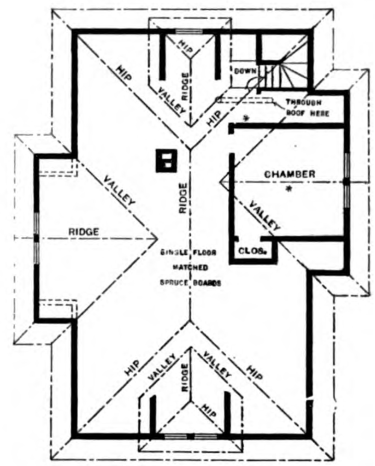
During the past year the unions in 425 towns made demands for better wages or conditions, and 98 per cent. of the demands were granted. In its existence the brotherhood, according to the statement in question, has raised the wages from $2 a day for ten or more hours' work to from $2.75 to $5 a day, in different sections of the country for an eight or nine hour day. In no place do carpenters work more than nine hours for a regular day's pay. In 340 cities and towns and districts the eight-hour day is established. This includes every large city. In 600 districts the hours are still nine a day.

The brotherhood has a benefit system, paying sick, strike, death and disability benefits, these latter ranging from $100 to $400, according to length of membership or extent of disability, and also a benefit to a member on the death of his wife. In death and disability benefits the brotherhood has paid $941,325.31. It has made donations, as an international body, aggregating $200,000, to assist other organizations on strike, of which $40,000 was donated to the miners last year.

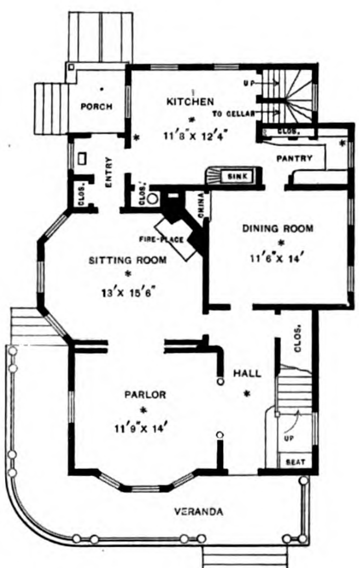
The brotherhood's present financial holdings are reported as $740,727.18 in the general defense and other funds, $270,000 in real estate investment for the same funds, and $18,200 in other sums, all aggregating $1,028,927.18. It is estimated that the local unions have an aggregate of several millions in their treasuries.



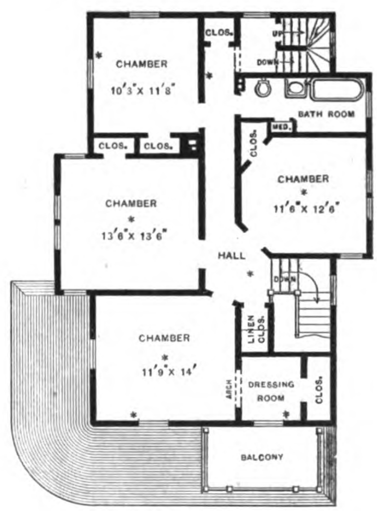
Foundation.



Attic and Outlines of Roof.

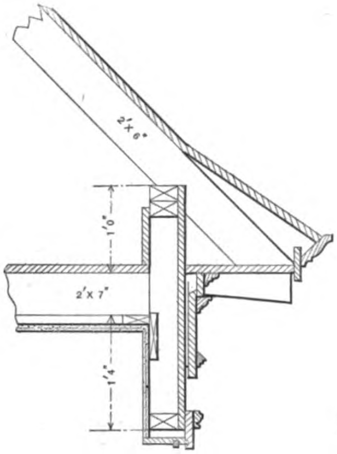


First Floor.

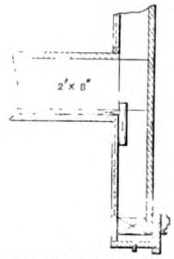


Second Floor.

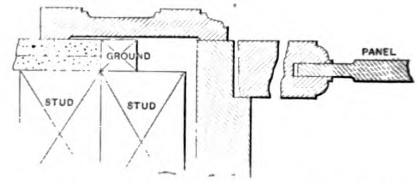
A Frame House at Worcester, Mass.—Floor Plans.—Scale, 1-16 Inch to the Foot.



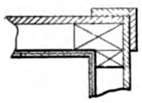
Details of Main Cornice.—Scale, ½ Inch to the Foot.

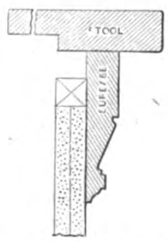


Section at Second Floor.—Scale, ½ Inch to the Foot.

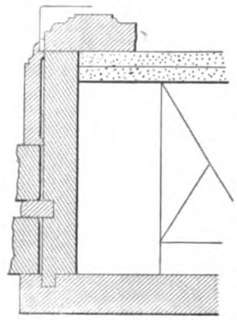


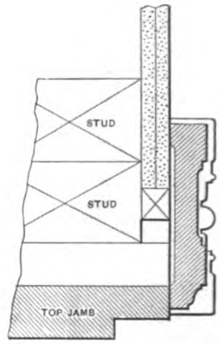
Details of Door Frame and Finish in Front Hall, Parlor and Sitting Room.—Scale, 3 Inches to the Foot.


Section Showing Corner Construction. — Scale, ½ Inch to the Foot.

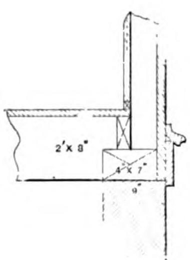


Window Stool and Apron.—Scale, 3 Inches to the Foot.

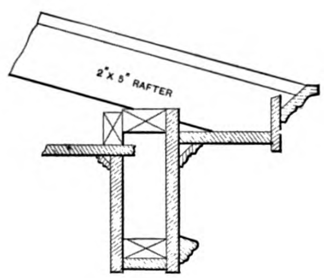

Horizontal Section through Window Frame.—Scale, 3 Inches to the Foot.



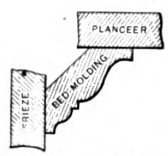
Head Casing, Showing Finish in Parlor, Front Hall and Sitting Room. — Scale, 3 Inches to the Foot.



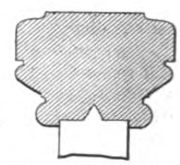
Detail of Water Table.—Scale, ½ Inch to the Foot.

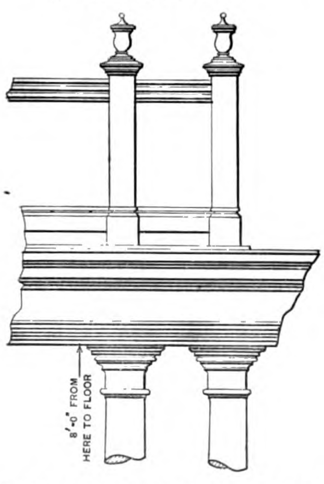


Porch Cornice.—Scale, ¾ Inch to the Foot.

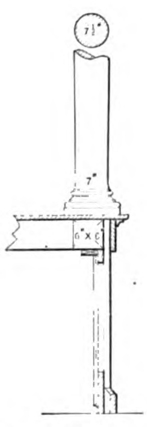


Section of Bed Molding of Cornice.—Scale, 3 Inches to the Foot.

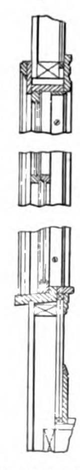

Section of Hand Rail.—Scale, 3 Inches to the Foot.

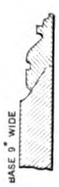


Partial Elevation of Railing and Cornice Over Front Veranda.—Scale, ⅜ Inch to the Foot.

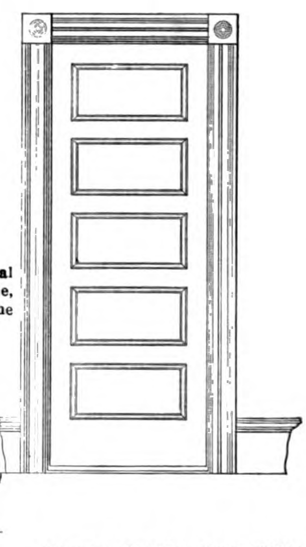


Details of Porch Column.—Scale, ⅜ Inch to the Foot.


Section of Window Finish.—Scale, ⅜ Inch to the Foot.



Base in Principal Rooms.—Scale, 3 Inches to the Foot.


Elevation Showing Door Finish.—Scale, ⅜ Inch to the Foot.

Miscellaneous Constructive Details of Frame House at Worcester, Mass.

USE OF CONCRETE-STEEL CONSTRUCTION IN NEW YORK.

THE increasing use of reinforced concrete-steel construction throughout the United States and elsewhere has excited no little interest on the part of the architectural profession, and has led the Bureau of Buildings of the Borough of Manhattan, Greater New York, to issue under date of September 9 of the present year a series of regulations for this class of work, reading as follows:

1. The term "concrete-steel" in these regulations shall be understood to mean an approved concrete mixture reinforced by steel of any shape, so combined that the steel will take up the tensional stresses and assist in the resistance to shear.

2. Concrete-steel construction will be approved only for buildings which are not required to be fireproof by the Building Code, unless satisfactory fire and water tests shall have been made under the supervision of this bureau. Such tests shall be made in accordance with the regulations fixed by this bureau and conducted as nearly as practicable in the same manner as prescribed for fireproof floor fillings in Section 106 of the Building Code. Each company offering a system of concrete-steel construction for fireproof buildings must submit such construction to a fire and water test.

3. Before permission to erect any concrete-steel structure is issued complete drawings and specifications must be filed with the Superintendent of Buildings, showing all details of the construction, the size and position of all reinforcing rods, stirrups, &c., and giving the composition of the concrete.

4. The execution of work shall be confided to workmen who shall be under the control of a competent foreman or superintendent.

5. The concrete must be mixed in the proportions of one of cement, two of sand and four of stone or gravel; or the proportions may be such that the resistance of the concrete to crushing shall not be less than 2000 pounds per square inch after hardening for 28 days. The tests to determine this value must be made under the direction of the Superintendent of Buildings. The concrete used in concrete-steel construction must be what is usually known as a "wet" mixture.

6. Only high grade Portland cements shall be permitted in concrete-steel construction. Such cements, when tested neat, shall, after one day in air, develop a tensile strength of at least 300 pounds per square inch; and after one day in air and six days in water shall develop a tensile strength of at least 500 pounds per square inch; and after one day in air and 27 days in water shall develop a tensile strength of at least 600 pounds per square inch. Other tests, as to fineness, constancy of volume, &c., made in accordance with the standard method prescribed by the American Society of Civil Engineers' Committee, may from time to time be prescribed by the Superintendent of Buildings.

7. The sand to be used must be clean, sharp, grit sand, free from loam or dirt, and shall not be finer than the standard sample of the Bureau of Buildings.

8. The stone used in the concrete shall be a clean, broken trap rock, or gravel, of a size that will pass through a ¾-inch ring. In case it is desired to use any other material or other kind of stone than that specified, samples of same must first be submitted to and approved by the Superintendent of Buildings.

9. The steel shall meet the requirements of Section 21 of the Building Code.

10. Concrete-steel shall be so designed that the stresses in the concrete and the steel shall not exceed the following limits:

	Pounds per square inch.
Extreme fiber stress on concrete in compression	500
Shearing stress in concrete	50
Concrete in direct compression	350
Tensile stress in steel	16,000
Shearing stress in steel	10,000

11. The adhesion of concrete to steel shall be assumed to be not greater than the shearing strength of the concrete.

12. The ratio of the moduli of elasticity of concrete and steel shall be taken as 1 to 12.

13. The following assumption shall guide in the determination of the bending moments due to the external forces: Beams and girders shall be considered as simply supported at the ends, no allowance being made for the continuous construction over supports. Floor plates, when constructed continuous and when provided with reinforcement at top of plate over the supports, may be treated as continuous beams, the bending moment for uniformly distributed loads being taken at not less than $\frac{WL}{10}$; the bending moment may be taken as $\frac{WL}{20}$ in the case of square floor plates which are reinforced in both directions and supported on all sides. The floor plate to the extent of not more than ten times the width of any beam or girder may be taken as part of that beam or girder in computing its moment of resistance.

14. The moment of resistance of any concrete-steel construction under transverse loads shall be determined by formulas based on the following assumptions:

a. The bond between the concrete and steel is sufficient to make the two materials act together as a homogeneous solid.

b. The strain in any fibre is directly proportionate to the distance of that fiber from the neutral axis.

c. The modulus of elasticity of the concrete remains constant within the limits of the working stresses fixed in these regulations.

From these assumptions it follows that the stress in any fiber is directly proportionate to the distance of that fiber from the neutral axis.

The tensile strength of the concrete shall not be considered.

15. When the shearing stresses developed in any part of a construction exceed the safe working strength concrete, as fixed in these regulations, a sufficient amount of steel shall be introduced in such a position that the deficiency in the resistance to shear is overcome.

16. When the safe limit of adhesion between the concrete and steel is exceeded, some provision must be made for transmitting the strength of the steel to the concrete.

17. Concrete-steel may be used for columns in which the ratio of length to least side or diameter does not exceed 12. The reinforcing rods must be tied together at intervals of not more than the least side or diameter of the column.

18. The contractor must be prepared to make load tests on any portion of a concrete-steel construction, within a reasonable time after erection, as often as may be required by the Superintendent of Buildings. The tests must show that the construction will sustain a load of three times that for which it is designed without any sign of failure.

Approved September 9, 1903.

HENRY S. THOMPSON,
Superintendent of Buildings, for the Borough of Manhattan.

Carpenters' Associations to Unite.

According to the reports of Adolph Strausser of Buffalo, the umpire to whom was left the question of the amalgamation of the two national organizations of carpenters, the United Brotherhood of Carpenters and Joiners of America and the Amalgamated Society of Carpenters and Joiners are to be merged into one national organization on January 1, 1905. The new organization is to take the name of the brotherhood, and the general secretary of the American District of the Amalgamated Society will for three years after January 1, 1905, be assistant secretary of the new organization. The other amalgamated society officers will retire, and unions of the amalgamated society will be granted new charters free. If there are less than ten members in any amalgamated union, they shall join the new organization individually.

A temporary trade agreement for the year 1904, commencing January 1, is provided by which each organization shall recognize cards from the other.

Convention of American Institute of Architects.

The American Institute of Architects held their thirty-seventh annual convention in the city of Cleveland on October 15, 16 and 17, in accordance with the programme announced in our last issue. There were about 150 delegates present, many of them architects of national prominence, and the gathering was one of the most successful which the association ever held. It was particularly gratifying to many that the meeting was in Cleveland, as it gave them the opportunity to study the group plan of the public buildings of the city, which has been under consideration for some time past, and a report concerning which has recently been made by the committee appointed for the purpose. The group plans were on exhibition, and were carefully explained to the delegates by some of the members of the committee having the matter in charge.

The opening session was held in the Assembly Room of the Hollenden Hotel, Thursday morning, October 16, President Charles F. McKim occupying the chair. His opening address was received with close attention on the part of those present, and in the course of his remarks he paid a tribute to the progressiveness of Cleveland. His address was followed by the reading of various reports of officers and committees, which fully occupied the rest of the forenoon.

After luncheon, which was served in the banquet hall to the delegates and the lady guests, a ride was taken through the city's parks and over the famous boulevards. In the evening some of the papers announced on the programme was read and discussed, these embracing "The Necessity for Trained Men in Future Artistic Productions," by W. A. Boring of New York; "The Advantages of the School of Rome for the Study of Mural Painting," by John La Farge; "Rome as a Place of Schooling for a Decorative Painter," by Edgar V. Skeeler of Philadelphia, Pa., and "The Significance of Rome to the American Architectural Student," by Austin W. Lord.

The session of the second day was devoted almost exclusively to the study of Cleveland's group plan, and after a thorough discussion of the matter and an examination of the models exhibited, Langford Warren, Professor of Architecture at Harvard, presented a resolution expressing appreciation and approval of the work of the survey and supervising boards by the institute and commending the public spirit of Cleveland in accepting the group plan as the most modern and sensible method of erecting and placing its public buildings. The members also discussed the rearrangement of the schedule of minimum fees for members of the institute, the changes, however, being of a minor nature.

In the afternoon the lady guests were entertained by a theater party, and in the evening the visiting architects were the guests of the Cleveland Chapter at a banquet at the Century Club rooms, W. R. Watterson, president of the local chapter, acting as toastmaster.

On Saturday morning a brief session was held, the only business of importance being the election of officers, which resulted as follows:

President, W. S. Eames of St. Louis.

First Vice-President, Frank Miles Day of Philadelphia.

Second Vice-President, W. A. Boring of New York.

Secretary, Glenn Brown of Washington, D. C.

Directors: R. D. Andrews of Boston, E. B. Green of Buffalo and C. F. McKim of New York.

It was decided to hold a special meeting of the convention at St. Louis next year, owing to the presence there of the Louisiana Purchase Exposition, but the regular annual meeting of the institute will be held at Washington next fall.

The report of the Labor Department of the British Board of Trade on strikes and lockouts and on conciliation and arbitration for the year 1902, which has just been published, shows that the number of disputes reported—462—was smaller last year than in any of the preceding years, although the number of persons involved in such disputes was larger. Only about one-half the disputes related to questions of wages and a considerably smaller proportion to hours of work. A large number of the troubles recorded arose out of refusals of union workmen to work with nonunion men, and other questions of trade union principles. One striking feature of the report is the evidence that the results obtained by the conciliation and arbitration boards were comparatively small, the disputes settled by conciliation affecting only 2.78 per cent. of the workmen engaged, and those settled by arbitration only 1.75 per cent. In nearly all these cases the disputes were settled through compromises on both sides. The number of strikes and lockouts recorded last year in Great Britain was comparatively small, as compared with the record of such labor troubles in this country. This is accounted for mainly by the fact that in Great Britain the sympathetic strike, which has been such an important factor in the labor situation in this country, is almost entirely absent, as is the boycott which has prevailed to an unfortunate extent in a number of labor disputes here in recent years. The sympathetic strike and the boycott alike seem to be discouraged by the trades unions on the other side.

Small Gas Engines.

The gas engine is being installed in a great many small shops which formerly used steam as motive power, and this with very high priced gas, $1.25 per thousand feet. Either the boilers have given out, or the engines; sometimes coal is too dear. Whatever the particular reason may be, the gas engine is doing the work that steam did with entire satisfaction and marked economy. Its mechanism is simpler than that of the steam engine and is readily comprehended in its management by persons of ordinary intelligence. The economy of gas engines varies greatly, being governed wholly by the price of gas. With natural gas at 10 cents per thousand feet, producer gas at 50 cents and illuminating gas at whatever companies choose to sell it for, gas engines are still much cheaper to run than steam engines, and there is no question but that they are making great inroads on the small engine and boiler business. It is said to be possible to get 1 horse-power from 1 pound of coal reduced to gas, but steam engines are doing well when they produce 1 horse-power from three times that amount of coal. The gas engine of the future, however, will materially reduce the consumption of coal, or gas, which is the same thing, for there are material losses in it, due to phenomena not yet fully understood. Mr. Grover, an English gas engineer, made some experiments recently to measure the actual and theoretic efficiencies of gas engines and finds that there are great discrepancies between what is theoretically possible and the gauge pressures registered in the cylinders direct with different volumes of gas and air. In a ratio of gas to air of 15 to 1 it was found that the observed pressure was 31 pounds absolute—that is, above the atmospheric pressure—while the theoretically possible pressure is 73 pounds; with a ratio of 10 gas to 1 air the observed pressure was 63 pounds absolute against 92 pounds calculated; at a ratio of 6 to 1, air to gas, the pressure upon explosion was 77 pounds absolute, while the calculated pressure should have been 119 pounds. This loss of efficiency has proven a puzzle to investigators, and they account for it by various speculations, such as thin films of water on the cylinder walls, absorption of the heat of explosion by the metallic portions exposed to the inflammation of the gas and losses directly attributable to the water jackets. If heat is a mode of motion, as an English scientist holds, then the gas engine is most wasteful; a gas engine of 35 horse-power known to the writer discharges at each exhaust a tremendous volume of heat, quite sufficient to do a great deal of work elsewhere; that this work should be done in the cylinder goes without saying. The report made by the exhaust is like that of a small cannon, showing that for some cause or another a large part of the energy of the explosion is dissipated on the air. This engine has the reputation of being a superior one of its class, but that there is room for further improvement is apparent.

JOINTS IN SCISSORS TRUSSES.

BY F. E. KIDDER, CONSULTING ARCHITECT.

IN the issues of this journal for April, May and June, 1902, the writer showed how the joints in the more common forms of trusses should be made, and gave rules for determining the size of the bolts and straps. At that time the writer promised an article on the joints in scissors trusses, which has been delayed until now on account of urgent demands upon his time.

Scissors trusses are a distinct type of truss, and the joints in these trusses, because of the inclination of the members, differ from those in almost all other forms.

The typical forms of scissors trusses, and the way in which they are strained were described by the writer in *Carpentry and Building* for November, 1900. The scissors truss is susceptible to great variations, but the joints are similar in all of them. Some of the joints are very easy to make, but there are always two, and sometimes three or four, which in trusses of wide span, or in trusses which support large roof areas, must be carefully proportioned in order to successfully resist the stresses.

nailing. This vertical tie always has a great stress (see " Stresses in Roof Trusses " in the issue of the paper for December, 1901), and when made of boards or plank it requires a large number of spikes to hold the ends.

In all of the joints 1, 2, 3 and 4, there should be at least one ¾-inch bolt, in addition to the spikes, to prevent the outer boards from curling, or separating as they season.

The writer does not consider this construction as good as that shown in Fig. 2, but in country towns it may safely be used for spans of 34 feet, and with trusses not over 12 feet apart, provided that the inclination of the rafter and tie beams is about as shown in Fig. 1. When the angle between the rafter and tie beam is greater than in the figure, the boards do not lap on each other as

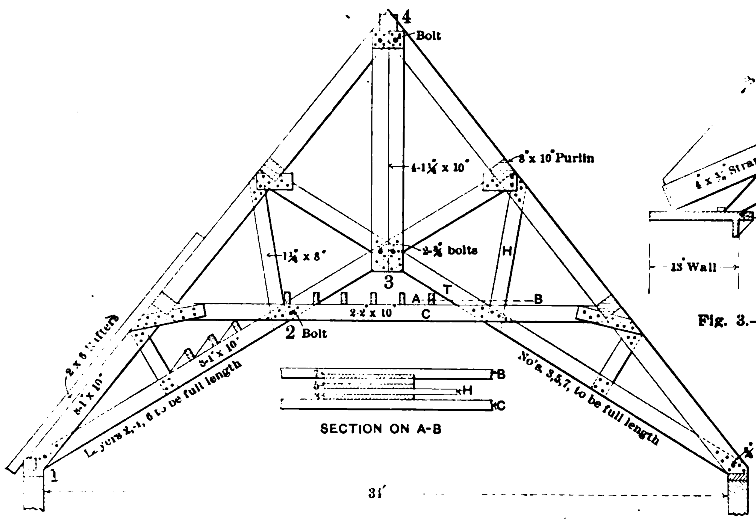


Fig. 1.—The Simplest Form of Scissors Truss.

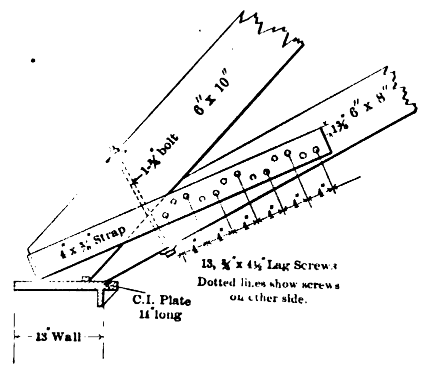


Fig. 3.—Detail of Joint at A of Fig. 2.

Joints in Scissors Trusses.—By F. E. Kidder.

The trusses shown in Figs. 1, 2, 5, 7 and 9 of this article have been selected as representative of the most common forms of scissors trusses, and embracing the different kinds of joints which have to be made.

Fig. 1 is about the simplest form of the scissors truss, and the construction shown is also the simplest. This truss was used by the writer over a church in a small town, where rods and special iron work would have been expensive. As indicated by the engraving, the truss was built of 1-inch rough spruce boards, spiked together, and the joints were formed by lapping and spiking the boards. The joints in this truss, which require special attention, are those numbered 1, 2, 3 and 4. The joint at 1 must be capable of transmitting almost the entire thrust in the rafter to the tie beam. In this case the boards of the tie beam and rafter interlock, and are well spiked together, and the pieces are further secured by one ¾-inch bolt.

Four boards in each tie beam are the full length, so that one half of the sectional area is available for transmitting the tensile stress, and the other half is used principally for filling, although it assists in resisting the transverse strain produced by the ceiling joists.

Joints 2 and 3 are also almost entirely in tension and require a good many spikes. The cross tie C was made of two planks, one on each side of the tie beams, so that they do not weaken the latter. The main vertical tie was made of four boards, in order to get a large area for

much, so that there is not as much room for spikes. On the other hand, it is not desirable to have a sharper angle at 1, as the sharper the angle the greater will be the stress in the tie beam.

With this form of construction, cement coated spikes should be used if they can be obtained, as they " hold " much better than the common spikes.

The truss indicated in Fig. 2 represents the trusses B in the half-tone view, Fig. 12, and shows the best construction for trusses of this type. The only joints in this truss which require any special attention are those at A and B. To prevent any spreading of the rafters under the greatest possible load on the roof will produce a stress in the tie beam of this truss of about 25,000 pounds, hence the joints at A and B must be capable of resisting 25,000 pounds each.

The writer has found that the best method of making this joint is by means of a wrought iron strap and lag screws, as shown by the enlarged detail, Fig. 3. Lag screws are preferable to bolts, for the reason that it is almost impossible to get the holes in the strap and in the wood in line, and usually the hole in the wood has to be made so large that the bolt does not fit tightly. With lag screws each screw is bound to get a good bearing in the wood. The holes in the two sides of the strap must, of course, be staggered, so that they will not come opposite each other.

The net sectional area of the strap should be at least

equal to the stress in the tie beam divided by 20,000 pounds.

The number of lag screws (for both sides) is found by dividing the stress in the tie beam by the resistance of one screw. The writer has been unable to find any data on the resistance of lag screws, but believes that the following values may be used with safety:

Safe Resistance of Lag Screws, When Used as in Fig. 3.

½ x 4 inch lag screw, 1,000 pounds, minimum thickness of strap. ¼.
⅝ x 4 inch lag screw, 1,500 pounds, minimum thickness of strap, ¼.
¾ x 4½ inch lag screw, 2,000 pounds, minimum thickness of strap, 5-16.
⅞ x 5 inch lag screw, 3,000 pounds, minimum thickness of strap, 5-16.

The joint at B is best made by halving the timbers and bolting them together.

The roof purlins in this roof were hung in Duplex hangers, which, in the opinion of the author, offer the most convenient and best means of support.

Another method of joining the rafters and tie beams of scissors trusses is shown by Fig. 4, in which the horizontal thrust of the rafter is resisted by a single bolt. When the inclination of the rafter is quite flat, this joint is to be preferred to that shown by Fig. 3. It also has the advantage, that where the truss is erected, one piece at a time, the tie beams may be put up first, and a seat is provided to receive the rafters. The strap prevents the end of the rafter from springing up.

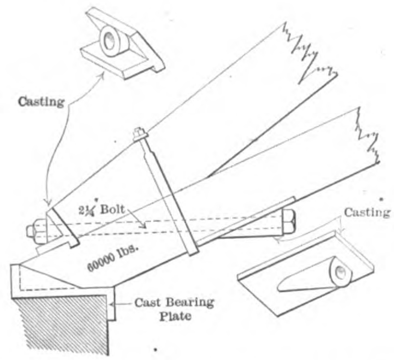


Fig. 4.—One Method of Joining Rafters and Tie Beams.

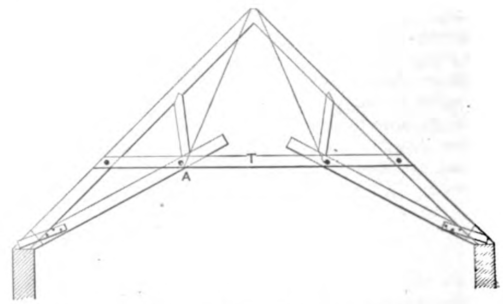


Fig. 5.—Truss with a Horizontal Tie.

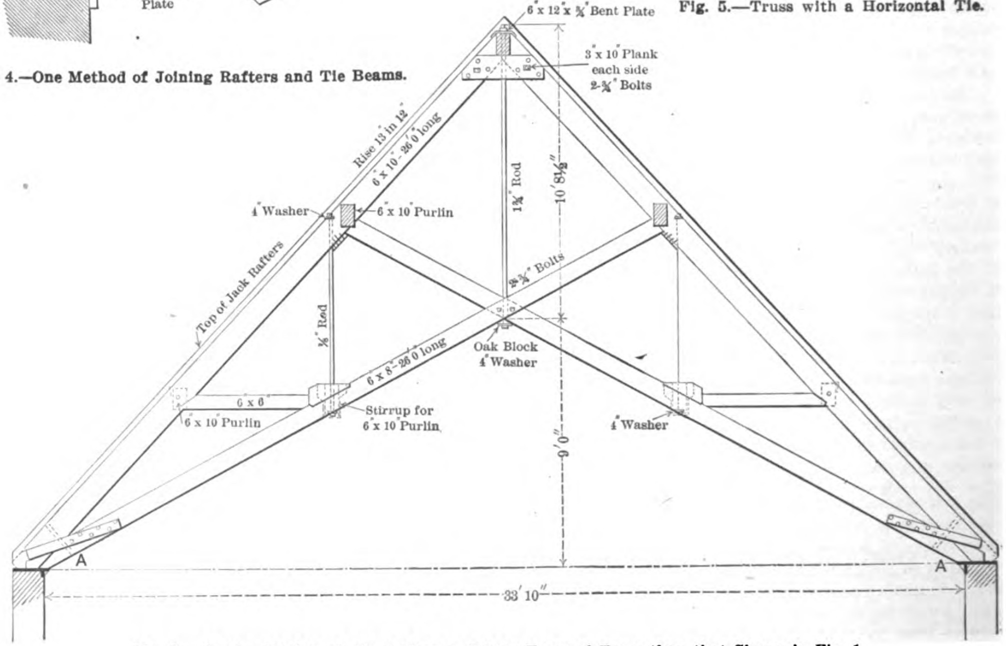


Fig. 2.—In the Opinion of the Author, a Better Form of Truss than that Shown in Fig. 1.

Joints in Scissors Trusses.—By F. E. Kidder.

For the truss shown in Fig. 2, the above rules would require a net sectional area, in the strap, of $\frac{25,000}{20,000}$ or ¼ square inch, and the number of ¾-inch lag screws, $\frac{25,000}{2,000}$, or 13.

With a thickness of ⅜ inch, the width of the strap **must** equal $\frac{1.25}{⅜}$,or 3 1-3 inches, and to this must be added the width of one hole, making the total width 4½ inches. The strap used was 4 x ⅜ inch. In addition to the strap, the tie beam and rafter should also be bolted together by one bolt, to bring them tightly together before the strap is put on, and also to hold them together when the truss is raised.

The other joints of this truss require no computations.

When the center of the ceiling is to be level, a truss with a horizontal tie, as in Figs. 5 and 7, is sometimes more economical than one of the shape shown by Fig. 2, as the horizontal tie permits of the use of smaller rods, and also affords a support for the ceiling joists. When the conditions will admit, it is better to make the horizontal tie of two planks, and bolt them to the tie beam (one on each side) by a single large bolt, as in Fig. 6.

If the horizontal tie must be kept flush with the inclined ties, as will usually be the case when the ties are exposed, then the joint should be made, as shown in Fig. 8.

The diameter required for the bolt in Fig. 6 may be determined by means of the following table, which gives the maximum safe resistance for one bolt without crushing the wood. The bolt should have a resistance equal

to the full stress in the horizontal tie; thus if the stress in the latter is 22,000 pounds it will require a 2½-inch bolt in the joint.

It is always better to use one single bolt (up to about 3 inches in diameter) than two smaller bolts, for the reason that where two bolts are used, one bolt is almost sure to be strained more than the other.

Maximum Allowable Stress on Bolts Used as in Fig. 6.

Diameter of bolts in inches.	Thickness of planks, T. Inches.	Yellow pine. Pounds.	Oregon pine. Pounds.	Spruce. Pounds.
1	2	4,400	4,400	4,400
	3	3,000	3,000	3,000
1¼	2	7,500	7,500	6,000
	3	5,720	5,720	5,720
1½	2	9,000	8,000	7,200
	3	10,000	10,000	10,000
1¾	2	10,500	9,400	8,400
	3	15,600	14,000	12,600
2	2	12,000	10,800	9,600
	3	18,000	16,200	14,400
2¼	2	13,500	12,000	10,800
	3	20,200	18,000	16,200
2½	2	15,000	13,500	12,000
	3	22,500	20,250	18,000

When the stress in the horizontal tie is very great, as is the case in a truss like that shown in Fig. 9, it is difficult to make a satisfactory connection with a wooden tie, and it is much better construction to use two rods, as shown in Figs. 9 and 10. By using a cast iron washer, as shown in Fig. 10, a very strong joint is easily made.

Wherever rods or large bolts intersect a tie at an angle other than 45 degrees cast iron washers having a seat for the nut at right angles to the axis of the rod (or oak blocks) should always be used, as otherwise it will be necessary to cut such a large hole in the tie to get a sufficient bearing for the washer as to very seriously weaken it.

The foregoing details cover those joints in scissors trusses which are peculiar and difficult to make.

There is one other connection, however, which it may be well to mention in this article, and that is where two diagonal trusses intersect at the center. When a church has three or four gables, or arms, roofed by trusses, it is generally necessary to support the roof over the "crossing" by means of diagonal trusses.

If the trusses are of the shape shown in Fig. 9, two full trusses may be used, and the rods and top chord arranged so that those of one truss will pass above those of the other, and in that case each truss may be figured to support one half of the roof.

If either of the forms of truss shown in Figs. 2, 5 or 7 are used, however, it is impracticable to pass the trusses by each other, or to join them at the center, so as to obtain the strength of two trusses. In such cases, the writer is in the habit of building one diagonal truss capable of supporting the entire roof load, and suspending two half trusses at its center. Fig. 11 represents the top and bottom joints at the center of a diagonal scissors truss recently used by the writer and shown in Fig. 12.

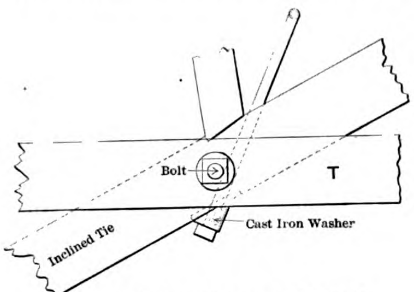


Fig 6.—Detail of Joint at A of Fig. 5.

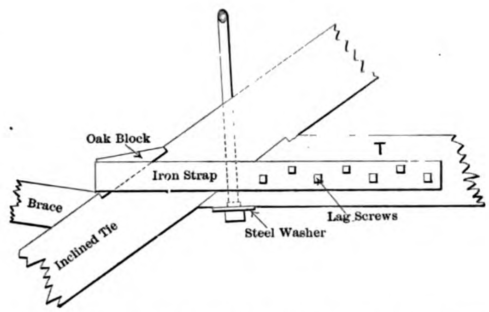


Fig. 8.—Form of Joint Where Horizontal Tie is Kept Flush with the Inclined Ties.

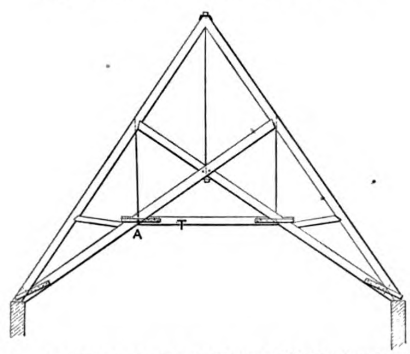


Fig. 7.—Another Example of Truss with Horizontal Tie.

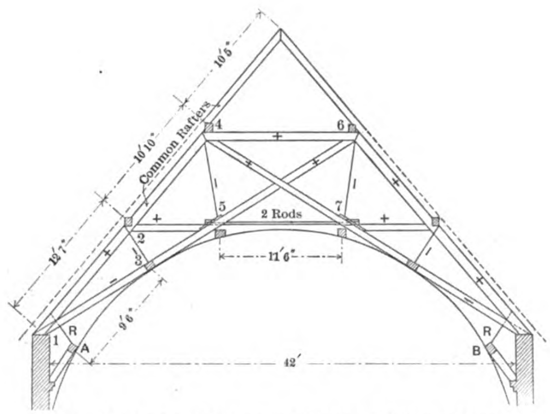


Fig. 9.—One of the Common Forms of Scissors Truss.

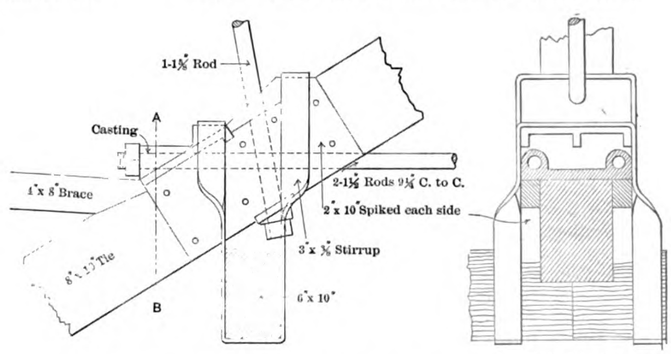


Fig. 10.—Details of Joint Where Two Rods Are Used in Connection with Wooden Tie.

Joints in Scissors Trusses.—By F. E. Kidder.

The photographic view shows the full diagonal truss, D D, in place, and supporting one half truss behind it. The other half diagonal had not been set when the photograph was made. In addition to the diagonal trusses, three trusses like Fig. 2 were used, one of which is shown at B. Instead of using a single rod at the center of the through truss two rods were used, one on each side of the truss, and the washer at the bottom extended 4 inches beyond the sides of the truss, to receive the abutting half trusses. The tie beams of the half trusses were also tied together by two bent straps, spiked to each side of each tie beam and passing over the tiebeams of the through truss.

The tops of the half trusses were secured to the top of the through truss by means of four 6 x 6 inch angles bolted to the principals, as shown in Fig. 11. This construction proved very satisfactory both for strength and facility in erecting.

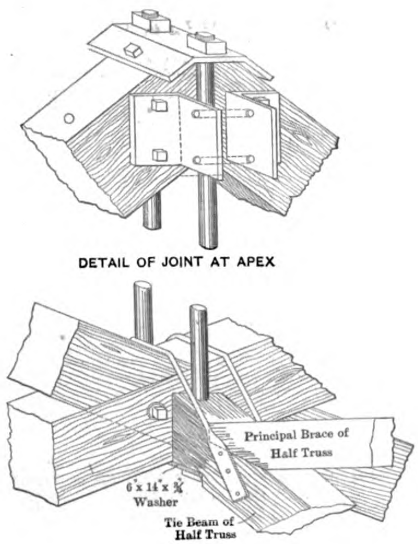


Fig. 11.—Details of Center Joints of Diagonal Truss D D, Fig. 12, Showing Manner of Supporting the Half Truss.

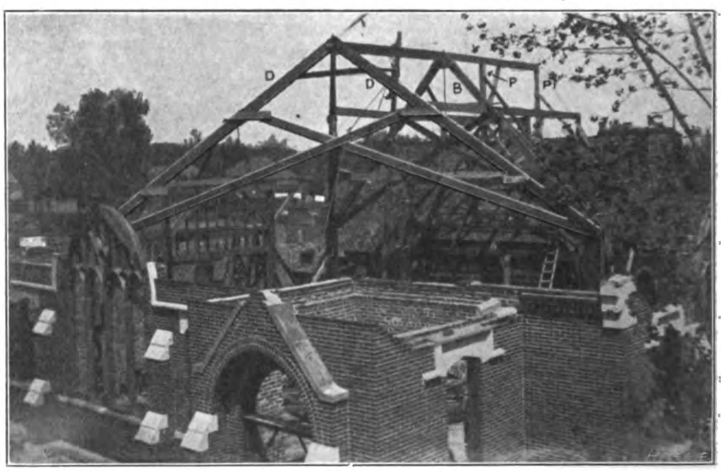


Fig. 12.—Showing Diagonal Truss Over a Church Having Three Arms of Equal Width and Three Gables.

Joints in Scissors Trusses.—By F. E. Kidder.

Treating Cement Finished Surfaces for Painting.

In describing how the surface of a house that is finished in cement should be treated before paint is applied. so that the cement which has been on for about three months will not destroy the paint, a writer in a recent issue of the *Painters' Magazine* says: "When a cement finished exterior wall has stood for three months, it is no longer considered 'hot,' and much depends on the original composition of the cement, whether the quick lime it contained before calcination had been thoroughly slacked or not. This being an uncertain factor, it is not safe to paint cemented surfaces with oil paint before the end of a year, unless such wall is treated with an isolating size or preparation, which will not permit any soluble salts of lime to come into contact with the paint. For comparatively new cemented surfaces the painters of Continental Europe employ a size of linoleic acid, which is an article of commerce on the Continent. This, however, is a slow drying material, and therefore not much in favor in this country. Experience shows that a new cemented surface, say not over four weeks old, is best treated with a wash of dilute sulphuric acid, strength about 17 degrees Be., and after six hours with a brush of strong vinegar. The acid solution changes any caustic lime present into the inert sulphate of lime, and the vinegar will neutralize the remaining traces of acid and alkali. In the case noted, the surface has stood three months, so that a wash of strong vinegar, liberally applied, will probably be sufficient for either oil or water paint. If it is intended to finish with oil paint, apply the wash of strong vinegar and allow the wall to dry out again. Then give the priming coat of pure white lead, thinned with pure raw linseed oil only, using not over 10 pounds of keg lead to 1 gallon of the oil and no driers of any kind. Allow this to stand until hard to the touch all over the surface, then proceed with whatever material it is desired to use. For water paint the wash of vinegar is not so important, but its use is suggested as a matter of protection.

Wages in Canadian Building Trades.

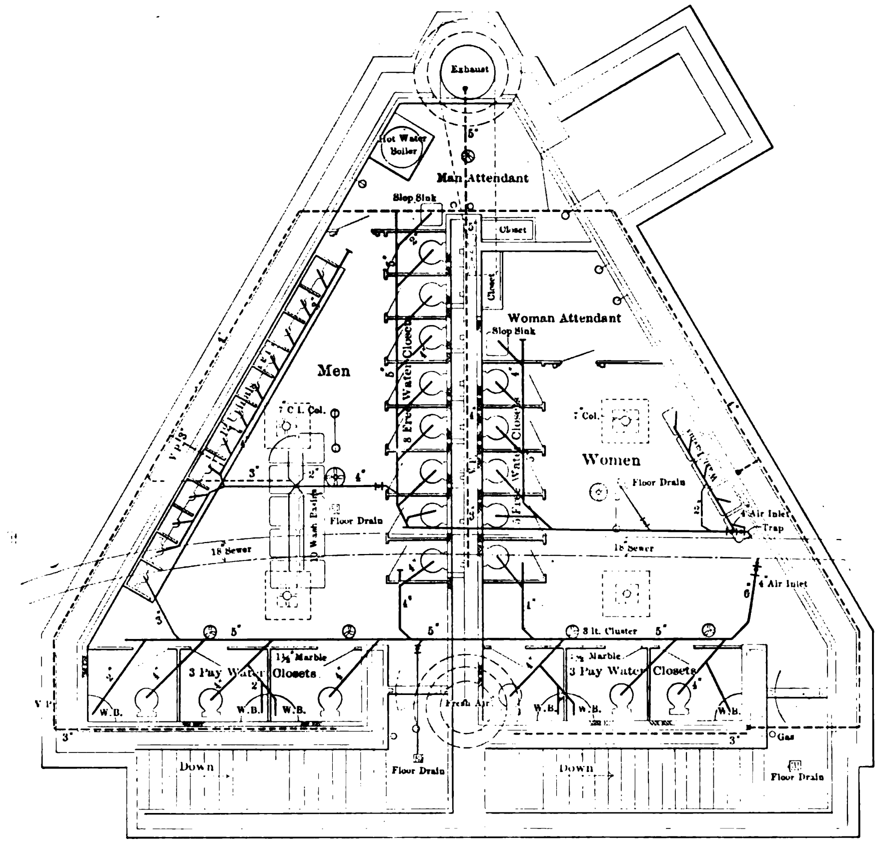
An interesting table is published in a recent number of the Canadian *Labor Gazette*, showing the changes that have taken place in working hours and wages of mechanics in the building trades in Canada during the present year. In ten towns and cities the wages of bricklayers and masons were increased by $1 to $3 per week; in 15 towns and cities the wages of carpenters were increased from 25 cents to $3 per week. In Montreal, plasterers obtained an increase of $1.36 per week, and in Toronto $2.20. Wages of plasterers' laborers also advanced by $2.20 per week. Painters, decorators and paperhangers in eight cities got increases ranging from 65 cents per week in Montreal to $2.78 in St. Catharines. The wages of plumbers and gas fitters in six cities show advances ranging from 50 cents per week in St. Catharines to $5.33 in New Westminter, British Columbia. Stonecutters were given increases ranging from $1.50 to $4 per week, and builders' laborers of 28 cents to $2.10 per week. Coupled with this general rise in wages there were in many instances reductions in the number of working hours.

It is stated that the Dutch Government will open a competition in designs for Andrew Carnegie's Palace of Peace, for the building of which he gave the sum of $1,500,000.

BROOKLYN'S PUBLIC COMFORT STATIONS.

A FEATURE of municipal improvements which is attracting the attention of officials of many of the larger cities of the country, more especially those of the East, will be found in the public comfort stations now being completed at various points within the corporate limits of the Borough of Brooklyn, N. Y. These stations are the result of a great deal of careful study and thought on the part of F. J. Helmle, Superintendent of Public Buildings and Offices in the city named. They are in every way a model of their kind and are daily demonstrating the wisdom of those responsible for their conception. There are six of these stations at present under way, all based 18-inch sewer, with which the fixtures are connected. All the vent pipes run in chases, which are simply channels cut in the walls. The divisions of the various closets and urinals, as well as some of the trim, is of white Italian marble, and the walls are of enameled brick.

The plumbing equipment was furnished by the J. L. Mott Iron Works of New York City, the syphon jet closets being of their Sorrento pattern with automatic flushing. In fact, the entire flushing system of the station is automatic in its action. The wash basins are of glazed earthenware throughout, with nickelplated fixtures, and have automatic stop faucets. The basins are supported



Plan Showing General Arrangement of Plumbing Fixtures.

Brooklyn's Public Comfort Stations.

upon the same general design, but the particular arrangement and construction which we illustrate herewith are those of the station adjoining the Borough Hall plot, at the intersection of Fulton and Joralemon streets. The entire work, with the exception of the ventilating towers, is underground.

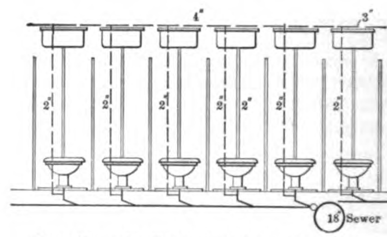
In the illustrations presented we show a plan of the station with its various divisions, also sectional views, indicating the construction employed. The entrances to the station are from the sidewalk level, and an inspection of the floor plan will show that there is a main central wall dividing the station into accommodations for women on the one hand and for men on the other. In the division at the right there are 5 wash basins, 5 free closets and 3 pay closets; while in the division for men are 10 wash basins in a group near the center of the space, 12 urinals, 8 free water closets and 3 pay water closets. The plan here presented gives an idea of the piping employed, with the size of the main sections, the vent pipes, the position of the floor drains and, in a general way, the location of the electric lights. The two dotted lines extending under the entire area represent the on iron standards, as shown in the end elevation, which appears among the accompanying details.

Much care and thought have been given to the question of ventilation, this being more than an ordinary problem by reason of the fact that the station, as elsewhere stated, is entirely underground. It will be noted that at either end of the plan are dotted circles, one of which is marked "Fresh air," and the other "Exhaust." Directly over these points, at the street level, are towers, possibly 15 feet or more in hight, surmounted by clusters of electric lights. One of the towers, or lamp posts, as they may be designated, is the "intake" for the fresh air, while the other is the vent for the foul air. At the base of one of the towers is a blower, operated by an electric motor, while at the other is an exhaust fan, operated by similar power. In the rear wall of each water closet are two registers, one being for the admission of fresh air and the other for the escape of foul air. A general idea of the construction of the central wall of the station may be gained from an inspection of the detail which is here given. There is also a section through one of the pay closets, and an elevation of a portion of the free closets indicating the general arrangement of piping and fixtures.

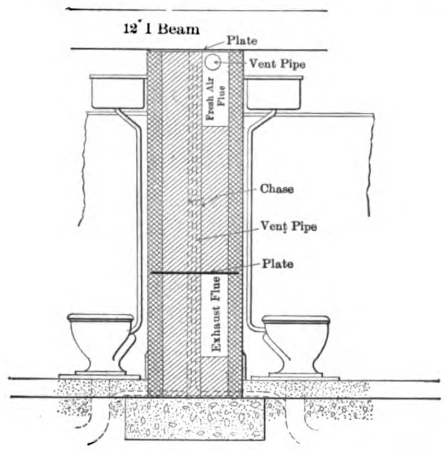
The whole interior is finished in white, so that with the electric lighting everything is as bright as day below ground. An interesting feature of the lighting equipment is the polished metal switch board, which is located just within the entrance in the wall at the end of the row of free water closets. In the switch board are a number of keyholes of intricate pattern, so that in turning on the lights it is only necessary for the attendant to insert a key and then withdraw it. In turning off the lights the key is inserted in the opening immediately above the one that is used for turning on the lights. By this arrangement there is no chance for any one meddling with the switch board, and the lights are therefore always under the supervision of the attendant.

While, for the most part, the equipment of the station is for the free use of the public, those who desire to have a clean towel and soap can secure them at a penny each. In the pay closets are wash basin, mirror, hat rack, comb and brush and towel, all of which is at the service of the visitor on the payment of 5 cents. These pay closets are of good size, and ample room is afforded for a person in making a complete change of toilet if desired.

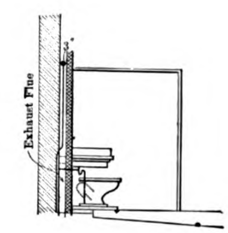
The heating in the winter months is by means of a hot water boiler, located in the room occupied by the attendant on the men's side.



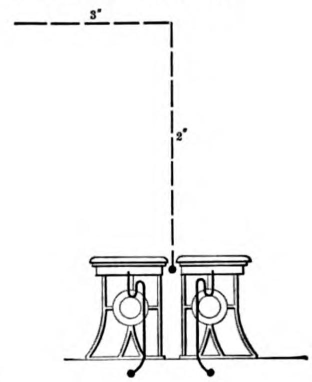
Elevation of a Portion of the Free Closets.



Vertical Section through Center Wall, Showing Relative Position of Ventilating Flues.



Section through Pay Toilets.



End Elevation of Wash Basins, Showing Iron Supports.

Brooklyn's Public Comfort Stations.—Various Details of Construction.

Pennsylvania Supreme Court on the Rights of Labor.

A most impressive judicial decision on the labor question has just been rendered by the Supreme Court of Pennsylvania. The decision is not based on narrow statutory definitions, but on the broadest grounds of constitutional law. The case grew out of the recent dispute among the organizations connected with the Philadelphia building trades. The Plumbers' Union, to which the complainants belonged, was not affiliated with the Allied Building Trades, and the officers of the latter body threatened to call a general strike of the workmen employed on a large building in progress unless the plumbers were discharged. The terrified contractors, to avoid further loss, complied with the demand, but the plumbers brought a suit at equity to restrain the conspiracy to deprive them of employment. Their suit was granted in the lower court and that decision is now upheld.

The rights of enjoying and defending life and liberty, of acquiring, possessing and protecting property, says the court, are inherent and indefeasible, and are not dependent on statutory authority. The right to the free use of his hands is the workman's property, as much as the rich man's right to the undisturbed enjoyment of the income from his factory, his houses or lands. To exercise it he must have the unrestricted privilege of working for such employer as he chooses, at such wages as he chooses to accept.

It is a right of which the Legislature cannot deprive him, one which the law of no trade union can take from him, and one which it is the bounden duty of the courts to protect. The most concerned in jealously maintaining this freedom is the workman himself.

This duty the courts must exercise, because the constitution has placed these fundamental rights beyond the encroachment even of the Legislature, so that no matter what statutory definition be given to a combination to deprive a workman of employment by force, threats or intimidation of any kind, such combination still remains unlawful; courts are still bound to protect the humblest mechanic or laborer in his right to acquire property.

Trades unions may, of course, cease to work for reasons satisfactory to their members, but if they combine to prevent others from obtaining work or to prevent an employer from employing others, by threats of a strike, they combine to accomplish an unlawful purpose, a purpose as unlawful now as it ever was, though not punishable by indictment. Such combination is a despotic and tyrannical violation of the indefeasible right of labor to acquire property which courts are bound to restrain. It is utterly subversive of the letter and spirit of the declaration of rights. If such combination be in accord with the law of trades unions, then that law and the organic law of the people of a free commonwealth cannot stand together; one or the other must go down. And so, the Supreme Court concludes, it comes simply to a question, "Shall the law of an irresponsible trades union or the organic law of a free commonwealth prevail?" The answer is that "every court of the commonwealth is bound to maintain the latter in letter and in spirit."

WHAT is said to be the longest row of houses ever under construction at one time in Greater New York is that in Second street, between Eighth and Ninth avenues, Brooklyn, where 26 dwellings are under way. Each house has a bay front, octagon or circular, and there are variations in color in the stone with which the fronts are faced. Nineteen of the dwellings are three stories and basement in hight, while the others are four stories and basement.

FIRE PROOF CONSTRUCTION.

ONE of the very interesting papers read at the recent annual convention of the International Association of Fire Engineers at Atlantic City was that of Perez M. Stewart, late Superintendent of Buildings in the borough of Manhattan, Greater New York, dealing with the subject of fire proof construction. In view of the opportunities afforded the author of the paper while at the head of the Building Department to study the advancement made in the design and construction of fire resisting buildings, what he has to say is of more than usual interest and value to architects and builders. We present the following rather copious extracts from the paper in question:

It would seem to indicate almost mental aberration to seriously question to-day the efficiency of the better types of fire proof construction. No better proof can be desired of the fact that fire proof construction really does reduce the fire loss than is afforded by the favorable premium rates granted by fire insurance underwriters on superior types of construction.

Fire protection is a term broad and elastic. Roughly speaking, like "All Gaul," it may be divided into three parts. 1. The protection from without afforded by the municipality. 2. The ability of the building itself, in consequence of its structural excellence, to withstand the effects of fire, either from within or from without. 3. The multitude of fire detecting and fire fighting devices installed in, but not integrally a part of, the building itself.

A careful consideration of the matter of fire protection should convince every owner that the introduction of safeguards against fire will bring a fair return in reduced rates on the increased outlay, besides fulfilling a moral obligation which he owes to his lessees, tenants, neighbors and himself.

Several theatres in New York have had their insurance rates materially reduced because of changes in their construcuction, made at the instigation of the Department of Buildings. That the fire proof character of a hotel is a most desirable advertisement is indicated by the fact that some proprietors who cannot honestly claim that characteristic attempt to deceive their patrons by untrue representations. One of the large hotels of New York maintains a room in a burnt condition as an indication of what can happen in a fire proof hotel without the knowledge of any of the patrons or the proprietor. A fire that originated in this room nearly burned itself out before any one was aware of it.

Reducing Fire Hazard.

In considering the manner in which construction tends to reduce the fire hazard, we find that the subject naturally divides itself into three heads: 1. The Use of Incombustible and Fire Proof Material. 2. The Manner of Combining the Materials of Construction. 3. The Provision of Devices and Forms of Construction that Afford Protection Against Fire from the Outside.

Among the materials most commonly used in building construction which are generally considered incombustible, may be enumerated the following: Brick, stone, terra cotta, wire, glass, iron, steel and concrete. By such incombustible materials is meant those which will not burn or produce flame when subjected to a heat of 2000 to 3000 degrees F. Incombustible materials are not necessarily fire proof. It is important that this should be kept in mind.

By fire proof materials is meant such as not only do not burn, but which, under the action of fire, remain intact and preserve their strength, or the strength of those parts which they protect.

As a notable example of what has been done in eliminating combustible materials in the furnishing of a building, St. Bartholomew's Clinic, in New York City, may be mentioned. In seeking to make the building as absolutely germ proof as possible, the architect also made it as fire proof as it is possible to make it. The furniture throughout the building is made of incombustible material, except in the trustees' offices. Even here the architect was desirous of having only iron or stone furniture used, but the trustees were too solicitous of their comfort, and had their rooms fitted up with hard wood furniture and a soft rug on the floor.

As an illustration of the distinction between incombustible materials and fire proof materials, we need only refer to the unprotected as against the protected or fire proof column. Cast iron certainly will not burn, yet the effect of the heat of a fire is well shown in the bulging and collapsing of the unprotected columns of the Hackett-Carhart Building, at the corner of Broadway and Thirteenth street, in New York City, last winter, causing nearly the entire roof and part of the floor below it to fall in. As against this may be mentioned the case of the McMahon Building in Chicago. This was a building occupied as a cracker bakery. One-half of the building was of the so-called slow burning construction, consisting of columns, girders and floors of yellow pine material. At one end was erected a bakery, consisting of brick walls and steel beam and column construction, all protected by concrete.

Steel Construction and Concrete.

A fire destroyed entirely the portion of the building of slow burning construction. As exemplifying the splendid protection afforded to steel construction by a properly applied envelope of concrete, it may be stated that notwithstanding the intense fire existing in the slow burning section, which abutted on the section occupied by the bakery, the bakery ovens weighing in the neighborhood of 1000 tons, and supported upon the concrete protected steel columns, remained in position at the end of the fire at their original hight, extending from the third to the fourth stories.

A more spectacular example of the efficiency of properly protected iron work against the inroads of fire has seldom been afforded.

It will thus be seen that the manner of construction or the disposition and arrangement of parts of construction is even more important than the use of incombustible material. Where wood is used and is exposed, it should be so placed that as little surface is exposed as possible. A fire will spread with greater difficulty when the flames have only one side to work on and the supply of air for the combustion is limited. The selection of the wood is of great importance. Hard woods are much more difficult to burn than softer woods and sustain the flames less readily. Oak and yellow pine make the best structural materials among the different kinds of woods. Ordinary paints, and especially varnishes, should be avoided.

The danger of the spread of fire in a building increases first, with the increase in area covered, and second in greater degree with the increase in hight.

The danger is met in the first instance by providing fire stops in the way of brick walls or fire proof partitions. Any openings that may be necessary in these partitions should be provided with fire proof doors and windows.

Spread of Fire Vertically.

The spread of fire in a vertical direction is undoubtedly most effectively guarded against by making the floors continuous and unbroken—that is, eliminating all openings in the floors and placing the necessary means of communication, such as stairways, elevators, pipes, shafts, belts, &c., in shafts entirely separated from the rest of the building by brick walls. A close attention to this detail is very important. In one of our early fire proof office buildings there occurred a fire some years ago in which the greatest damage was done in an office two stories above the one in which the fire originated. The flames in the lower story burned away the wood work casing around the smoke or drain pipes and were drawn up through the openings in the floor for the pipes, and in this way ascended to the upper story, where they destroyed the pipe casing and set fire to the contents of the room.

In this incident, too, is shown the danger in the use of furring and casing, especially when of wood. Air spaces are thus formed which constitute channels through which fire, by creating draft in them, is spread. All casings, wainscoting, trim, &c., should be solidly backed up with some incombustible material; or in case it is impracticable to so back them up, good and sufficient fire stops should at least be provided at intervals. In nonfire proof buildings, where wood floors or stud partitions are used, a judicious use of fire stops is very desirable. In the spaces formed by wood floor beams, the floor and ceiling act as a flue through which the fire spreads very rapidly; so do the spaces between the treads in the soffits of stairs. In the case of wooden stairways it is very desirable that fire stops of some incombustible material should be provided. Steam coal ashes or similar incombustible materials placed flush with the floor beams make not only an excellent fire stop by protecting the floors to a great extent, but serve the additional purpose of deafening or preventing the transmission of sound. In fire proof floors where wood flooring is used secured to wooden sleepers, it is very important that the space between the sleepers up to the underside of the flooring be filled in solidly with some incombustible material.

The Elevator Shaft.

The elevator shaft in its construction constitutes a flue up which a fire is drawn with great force. On account of the necessarily large openings at each story, particularly in the case of freight elevators, the danger of communicating fires is great. The shaft walls in the first place should be absolutely fire proof and constructed of incombustible materials. The requirements of the Department of Buildings of New York City, to which any construction before being approved for use as inclosing walls for elevators must be submitted, cannot be said to be too severe. These requirements are that the proposed construction shall practically remain intact after being exposed to a fire maintained for one hour at a temperature of 1700 degrees F., and then subjected to a stream of water at 30 pounds pressure for five minutes. Any construction that is used should be self supporting. Such iron work as is necessary for the construction of the shaft should be thoroughly protected by fire proof covering. No wood work whatever must enter into the construction. The necessary openings must be provided with fire proof doors. For this purpose the Fire Underwriters' door is the best, although for offices and residence buildings it is generally regarded as impracticable on account of its unsightliness. In such cases doors and frames of metal, or wood covered with metal, the so-called Kalimined process, which are now being produced in a variety of shapes and finish, can be well used. Door openings should be the only ones allowed in shafts. Where it is necessary to provide light, and it cannot be obtained by windows opening directly to the outer air, it can be secured by window lights in the doors; or if that is not sufficient, by stationary metal sashes set in metal frames. In all cases the windows should be glazed with wire glass.

What has been said of elevator shafts applies equally well to inferior light and vent shafts, except, of course, that in such cases the window sashes cannot be made stationary. Pipe shafts should be solid for their full length. Provision should be made for expansion and contraction, so that the openings for service pipes at each story can be completely filled up by the pipes without danger of damage to either pipe or partition.

Fire Damage from Outside.

But, coming to the third division of our subject, in a closely built up location, no matter how much care or money has been expended upon a building to make it safe against fire within itself, there still remains the danger of fire damage, if not destruction, from the outside. Insurance underwriters generally regard a brick wall increasing in thickness from the top down as the most satisfactory protection against the attacks of fire from the outside.

If a building can be inclosed in solid brick walls on all sides, carried 3 feet above the roof level, it would be practically safe against fire from the outside. But the public is not yet ready to sacrifice the space necessary for the interior court yard that would be required for light and ventilation purposes under such conditions.

Since wall openings must normally be open more or less of the time, either to traffic or to the passage of light, the first form of protection took the obvious form of a sheet iron door or shutter, arranged to be closed at night. Practical experience, however, soon showed that any considerable amount of heat warped the sheet iron shutter to such an extent as to seriously impair its usefulness. A great improvement on the iron shutter came with the design of the tin clad wooden sutter, a device without a superior for many forms of wall opening protection. As applied to the windows of mercantile establishments, however, the tin clad shutter shared with the sheet iron shutter several defects. It did not admit a night fire in a building to be seen from the outside; it did not lend itself readily to the adaption of devices to close the shutter automatically in the event of fire, and it was very unsightly.

A substitute, which eliminates these weaknesses, besides possessing many added advantages, is to be found in the fire proof window glazed with wire glass, set in sash and window frame covered with metal. This window is made in a number of different styles, some with sash of wood covered with metal, some with hollow sash of metal.

Wire glass is made either with an opaque or polished surface, and the wire reinforcing, embedded in the glass itself, although keeping the window intact against the attact of a fire of almost any intensity, may be broken readily by the firemen when it becomes necessary to enter the building or introduce a fire stream.

The walls of buildings, wherever practicable, should extend 2 or 3 feet above the roof level. This is absolutely essential in the case of parapet walls, or walls adjacent to other buildings, to prevent the creeping of fire along the roofs.

Roof coverings must always be of some fire proof material, such as tin, iron, slate or tile, and where openings exist a filling of wire glass skylights. These materials best resist the passage of heat from falling embers, or flames lapping over the parapet walls. The tile and slate are slower in transmitting heat than the iron or tin, and for this reason, perhaps, afford a better protection.

The Sanitary Value of Slate.

A material, says *Cement and Slate*, that seems to be designed by nature for use where a clean, nonabsorbent surface is required, is slate. It meets all of these requirements, combined with strength and durability, and can be made neat and even beautiful where adornment is required. The surface is smooth, therefore it will not absorb oils or odorous or decaying organic matter; it is not affected by acids, in which respect it is better even than marble. It is impervious to water, air, and changing weather conditions, and not sensibly affected by ordinary variations in the degree of heat. These qualities are not found in any other mineral product, and, taken in connection with the ease with which it can be worked and its consequent low price when compared with other materials used for the same purpose, it is really economical as well as highly satisfactory to use slate slabs for sanitary purposes.

The more fully builders and contractors realize the fact that slate has made a place for itself in the interior fittings of the building, as well as upon the roof, the more satisfactory work will they be able to turn out. Slate has the merit and is not endeavoring to obtain a position by favor which it cannot maintain by excellence. That this is true is shown by the increased call for mill stock. Builders are everywhere waking up to the fact that, to be up to date, they must use the most serviceable as well as the most economical fittings for their buildings. In the case of the sanitary construction slate fulfils these conditions.

Among the various uses to which slate is put for this purpose are bathtubs, urinals, wash trays, kitchen sinks, dairy uses, drainage, cisterns, &c. For all these purposes and many more the slate is prepared at the factory, according to measurements supplied by the contractor, and all that the latter has to do is to set the slate into place, after it has been set up and fitted at the factory before it is shipped. Slate used for this purpose can be used either in its natural color or it can be given any color or almost any figure desired. By the process of marbelizing slate all kinds of marble, granite, wood or tiling material can be imitated.

DOORS AND DOORWAYS.*—V.

By FRED. T. HODGSON.

"IN the old French joinery," says Viollet de Duc, "there are certain works that indeed somewhat resemble Oriental work, but it is generally more thoughtfully and more faithfully carried out, and the workmanship was far superior to the older work. Railings and panelings were simply composed of planks, joined together and tenoned into rails or stiles as the case might be, to prevent them from warping and to at least decorate the flat surface of one side, and the joiner often arranged on them a kind of lattice work of small strips of wood halved together and forming geometrical arrangements more or less complex. The flat surface of the planks was frequently carved in low relief, worked in the thickness of the plank, in the compartments formed by the lattice."

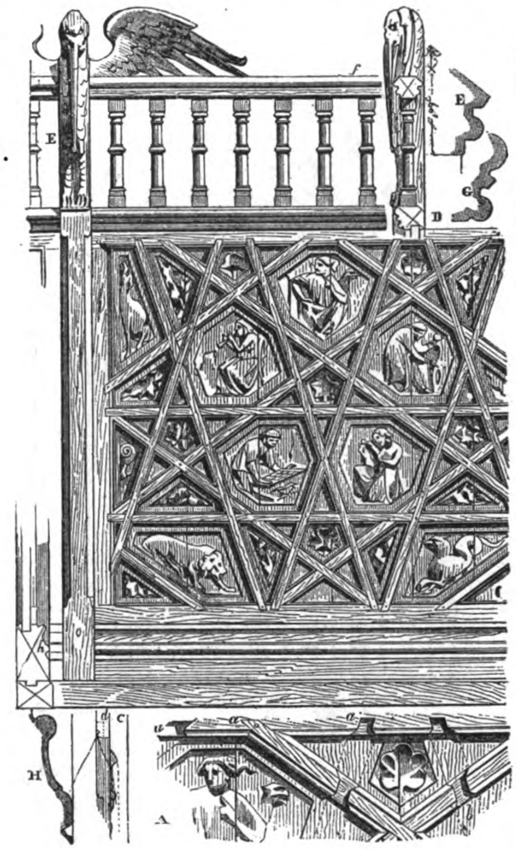


Fig. 21.—Showing French Decorated Panel Work in Doors and Wainscot.

In Fig. 21 is shown an example of this sort, and is given here to show the readers of *Carpentry and Building* how complicated some of this work was, and yet it was made use of by French workmen in the decoration of both interior and exterior doors, wainscoting and paneling generally for two or three centuries. The stiles and rails are of various widths, plain, the joints being indicated in the illustration. The ends of the lattice strips are let into stiles and rails, as indicated at *a* on detail A, and are then nailed to the plank at each intersection, thus forming a perfectly rigid surface that prevents the warping of the ground. This lattice is halved and coped together, as shown at *b*. The section C shows at *c* the thickness of the plank, and at *d* that of the lattice. (This piece of joinery existed in fragments in the Cathedral of Perpignan in 1834, serving as a paneling in the chapel of St. Jean. It was of pine.) An open railing with turned balusters was placed above the rail D, and the whole was supported by stiles E at regular distances. At F is given the profile of the upper rail *f*; at G is that of the railing, and at H is that of the lower rail *h*. Let us examine the leaves of a door of the church at Gannat, which is constructed on this principle.

It is apparent why the wooden strips fastened to the planks and intersecting in all directions should retain the planks in a plane. This system is indeed exceptional in mediæval joinery in not having grooved-in panels, but a plain ground on which is nailed a network of strips that is not merely an applied decoration, but is composed of pieces joined together and possessing strength of itself.

Since the thirteenth century the system of panels inserted in grooves has been adopted in French joinery, but the tongue and grooves are generally of trapezoidal section. We give one of these panels in elevation at A, Fig. 22, in vertical section at B, and horizontal section at B′. This system is worthy of notice. The framing is composed of stiles and rails, between which are inserted panels. The side stiles terminate the framing and receive the tenons of the rails, into which intermediate muntins are tenoned. At C is a side stile, with a muntin at D. The molding E of the rail is stuck without reference to the joints, and when the joints are made the molding is notched as indicated at F, so that it stops against the upper ends of the stiles. These are merely chamfered between the joints, the chamfers or moldings being stopped as at G, so as to leave full strength at the joints and to avoid mitered joints that are always defective. The panels H are grooved in as in section 1; though made thinner on their edges so as to enter the grooves they retain their full thickness at the center, as shown at K in section B′. These panels are loose in their grooves, and may shrink without causing inconvenience. The stiles and rails being framed together at right angles, the drying of the wood does not open the joints, as always happens in mitered joints, and the entire system shrinks at the same time. Various methods of connect-

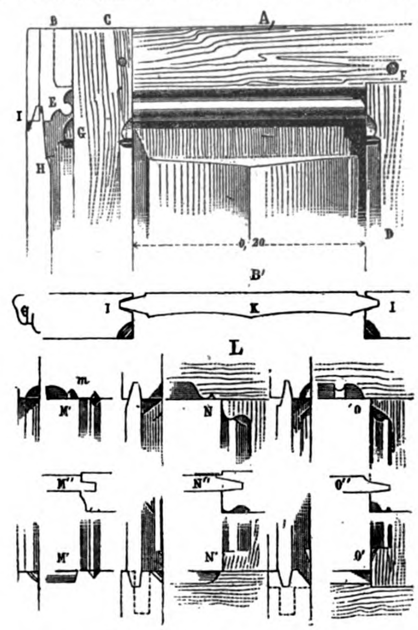


Fig. 22.—Details of Panel Work.

Doors and Doorways.

* Continued from page 275, October issue.

ing the stiles and rails of the framing are shown at L. At M the moldings on the stiles are worked through without reference to the joints, while those of the rails are stopped near the joints. At N and O the moldings on both stiles and rails are stopped at the joints. The joints of the stiles and bottom rail are shown at M' and O'; at M", N" and O" are horizontal sections of the panels and stiles.

When the paneling is high, it is necessary to subdivide it by one or more intermediate rails, in order to avoid too great length of panels that are always inclined to warp. Fig. 23 is a door 7 feet 4 inches high, having a base or plinth, A, on bottom into which is tongued the lower rail B. The intermediate stiles C are tenoned into the lower rail, which is itself tenoned into the end stiles D. The same system reversed is employed for the upper rail F and the cap E. But cross rails H are tenoned into each pair of stiles at G, so as to diminish the length of the panels. When the paneling is set against a wall these cross rails are merely set in rebates, as indicated on the section at I, and held in place by fastenings. These panels have no effect on the framing, and if they are made of well seasoned wood, only having the width of a board, as described at the beginning of this article, no inconvenience will be caused in any part of the work by changes of temperature. For the most important point in all joinery is to leave the wood opportunity to swell or shrink without affecting the joints. The tenons K of the stiles pass through the upper rail and the cap also, in order to keep this straight, as it sometimes becomes crooked when it is merely tongued into the upper rail. The width of the cap being much greater than that of the upper rail, when it bends it is strong enough to break off the tongue formed lengthwise the grain. This system of paneling was adopted during the thirteenth and fourteenth centuries with variations in the sections. Until the fifteenth century the pieces always retain their square form at the joints.

The example given in Fig. 23 show the moldings worked on the rails without stops and stopped on the stiles near the joints. But even where the molding extends around the panels on the stiles and rails without stopping, as frequently practiced in paneling during the fifteenth century, mitered joints are avoided. We find an example of this in one of the beautiful panelings that decorates the Church of St. Trophime, Aples, and there are still many more to be found in France.

There is a very curious west door and doorway in a small church in Corneilla, near Prades, France, which are shown in Fig. 24. The doorway is executed with much delicacy in the red veined marble of the Pyrenees, and is admirably preserved, the ornamental parts of the capitals and arch moldings being as sharp as on the day they were carved. It has undergone a certain amount of restoration, which has, however, left all its chief features undamaged. It has four orders of arch moldings, of which two only are enriched, having in each case a cylindrical roll, which in the outer one of the two orders is grooved spirally, and in the inner one is ornamented with a band of interlaced work. The capitals of the outer shafts on each side carry winged lions, having one head at the angle serving two bodies; those of the next order have on one side figures of goats similarly grouped, and on the other those of rams; while the innermost capitals on both sides are floriated. The whole of these figures stand in high relief from the body of the capital. The tympanum carries the usual design of a *vesica piscis* containing the Virgin seated with the young Saviour on her knees, and supported by adoring angels on each side carrying censors.

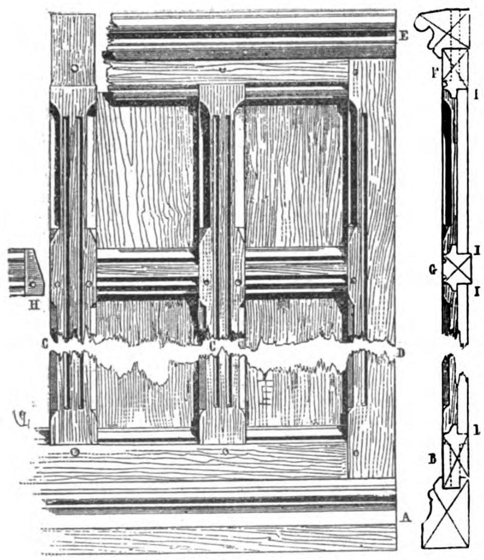


Fig. 23.—Showing Door Construction with Details.

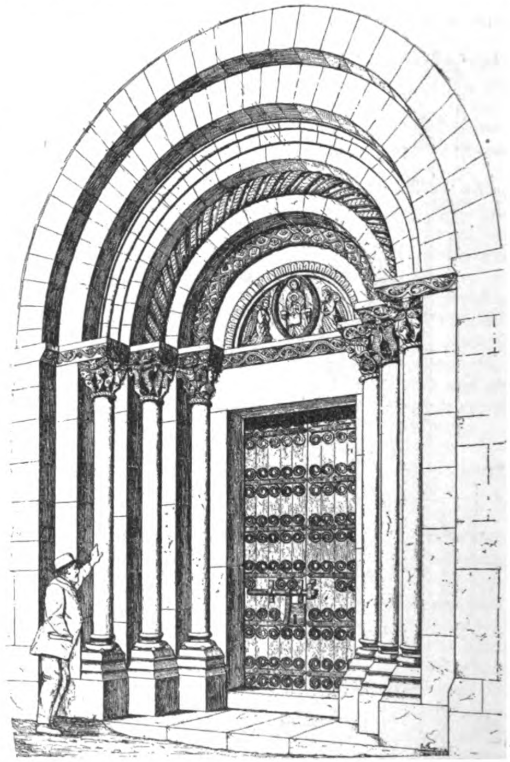


Fig. 24.—A Door and Doorway on the West Side of Corneilla Church.

Doors and Doorways.

The scroll work with which the original doors are covered is a remarkable example of the iron work of early times in this district; even more striking instances are to be found in the same neighborhood, which formerly was renowned for its small forges, *à la Catalan.*

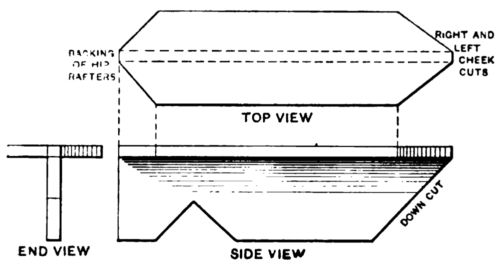
The village of Corneilla is situated near the small fortified town of Villefranche, at the foot of one of the chief spurs of Mont Canigon, and on the side of one of the most picturesque gorges of this very interesting but little visited region. It is 4 miles distant from the town of Prades, the *chef lieu* of the arrondissement of the same name, and the center of the great mineral district which is the chief source of supply of iron ore for the forges and furnaces of the south of France.

IN the neighborhood of Prospect Park, Brooklyn, N. Y., are a number of recently erected detached and semi-detached dwellings of individual design which are served by a central heating plant maintained by the company owning the buildings, and which supplies hot water as well as heat.

CORRESPONDENCE.

Obtaining Bevels of Rafters by Use of Template.

From L. E. N., *Banksville, Pa.*—If not out of order, I would like to suggest for the benefit of those readers who may be interested, using a template in place of the bevel square for finding the cheek cuts on jack rafters. I find this method a great saving of time, as I can have all the cuts on one template and use a steel tape for measuring off the lengths. The template is made of two boards, and when finished has the appearance shown in the accompanying sketches, which represent top, side and end views.



Obtaining Bevels of Rafters With Template.

It is possible, of course, that some of the readers of *Carpentry and Building* have used this method, as it is not new to me, but there have been several little things I have picked up from reading the paper that may have been old to others, but which were doubtless new to quite a number, including myself. I should be glad to hear what others have to say in regard to the suggestion I have made.

Designs for Two-Family Houses.

From D. R. J., *Glens Falls, N. Y.*—We would say in reply to the question raised by "F. W. S." of Lowell, Mass., in the September issue of *Carpentry and Building* that we should like very much to see published the plans of the two-tenement house to which he refers.

What Are the Merits of California Redwood for Outside and Inside Finish

From W. S. W., *Sterling, Kan.*—I would like to ask through the columns of the paper for an expression of opinion on the part of those having a practical knowledge of the subject as to the merits of redwood for outside and inside finish of houses and also for doors. In this particular section I find much prejudice against the wood, the claim being made that it will shrink endways. I have used it to some extent in the last two years, and am very well satisfied with it. In the house I am now living there are redwood doors, and though the house was built this past season I see no fault with the doors as yet. This I do know, however, that when the doors are made they should be covered with paper and protected from the light and dampness until filled, for they will darken when exposed. I would like very much to hear from others on this subject, as it is one concerning which many cannot fail to be interested, and if all will express their views fully and freely much valuable information may be the result.

Inside or Outside Cold Air Supply.

From D. B. T., *Northville, N. Y.*—I should like to inquire through the columns of the paper what is considered the best point from which to take the cold air supply for a hot air furnace plant—from outside or from the hall of the building?

Finding Side Bevel of Valley Rafters in Roofs of Unequal Pitch.

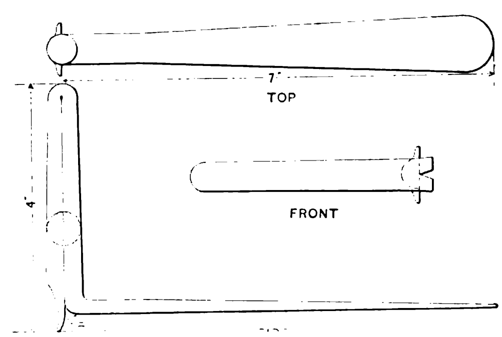
From G. D. INSKIP, *Philadelphia, Pa.*—In the issue of *Carpentry and Building* for September I notice an article on the above subject, which contains statements in which I cannot concur, as I believe they are open to question, and I am inclined to think that the correspondent is not altogether familiar with iron construction. One of the statements to which I take exception is found in the first paragraph, near the top of page 244, where it says, "In a roof constructed of iron the bevel would be the correct one to apply to the flange of the valley that would lie in the plane of the main roof," &c. Another one is found in the first paragraph at the top of the second column on the same page, where it is intimated that various books that have been published on roof framing seem to ignore the distinction between the bevels described, "they invariably treating the cuts for hips and valleys 'backed,' and thereby mislead the carpenter, who always treats his hips and valleys square." I would state for the information of the correspondent in question that there are writers who have framed roofs under all conditions and do not find it necessary to lay them out full size or to a scale. Furthermore, the correspondent says in the concluding paragraph, on page 245, that "this rule to find the bevels is more of a scheme than a geometrical solution," &c. I take issue with that statement, as it has its solution in geometry and mathematics.

What Will Prevent Burning Out of Colors in Frescoed Walls?

From A. J. B., *Fort Dodge, Iowa.*—Will some of the experienced readers of the paper tell me what will neutralize lime in walls of buildings. I mean something that will stop the burning out of colors where such walls are calsomined or frescoed. Of course, where lime is properly slacked, there is little trouble in this direction, but there are many walls in which the lime seems to retain this destructive element for years, and I have not been able to hit upon anything that will stop it. It occurs to me that if the builders who have had trouble of this kind would tell how they overcame the difficulty, if at all, it might be the means of drawing out an expression of opinion from others and thus start a very interesting and profitable discussion.

Staging Bracket for Shingling a Roof.

From F. W. D., *Niles, Mich.*—I have been much interested in the articles on the above subject, and with a view to contributing to the discussion I inclose a sketch showing the form of bracket I have been using for a number of years and find it answers the purpose. The brackets are made of wrought iron, and when in use the thin tong is slipped under one course of shingles, the points catching the next lower course and keeping them



Staging Bracket for Shingling Roof.

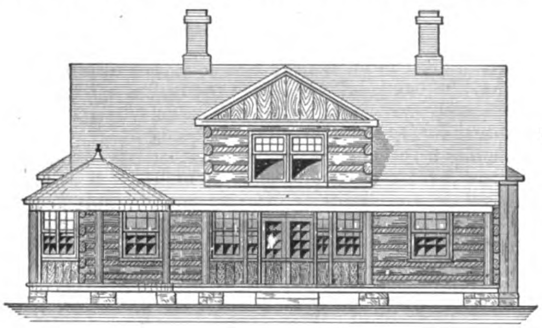
from slipping. A 2 x 4 is placed on the brackets, and staging is ready for operation. The advantage of this form of bracket is that it can be used on roofs of any pitch and on old as well as new shingles.

Some Old English Wrought Nails.

From E. F., *Montego Bay, Jamaica, British West Indies.*—I send by this mail some specimens of old English wrought nails and their history, so far as I can give it, thinking it may not be without interest to some of the readers of the paper. The nails were used in the construction of the old slave houses on Williamsfield Plantation, and slavery has been abolished over 60 years. My father bought this plantation some 35 years ago, and there was then not one of these slave houses standing, their foundations only showing where they once stood. Scattered about in the earth around were the nails which have been collected, and after so long an exposure to the elements their state of preservation is certainly wonderful. Think of a cut nail or a wire nail after one-quarter of similar exposure! We cannot be far wrong if we place the age of these nails at over a century, assuming that the houses must have existed 40 years prior to the abolition of slavery.

Design for a Rustic or Log House.

From L. H. H., *Glenwood, Ill.*—Noting in the October issue of the paper an inquiry from "G. M.," Princeton, N. J., for plans of a rustic house, I submit herewith the preliminary sketches of a log house, which while not exactly what the correspondent asked for, might be of interest to a number of the readers. This house was designed mostly by my wife and daughter for a poor man's home in the South, and is intended to be built, for the most part, of such material as the land affords—that is, stone, logs, sand and lime. As much of the cheap Southern timber land has had the "saw" timber slaughtered, the house is so designed as to be built of short logs. This will, perhaps, be more readily understood by a glance at



Front Elevation.—Scale, 1-16 Inch to the Foot.

Design for a Rustic or Log House.—Submitted by "L. H. H.," Glenwood, Ill.

the illustration just above the side elevation on this page, which represents the superstructure in the shape of six small packing boxes. The house will be found very roomy and well ventilated, and although the extra large hall is a radical departure from Northern ideas, yet a lady who has spent many winters in the South assures me it is quite proper for a Southern home.

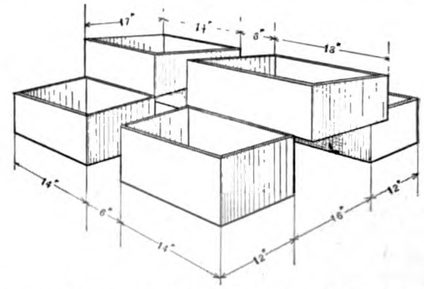
The ends of the hall, bay windows and gables are intended to be finished with slabs with the bark on them. The veranda columns are the trunks of small trees, and the whole design is intended to embrace features of rugged comfort, simplicitly and convenience, eliminating all costly or unnecessary expenditures and depending solely on what nature will produce, such as flowering plants, climbing vines and natural forest shade trees for beautifying the home. The house is intended to cost from $600 to $900, according to the location and the ability of the builder to adapt himself to the natural surroundings. It is, of course, expected that the settler will do the work very largely himself and without the aid of much highly skilled or costly labor. While these plans were not originally designed for publication, it would cost but little more to build from them than would many of the ordinary log houses scattered through the Southern States, and at the same time would embrace many of the home features not covered by them.

A Question in Roofing.

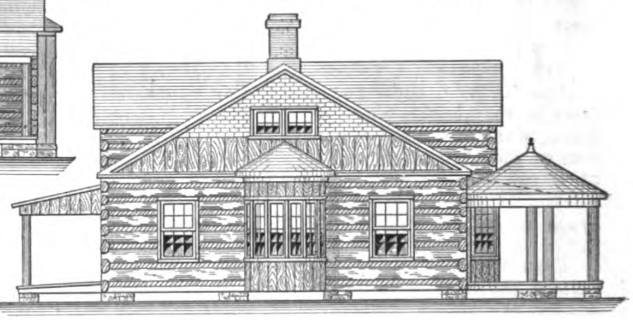
From P. D. B., *Redford, N. Y.*—In answer to the inquiry of "S. F. H.," Lakeview, N. J., I would advise him to put on terra cotta roofing tiles, as they are not much heavier than slate, and are neat and artistic in their effects. There are various manufacturers of tile from whose productions a selection can readily be made.

Reminiscences of a Builder.

From W. S. W., *Washington, Iowa.*—As many of the correspondents are writing of their personal experiences, perhaps it may not be considered egotistical for me to write a little concerning incidents in my life work. I feel, too, that I have further reason to ask the indulgence of the editor as I am one of the oldest readers, not that I am considered an old man, but I believe this will be the nineteenth year of my continuous reading of *Carpentry and Building*, and I do not regret that I began reading it that long ago, for I think within the time named almost every subject in which a carpenter needs instruction has been well discussed. I suppose I am one of those who are sometimes spoken of as having



Superstructure of House as Represented by Six Packing Boxes.



Side (Right) Elevation.—Scale, 1-16 Inch to the Foot.

never learned the trade, but I did learn something of how to use tools from the man with whom I first worked. Up to the time I began working for myself, however, I never saw a man who seemed to understand the principles of hip and valley roof framing. I remember once working with an older carpenter than myself and one who was considered a first-class workman. He was dressing with his block plane a piece of work and for 15 or 20 minutes he tried to make the fascia and mold fit in a valley joint of pitch cornice on a one-third pitch roof. The contractor, who was also a carpenter, came around and said to him, "Can't you cut it?" but went away without being able to give any information on the subject. That put me to studying, and as there was another valley to work, I said I would go around and try and cut the fascia in the miter box. The man said, "You can't do it." I said, "I think I can." So I cut two little blocks and set them in the box so as to hold the fascia at the same angle to a level that it would have on the roof. I then cut it in the box, put the two pieces on, had a good joint and never planed it at all. Then I said I would cut the mold also, which I did by using a different set of blocks.

This method I used for some time, but was not satisfied with it because it did not bring into use any of the principles of roof framing. I soon found that the cut across the roof boards and the side bevel for jacks could be obtained by using the length of common rafter-on the blade of the steel square and the half width of the gable on the tongue, or, as I have seen it much better stated, "the base and hypotenuse." But what bothered me for a long time was how to get the plumb cut for roof boards and fascia. At last it dawned upon me that the fascia, when it stood square with the common rafter, simply represented another roof, the rise of which was the same as the run of the one I was working on, and the base of its common rafter would be the rise of the present one. Then it was all clear that I could just treat this fascia as a roof board on another roof, using its base and hypotenuse. Now I have framed a good many roofs since then and my rule has always been "base and hypotenuse" for all side bevels for jacks and also for hips and valleys to fit against ridge board and for cut across roof boards.

I cut all roof timber on the ground, doing it myself while others are putting on the outside lining, and have it all ready to put up by the time they are up to the square. Now, while I have seen the principles of roof framing often explained in the last 18 years in *Carpentry and Building*, yet my experience as given in this letter took place before I had ever seen anything published on the subject of bevels.

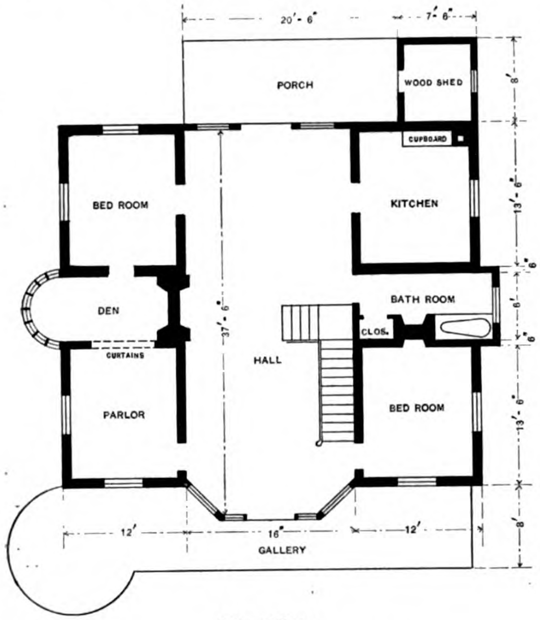
I often wonder why so many men who work at the carpenter's trade take so little interest in the subject of hopper bevels. You may tell them the figures on the square to use for a certain cut, but they never inquire into the reason and by the next time they have forgotten it. I think it would be well for those who write on the subject to take for their example some other pitch than the half pitch, for while many men know that 12 and 17 will give the cut on half pitch, they are all at sea when some other pitch is used, as, for instnce, a pitch of 5 or 7 inches rise to 1 foot run.

I might here call attention to the way some architects state the pitch of a roof. I once framed a roof which had six hips and three valleys, and it was specified "to rise 10 feet in a run of 13." I took what was as near to it as I could get and framed my roof to 9 inches rise to 1 foot run. Then I could cut all the timber on the ground; 12 inches ought to be given as the base line for all pitches.

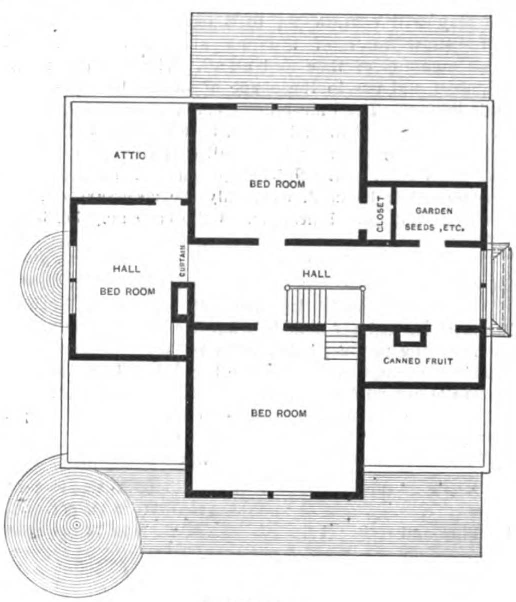
There are two sketches which seem to me to cover the subject of hopper bevels, which might be of interest if they were published again. One appeared in the January issue of 1887, contributed by myself, and the other in the July issue of the same year by Fred. Lascy of San Francisco. It is interesting to note how near they are alike, only his demonstration goes further into the subject of bevels than mine.

I have read with much interest what has been written on the subject of what constitutes a day's work, and while I have never run across in my 25 years' experience in different parts of the country any such wonders as some of these men are described to be, yet I recognize that this is the day of specialists and it will not do for us who are all around workmen to say what a man can do who confines himself to one kind of work until he becomes an expert. In my work I have confined myself almost wholly to dwelling houses, doing all parts of the work, even to building the stairs. Why, I even gave a man $8 for one day's instruction in stair building and getting out the hand rail for a winding stairs, but to most carpenters I suppose this would appear very foolish. It paid in the end, for I was soon asked to take charge of the building of some stairs where there was a quarter turn on the wall string. I cut the pattern of the well hole, cylinder and wall string out of the straight board, dadoed them on the back, bent them around forms, filled and glued them up and had a nice job. When it came to the finishing of one of these flights of stairs, an old carpenter, who was putting on the base molding and running it up the wall string, said, when he came to the quarter turn, that he would have to put it on in short pieces. I told him I thought I could bend it on. But he said, "No, you can't. There are older men than you who have tried and failed." But I said I would try. So, as I knew the diameter of the circle on which the wall string was made and the pitch of the string around the curve, I applied the principle for finding the distance for saw kerfs which I have seen explained in *Carpentry and Building* and which I had learned from my stairbuilder. I kerfed the mold so that the saw kerfs would stand plumb and bent it on without any trouble.

Now these things, which cost me money and much study to obtain, have all been published over and over again since I began reading *Carpentry and Building*. So there is no excuse for men being ignorant on these subjects if they will only read some good publication like *Carpentry and Building*.



First Floor.



Second Floor.

Design for a Rustic or Log House.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

Rule for Setting Windows.

From D. P. B., *Redford, N. Y.*—In answer to "A. A. C." of Bloomingdale, Ind., I will say that the rules for setting windows are deduced from proportion and are invariable. Take the distance from the floor line to the ceiling—from the top of the floor to the underside of the ceiling—and divide it into 15½ diameters. Divide each diameter into 60 minutes. From the top of the window stool to the floor line is two diameters and 25 minutes. From the inside of the soffit or architrave to the ceiling line is two diameters 45 minutes. From the top of stool to the underside of the soffit is ten diameters. The first-story windows should be two and one-eighth times their width, the second-story windows one and seven-eighths times their width, the third-story windows one and three-quarters times their width, the fourth-story one and one-half times their width and the attic windows should be square.

Method of Making Portland Cement.

From S. D. S., *Portsmouth, Va.*—Referring to the inquiry of "E. F.," Jamaica, British West Indies, on page 292 of the November issue regarding the method of making Portland cement, I would say that it cannot be answered fully in the limits of this paper. In general, the clay will contain 1½ to 2 parts, or about 60 per cent., silica to 1 of alumina and iron oxide, with small amounts of lime and alkali. The silica must be combined and not in the shape of sand. In some cases shale is used. The limestone or chalk should be a nearly pure carbonate of lime, it being necessary that the magnesia contained should be so small that there is not more than 3 per cent. in the finished product. An argillaceous limestone may be used, with only the necessary amount of clay, or of pure limestone, as the case may be, being added.

These ingredients are thoroughly ground dry to about the same fineness as the finished cement and then burned at a very high heat. In American plants this burning is almost exclusively done in what are called rotary kilns, the resulting product being what is called clinker. This clinker is ground again to make the finished product, the present standard for fineness being that 95 per cent. shall pass a sieve having 100 meshes to the inch, and 75 per cent. pass a sieve having 200 meshes to the inch.

The finished product should contain

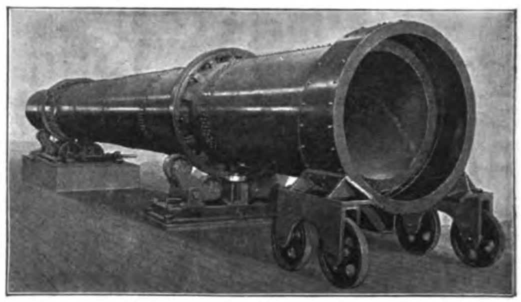
Carbonate of lime....................60 to 63 per cent.
Silica................................20 to 22 per cent.
Alumina and iron..................... 8 to 14 per cent.
Magnesia not to exceed 3 per cent.
Sulphuric anhydride not to exceed 2 per cent.

Its specific gravity should be 3.1 to 3.25.

From SANFORD E. THOMPSON, *Newton Highlands, Mass.*—In reply to the inquiry of "E. F.," Jamaica, West Indies, whose letter appears in the November issue, I would say that there is but one locality in the United States where chalk and clay are used in the manufacture of Portland cement, but in England they are used almost exclusively. What is called the wet process of mixing is generally employed. The two materials in proportions required to produce Portland cement are mixed together in vats and ground in a wet state. By using a comparatively small percentage of water, it has recently been found possible to pump the mixture into the upper end of a long rotary kiln, which consists essentially of a steel shell from 4 to 7 feet in diameter and 60 to 80 feet long, lined with fire brick. A view of one of these, as made by the Vulcan Iron Works, is shown in the engraving. The fuel, which is generally pulverized bituminous coal, is blown into the lower end and ignites into a flame, thus drying out the "slurry" which enters the upper end and then burning it to a clinker. The character of the clay is best described by quoting from S. B. Newberry, one of the foremost authorities on cement manufacture, who writes the introduction to a book giving a full description of raw materials and machinery used in different Portland cement plants, and which is entitled "The Cement Industry."

"Clay—this should be highly siliceous, low in magnesia and sulphates, and practically free from sand. For convenience in securing correct proportions it is an advantage to use a clay free from carbonate of lime, though marly clays are more easily mixed with the other materials. Highly siliceous clays, up to 70 per cent. silica, or over, give mixtures which stand the high heat of the kiln without fusing, produce a clinker which is comparatively easy to grind, and yield a slow setting cement which shows steady gain in strength over long periods. For the best results, in the writer's opinion, the silica should be equal to at least three times the iron oxide and alumina together. For example, a clay containing 18 per cent. alumina and 4 per cent. iron oxide should contain at least 66 per cent. silica. Highly aluminous clays give a fusible clinker and quick setting cement, and are in many respects troublesome to use. Clays containing more than 5 per cent. iron oxide will give a dark colored cement, and the lower the iron the lighter in color the cement will be.

"The presence of sand may be detected by washing the clay through a fine sieve. More than perhaps 5 per cent. of sand remaining on a sieve of 150 meshes per linear inch will be likely to cause trouble unless the mixed material is subsequently finely ground.



Making Portland Cement.—General View of a Rotary Kiln.

Analyses of Typical Clays.

	Medway, England.	Harper, Ohio.	Sandusky, Ohio.	La Salle, Ill.
Silica	70.56	51.50	65.41	54.30
Alumina	14.52	13.23	16.54	19.33
Iron oxide	3.06	3.30	6.06	5.57
Lime	4.43	11.52	2.22	3.29
Magnesia	...	3.45	1.88	2.57
Carbonic acid	3.48	12.85	...	...
Alkalies	3.95	...	...	...

"Alkalies (potash and soda) are not generally determined in analyzing clay. In the writer's opinion they exert but little influence, in the small amounts present in ordinary clays, on the character of the burning or quality of the resulting cement."

The chalk used in England is nearly pure carbonate of lime, the analyses generally running from 94 to 98½ per cent. The chemical composition of two typical chalks is quoted from Butler's "Portland Cement:"

Chalks.

	White.	Gray.
Insoluble silicious matter	1.50	3.95
Soluble silica	0.10	0.20
Alumina and oxide of iron	0.80	0.75
Carbonate of lime	97.32	94.37
Potash	0.22	0.18
Soda	0.16	0.13
Magnesia	Trace.	Trace.
Sulphuric acid	Trace.	Trace.
Totals	100.10	99.58

I would suggest to the West Indian correspondent that he secure a copy of the work, "The Cement Industry," price $3, and it would doubtless be of assistance to him if he get the work by Butler, just referred to, which while more expensive ($6), describes the English method of manufacture, but pays little attention to the more modern rotary kiln process.

Plans Wanted of Dog-Leg Stairs.

From M. H. G., *Lawn Ridge, Ill.*—I would like some of the readers to send for publication the plans of a flight of dog-leg stairs, and to describe how they are to be finished.

Does the Frame of a House Require Bracing Where Sheathing Boards are Omitted?

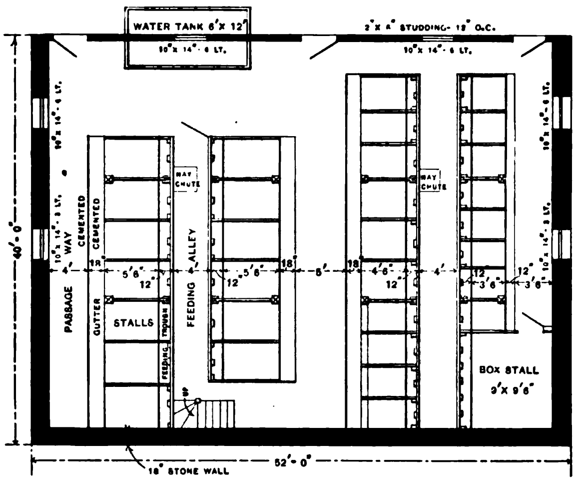
From MANHATTAN, *New York*.—It is proposed to erect a 12-room, 2½-story suburban house of balloon frame, and to use straight dry studs, well braced, doing away with sheathing boards and siding. The spaces between the studs are to be filled in with fire proof plaster blocks, approximately 2 feet in size and 2 inches in thickness. The sheathing boards being omitted would the bracing be sufficient? The same kind of blocks are to be used for partitions, the floor joist being extra heavy and about 1 inch thicker by 2 inches extra depth. The outside of the house is to be stucco work. Will the readers of the Correspondence columns give me their objections, if any, to this form of construction?

Should Outside Work Be Primed as Soon as Finished?

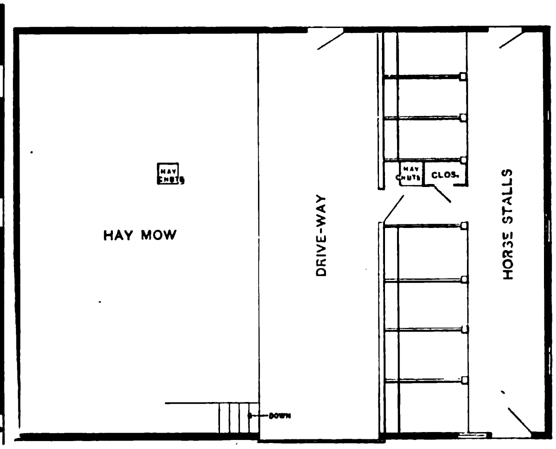
From P. D. B., *Redford, N.Y.*—I notice in the November issue what " C. A. W." of Port Jervis has to say concerning the question of priming outside work. I, too, did my priming as fast as the work was completed. It will do in the Western dry belt, but not on the Atlantic Slope. Just by way of illustration, I desire to say that five years ago I primed and painted a new clapboarded house as fast as the work was done. The cornice and the corner boards had not been painted for years. Last June I painted it again, as the clapboards were nearly bare. I also painted another building the same time, using the same painter. The first building is sheltered by trees, while the second is not. The second had not been painted for 20 years, and now looks well and will stand four or five years more. Lumber must contract and set, and when set rain makes little impression on it.

Construction of Plank Frame Basement Barn.

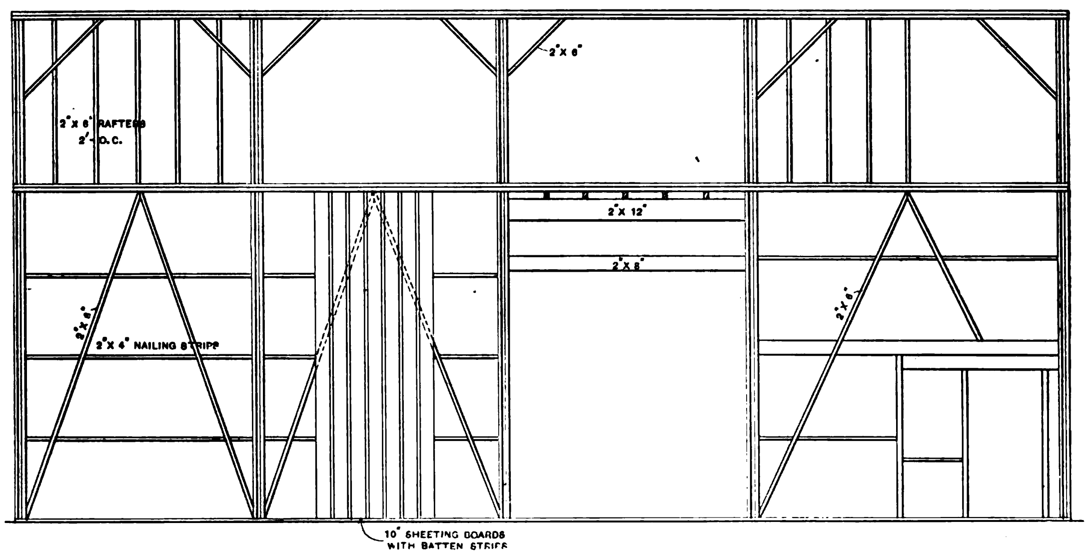
From S. H., *Minneapolis, Minn.*—I would like to have the readers experienced in plank frame barn construction comment upon the plans of the basement barn which I send herewith and from which I intend to build next summer. I would like very much to know the weak points of the barn and the best way to remedy them. I think the drawings showing the plans and details are so clear as to practically explain themselves.



Basement Plan.



Main Floor.



Elevation of Front Framing of Barn.—Scale, ⅛ Inch to the Foot.

Construction of Plank Frame Basement Barn.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

Remedy Wanted for Roof That Sweats.

From E. Q. R., *Frankfort, N. Y.*—I have a tin roof on a house that sweats badly in very cold weather. The roof is a steep one and was originally covered with shingles. The building is in the shape of a T. having three gable ends, and there are windows 12 x 16 inches in size in each gable. In cold weather the roof sweats whether the windows are open or closed. The house is two stories in hight, without any floor in the garret, which is about 10 feet high in the center, running down

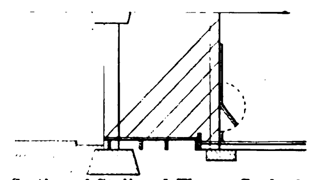
to the eaves. I shall be glad to learn of a remedy for the sweating.

***Note.*—Our readers have discussed such problems in the past, and we shall be glad if they will lend their assistance to this correspondent. In the meantime, we would suggest that the sweating, or, properly speaking, the condensation, is due to the roof being cold, and moist air coming in contact with it on the underside leaves moisture in the form of small drops. Where the air is very moist a considerable condensation is likely and may cause annoyance. The best method of overcoming this trouble is to provide the same temperature below that exists above the roof. Under such conditions the moisture in the air will not condense.**

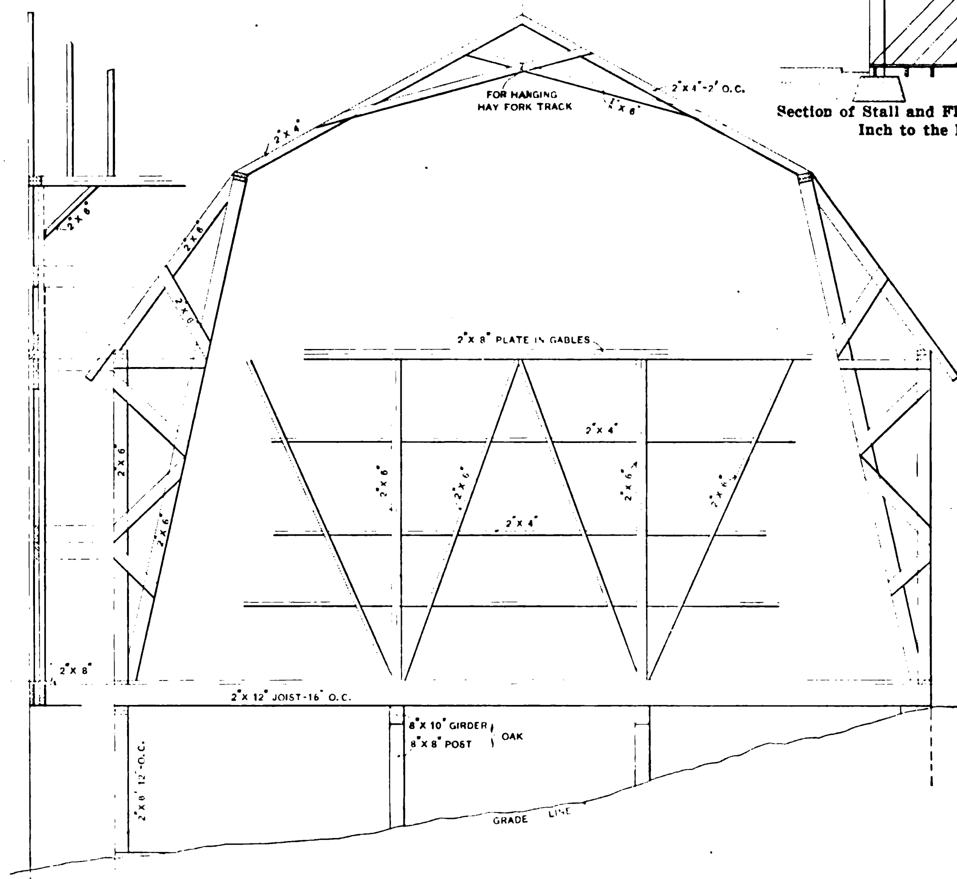
How to Heat a Village House.

From Thomas Hyde, *Albany, N. Y.*—In one of the early issues of the current year there appears an article by Dr. Harvey B. Bashore, taken from an issue of the *Sanitarium*, which is intended to instruct people how to heat the halls and rooms of a country house properly and equally, where a stove must be relied on to do it. I contend that the author is wrong in every idea that he advances. To heat the halls or other parts somewhat remote from the stove he advises the use of an air shaft (of course he means a ventilating flue), which he says will assist somewhat in "sucking out" the heated air from the adjoining rooms. Now, I want to ask how it is going to do it? Without admitting some air we cannot take any out. He also speaks of the value of the fire place as a ventilator. I have nothing to say against the fire place as a ventilator where a furnace is used and covered almost to the floor line. But the article was dealing solely with a stove. The doctor says that the escape of the hot air up the chimney will create a partial vacuum and consequently cause in the room a movement of the air toward the opening. How can any of the air in the room escape unless some is admitted? And how can you produce a partial vacuum where air is admitted? Also how can you move, circulate or rotate the air in a partial vacuum or from the direct radiation from a stove, no special provision having been made for the admission of air? If there is to be movement, it will be from the outside air forcing its way through crevices, &c., to prevent that which nature abhors—a vacuum. The air thus passing over the room would be cold and would sweep over the stove and carry all the heat with it, making the room very well adapted for cold storage purposes, but not for a living room.

Now, I will tell the doctor what I would use: If I could do no better, I would get a length or a length and a half of stove pipe about 2 inches larger in diameter than any smoke pipe, and would hang that on my stove pipe, leaving a space of 1 inch all around between the two. The air, being confined and heated, would move out from the top and be replaced by the heavier and cooler air at the bottom, thereby creating a rotary movement, which would eventually bring about an equalization of temperature. Better yet would it be to use a hot air radiator. I have in mind one in particular which I consider is constructed on as nearly sound principles as it is possible to make one. Of some others, my opinion is not so favorable. If you must depend upon a stove, shut up your fire place and do not build any air ducts. If you heat by a hot air furnace do just the opposite, and preserve your health.



Section of Stall and Floor.—Scale, ¼ Inch to the Foot.



Edge and Side Views of Bent of Barn, Showing Construction.—Scale, ¼ Inch to the Foot.

Construction of Plank Frame Basement Barn.

WHAT BUILDERS ARE DOING.

BUILDING operations in Atlanta, Ga., were conducted upon a gratifying scale of activity during October, and the report of Building Inspector Frank A. Pittman shows that the month is far ahead of October of last year. We understand that the inspector is looking for a record in the building line this year, and it is thought that the aggregate value of the building improvements will go beyond the $3,000,000 mark. During October there were 370 permits issued for buildings, estimated to cost $301,000, as against 272 permits for buildings aggregating a value of $137,356 in October of last year. For the ten months 2971 permits have been issued for buildings, estimated to cost $2,792,622, while for the 12 months of last year there were 2820 permits issued for buildings costing $1,868,593, so that the present year is far ahead of last year, both in the number of permits and in the estimated value of the improvements.

These figures tend to show the wonderful growth in building activity in the city of Atlanta during the past year. That the large increase in the value of the buildings being erected is not due to a few large structures is evidenced by the fact that more permits have already been issued than during the entire 12 months of last year. The statement is made that more buildings are being erected this year than ever before in the history of the city, and, furthermore, they are of a better quality.

Baltimore, Md.

The Builders' Exchange of Baltimore will hold its quarterly meeting on Tuesday evening, December 1. A special committee has been appointed, and is arranging to make this an occasion of great interest to the building trades of that locality by effecting a more thorough organization of employers and dealers, to protect themselves and the public from the abuses of the sympathetic and other strikes, and to restore confidence between the public and the building industries.

There is a fair amount of work in progress in and about the city, but the situation is such as to cause operators to move cautiously with regard to new undertakings. The District Council of Baltimore and vicinity of the United Brotherhood of Carpenters and Joiners of America issued under date of November 1 a notice to all architects, builders and contractors in the city and vicinity who employ carpenters, to the effect "that on and after May 1, 1904, the minimum rate of wages for carpenters shall be $3 per day, eight hours to constitute a day's work."

Bridgeport, Conn.

At the annual meeting of the Bridgeport Branch of the Interstate Builders', Contractors' and Dealers' Association, held in October, the following officers were elected for the ensuing year: President, W. L. Sanford; vice-president, Robert E. Hurley; secretary, L. D. Stone; treasurer, R. T. Rock, and sergeant-at-arms, James Van Stone.

The Executive Committee, which is composed of two from each branch of the building business, consists of Superintendent James Tilford of the A. W. Burrit Company, and Richard H. Murphy, superintendent of the Frank Miller Lumber Company, representing the dealers; D. C. Mills and W. R. Muirhead, representing the carpenters; R. E. Hurley and R. H. Jackson the masons; F. C. Booth and G. E. Schofield the plumbers, and W. W. Walker and Samuel Dawe the painters.

We understand that the association is rapidly increasing its membership, and now has something like 800 names on the rolls.

Cleveland, Ohio.

The regular annual meeting of the Builders' Exchange was held in their rooms in the Chamber of Commerce Building on the evening of Wednesday, November 11, a large representation being present. The directors rendered their annual report, this covering a brief history of the work in which the exchange is interested and is carrying forward. The report of the committee on a new building was submitted by its chairman, S. C. Bradley, and while not advising the exchange to give up the idea of a new home, the committee advised that plenty of time be taken for consideration. Reports from other standing committees were also received.

After the business meeting about 75 members went to the club's rooms on the sixth floor, where a luncheon was served. At its conclusion President Hunt made his annual address, after which other members of the exchange gave informal talks. Among the speakers was W. D. Gates of Chicago, well known to the trade as a former president of the National Brick Manufacturers' Association.

President William H. Hunt's address was received with marked attention. He referred, among other things, to Cleveland's future greatness, and to the close and intimate relationship which the builder has with the visible material evidences of the city's growth, and hence his activity at all times in civic and public affairs. He pointed out that the cause of many of the evil practices which enter into business dealings is the frequent opportunity presented for wrongfully diverting things to personal advantage. "Venality in trade," he said, "has developed to such an extent that it is a far reaching and debasing influence. A man is strong who knows the full value of his individual talents, who realizes and is content when he reaches the full limit of his natural capacity. That man lends dignity to his vocation who regards his trade as an institution whose principles are to be safeguarded as should be the sancity of his home. Every builder must be led to see his duty to his trade, and jealousy, selfishness and self aggrandizement must give way to a feeling of altruism. We should hold ourselves ready for unselfish deeds for the common good. Changes in general business conditions, any disturbance of the industrial situation affects at once the builder. In command of material and labor the builders' calculations are of necessity based upon a reasonable conviction that the stability of market prices and conditions will be maintained for a reasonable period of time. So varied and numerous have been trade disturbances that it becomes more important every day that the building trades unite in support of a fixed, yet wise, policy for dealing with the evils which are a menace to the building industry."

At the annual election of the new Board of Directors, which was held during the afternoon of the day named, Mr. Hunt was re-elected as a director, with J. W. Conger, Leopold Dautel, K. F. Gill, John Leese, W. B. McAllister, E. W. Palmer, W. M. Pattison, J. C. Skeel and Henry Watterson. A meeting of the new board is to be held within a few days for the purpose of organization and election of officers for the ensuing year.

Chicago, Ill.

The figures covering building operations in the city during the month of October show a decided increase over those for the previous month, although a slight decrease as compared with October of last year. In this connection, however, it should be borne in mind that October, 1902, was the most prosperous of any corresponding month in ten years. During October of the present year permits were issued for 568 buildings, having a frontage of 21,030 feet, and involving an estimated expenditure of $3,840,170. These figures compare with permits for 563 buildings, having a frontage of 17,579 feet, and costing $4,056,205 in October of last year. Going back to the year 1901 we find that in October permits were issued for 586 buildings, having a frontage of 17,182 feet, and costing $2,952,660.

For the first ten months of the present year permits were issued in the city of Chicago for 5226 buildings, having a frontage of 148,415 feet and involving an estimated outlay of $28,711,870, these figures comparing with 4761 permits for buildings having a frontage of 143,771 feet and costing $38,473,533 in the 12 months of 1902.

At a meeting of the Chicago Architects' Business Association, held the third week in October, the following officers were elected for the ensuing year: President, George L. Pfeiffer; vice-president, W. W. Clay; second vice-president, S. Milton Eichberg; secretary, Charles R. Adams; treasurer, S. A. Treat; directors, Fred. Ahlschlager, Emery S. Hall, H. B. Wheelock, P. B. Wight, E. M. Newman and H. L. Gay. The next meeting will be held November 17, when it is expected changes in the constitution, with a view to admitting associate members, and also changes in the method of voting, will come up for consideration.

Galveston, Texas.

The fourth annual convention of the Texas Builders' Exchange was to have been held early in November, but owing to the State quarantine being placed on the city of San Antonio, on account of yellow fever, the convention has been postponed to November 30.

Los Angeles, Cal.

In Los Angeles the building situation seems to be practically unchanged. The number of permits issued during October reached the large figure of 624, showing a total valuation of $1,153,910, as compared with 551 permits, of a total value of $954,613, issued in October, 1902. Builders are inclined to believe that the high water mark in building has possibly been reached for the present, although they do not expect any very serious falling off. The completion of the large structures already under way will occupy considerable time, and with the exception of a few more which are already planned, it is probable no more will be undertaken this year. The construction of dwelling houses is expected to proceed about as heretofore. In this connection it is noteworthy that during the ten months of the year already passed 3218 residences and cottages have been erected. The labor situation is at the present time satisfactory, and no trouble of any consequence is anticipated.

New York City.

The local building situation seems to be very slowly but surely clearing, and it is hoped that when the present conditions are adjusted operations can be carried forward upon a more suitable basis than has been the case for some time past. At one time during the month it looked as though Local Union No. 2 of Iron Workers would cause a still further suspension of operations, but according to a representative of the Employers' Building Trades Association the efforts of the union to hinder the work of the Iron League in the city have proved a complete failure. A few men quit work on some of the buildings, but nearly all of them returned in the course of a day or two; while the vacancies that did exist were filled without trouble from the ranks of the new unions which signed the arbitration agreement last May with the Employers' Association. There also developed early in November some trouble with the bricklayers and masons, which resulted in a strike against the Fuller Construction Company. The issue in the case seems to be whether the members of the Bricklayers' Union or somebody else shall install fire proofing in buildings. There are other minor troubles, which have been the means of interfering more or less with operations on some of the larger buildings in different parts of the city, but altogether the feeling is one of growing confidence on the part of contractors as to the outcome.

At the present time there are comparatively few permits issued for building improvements, although taking the figure for the ten months of the year they make a fair showing as compared with the same period a year ago. Up to November 1 there were 1478 permits issued in the boroughs of Manhattan and the Bronx for building improvements, involving an estimated outlay of $69,763,000, to which is to be added a trifle over $9,500,000 for alterations and repairs. These figures compare with 1449 permits issued for building improvements, estimated to cost $78,629,500, in the first ten months of last year. In the same time permits were filed for alterations and repairs estimated to cost $8,355,000. For the first ten months of this year there were issued in the Borough of Brooklyn 3270 permits for buildings, costing $20,158,750, as against 2532 permits for building improvements, costing $14,770,000, in the first ten months of last year.

Philadelphia, Pa.

Building operations in October were conducted upon a somewhat restricted scale, as compared with the previous month and with October of last year. There has been a great falling off in the erection of factory buildings, and in every direction there are indications of a more conservative attitude on the part of builders and capitalists seeking investments in real estate. According to the report of the Bureau of Building Inspection there were 714 permits issued in October of the present year, covering 1068 operations, which were estimated to cost $1,851,105, this being a decrease of $315,000 in the cost of improvements as compared with the same month last year. Of the permits issued 442 were for two, three and four story buildings, estimated to cost in the aggregate $996,855. Among the other permits issued were six for warehouses, costing a trifle over $266,000; 192 permits for miscellaneous structures, involving an estimated outlay of $181,000, while alterations and additions call for an expenditure of nearly $200,000.

From present indications it seems probable that the first of the year will witness a crisis in the building situation in the city. Meetings have been held by workmen and employers with a view to reaching an equitable adjustment of the present misunderstanding, but thus far without avail. The builders appear to be firmly resolved not to employ any workmen who will not agree not to participate in sympathetic strikes, and who will not promise to submit any differences between laborers and employers to arbitration. The present agreement between the employers and the unions expires early in the year, and a serious rupture seems likely to occur at that time. The troubles in the building trades are said to be already responsible for the holding up of work which involves an estimated expenditure of something like $10,000,000.

An interesting happening since the forms of our last issue went to press was the visit of eight prominent builders of Boston to Philadelphia for the purpose of discussing various phases of the labor situation with the officials of the local Builders' Exchange, whose guests they were. The Boston delegation included William H. Sayward, S. F. Hicks, Ira G. Hersey, Lyman D. Willcutt, Isaac F. Woodbury, Neal McNeil, Alan McIntosh and Parker F. Soule, and upon arrival in Philadelphia they held a long conference with the Advisory Board of the Philadelphia Exchange. After the conference a luncheon was served in Greene's Hotel, after which the visitors were taken for a drive through Fairmount Park and to visit the Belmont filter plant. In the evening they were given a dinner at the Union League, at which prominent members of the local building interests were present. The following day the morning and afternoon sessions were held at the rooms of the Builders' Exchange, at which time the relations between contracting builders and their employees were discussed.

The local Reception Committee for the entertainment of the visitors consisted of F. M. Harris, Jr., George Watson, John S. Stevens, David H. Watts, William B. Irvine, Cyrus Bargner and John R. Huhn.

The Board of Directors of the Builders' Exchange recently tendered a vote of thanks to Richard H. Watson and the Master Plumbers' Association, through whose efforts was secured the recent decision of Justice Dean, that members of trade unions may cease to work for reasons satisfactory to them, but if they combine to prevent others from obtaining work the combination is unlawful.

Pittsburgh, Pa.

Probably the most important development in the building situation is the lockout affecting 25 different crafts affiliated with the Building Trades Council, which became effective on November 14, as a result of a notice served on the council the early part of the week by the Builders' Exchange League. For some time a strike has been in progress between the master plumbers and the journeymen plumbers who are represented in the council, over the refusal of the former to grant an increase of 50 cents per day. It is claimed by the Builders' Exchange League that a sympathetic strike was ordered by the Building Trades Council on several buildings now in the course of construction, with the result that building operations were suspended and the work delayed. A meeting of the league was held early the second week in November and a letter addressed to the council notifying it that if by Friday, the 13th, all sympathetic strikes were not declared off a lockout would be ordered. As the sympathetic strikes continued at the time named the lockout was put in force, and it is stated that something like 10,000 men are affected. All large buildings are tied up, and building operations are practically suspended throughout the city and vicinity.

The report of building operations for the month of October, issued by Superintendent A. S. Dies, shows a total of 159 permits for building improvements, estimated to cost, with additions, alterations and repairs, $845,246, which is a decrease of $544,500 as compared with October, 1902. In the month of September of this year there were 180 permits issued, involving an estimated expenditure of $1,044,190. Of the permits granted in October 30 were for brick buildings, 81 were for frame structures, 45 were for brick veneer, one for brick and frame and two for stone structures. The falling off in the October figures as compared with same month last year and from the preceding month is attributed to the higher wages demanded and the continued high prices of materials, which have caused several projected operations to be held up for a time, at least. Perhaps one of the most striking incidents of the effect of the present building situation is in the case of 50 brick dwellings which were to be erected in Glenwood. The contract for these structures was awarded a short time ago by W. S. Haynes of Samuel W. Black & Co., who states that nothing will be done on the operation until the general lockout inaugurated by the master builders is settled.

It seems to be a conservative estimate that something over $4,000,000 worth of work has been held up or indefinitely postponed as a direct result of the strikes which have occurred in the building trades. This does not apply to any one particular class of buildings, but embraces high grade dwellings, public buildings, churches or charitable institutions and business structures. Speculative building has also been cut down to a very appreciable extent. It is stated that one result of this discouraging condition has been that a large amount of work has gone to outside contractors.

With regard to the outlook for the coming year, one of the most conservative architects in the city is reported in the Pittsburgh *Gazette* as expressing the following views: "Very little building will be done next year that is not absolutely necessary, unless labor conditions are remedied. Repairs and additions to stores that have been leased and a limited number of houses will constitute the bulk of the work. The general public, following the example of shrewd men of business, have concluded that it is the part of wisdom to wait, and no argument will convince them to the contrary." The remedy which the builders and contractors are seeking for this constant disturbance is an annual adjustment of all the wage scales at the same time. Attempts are now being made to bring this general adjustment period to January 1, 1905. Until such a system is adopted it seems to be the prevailing opinion that architects, contractors and builders are likely to be harassed by strikes, to their own great loss and to the retarding of the growth of the city.

Portland, Ore.

Much activity prevails in building circles, and a vast amount of work is being done in the erection of both business and residence structures. Fair weather, a well stocked labor market and the reduction in the cost of lumber have encouraged property owners to go ahead with improvements, and building activity promises to continue right through the rainy season. Many contractors anticipate that next year will be more than usually busy in the building line, and for this reason they will hurry through as much work as possible this winter. The labor field is now free of disputes. The union carpenters and painters failed to win their demands last spring and summer, and the union plumbers have but recently surrendered. In the building trades the labor unions have been obliged to yield all along the line.

Lumber has been materially reduced, and some minor expenses have also been cut. Contractors are inclined to believe that building will be considerably cheaper next year than it has been during the present year. Most of the dwellings now being built range in cost from $1500 to $5000. more than half of this going for carpenter work and lumber. With the already large cuts in lumber prices, and the probability of reductions in other materials and labor before spring, it is held that next year should be a favorable year for builders.

San Francisco, Cal.

City Architect Cuthbertson reports that building operations for October showed an increase over those for September, the number of applications for building permits being 395, of which all but 12 were granted. The total estimated value represented by these permits was $1,528,403. For September the building permits granted numbered 338, with a total estimated cost of $876,080. Of the permits granted during October 144 were for new buildings, at an estimated cost of $1,087,083, and 40 were for alterations at an estimated cost of $403,452. Among the permits was one for a $160,000 building on Ellis street, one for an $85,000 building on Thirty-first street, one for an $80,000 addition to an apartment house, one for a $150,000 building on California and Webster streets, two for $35,000 buildings, one for a $50,000 building, two for $45,000 buildings and one $30,000 building.

On the whole, builders are well satisfied with the outlook, and are inclined to feel that the present fall and winter will show a steady run of building. They are not anticipating any great rush, and in some lines they would not be surprised to have it comparatively quiet. The outlook now is that few large office or apartment buildings will be undertaken during the next few months. Few plans for such buildings are being drawn, so far as known, and the fact that there are now some large downtown buildings partially vacant is not calculated to induce capital to invest in this class of buildings. The reduction in the price of materials will, however, it is believed, have a tendency to encourage the construction of residences, particularly as there seem to be no signs of a lowering of rents. As yet the price of labor is very high, and although there are thought to be more unemployed artisans in the city then heretofore, there is no immediate prospect of a reduction in wages.

Seattle, Wash.

Building operations in Seattle continue active, despite the absence of the speculative element from the local real estate market. A noticeable feature of the present building activity is the unusually large amount of residence buildings now under way. During the past two or three years there has been a great deal of speculative residence building in Seattle, but more recently persons desiring homes have taken to having their houses constructed under their own supervision instead of buying them already built.

Shreveport, La.

The Shreveport Builders' Exchange has recently moved to the First National Bank Building, where it now occupies handsome quarters, which have been specially fitted up to meet the requirements of the organization. There is a reception room, 17 x 40 feet in size, which is also used for the exhibition of such samples of materials as are of interest to various branches of the trade. Leading from this is a consultation room, where the members may transact their private business, or confer with nonmembers regarding contracts or other matters which are constantly coming up for consideration. Leading from the opposite end of the reception room is the "figuring room," which is provided with tables, stationery, latest price-lists and needful works of reference touching the various phases of the contracting business. The rooms are heated by steam and lighted by electricity and gas.

All the local architects bring to the Exchange complete sets of plans and specifications, and upon a blackboard provided for the purpose there is posted the day and hour when proposals for the particular job will be opened. The active membership of the exchange at present comprises the nine leading general contractors of the city, while the leading lumber dealers and manufacturers are associate members, and the architects are honorary members.

The exchange was organized March 24, 1900, and slowly but surely has worked its way into the confidence of the public, and is now recognized by conservative business men as a powerful factor toward creating and maintaining harmonious relations between all interested in building operations.

The immediate outlook for the building industry in the city is not of the most flattering nature, and the record for the ten months of the year shows a considerable shrinkage when compared with the corresponding period of last year.

Tacoma, Wash.

The first ten months of 1903 show a record of over $1,500,000 in the value of the building undertaken. This is considerably larger than for any previous period of ten months. During October the aggregate estimated cost of the building initiated amounts to $148,173. Of the building permits issued, 68 were for dwellings, costing in the aggregate $65,720. In the month preceding 45 dwelling house permits were issued at a total cost of $52,112. The largest buildings undertaken during the month, just closed, were the new packing house of the Tacoma Meat Company, to cost $25,000; the new mill of the Tacoma Cedar Gompany, to cost $25,000, and the Tacoma Cataract's power house, to cost $6640.

In the matter of future building some difference of opinion exists. The decreased cost of construction work will undoubtedly have a tendency to encouage building; but, on the other hand, the Eastern financial situation and a general feeling of uncertainty will tend to discourage all speculative building. At least one large building will be started during November. This is the three-story brick and steel stock house to be put up by the Pacific Brewing & Malting Company. The contract for this work has already been let, although no permit has as yet been taken out.

Washington, D. C.

Some idea of the growth of the city of Washington may be gathered from the annual report of the Inspector of Buildings Ashford, submitted to the Commissioners of the District of Columbia on October 21, and covering the fiscal year ending June 30, 1903. The figures show that 6841 permits were issued for building improvements in the District of Columbia, representing an estimated outlay of $11,584,603, which is an increase over the previous year of 681 in the number of permits and 273 in the number of new buildings and of 217 in dwellings. Prominent among the improvements may be noted 938 permits for brick dwellings, costing $4,100,656, while there were 172 permits for frame dwellings, costing a trifle over $300,000. There were 40 apartment houses, involving an outlay of $2,646,500, and 11 permits for office buildings of brick, costing $1,047,367.

The report of the inspector is comprehensive, and carries throughout a plea for increased forces and facilities. It also points out the necessity of elevator operators and all architects, builders and contractors being licensed. "It seems hardly reasonable," says the inspector, "that the law appreciates the necessity of licensing and examining the man who is charged with the installation of plumbing fixtures in a house, and the operation of a power plant, while the man who is responsible for the safety of the entire structure from foundations to roof, containing the plumbing fixtures and heating apparatus, is not required to furnish evidence of his ability to safely construct the building wherein the lives of hundreds may be jeopardized through his ignorance." Building operations have increased steadily at the rate of over $500,000 a year since 1894, when they were at their lowest ebb during the last 20 years, the valuation at that time being $4,305,000.

Law in the Building Trades.

WHEN THERE IS NO LIMITATION ON TIME IN CONTRACT.

Where a contract for the construction of building did not provide any time within which it should be completed, and provided for no penalty for delay, the contractor was bound only to finish it within a reasonable time.—Krause *vs.* Board, &c. (Ind.), 66 N. E. Rep., 1010.

Where, before a payment on a building contract becomes due, the owner accepts an order by the contractor in favor of a material man for specified amount, payable provided value has been received, the material man can recover the amount due from the contractor when such sum becomes due, and not simply the amount that was due him when the order was delivered.—White *vs.* Livingston (N. Y.), 66 N. E. Rep., 1118.

WHAT IS "OPEN VIOLATION" OF A BUILDING CONTRACT.

The failure of a builder to follow the plans and specifications, and using poor materials, leaving the floors so far from level that the furniture leaned forward or to the side, and so that the roof leaked, and the doors and windows could not be closed, was an open violation of the building contract.—Sarrazin *vs.* Adams, &c. (La.), 34 So. Rep., 301.

RIGHT OF CONTRACTOR TO BALANCE AFTER OWNER COMPLETES.

Where the work is abandoned by the contractor, and the owner completes it under a right reserved under the contract, the work of completion is deemed to be done under the contract, and on account of the contractor, and he is entitled to any balance of the contract price above the cost of completion.—White *vs.* Livingston (N. Y.), 66 N. E. Rep., 1119.

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

BY CHAS. H. FOX.

We now take up the development of the soffit of the radiant arch, but before constructing the diagrams represented herewith it may not be out of place to mention the fact that the conoidal surface of the soffit being a warped one, the developments are only close approximations. It is, we believe, impossible to find the true covering of a conoid any more than that of a sphere, which can only be represented by means of projections. However, the developments here given are so nearly correct that the difference in practice will hardly be perceptible.

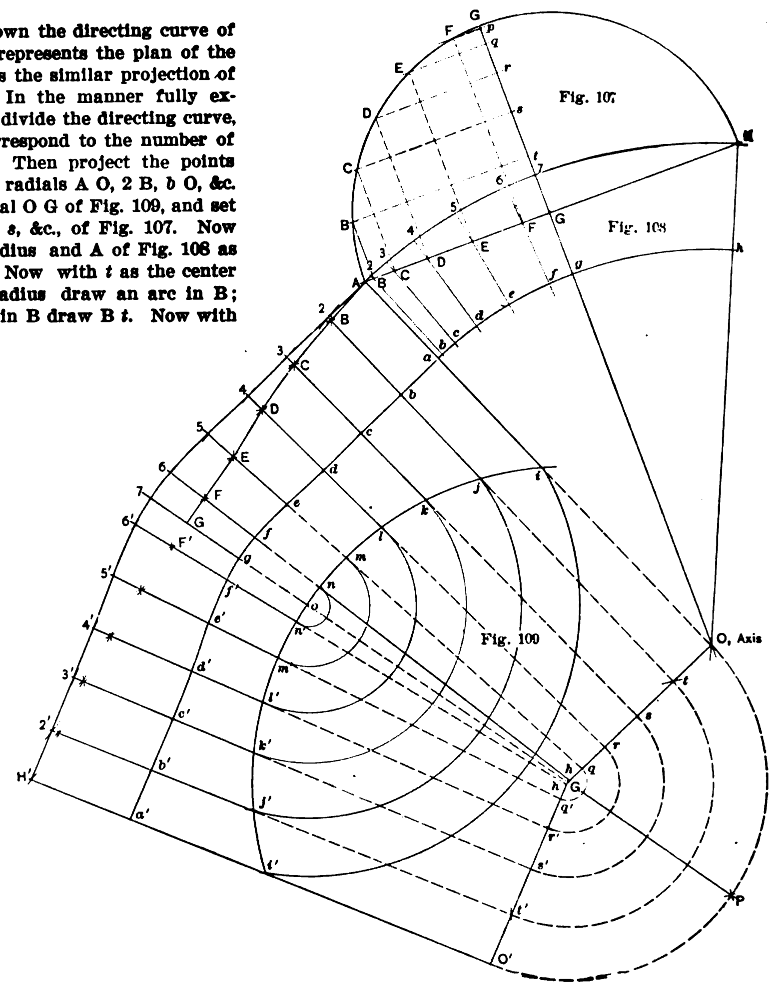
In A D G of Fig. 107 is shown the directing curve of the soffit. In Fig. 108 A 7 H represents the plan of the outer face, and *a g h* represents the similar projection of the inside face of the arch. In the manner fully explained for the like operations divide the directing curve, as shown in A B C, &c., to correspond to the number of stones the arch may contain. Then project the points into the opening line, draw the radials A O, 2 B, *b* O, &c. This done, at O erect the vertical O G of Fig. 109, and set off O *t s*, &c., equal with G *t s*, &c., of Fig. 107. Now with A B of Fig. 107 as the radius and A of Fig. 108 as the center draw an arc in B. Now with *t* as the center and O B of Fig. 108 as the radius draw an arc in B; through the intersection given in B draw B *t*. Now with B C of Fig. 107 as the radius and B of Fig. 109 as the center draw an arc in C; then with *s* as the center and O C of Fig. 108 as the radius draw an arc in C; join C with *s*. In the same manner, with the length of the arcs C D, &c., of Fig. 107 as the radius and the points C, D, &c., of Fig. 109 as the centers, together with the lengths O C, O D, &c., of Fig. 108 and the points *r*, *q*, &c., as the centers, may the points C, D, &c., be projected. Then trace a curve as shown through the points given in A B C, &c., and the development of the curve of intersection of the directing curve with the surface of the conoid may be projected.

Next set off B 2, B *b*, C 3, C *c*, &c., equal to the corresponding lengths of Fig. 108. Through the points given in A 2 3, &c., trace a curve, which will be the development of the outer edge of the soffit. A similar curve traced through the points *a*, *b*, *c*, &c., will give the development of the inside edge of the soffit. The other half of the diagram may be made by inversion. Take point G as center, and with any radius draw an arc, *i' i*; then with *o* as the center rotate *i j k*, &c., into the corresponding points at the opposite half of the drawing. In a similar manner, with the points G, P, respectively, as the centers, may the points O', *t'*, *s'*, &c., be found. Then through the points given in O' *i'*, *t' j'*, &c., draw lines equal to that of the corresponding lines at the right half of the diagram, and in this manner may the development be completed.

The method just explained, by means of which the surface of the soffit may be developed, is only applicable to arches situated in circular walls, the outer face curves of which are drawn with a short radius. The reason of this is that the developments of the curves of intersection are obtained by revolving the axis line into the plane of the paper, or into the horizontal plane which may contain the plan. The axis then becomes a directing line, and by its direction may be obtained the true length of auxiliary lines, through points upon which, as explained, are traced the curves of intersection. This operation, if the radius is a long one, necessitates the drawing of lines equal in length to that of the radius; so that if the radius made use of in drawing the face curve equals 20 feet, the lines of the developments require also to be 20 feet in length.

While it is not impossible to project developments which may contain lines of this or perhaps of greater length, yet it is very inconvenient and requires the assistance of an extra man at the drawing board. The writer, having been taught by practical experience the inconvenience attending the method described, was led to invent if possible some method which would give a close approximation without having to make use of the objectionable long lines. After having worked out several methods, and carefully tested them, we present in the accompanying diagrams the one which gave the closest approximation to truth.

In Fig. 110 is given the plan of the soffit, I *i* representing the center line and A *a* the jamb line at the spring line of the arch. In A E I of Fig. 113 is shown the directing curve of the soffit, divided as before explained in A B' C', &c., to correspond to the number of stones the arch may contain. In Fig. 112 are shown the developed curves of the soffit, which belong respectively to the outer and inside face molds. This understood, draw



Figs. 107, 108 and 109.—Diagrams Showing Development of Soffit of Radiant Arch

Laying Out Circular Arches in Circular Walls.

in Fig. 110 the chord line A I; then draw the tangents I 6', A 6', respectively, with the points I A of the outer face curve, and *i f'* and *a f'* tangent, respectively, to the points *i a* of the inside face curve. Join 6' *f'* with the radial 6' *f*. Now in Fig. 113 set off I 8' 7' 6', &c., equal with the length of the corresponding points of the chord line A I of Fig. 110; then, parallel with the center line, from each point draw 8' 8, 7' 7, &c.; then square with the center line draw H' 8, G' 7, F' 6, &c., and through the points given in I 8 7, &c., trace a curve, as shown. In the same manner set off I *h g f*, &c., equal &c., of Fig. 110; through the points given in A B C D and *a b c d* trace the developed curves of the outer and inside edges of the soffit.

In order to test the accuracy of the position of the arris lines, as B *b*, C *c*, &c., of the soffit, which belong to the several stones it is best to rectify the arcs A B C of the outer and *a b' c'*, &c., of the inside face molds, Fig. 112, along the curves of intersection. But if proper care has been exercised at the developments the lines as already projected will be found correct.

As a further help to the readers, more especially to

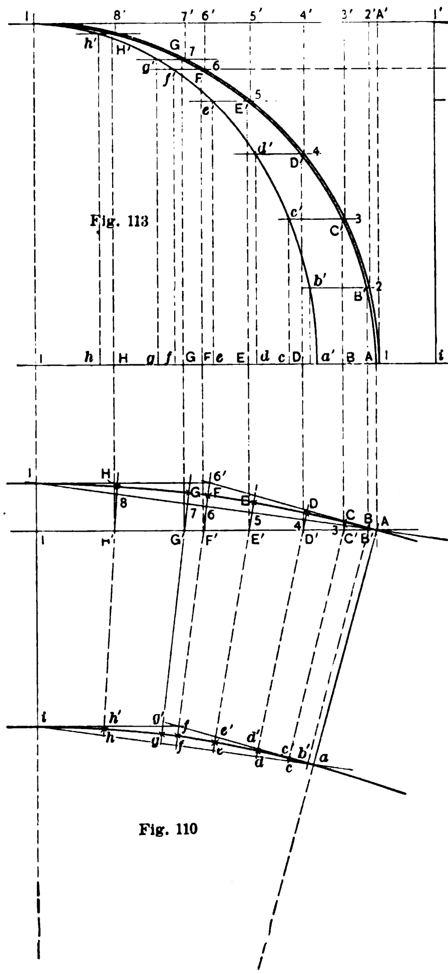


Fig. 113

Fig. 110

Fig. 110.—Plan of Soffit.

Fig. 113.—Directing Curve of Soffit, Together with Developed Curves of Intersection Which Belong to Vertical Planes, of Which the Chord Line A I and the Tangents *i f* and *f e* are Respectively the Plans.

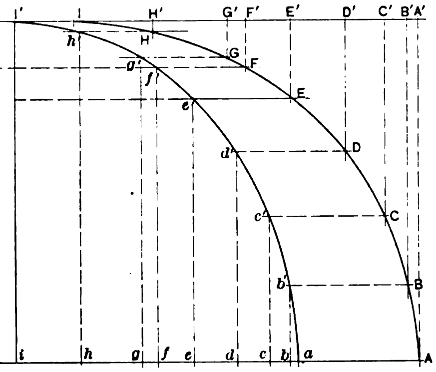


Fig. 112

Fig. 112.—Showing Curves of Soffit Which Belong to Developed Outer and Inner Face Molds.

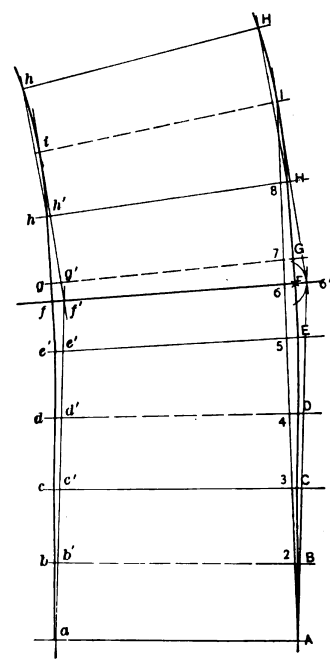


Fig. 111.—Method of Developing Joint Lines of Inner and Outer Face Curves Which Belong to the Soffit Molds.

Laying Out Circular Arches in Circular Walls.

with *i h' g' f'*, &c., of the tangents *i f'*, *f' a* of Fig. 110. Erect the verticals and draw the horizontals, and through the intersections trace the curve *a' c' f'* I of the diagram.

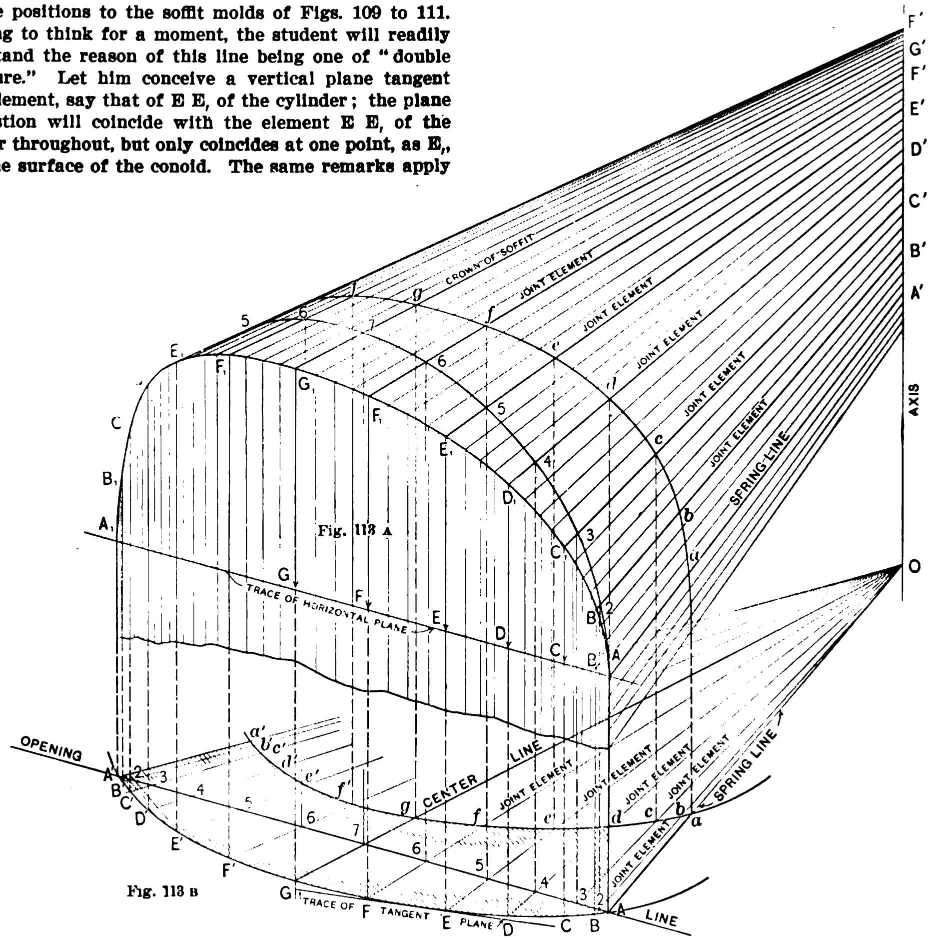
Now in Fig. 111 draw a line, as A I, and on it set off I 8 7 6, &c., equal to the length of the arcs I 8, 8 7, 7 6, &c., of Fig. 113; then with point 6 as a center and 6 6' of Fig. 110 as a radius draw an arc in 6'; tangent with the arc draw I 6' and A 6'. Now set off A *a* and I *i* equal with the width of A *a* of the soffit, Fig. 110; at *a* and *i* draw lines, as *i f'*, *f' a*, parallel respectively with I 6', 6' A. These intersect in *f'*. Now through the intersection at 6' *f'* draw 6' *f*; now set off *f' f' g' h' i* and *f' e' d' c'*, &c., equal with the length of the corresponding arcs of Fig. 113. Join A *a*, 2 *b'*, 3 *c'*, &c. Now set off B 2 *b*, C 3 *c*, D 4 *d*, &c., equal respectively with B 2 *b*, C 3 *c*, D 4 *d*,

those who are anxious to obtain a knowledge of the geometrical principles which are made use of at the projections and developments of the several molds, patterns, &c., we have in Figs. 113A and 113B introduced diagrams showing an oblique projection of the surface of a right conoid, such as that which forms the soffit surface of the radiant arch, and of which surface a full development has been given above in the diagrams, Figs. 107 to 109. The manner in which this surface may be generated has been very fully explained in the diagrams, &c., of Chapter VI, to which we refer the readers. In Fig. 108A is shown a representation of the plan of the soffit, at which we take A G A' *a' g a* to represent the base of a cylinder, the cylindrical surfaces of which form a portion of the outer and inside faces of the radiant arch. The right line A G A′ corresponds to that of the opening line made use of in preceding diagrams. The horizontal projection of the elements of the soffit which belong to the joints are given in A *a* O, B 2 *b* O, C 3 *c* O, &c.

Now in Fig. 113A we may assume the line A *a* A′ as the generatrix. This, moving parallel to the horizontal plane, touches the directing curve, of which A 2 3, &c., is the representation, and the right line directrix, or axis, A′ B′ C′, &c. In this movement it not only generates the warped surface of the soffit but also in a manner pierces the cylinder and so generates the curves A B, C,, &c., *a b c*, &c., of double curvature. These are of course the lines which have to be developed or transferred in their relative positions to the soffit molds of Figs. 109 to 111. Stopping to think for a moment, the student will readily understand the reason of this line being one of "double curvature." Let him conceive a vertical plane tangent to an element, say that of E E, of the cylinder; the plane in question will coincide with the element E E, of the cylinder throughout, but only coincides at one point, as E,, with the surface of the conoid. The same remarks apply at their intersection with the surface of the larger cylinder than at their intersection with the axis line. For example, compare the length of E F, of the curve of double curvature with that of E′ F′ at the axis line.

We may advise our readers—those who wish to obtain a thorough practical knowledge of this intricate problem—to construct a model of the soffit, either in wood, stone or plaster of paris. The construction of a model of this kind is the best method of obtaining a proper insight into the problem, and a greater amount of knowledge may be obtained in a few hours from a study of the model than could ever be obtained by a study of the drawings alone.

THE site of the old Virginia Hotel at the Grand Circle, Fifty-ninth street and Broadway, New York City, is to be improved by the erection of an office building for the New York *American and Journal.* The plans are being drawn by H. P. Kerby and Petit & Green, of 23 West Thirty-fourth street, and the preliminary sketches call for a building, 42 stories high, to be surmounted by a dome made of colored terra cotta. The size of the building is about 76 x 73 x 41x 97 feet.



Figs. 113A and 113B.—Plan and Geometrical Elevation of Conoid.

equally to a plane which may be made tangent to the element E, E′ of the conoid; it will only coincide at the one point, as E,, with the surface of the cylinder. This, of course, arises from the fact that the projections of the curve A B, C,, &c., are curve lines, as A E G of the plan and A E, G, of the elevation. We may remark, "from the fact that all the points of a curve of double curvature do not lie in the same plane both of its projections must always be curved lines." The surface takes the name of "conoid," because of the analogy existing between it and the surface of a cone. When, as in the case of the radiant arch, the right line directrix (axis) is perpendicular to the plane director the conoid takes the name of "right conoid" and the directrix the name of "the line of striction." It takes this name because it contains the shortest distance between the elements, so that the surface is, as it were, cramped or compressed along this line. This is noticeable on an examination of the diagram, at which the greater length is shown between the joint elements

A LARGE summer hotel is to be erected at Larchmont, N. Y., in accordance with plans just prepared by John W. Ingle, architect, of 109 West Forty-second street. According to the plans, the building will be 350 feet long and the estimated expenditure is in the neighborhood of half a million dollars. All the rooms will be arranged in suites and there will be accommodations for 450 guests. Although no contracts have as yet been given out, it is expected that the actual work will be started this fall, so that the building will be ready for occupancy next season.

Sheet Zinc for Roofing.

Due recognition of the merits of zinc sheets as a roofing material is planned, says the *Lead and Zinc News*, by the Director of Works of the Louisiana Purchase Exposition. The temporary character of the Exposition buildings naturally precludes the use of zinc as a roofing material on such work, cheaper materials answering as well during the very short life of the buildings. However, Director of Works Taylor has prepared designs for a building to be surmounted by two domes, one of which is to be covered with zinc and the other with copper. The designs are striking and beautiful, the roofing materials affording a strikingly marked contrast. The construction of these domes will afford an excellent opportunity for the display of the adaptability of sheet zinc for roofing purposes and one which will be regarded by architects the country over as of decided value.

Incidentally it develops that Director of Works Taylor is a thorough believer in the merits of sheet metal roofs, he having given the subject his personal consideration for many years. So are other leading architects of the country. A demonstration of the application of zinc in architectural construction, as it now prevails on the Continent and especially in France and Belgium, would be of especial value to all architects and builders who are seeking after the welfare of their clients and for good work. Manufacturers of sheet metal roofing materials have before them a very excellent opportunity to make such an exhibit of their products and the correct methods of the application of sheet metal roofs a source of no little profit to themselves, and to do much to popularize such roofs throughout the architectural profession of this and other countries.

It developed recently that the long life of sheet zinc for roofing purposes in the United States has been demonstrated by as severe a test as most architects and builders would demand. In Southern Wisconsin a sheet zinc roof was constructed in 1854, and since then it has been subjected to all the climatic changes which have occurred in that portion of the Mississippi Valley. The roof has never cost the owner of the building a single dollar for repairs, and careful examination of the sheets which composed the roof, made during the past few weeks, has proved that the exposure of half a century has wrought no injury thereto. From the appearance of the roof to-day there is every reason to believe that the roof will serve equally well for another half century. The showing is decidedly valuable to the zinc industry and a portion of this roof is to form one of the exhibits which will be installed at the World's Fair.

A San Francisco Synagogue.

Ground has been broken for the new synagogue of the congregation Sherith Israel, at the corner of California and Webster streets, San Francisco. The completed structure will be faced throughout with gray California sandstone. In its general lines the building is of the Romanesque Byzantine style of architecture. Its most prominent feature is a large dome surmounting the auditorium. The latter is 96 x 80 feet, and is reached by short flights of steps starting just inside the entrances. The seating capacity of the auditorium is 1100, and the gallery is to be provided with a seating capacity of 450. On the east side of the synagogue will be six schoolrooms, and on the west side will be placed the offices and women's sitting rooms. On the ground floor there will be a lecture room capable of seating 500 people, and a small chapel with a capacity of 100. The cost of the structure will be between $225,000 and $230,000, and it is expected that the entire building will be completed by September 1, 1904.

A CARELESS mason dropped a brick from the second story of a building on which he was at work. Leaning over the wall and glancing downward, he discovered a respectable citizen with his silk hat jammed over his eyes and ears, rising from a recumbent posture. The mason, in tones of apprehension, inquired: "Did that brick hit any one down there?" The citizen, with great difficulty extracating himself from the extinguisher into which his hat had been converted, replied with considerable wrath, "Yes, sir, it did. It hit me." "That's right," exclaimed the mason, in tones of undisguised admiration; "noble man, I would rather have wasted a thousand bricks than have you tell me a lie about it."

Artificial Pumice.

While emery is used for sharpening tools, sand for polishing stones and glass, oxide of iron for fine glass, and chalk and felt for metal ware, pumice is most frequently used for sharpening soft materials. Pumice stone is unreliable, both in grain and hardness. Variations have been noted even in the same piece. This has suggested the idea of replacing it with artificial pumice. Consul-General Oliver J. D. Hughes of Coburg, Germany, reports that the factory of Schumacher, at Bietigheim, in the valley of the Enz, has been manufacturing an artificial pumice stone out of ground sandstone and clay for some time, and it is interesting to note to what extent this manufacturer has tried to adapt his products to the various purposes for which they are required. There are on the whole ten kinds, differing from each other in regard to hardness and grain—viz.: There is (1) a hard and soft kind with coarse grain, particularly useful in the leather, wax cloth, felt and wood industries; (2) a hard and a soft kind with medium coarse grain, suited to stucco workers and sculptors and particularly useful for polishing wood before it is painted; (3) a soft, fine grained stone for the white and dry polish of wood and for tin goods; (4) one of medium hardness with fine grain, for giving the wood a surface for an oil polish; (5) a hard, fine grained one for working metals and stones, especially lithographic stones; and finally pumice stones with a very fine grain. These artificial stones are used in pretty much the same way as those of volcanic origin. For giving a smooth surface to wood a dry stone is applied, but to give it a fine polish the stone is dipped in oil. For fine work no coarse grained and for coarse work no fine grained stones are used.

Mortar for Tall Chimneys.

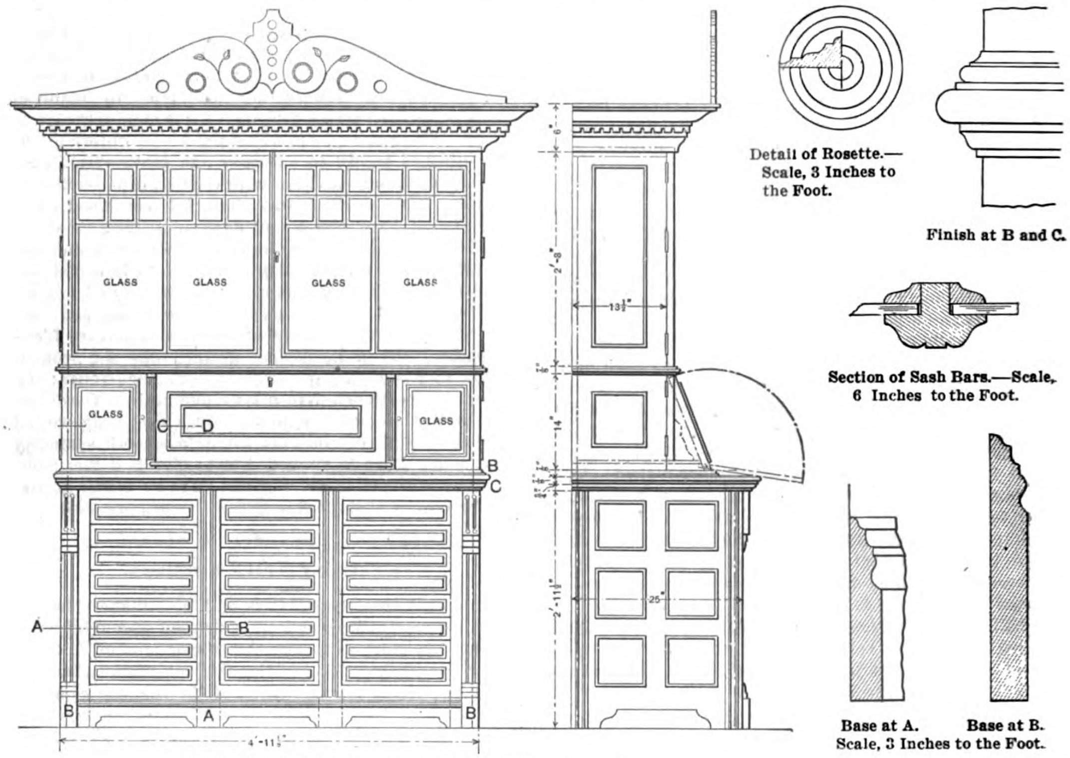
It is said that the builders of high chimneys in Germany are now using a mortar composed of a mixture of cement, lime and sand (in the proportions of 1, 2 and 6) for the upper portion of the chimney stack, where the gaseous products of combustion of the fuel are comparatively cool; while for the lower portions of the stack the proportions are 1, 2½ and 8. If the lime is hydraulic the proportion of the cement may be reduced; but if the sand is very sharp the proportion of cement must be increased. For the cap of a tall chimney stack the proportions of the ingredients of the mortar may be altered with economy and advantage.

In German practice the mortar is composed of cement, lime and sand; in the proportions of 1, 1 and 4. Mortar made of cement and sand alone is not at all suitable for tall chimney work, because it does not resist the action of heat well and is attacked by carbon dioxide, of which there is always a large quantity present in the flue gases; this is especially the case in the presence of moisture; and, of course, steam is always present in the gases found in a smoking chimney.

THE United States Department of Agriculture, Washington, D. C., has just issued through its Bureau of Forestry, a bulletin relating to a study of the possibilities of practical forestry on a track of Southern pine land which has suffered serious injury from fire, turpentining and destructive lumbering. The problem of how to restore such a forest to its original productiveness without prohibited outlay and while utilizing the standing timber is considered at some length. As this is the first working plan for the long leaf pine ever published, it is of special interest to other timber land owners in the same region who wish to know whether they can increase the value of their properties by the practice of forestry. The matter has been prepared by Thomas H. Sherrard, and the bulletin is entitled A Working Plan for Forest Lands in Hampton and Beaumont counties, South Carolina.

Architects' Combination Desk and Cabinet.

Through the medium of the accompanying illustrations we offer those of our architectural friends and draftsmen who may be interested some suggestions for a combination desk and cabinet, such as would be suitable for an architect's office, or, for that matter, the contractor and builder who is desirous of preserving drawings, photographs, &c., connected with his work. The illustrations show front and end elevations, plan and various miscellaneous details of construction, so that with a little study the ambitious carpenter may construct such a cabinet as that here represented. The upper portion, it will be noticed, is fitted with glass doors, below which is a panel which lets down, forming a shelf or lid upon which to write. Below this are numerous drawers in which may be kept drawings, photographs, &c.



Detail of Rosette.—Scale, 3 Inches to the Foot.

Finish at B and C.

Section of Sash Bars.—Scale, 6 Inches to the Foot.

Base at A. Base at B. Scale, 3 Inches to the Foot.

Front and Side Elevations.—Scale, ½ Inch to the Foot.

Architects' Combination Desk and Cabinet.

THERE has recently been filed with the Tenement House Department of New York City by Thomas Graham, architect for the Architects' Realty Company, plans and specifications of a six-story elevator apartment house, containing 43 suites of apartments and four stores, to be erected at the northwest corner of Madison avenue and Ninety-seventh street. The cost of the building is placed at $150,000, and the owners expect to have the building ready for occupancy by August of next year.

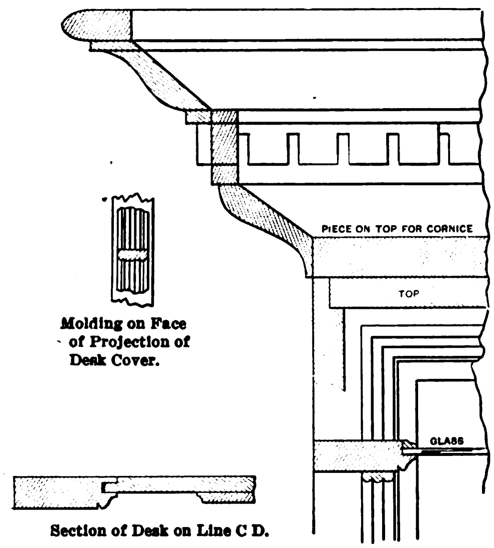
AN official announcement has been issued to the effect that St. Louis World's Fair Information Bureaus have been established at 387 Broadway, New York City, in charge of H. B. McClellan, and in Boston, at 176 Washington street, in charge of J. B. McBeath.

Iron and Steel in Architecture.

The apprehension is firmly implanted in the public mind, as the result of a good deal of ingenious but mischievous speculation, that the use of iron and steel in the framing of buildings has brought to an end the period of "monumental and enduring architecture." It may be that monumental and enduring architecture is a thing of the past, but not because there are any "lost arts" connected with the building trades, nor because in the modern use of materials we have fallen upon evil ways. Nothing endures in architecture which is practical and is built with a view to a satisfactory return upon the capital invested in it. When it has outlived its maximum usefulness it may be retained for sentimental reasons, or because the ground it occupies is not immediately needed for something else, or because for some reason the tide of life has swept by its location and left it stranded as might be the bones of a wreck upon the shore. Generally speaking, the useful life of a building in New York, where every inch of area must be utilized, is about 25 years. True, the onward sweep of progress forms occasional quiet eddies, and buildings therein may stand for half a century, or even longer, largely because the future development of the neighborhoods where we find them is still indeterminate and the wisest foresight cannot predict with confidence what form of new improvement will be most profitable. Even in New York these stagnant spots are found here and there, but what happens therein establishes no other rule than that of constant degeneration of neighborhoods unless this tendency is counteracted by constant reconstruction. The only significance of these facts is that monumental and enduring architecture is a feature of a cruder civilization than that of the present time. It cannot be financed, it does not pay when completed, and the more enduring it is the less it meets the requirements of modern life.

It would consequently seem to make very little difference whether the iron construction and the steel frame do or do not possess the elements of permanence which characterize stone, brick and well seasoned timber. There is very little reason to believe that if one of these modern business buildings was built of "one entire and perfect chrysolite" it would have any longer period of useful life than if built of the materials which in the present state of the art are available for structural purposes. Whether it is or is not true that in the progress of time the corrosion of steel frames will render such buildings insecure and necessitate their removal, is unimportant. It might be important if this result was threatened within five or ten years, or materially sooner than it would be required by business considerations, but nothing in experience thus far gathered affords a basis for this apprehension. Not many buildings of the new type of steel frame have had to be removed as yet for any cause, and of those into which iron has largely entered not enough have been destroyed to give conclusive data as to how long they would have lasted if the ground occupied by them had not been needed for other purposes. Two of these in New York are instructively typical.

The first of the modern steel frame buildings to be

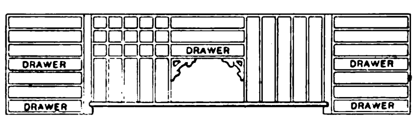


Molding on Face of Projection of Desk Cover.

Section of Desk on Line C D.

Details of Cornice.

Scale, 3 Inches to the Foot.



Partitions Inside of Desk.

Architects' Combination Desk and Cabinet.

deliberately pulled down and scrapped stood at the corner of Broadway and Forty-second street, and was intended for hotel purposes. It was built to last a generation at least, but the ground it occupied was needed for a more important purpose, and after three years of life it had to go. Now three years is not a long enough period to afford a basis for generalization as to the life of steel frames, but in the demolition of this building, not well built originally, some facts were learned which are of interest and value. It is doubtful that if 20 years had been added to its life it would have told any very different story. The frame was run up with Z-bar columns, and the outside walls were supported at each story. The basement floor and the sidewalk beams and girders were supported on cast iron columns resting directly on the rock. All the steel colunms were stepped into cast iron bases, with the exception of those of the north wall, which were supported on grillage beams resting upon the rock. Reference to the specifications showed that the steel work was to be thoroughly cleaned of scale and rust before leaving the shop, and given a coat of boiled linseed oil, worked into all seams and open spaces; all pins, pin holes and machined surfaces were to be coated with tallow and white lead, and all contact surfaces were to be thoroughly painted before joining. Pieces which could not be reached for painting after joining were required to receive two coats of paint before erection. Grillage beams were coated with asphalt before setting in place. It is doubtful if these specifications were in every instance strictly followed; indeed, it may be said with confidence that they were not. The work was "rushed" under somewhat unfavorable conditions. The frame was joined in winter, work was more or less delayed by severe weather and heavy snow, and for part of the time the bricklayers and stone masons pushed the steel workers so hard that nobody paid much attention to the letter of the specifications. Construction was begun in November, 1898, and was finished in one year. The steel frame was taken apart in December, 1902.

It would not have been reasonable to expect to find in the steel members of the framing any evidences of very serious deterioration during this brief interval; but it was not at all unreasonable to expect that in three years deterioration would have begun, and that its direction and rate of progress could at least be approximated from the visible beginnings. As a matter of fact, it was the conclusion of the experts of the Bureau of Buildings that no other corrosion of consequence could be discovered than had obviously begun and gained measurable headway before the building was covered in. There was considerable rust behind the splice plates of the column connections on the fifth story. At about this point the work was arrested by snow and sleet, and in the eagerness of the contractor to make up for lost time it is probable that many requirements of the specifications, as well as certain specific provisions of the building code, were either disregarded or perfunctorily complied with. To this such deterioration as was noticed in the steel frame of the building was undoubtedly attributable. Absolutely nothing was discovered by the inspectors detailed to watch every step of the work of demolition which warranted the belief that in any period which could be forecast from data at hand the steel frame of this badly constructed building would not have lasted as long as the stone and brick work, and longer than in that position any building erected in 1898 would be likely to be profitably useful. This is only one of a number of examples, showing that neither fire, wind strain nor rust is effecting the deterioration of steel frames as rapidly as those who first adopted this form of construction had reason to expect.

Another interesting example of the life of metal properly used is furnished by the demolition of the building of the Bank of the State of New York, lately pulled down to make better use of the land. From illustrated details of what the demolition revealed, published by the *Engineering News*, we condense the following facts, which valuably supplement those above stated: This building was erected in 1855, and was considered in its day one of the finest business structures of the city. It was not a steel frame building. Its outer walls were of brick, faced on the front with marble; but the floors were of full iron framing, and it was probably the first example of riveted wrought iron construction. Between the floor beams was a sheet iron trough plate flooring leveled up with cement to support the wooden flooring. The work of construction does not seem to have been thoroughly well done in all details, especially in the matter of riveting. The method of construction, long obsolete, has historical interest, but probably would not repay analysis in this connection. The question of greatest concern would seem to be that of the condition of the iron work when it was taken apart. On this subject, *Engineering News* says:

All of the iron work appears to have had two coats of metallic paint, probably iron oxide. The condition of this paint covering, and of the iron work in general, at the time of taking down the building, was excellent. Rust, where it was to be found at all, was only incidental, in small patches here and there; but entire girders could be found with practically no spots of rust whatever. It is to be noted that both girders and beams (joists) were surrounded by an air space, and the lower side of the trough plate flooring also faced this air space. The beams, with their thinner metal and poorer painting (in some cases at least), showed more rust than the girders. The latter were practically unaffected.

When this building was put up there was very little of the knowledge and none of the experience which has since been gained in steel frame construction. The cast iron beam, used in supporting heavily weighted floors, had just begun to be displaced by the wrought iron beam here employed. In this instance the 10-inch floor beam was built up of thin plates of wrought iron. The web and flange plates were held together by rivets. The main girders were composed of two vertical web plates, with flanges connected thereto by vertical stiffeners riveted between the web plates, and engaging the flanges by means of tenons fitting into square holes punched in the flange plates. As these were not commercial forms of beams or girders, it may be assumed that the architect, James Renwick, who, as the architect of Grace Church and St. Patrick's Cathedral, was the Sir Christopher Wren of New York, was a man of great ingenuity in the discovery of convenient means.

So far as our present knowledge goes, all anxiety as to the durability of iron and steel frames may be dismissed. It is conceivable that under some conditions the deterioration would be very rapid, and that electrolysis might hasten disintegration, but no evidence has yet been found to warrant uneasiness on this score, or to give plausibility to the prophecy that the present tendency in architecture will go on until some lofty "skyscraper" collapses in to its own cellar excavation in a heap of rubbish and a cloud of dust. This may happen, but it will not be in consequence of unsuspected corrosion of steel members. Why this system of construction will not give us examples of monumental and enduring architecture is explained by the reasons which compelled the removal of both the buildings hereinbefore described, to make room in the one instance for a 23-story newspaper building and in the other for a 25-story office building. The fashion of this world passeth away more quickly in buildings than in anything else which occurs to us at the moment.

New Publication.

Skylight and Roof Tables. By H. Collier Smith. Size 8¾ x 6½ inches. 84 pages. Substantially bound in leather covers. Published by the David Williams Company, 232 to 238 William street, New York City. Price, $2, postpaid.

This work, as the title indicates, is intended to be of special interest and value to the sheet metal worker and all others having occasion to lay out skylights. The author is a well known, practical sheet metal worker of many years' experience in the manufacture of skylights, and deals with the subject matter in a way to be of the most service to those in the trade addressed. In order to save time during the day the author devoted leisure hours in the evening for several years to computing tables from which the length of bars for any ordinary pitch of skylight could be obtained, and thus avoid the loss of time and chance of error involved in working out lengths of bars for each separate skylight during the rush and stress of working hours. These tables are reproduced in this book, comprising full measurements for skylights of 8-inch, 6-inch and 30-degree pitch, which are about the only standards used in any shop.

As it is sometimes necessary to construct skylights of special pitch, a table is provided, by the use of which the length of common, jack, hip or valley bars or rafters for any pitch may be obtained by a simple operation in multiplication. Accompanying the table are illustrations of the cross section of a skylight, with pattern of curb, ridge, hip, common and jack bars, showing the glass line on which measurements are taken. There are also a number of pages devoted to roof tables, showing how by simple process of multiplication the lengths of hip and valley rafters may be obtained.

WORK has just been commenced upon a two-family flat in the city of Albany, which has a frontage of 30 feet and a depth of 83 feet. The first floor, which is designed for occupancy by a doctor, will have a parlor, reception hall, dining room, kitchen, bathroom, servant's bedroom, doctor's office and waiting room, together with three sleeping rooms, each 10 x 15 feet in size. There will also be ample closet room. The second floor will be divided into about the same number of rooms, while the attic will be finished for storage purposes. The exterior of the house will resemble a large villa with high hip roof, dormer windows and broad projecting cornice with deep frieze and brackets. The front will be broken with octagon bay windows and a tower. All the rooms throughout will be finished with oak and Georgia pine floors, spindle arches, open fire places in the parlor with cabinet mantels and tile hearths, electric bells, speaking tubes, door openers, &c. The work is being done in accordance with plans prepared by John F. Lape of Rensselaer, N. Y., who is also Superintendent of Construction, while James W. Paterson is the general contractor.

THE bothersome problem of how to make the courts of apartment houses attractive with verdure has been solved by the Boston Committee of the American Park and Outdoor Art Association, in its treatment of the court of the Boston Public Library, the *Evening Transcript* of that city tells us. Attempts to make lawns of such inclosed places are failures because grass does not grow well in the shade. Neither do most varieties of flowers, and, if they did, their frequent renewal would be expensive, while their effect in such confined quarters is one of "fussiness." But a shade-growing plant like the rhododendron furnishes an agreeable green, while a natural setting for it is the myrtle, or the hardy wood plant known as Herb Robert. The possible selection of growing things is much wider than is here indicated, but the suggestions offered may be valuable to those who would make an earth court fulfil its mission.

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